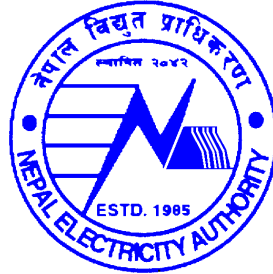


Nepal Electricity Authority

(A Government of Nepal Undertaking)

TRANSMISSION DIRECTORATE GRID OPERATION DEPARTMENT



BIDDING DOCUMENT FOR

PROCUREMENT OF
SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF POWER
TRANSFORMERS AT VARIOUS SUBSTATIONS

INTERNATIONAL COMPETITIVE BIDDING (ICB) (SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE)

Invitation for Bid (IFB) No.: Re-GOD/2079/080-03

VOLUME –I OF III

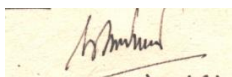
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Grid Operation Department
Min Bhawan, New Baneshwor, Kathmandu, Nepal
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Electronic mail address: gridoperation@nea.org.np

June 2023

Abbreviations

BD	Bidding Document
BDF	Bidding Forms
BDS.....	Bid Data Sheet
BOQ	Bill of Quantities
COF	Contract Forms
DP	Development Partners
DoLI	Department of Local Infrastructure
ELI	Eligibility
EQC	Evaluation and Qualification Criteria
EXP	Experience
FIN	Financial
GCC	General Conditions of Contract
GoN ¹	Government of Nepal
ICB	International Competitive Bidding
ICC.....	International Chamber of Commerce
ITB	Instructions to Bidders
JV	Joint Venture
LIT	Litigation
NCB	National Competitive Bidding
PAN	Permanent Account Number
PPA	Public Procurement Act
PPMO	Public Procurement Monitoring Office
PPR	Public Procurement Regulations
PL	Profit and Loss
SBD.....	Standard Bidding Document
SCC	Special Conditions of Contract
TS.....	Technical Specifications
VAT	Value Added Tax
WRQ	Works Requirements

¹ "GoN" word indicates all public entities according to Public Procurement Act, 2063




BIDDING DOCUMENT

FOR

“Procurement of
Supply, Installation, Testing and Commissioning of Power
Transformers at Various Substations”

International Competitive Bidding (ICB)
Single Stage, Two Envelope Bidding Procedure

Issued on: June 2023

Invitation for Bids No: Re-GOD/2079/080-03

Contract Identification No: Re-GOD/2079/080-03

Employer: Nepal Electricity Authority, Grid Operation Department
Min Bhawan, New Baneshwor, Kathmandu, Nepal

Tel.: +977 (01) 4106919, 4106782, 4106965

Electronic mail address: gridoperation@nea.org.np

Financing Agency: Government of Nepal and Nepal Electricity Authority

June 2023

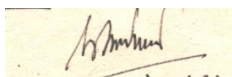
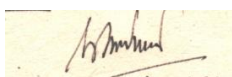


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Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Invitation for Bids No:- Re-GOD/2079/080-03

First Date of publication: June 09, 2023

1. Nepal Electricity Authority intends to apply the part of its internal funds to cover eligible payments under the Contract for ***Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations (Contract Identification No.: Re-GOD/2079/080-03)***. Bidding is open to all eligible Nepalese and Foreign Bidders.
2. Nepal Electricity Authority invites electronic bids from eligible bidders for the ***Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations***, under International Competitive Bidding (ICB) Single Stage-Two Envelope Bidding procedures.

Only eligible bidders with the following key qualifications should participate in this bidding:

- a) Minimum Average Annual Construction Turnover of the best 3 years within the last 10 fiscal years: 16.52 MUSD.
- b) Required Bid Capacity of the Bidder should be equal to or more than the 18.50 MUSD.
- c) Specific Construction Experience in Contracts of Similar Size and Nature:
 - i) Participation as a Prime contractor, Management contractor or Subcontractor, in at least 2 (Two) EPC/Turnkey/DB Contract within the last 10 (Ten) years, each with a value of at least 12.40 MUSD that have been successfully or are substantially completed and that are similar to the proposed works. For foreign Bidders, one of the above Contracts must have been completed outside the Bidder's home country.
 - ii) For the construction experience in key activities, the Bidder shall have successfully executed as a Prime Contractor, Management Contractor or Subcontractor and same should be of designed, supplied, installed, tested and commissioned of Power/Auto-Transformers with a cumulative capacity of 400MVA or higher, 110kV or higher voltage.

Detailed qualification criteria of the Bidder, Subcontractors/manufacturers and construction period are more elaborately described in the bidding documents.

The contract duration is **18 (Eighteen) months** from the date of contract effectiveness.

3. Under the Single Stage-Two Envelope Bidding Procedure, Bidders are required to submit the Technical Bid and the Price Bid, as per the provision of ITB 21 of the Bidding Document.
4. Eligible Bidders may obtain further information at the office below during office hours from Sunday to Friday.

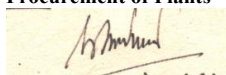
The Director

Grid Operation Department

Nepal Electricity Authority

Min Bhawan, New Baneshwor, Kathmandu, Nepal.

Phone: + 977 (01) 4106919, 4106782, 4106965



Email: gridoperation@nea.org.np

For inspection of the Bidding Document, Bidder may visit PPMO website www.bolpatra.gov.np/egp.

Complete bidding documents are also posted on the NEA website:
https://nea.org.np/tender_prequalification for viewing/inspection only.

5. A complete set of Bidding Documents is available online and can be downloaded from PPMO's web Site: <https://bolpatra.gov.np/egp>. Interested Bidders should deposit the amount of NPR. 20,000.00 as the cost of Bidding Document in the office's Rajaswa (revenue) account as specified below and the scanned copy (.pdf format) of the Bank deposit voucher shall be uploaded by the Bidder at the time of electronic submission of the Bids. Information to deposit the cost of Bidding Document in Bank:

Name of the Bank: Kumari Bank Limited, Putalisadak Branch, Kathmandu

Name of the account: NEA Transmission Directorate

Account Number: 0010002263400001

6. Pre-bid meeting will be held at Employer's office address provided below at 12:00 noon on **July 07, 2023**. Pre-bid meeting is invited to clarify to the Bidders about the exact scope of the work, the basic data available and other issues in accordance with the relevant clauses of the Bidding Documents. Moreover, the Bidders are strongly advised to visit the site to acquaint themselves with terrain conditions and associated details of the locations of the substations before submission of the Bids.
7. Only the electronic bids must be submitted through PPMO website www.bolpatra.gov.np/egp on or **before 12:00 noon on July 24, 2023**. Bids received after this deadline will be rejected. There is no provision for hard copy submission.
8. The Technical Bids will be opened in the presence of Bidders' representatives who choose to attend **at 12:30 hours NST on July 24, 2023** at the Employer's office address given below. Bids must be valid for a period of at least 120 days after bid opening and must be accompanied by a Bid Security or scanned copy of the Bid Security in .pdf format in case of e-bid, amounting to a minimum of **USD 550,000.00 or Equivalent NPR amount** @ exchange rate of Nepal Rastra Bank 30 Days prior to the deadline for Bid submission, which shall be valid for 30 days beyond the validity period of the Bid. If the bank guarantee is issued by a foreign bank, it shall be counter guaranteed by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.
9. If the last date of purchasing and /or submission falls on a government holiday, then the next working day shall be considered as the last date. In such case, the validity period of the **Bid and Bid Security** shall remain the same as specified for the original last date of bid submission.
10. In the case of discrepancies or error in Bid Documents, Bid notice or any other document, NEA reserves the right to amend and correct at any time.
11. After the completion of evaluation of Technical Bid for substantial responsiveness, substantially responsive Bidders will be invited to attend the opening of Price Bids. The date, time and location of opening of Price Bid shall be notified in writing and/or published in national daily.
12. The Contract will be awarded to the Bidder whose offer has been determined to be the lowest evaluated Price Bid and will be substantially responsive to the Bidding Documents.
13. The Bidder shall bear all costs associated with the site visits, preparation and submission of its Bid and NEA will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the Bidding process.
14. NEA reserves the right to accept or reject any bid, and to annul the Bidding process and reject all Bids at any time prior to award of contract, without thereby incurring any liability to the affected

Bidder(s) or any obligation to inform the affected Bidder(s) of the grounds for NEA's action.

15. The office address of the Employer:

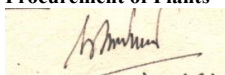
Grid Operation Department

Nepal Electricity Authority

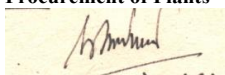
Min Bhawan, New Baneshwor, Kathmandu, Nepal.

Phone: + 977 (01) 4106919, 4106782, 4106965

Electronic mail address: gridoperation@nea.org.np



PART I: BIDDING PROCEDURES



Section 1 - Instructions to Bidders

This section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of Contract.

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Section 1 - Instructions to Bidders

A. General

1. **Scope of Bid**
 - 1.1 In connection with the Invitation for Bids indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section 5 (Works Requirements). The name, identification, and number of Contracts of the International Competitive Bidding (ICB) are provided in the BDS.
 - 1.2 Throughout this Bidding Document:
 - (a) the term “in writing” means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
 - (c) “day” means calendar day.
2. **Source of Funds**
 - 2.1 **GoN Funded:** In accordance with its annual program and budget, approved by the GoN, the implementing agency **indicated in the BDS** plans to apply a portion of the allocated budget toward the cost of the project named in the BDS. The GoN intends to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued.

Or

Public Entities' own Resource Funded: In accordance with its annual program and budget, approved by the public entity, the implementing agency indicated in the BDS plans to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued.

Or

DP Funded: The GoN has applied for or received financing (hereinafter called “funds”) from the Development Partner (hereinafter called “the DP”) **indicated in the BDS** toward the cost of the project **named in the BDS**. The GoN intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 DP Funded: Payment by the DP will be made only at the request of the GoN and upon approval by the DP in accordance with the terms and conditions of the financing agreement between the GoN and the DP (hereinafter called the “Loan Agreement”), and will be subject in all respects to the terms and conditions of that Loan Agreement. No party other than the GoN shall derive any rights from the Loan Agreement or have any claim to the funds.
3. **Fraud and Corruption**
 - 3.1 The Government of Nepal (GoN) requires that the procuring entities as well as bidders, suppliers, and contractors and their sub-contractors under GoN/DP-financed contracts, shall adhere to the highest standard of ethics during the procurement and execution of such contracts. In this context, the Employer;
 - (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” means the offering, giving, receiving, or soliciting,

directly or indirectly, anything of value to influence improperly the actions of another party;

- (ii) “fraudulent practice” means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
 - (iii) “coercive practice” means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
 - (iv) “collusive practice” means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.
 - (v) “obstructive practice” means:
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a GoN/DP investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (bb) acts intended to materially impede the exercise of the GoN’s/DP’s inspection and audit rights provided for under sub-clause 3.5 below.
 - (b) will reject bid(s) if it determines that the bidder has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
 - (c) will sanction a firm or individual, including declaring ineligible, for a stated period of time, to be awarded a GoN/DP-financed contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract.
- 3.2 The Bidder shall not carry out or cause to carry out the following acts with an intention to influence the implementation of the procurement process or the procurement agreement:
- (a) give or propose improper inducement directly or indirectly,
 - (b) distortion or misrepresentation of facts,
 - (c) engaging in corrupt or fraudulent practice or involving in such act,
 - (d) interference in participation of other competing bidders,
 - (e) coercion or threatening directly or indirectly to cause harm to the person or the property of any person to be involved in the procurement proceedings,
 - (f) collusive practice among bidders before or after submission of bids for distribution of works among bidders or fixing artificial/uncompetitive bid price with an intention to deprive the Employer the benefit of open competitive bid price,
 - (g) contacting the Employer with an intention to influence the Employer with regards to the bids or interference of any kind in examination and evaluation of the bids during the period from the time of opening of the

bids until the notification of award of contract.

- 3.3 PPMO on the recommendation of the Employer may blacklist a Bidder for a period of one (1) to three (3) years for its conduct including the following grounds and seriousness of the act committed by the bidder:
- (a) if convicted by a court of law in a criminal offence which disqualifies the Bidder from participating in the contract,
 - (b) if it is established that the contract agreement signed by the Bidder was based on false or misrepresentation of Bidder's qualification information,
 - (c) if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract.
 - (d) if the Successful Bidder fails to sign the Contract.
 - (e) if the bidder fails to inform about the saturation of maximum number of contracts as per ITB 4.11.
- 3.4 A bidder declared blacklisted and ineligible by the GoN, Public procurement Monitoring Office (PPMO) and/or the DP in case of DP funded project, shall be ineligible to bid for a contract during the period of time determined by the GoN, PPMO and/or the DP.
- 3.5 The Contractor shall permit the GoN/DP to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the GoN/DP, if so required by the GoN/DP.
- 3.6 DP Funded: In pursuance of the fraud and corruption policy, the DP.
- (a) will reject a Bid if it determines that the bidder recommended for award has directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
 - (b) will cancel the portion of the loan/ credit/ grant allocated to a contract if it determines at any time that representative(s) of the GoN or of a beneficiary of the fund engaged in corrupt, fraudulent, collusive, or coercive practices during the procurement or the execution of that contract, without the GoN having taken timely and appropriate action satisfactory to the DP to address such practices when they occur.
- 3.7 A bidder declared blacklisted and ineligible by the GoN, Public Procurement Monitoring Office (PPMO) and/or the DP in case of DP funded project, may be ineligible to bid for a contract during the period of time determined by the GoN, PPMO and/or the DP.
- 3.8 In case of a natural person or firm/institution/company which is already declared blacklisted and ineligible by the GoN, any other new or existing firm/institution/company owned partially or fully by such Natural person or Owner or Board of director of blacklisted firm/institution/company; shall not be eligible bidder.

4. Eligible Bidders

- 4.1 A Bidder may be a natural person, private entity, or government-owned entity—subject to ITB 4.5—or any combination of them in the form of a Joint Venture (JV) under an existing agreement, or with the intent to constitute a legally-enforceable joint venture. In the case of a JV:
- (a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. Maximum number of JV and other provision for JV shall be as per specified in the BDS. The

qualification requirement of the parties to the JV shall be as specified in Section 3; Evaluation and qualification Criteria, and

- (b) the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during Contract execution.
- 4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of Nepal or any country or eligible countries mentioned in the BDS. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed sub-Contractors or suppliers for any part of the Contract including related services.
- 4.3 A Bidder shall not have a conflict of interest. A Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in this bidding process, if:
- (a) they have controlling partners in common; or
 - (b) they receive or have received any direct or indirect subsidy from any of them; or
 - (c) they have the same legal representative for purposes of this bid; or
 - (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - (e) a Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which the party is involved. However, this does not limit the inclusion of the same sub-Contractor in more than one bid; or
 - (f) a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the Contract that is the subject of the Bid; or
 - (g) a Bidder or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Engineer for the Contract.
 - (h) **a Bidder that has a close business or family relationship with a professional staff of the Procuring Entity.**
- 4.4 A firm that is under a declaration of ineligibility by the GoN/DP in accordance with ITB 3, at the date of the deadline for bid submission or thereafter, shall be disqualified. The list of debarred firm is available at the electronic address specified in the BDS.
- 4.5 Enterprises owned by GoN shall be eligible only if they can establish that they are legally and financially autonomous and operate under commercial law, and that they are not a dependent agency of the GoN.
- 4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
- 4.7 In case a prequalification process has been conducted prior to the bidding

process, this bidding is open only to prequalified Bidders.

- 4.8 Firms shall be excluded in any of the cases, if
- (a) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Employer's country prohibits any import of goods or Contracting of works or services from that country or any payments to persons or entities in that country.
 - (b) DP Funded: as a matter of law or official regulation, Nepal prohibits commercial relations with that country, provided that the DP is satisfied that such exclusion does not preclude effective competition for the supply of goods or related services required;
 - (c) DP Funded: a firm has been determined to be ineligible by the DP in relation to their guidelines or appropriate provisions on preventing and combating fraud and corruption in projects financed by them.
- 4.9 Domestic Bidder shall be eligible only if the bidder has obtained Permanent Account Number (PAN) and Value Added Tax (VAT) Registration Certificate(s) and Tax Clearance Certificate or proof of submission of income return as stated in BDS from the Inland Revenue Office. Foreign bidder shall be eligible only if the bidder submits the documents indicated in the BDS at the time of bid submission and a declaration to submit the document(s) indicated in the BDS at the time of contract agreement.
- 4.10 Maximum number of running contracts that a Bidder, and all parties constituting the Bidder can have shall be as specified in BDS. The bidders shall be considered ineligible if number of running contracts exceeds the number as specified.
- 4.11 **For the purpose of ITB 4.10 above, the bidder shall declare that the bidder, and all parties constituting the Bidder have not running contracts constituting the Bidder has participated in bidding processes of many public entities and during that period the maximum number of contracts as specified saturates due to issuance of letters of acceptance by a particular public entity, the bidder shall inform in written to all other concerned public entities, where the bidder have participated in bidding process, within three days of issuance of last letter of acceptance that saturates the maximum number of contracts as specified.**
5. **Eligible Materials, Equipment and Services**
- 5.1 The materials, equipment and services to be supplied under the Contract shall have their origin in any source countries as defined in ITB 4.2 above and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.

For purposes of ITB 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.

B. Contents of Bidding Document

6. **Sections of Bidding Document**
- 6.1 The Bidding Document consist of Parts I, II, and III, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART I Bidding Procedures

Section 1 - Instructions to Bidders (ITB)

Section 2 - Bid Data Sheet (BDS)

Section 3 - Evaluation and Qualification Criteria (EQC)

Section 4 - Bidding Forms (BDF)

PART II Requirements

Section 5 – Works Requirements (WRQ)

Section 6 – Bill of Quantities (BOQ)

PART III Conditions of Contract and Contract Forms

Section 7 - General Conditions of Contract (GCC)

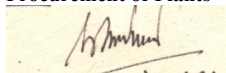
Section 8 - Special Conditions of Contract (SCC)

Section 9 - Contract Forms (COF)

- 6.2 The Invitation for Bids issued by the Employer is not part of the Bidding Document.
- 6.3 The Employer is not responsible for the completeness of the Bidding Document and their Addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

- 7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise any question or curiosity during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer shall be required to make available as soon as possible the answer to such question or curiosity in writing to any request for clarification, provided that such request is received as mentioned in BDS. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is encouraged to visit and examine the Site of Works and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the bid and entering into a Contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 The Bidder's designated representative is invited to attend a pre-bid meeting,



if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

- 7.5 The Bidder is requested, as far as possible, to submit any questions in writing, to reach the Employer as mentioned in BDS.
- 7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
- 7.7 Non attendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

8. Amendment of Bidding Document

- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 22.2. **However, the time available to submit bids shall not be less than five (5) days since amendment in bidding document.**

C. Preparation of Bids

9. Cost of Bidding

- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

10. Language of Bid

- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.

11. Documents Comprising the Bid

- 11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid containing the documents listed in ITB 11.2 and the other the Price Bid containing the documents listed in ITB 11.3, both envelopes enclosed together in an outer single envelope.
- 11.2 The Technical Bid shall comprise the following:
 - (a) Letter of Technical Bid;
 - (b) Completed Schedules, in accordance with ITB 12;
 - (c) Bid Security, in accordance with ITB 19;
 - (d) Alternative Technical Bids, at Bidder's option and if permissible, in

accordance with ITB 13;

- (e) Written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
- (f) Documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the Contract;
- (g) Technical Proposal in accordance with ITB 16;
- (h) In the case of a bid submitted by a JV, the JV agreement, or letter of intent to enter into a JV including a draft agreement, indicating at least the parts of the Works to be executed by the respective partners; and
- (i) any other required documents, which is not against the provision of Procurement Act/Regulation/Directives and Standard Bidding Document issued by PPMO as specified in the BDS.

11.3 The Price Bid shall comprise the following:

- (a) Letter of Price Bid;
- (b) completed Bill of Quantities, Price Schedules, in accordance with ITB 12 and ITB 14, or as stipulated in the BDS;
- (c) alternative price Bids, at Bidder's option and if permissible, in accordance with ITB 13;
- (d) Any other document required in the BDS.

11.4 The Bidder is solely responsible for the authenticity of the documents submitted by the Bidder.

11.5 **The Technical Bid shall not include any financial information related to the Price Bid. A Technical Bid containing such material financial information shall be declared non-responsive.**

12. Letter of Bid and Schedules

12.1 The Letter of Technical Bid and Priced Bid, Schedules, and all documents listed under Clause 11, shall be prepared using the relevant forms in Section 4 (Bidding Forms), if so provided. The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

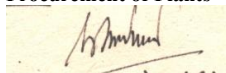
13. Alternative Bids

13.1 Unless otherwise indicated in the BDS, alternative bids shall not be considered.

13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, as will the method of evaluating different times for completion.

13.3 When specified in the BDS pursuant to ITB 13.1, and subject to ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details.

13.4 When specified in the BDS, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section 5 (Employer's Requirements). The method for their evaluation will be stipulated in Section 3 (Evaluation and



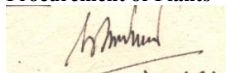
Qualification Criteria).

14. Bid Prices and Discounts

- 14.1 The prices and discounts quoted by the Bidder in the Letter of Price Bid and in the Schedules shall conform to the requirements specified below.
- 14.2 The Bidder shall submit a Price bid for the whole of the works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section 4 (Bidding Forms). In case of Unit Rate Contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.
- 14.3 The price to be quoted in the Letter of Price Bid shall be the total price of the Bid, excluding any discounts offered.
- 14.4 Unconditional discounts, if any, and the methodology for their application shall be quoted in the Letter of Price Bid, in accordance with ITB 12.1.
- 14.5 If so indicated in ITB 1.1 **and ITB 36.4**, bids are invited for individual Contracts or for any combination of Contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.3, provided the bids for all Contracts are submitted and opened at the same time.
- 14.6 Unless otherwise provided in the BDS and the Conditions of Contract, the prices quoted by the Bidder shall be fixed. If the prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Table of Adjustment Data in Section 4 (Bidding Forms) and the Employer may require the Bidder to justify its proposed indices and weightings.
- 14.7 The bidder is subject to local taxes such as VAT, social charges or income taxes on nonresident international personnel, and also duties, fees, levies on amounts payable by the employer under the Contract. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 30 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.

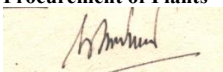
15. Currencies of Bid and Payment

- 15.1 The unit rates and the prices shall be quoted by the bidder entirely in Nepalese currency if not otherwise specified in the BDS.
- 15.2 Bidders shall indicate the portion of the bid price that corresponds to expenditures incurred in Nepalese currency in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).
- 15.3 Bidders expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country and wishing to be paid accordingly may indicate up to three convertible foreign currencies included in daily publication of Nepal Rastra Bank foreign currency exchange rate in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).
- 15.4 The rates of exchange to be used by the bidder for currency conversion during bid preparation shall be the selling rates for similar transactions prevailing on the date 30 days prior to the deadline for submission of bids published by Nepal Rastra Bank. Bidders should note that for the purpose of payments, the exchange rates confirmed by Nepal Rastra Bank as the selling rates prevailing



30 days prior to the deadline for submission of bids shall apply for the duration of the Contract so that no currency exchange risk is borne by the bidder.

- 15.5 Foreign currency requirements indicated by the bidders in the Schedule of Payment Currencies shall include but not limited to the specific requirements for
- (a) expatriate staff and labor employed directly on the Works;
 - (b) social, insurance, medical and other charges relating to such expatriate staff and labor, and foreign travel expenses;
 - (c) imported materials, both temporary and permanent, including fuels, oil and lubricants required for the Works;
 - (d) depreciation and usage of imported Plant and Contractor's Equipment, including spare parts, required for the Works;
 - (e) foreign insurance and freight charges for imported materials, Plant and Contractor's Equipment, including spare parts; and
 - (f) overhead expenses, fees, profit, and financial charges arising outside the Employer's country in connection with the Works.
- 15.6 Bidders may be required by the Employer to clarify their foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Payment Currencies are reasonable and responsive to ITB 15.3 above, in which case a detailed breakdown of its foreign currency requirements shall be provided by the Bidder.
- 15.7 Bidders should note that during the progress of the Works, the foreign currency requirements of the outstanding balance of the Contract Price may be adjusted by agreement between the Employer and the Contractor in order to reflect any changes in foreign currency requirements for the Contract, in accordance with Sub-Clause 14.15 of the Conditions of Contract. Any such adjustment shall be effected by comparing the percentages quoted in the bid with the amounts already used in the Works and the Contractor's future needs for imported items.
- 16. Documents Comprising the Technical Proposal**
- 16.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section 4 (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.
- 17. Documents Establishing the Qualifications of the Bidder**
- 17.1 To establish its qualifications to perform the Contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).
- 17.2 Domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 34 if margin of preference for domestic bidders is applicable in accordance with ITB 34.



18. Period of Validity of Bids

- 18.1 Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer. **If the prescribed bid submission deadline date falls on a government holiday, then the next working day shall be considered as the bid submission deadline date. In such case the validity period of the bids shall be considered from the original bid submission deadline date.** A bid valid for a shorter period shall be rejected by the Employer as non-responsive.
- 18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended 30 days beyond the deadline of the ` period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid and to include any additional conditions against the provisions specified in Bid Documents.

19. Bid Security

- 19.1 The Bidder shall furnish as part of its bid, in original form, a bid security as specified in the BDS. In case of e-submission of bid, the Bidder shall upload scanned copy of Bid security letter at the time of electronic submission of the bid. The Bidder accepts that the scanned copy of the Bid security shall, for all purposes, be equal to the original. The details of original Bid Security and the scanned copy submitted with e-bid should be the same otherwise the bid shall be non-responsive.
- 19.2 The bid security shall be, at the Bidder's option, in any of the following forms:
- (a) an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law or;
 - (b) a cash deposit voucher in the Employer's Account as specified in BDS.
- In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV (Bidding Forms) or in another Form acceptable to the employer. The form must include the complete name of the Bidder. The bid security shall be valid for minimum thirty (30) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.
- 19.3 The bid security issued by any foreign Bank outside Nepal must be counter guaranteed by a Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.
- 19.4 Any bid not accompanied by an enforceable and substantially compliant bid security, if required in accordance with ITB 19.1, shall be rejected by the Employer as nonresponsive. In case of e- Submission, if the scanned copy of an acceptable Bid Security letter is not uploaded with the electronic Bid then Bid shall be rejected.
- 19.5 The bid security of unsuccessful Bidders shall be returned within three days, once the successful bidder has furnished the required performance security and signed the Contract Agreement pursuant to ITB 41.1 and ITB 42.1.
- 19.6 The bid security shall be forfeited if:
- (a) a Bidder requests for withdrawal or modification of its bid, except as provided in ITB 18.2:
 - (i) during the period of bid validity specified by the Bidder on the Letter of Technical Bid and Price Bid, in case of electronic submission;

- (ii) from the period twenty-four hours prior to bid submission deadline up to the period of bid validity specified by the Bidder on the Letter of Technical Bid and Price Bid, in case of hard copy submission.
- (b) a Bidder changes the prices or substance of the bid while providing information pursuant to clause 27.1;
- (c) a Bidder involves in fraud and corruption pursuant to clause 3.1;
- (d) the successful Bidder fails to:
 - (i) furnish a performance security in accordance with ITB 41.1;
 - (ii) sign the Contract in accordance with ITB 42.1; or
 - (iii) accept the correction of arithmetical errors pursuant to clause 32;

19.7 The Bid Security of a JV shall be in the name of the JV that submits the bid. If the JV has not been legally constituted at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.

20. Format and Signing of Bid

20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it "ORIGINAL". Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE". In addition, the Bidder shall submit copies of the bid in the number specified in the BDS, and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

In case of e-submission of bid, the Bidder shall submit his bid electronically in PDF or web forms files as specified in ITB Clause 21.1(b). If a Bidder submits both the electronic bid and a bid in hard copy within the bid submission deadline, then the submitted Bids shall be accepted for evaluation provided that the facts and figures in hard copy confirm to those in electronic bid. If there is any major discrepancy in fact and figures in the electronic bid and bid in hard copy, it shall be treated as two separate bids from one Bidder and both the Bids shall be disqualified, as per ITB Clause 4.3 (e).

20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for unamended printed literature, shall be signed or initialed by the person signing the bid.

20.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

D. Submission and Opening of Bids

21. Sealing and Marking of Bids

21.1 Bidders may always submit their bids by mail or by hand or by courier. When so specified in the BDS, bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows:

(a) Bidders submitting bids by mail, by hand or by courier

- i. Bidders shall enclose the original of the Technical Bid, and the original of the Price Bid and each copy of the Technical Bid and Price Bid,

including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as: "ORIGINAL TECHNICAL BID", "ORIGINAL PRICE BID", "ALTERNATIVE BID" and "COPY OF TECHNICAL BID" and "COPY OF PRICE BID". These envelopes containing the original and the copies shall then be enclosed in one single envelope.

ii. The inner and outer envelopes shall:

(aa) bear the name and address of the Bidder;

(bb) be addressed to the Employer as provided in BDS 22.1;

(cc) bear the specific identification of this bidding process indicated in BDS 1.1;

(dd) The outer envelope and the inner envelope containing Technical Bid shall bear a warning not to open before the time and date for the opening of Technical Bid in accordance with ITB 25.1.

iii. The inner envelope containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB 25.7

iv. If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

(b) Electronic Bid Submission Procedures: Bidders submitting Bids electronically shall follow the electronic bid submission procedure specified in this clause as follows:

i. For e-submission, the bidder is required to register in the e-GP portal <https://www.bolpatra.gov.np>. for downloading and submitting the bid electronically.

ii. Interested bidders may either purchase the bidding documents from the employer's office as specified in the invitation for bid (IFB) or bidders registered in the e-GP portal of PPMO may download the bidding document from <http://www.bolpatra.gov.np> after login. If bidders choose to download the bidding document and submit the bid electronically, then the cost of the bidding document shall be deposited as specified in IFB. In addition, electronic scanned copy (.pdf format) of the bank deposit voucher/cash receipt should also be submitted along with the electronic bid files.

iii. The bidder shall then prepare/fill the documents and forms included in the issued bid documents or the downloaded bid documents from the e-GP portal of PPMO - <http://www.bolpatra.gov.np>. as applicable. The required documents and forms shall be prepared in PDF form and/or shall be filled in the web forms in the e-GP system as specified below:

Technical Bid:

S. N.	Document	Requirement	Remarks
1	Letter of Technical Bid	Mandatory	PDF/Web Forms
2	Bid Security (Bank Guarantee)	Mandatory	PDF
3	Company/Firm Registration Certificate	Mandatory	PDF

4	VAT registration Certificate	Mandatory (for domestic bidders and resident foreign bidders only)	PDF
5	Tax Clearance Certificate/Tax return submission evidence/evidence of time extension	Mandatory (for domestic bidders and resident foreign bidders only)	PDF
6	Power of Attorney of Bid signatory	Mandatory	PDF
7	Business Registration (Licence) Certificate	Mandatory, if Applicable	PDF
8	Bank Voucher for cost of bid document	Mandatory	PDF
9	Joint venture agreement	Mandatory in case of JV Bids Only	PDF
10	Qualification Information	Mandatory	Web Forms (Experience, Turnover, etc.)
11	Additional Document , if any	Mandatory	PDF

Price Bid:

S. N.	Document	Requirement	Remarks
1	Letter of Price Bid	Mandatory	PDF/Web Forms
2	Applicable Price Adjustment Table	Mandatory	PDF/Web Forms
3	Completed BOQ or Price Schedule	Mandatory	Web Forms

Note:

- a) The documents specified as "Mandatory" should be included in e-submission and non-submission of the documents shall be considered as non-responsive bid.
- b) Bidders (all partners in case of JV) should verify/update their profile documents as appropriate for the specific bid before submitting their bid electronically.
- iv) The Bidder shall then upload the PDF bid files and submit the complete bid online through e-GP portal of PPMO- <http://www.bolpatra.gov.np> within the specified date and time.
- v) Bidders are advised to download the bid submission report to ensure that all the documents/ files are up to date and complete.
- vi) The Bidder / Bid shall meet the following requirements and conditions for e-

submission of bids;

- aa) The e-submitted bids must be readable through open standards interfaces. Unreadable and or partially submitted bid files shall be considered incomplete and rejected for further bid evaluation.
- bb) In addition to electronically submitted PDF files/web forms, the Bidder shall be required to submit original bid security letter/ documents and clarifications as specified in ITB Clause 27. If a bidder does not submit the original Bid security letter and requested documents and or clarifications within the specified time limit then the bid shall not be considered for further evaluation.
- cc) If major discrepancy is found between the electronically submitted PDF bid files and the documents/ clarifications provided by the Bidder as per ITB Clause 27, then the bid shall not be considered for further evaluation.
- dd) The facility for submission of bid electronically through e-submission is to promote transparency, non-discrimination, equality of access, and open competition in the bidding process. The Bidders are fully responsible to use the e- submission facility properly in e-GP portal of PPMO-<http://www.bolpatra.gov.np> as per specified procedures and in no case the Employer shall be held liable for Bidder's inability to use this facility.
- ee) When a bidder submits electronic bid through the PPMO e-GP portal, it is assumed that the bidder has prepared the bid by studying and examining the complete set of the Bidding documents including specifications, drawings and conditions of contract.
- ff) Bidders who submit electronic bid should deposit the bidding document fee as specified in IFB and upload the scan copy (in pdf format) of the deposit voucher at the time of bid submission. The deposited amount shall be verified by the Employer during the bid evaluation process. The submitted Bid shall be non-responsive and shall not be evaluated if the cost for bidding document is not deposited as specified in the IFB.

22. Deadline for Submission of Bids

- 22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS.

In case of e-submission, the standard time for e-submission is Nepal Standard Time as set out in the server. The e-procurement system will accept the e-submission of bid from the date of publishing of notice and will automatically not allow the e-submission of bid after the deadline for submission of bid.

- 22.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

- 23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, and Modification of Bids

- 24.1 A Bidder may withdraw, or modify its bid after it has been submitted either in hard copy or by e-submission. Procedures for withdrawal or modification of submitted bids are as follows:

- (i) Bids submitted in hard Copy
 - a) Bidders may withdraw or modify its bids by sending a written notice in a sealed envelope, duly signed by an authorized representative, and shall

include a copy of the authorization in accordance with ITB 20.2 before 24 hours prior to the deadline of submission of bids. The corresponding modification of the bid must accompany the respective written notice. All notices must be:

- (aa) prepared and submitted in accordance with ITB 20 and ITB 21, and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL", "MODIFICATION;" and
- (bb) received by the Employer twenty four hour prior to the deadline prescribed for submission of bids, in accordance with ITB 22.
- (cc) The bidder shall clearly specify on envelope whether "MODIFICATION" is of Technical Bid or Price Bid.

ii) E-submitted bids.

- a) Bidder may submit modification or withdrawal prior to the deadline prescribed for submission of bid through e-GP system by using the forms and instructions provided by the system. Once a Bid is withdrawn, bidder will not be able to submit another bid response for the same bid.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders after completion of the bid opening.

24.3 Bidder may submit request for withdrawal or modification only one time.

24.4 No bid may be withdrawn if the bid has already been modified.

24.5 Except in case of any modification or correction in bid document made by procuring entity, Bidder may submit request for withdrawal or modification only one time.

24.6 In case of hard copy bid, no bid may be withdrawn if the bid has already been modified; except in case of any modification or correction in bid document by procuring entity.

24.7 Request for withdrawal or modification must be made through the same medium of submission. Request for withdrawal or modifications through different medium shall not be considered.

24.8 The following provisions apply for withdrawal or modification of the Bids:

- (i) In case of bids submitted in hard copy no bid shall be withdrawn or modified in the interval between 24 hours prior to the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

- (ii) In case of e-submitted bids no bids shall be withdrawn or modified in the interval between deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

25. Bid Opening

25.1 The Employer shall open the bids in public at the address, date and time specified in the BDS in the presence of Bidders' designated representatives and anyone who choose to attend. Then the Employer shall segregates the Technical Bid and Price Bid separately. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the Technical Bid and Price Bid are submitted together in one inner envelope, the Employer may reject the entire Bid.

25.2 The Employer shall download the e-submitted Bid files. The e-procurement system allows the Employer to download the e-submitted bid files (report) only after bid opening date and time after login simultaneously by at least two

members of the Bid opening committee.

- 25.3 After downloading each e-bid, electronically submitted Technical Bid shall be opened at first in the same time and date as specified above. Electronic Bids shall be opened one by one and read out. The e-submitted technical bids must be readable through open standards interfaces. Unreadable and or partially submitted bid files shall be considered incomplete.
- 25.4 Thereafter, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding bid. No Technical Bid and/or Price Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out and recorded at bid opening. Only the Technical Bid, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original and Modification, will remain unopened in accordance with ITB 25.1.
- 25.5 All other envelopes holding the Technical Bid shall be opened one at a time, reading out: the name of the Bidder; whether there is a modification; the presence of a bid security and any other details as the Employer may consider appropriate. Only Technical Bids read out and recorded at bid opening shall be considered for evaluation. No bid shall be rejected at opening of Technical Bids except for late bids, in accordance with ITB 23.1.
- 25.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, or modification; and the presence or absence of a bid security. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record.
- 25.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given **at least 15 days'** notice for the opening of Price Bids.
- 25.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened.
- 25.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders' representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.
- 25.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:
- a) the name of the Bidder;
 - b) whether there is a modification;
 - c) the Bid Prices, including any discounts and alternative offers; and
 - d) any other details as the Employer may consider appropriate.

Only Price Bids, discounts, modifications, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. No Bid shall be rejected at the opening of Price Bids.

- 25.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum, the name of the Bidder, the Bid Price (per lot if applicable), any discounts, modifications and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record.

E. Evaluation and Comparison of Bids

26. Confidentiality

- 26.1 Information relating to the examination, evaluation, comparison, and post qualification of bids and recommendation of Contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to all Bidders.
- 26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
- 26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.

27. Clarification of Bids

- 27.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Price Bids. In case of e-submission of bid, upon notification from the employer, the bidder shall also submit the original of documents comprising the Technical and Price Bid as per ITB 11 for verification of submitted documents for acceptance of the e-submitted bid.
- 27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.

28. Deviations, Reservations, and Omissions

- 28.1 During the evaluation of bids, the following definitions apply:
- a) "Deviation" is a departure from the requirements specified in the Bidding Document;
- b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
- c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

29. Determination of Responsiveness

- 29.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB11.
- 29.2 A substantially responsive Technical Bid is one that meets the requirements of the

Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or
- (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

29.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section 5 (Works Requirements) have been met without any material deviation, reservation or omission.

29.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

29.5 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 27, the bid shall not be considered for further evaluation.

29.6 In Case, a corruption case is being filed to Court against the Natural Person or Board of Director of the firm/institution /company or any partner of JV, such Natural Person or Board of Director of the firm/institution /company or any partner of JV such bidder's bid shall be excluded from the evaluation, if public entity receives instruction from Government of Nepal.

29.7 Except in case of e-submission, the Financial Bid of the bidder, which is evaluated as substantially non-responsive in technical bid, shall be returned to the respective bidders.

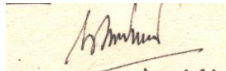
30. Nonconformities, Errors, and Omissions

30.1 Provided that a bid is substantially responsive, the Employer may waive any non-conformities in the bid that do not constitute a material deviation, reservation or omission.

30.2 Provided that a Technical Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its bid.

30.3 Provided that a Technical bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price may be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the methods indicated in Section 3 (Evaluation and Qualification Criteria).

30.4 If minor discrepancies are found such as in technical specification, description,



feature which do not make the bid to be rejected, then the cost, which is calculated to the extent possible due to such differences shall be included while evaluating the bid.

30.5 If the value of such non-conformities is found to be more than fifteen percent of the quoted amount of the bidder on account of minor discrepancies pursuant to ITB 30.4, such bid shall be considered ineffective in substance and shall not be involved in evaluation.

31. Qualification of the Bidder

31.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether Bidders meet the qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria).

31.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.

31.3 An affirmative determination of qualification shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.

32. Correction of Arithmetical Errors

32.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:

- (a) only for unit price Contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
- (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

32.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its bid shall be disqualified and its bid security may be forfeited.

33. Conversion to Single Currency

33.1 For evaluation and comparison purposes, the currency (ies) of the bid shall be converted into a single currency as specified in the BDS.

34. Domestic Preference

34.1 Unless otherwise specified in the BDS, a domestic preference shall be a factor in bid evaluation.

35. Subcontractors

35.1 The Employer may permit subcontracting for certain specialized works as indicated in Section 3. When subcontracting is permitted by the Employer, the specialized sub-contractor's experience shall be considered for evaluation. Section 3 describes the qualification criteria for sub-contractors.

Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified in the BDS.

36. Evaluation of Price Bids

36.1 The Employer shall evaluate Price Bid of each bid for which the Technical Bid has been determined to be substantially responsive. The Employer shall use the

criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

- 36.2 To evaluate a Price bid, the Employer shall consider the following:
- (a) the bid price, excluding Value Added Tax, Provisional Sums, and the provision, if any, for contingencies in the Summary Bill of Quantities, for Unit Rate Contracts, or Schedule of Prices for lump sum Contracts, but including Day work items, where priced competitively;
 - (b) adjustment for correction of arithmetic errors in accordance with ITB 32;
 - (c) adjustment due to discounts offered in accordance with ITB 14.4;
 - (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 33;
 - (e) adjustment for nonconformities in accordance with ITB 30.3;
 - (f) application of all the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria);
- 36.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
- 36.4 If this Bidding Document allows Bidders to quote separate prices for different lots Contracts, and to award multiple Contracts to a single Bidder **as specified in BDS**, the methodology to determine the lowest evaluated price of the Contract combinations, including any discounts offered in the Letter of Bid, is specified in Section 3 (Evaluation and Qualification Criteria).
- 36.5 if the bid for an Unit Rate Contract, which results in the lowest Evaluated Bid Price is seriously unbalanced or front loaded **or extremely low** in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analysis, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder as **mentioned in BDS** to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract **or may consider the bid as non-responsive**.
- 36.6 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 27, the bid shall not be considered for further evaluation.
- 36.7 In Case, a corruption case is being filed to Court against the Natural Person or Board of Director of the firm/institution /company or any partner of JV, such Natural Person or Board of Director of the firm/institution /company or any partner of JV such bidder's bid shall be excluded from the evaluation, if public entity receives instruction from Government of Nepal.
- 37. Comparison of Bids** 37.1 The Employer shall compare all substantially responsive bids in accordance with ITB 36.2 to determine the lowest evaluated bid.
- 38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 38.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to Contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

- 39. Award Criteria**
- 39.1 The Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
- 40. Letter of Intent to Award the Contract/ Notification of Award**
- 40.1 The Employer shall notify the concerned Bidder whose bid has been selected in accordance with ITB 39.1 within seven days of the selection of the bid, in writing that the Employer has intention to accept its bid and the information regarding the name, address and amount of selected bidder shall be given to all other bidders who submitted the bid.
- 40.2 After issuance of the notice under ITB 40.1 if the concerned bidder provides information pursuant to ITB 4.11 regarding saturation of maximum number of contracts, the employer shall disqualify the bidder and shall select the next lowest evaluated Bidder in accordance with ITB 39.1 and notify accordingly as per ITB 40.1.
- 40.3 If no bidder submits an application within a period of seven days of the notice provided under ITB 40.1, the Employer shall, accept the bid selected in accordance with ITB 39.1 and Letter of Acceptance shall be communicated to the selected bidder prior to the expiration of period of Bid validity, to furnish the performance security and sign the contract within fifteen days.
- 40.4 After communicating letter of acceptance under ITB 40.3, if the concerned bidder provides information pursuant to ITB 4.11 regarding saturation of maximum number of contracts, the employer shall reject the bid of that bidder and shall select the next lowest evaluated Bidder in accordance with ITB 39.1 and shall issue the notice accordingly as per ITB 40.1. In such case bid security of the rejected bidder shall not be forfeited.
- 40.5 At the same time, the Employer shall affix a public notice on the result of the award on its notice board and may make arrangements to post the notice into its website, if it has; and if it does not have, into the website of the Public Procurement Monitoring Office, identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at Bid Opening; (iii) name and evaluated prices of each Bid; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the Price it offered, as well as the duration and summary scope of the Contract awarded.
- 40.6 In Case, a corruption case is being filed to Court against the Natural Person or Board of Director of the firm/institution /company or any partner of JV, such Natural Person or Board of Director of the firm/institution /company or any partner of JV such bidder's bid shall be excluded from the evaluation, if public entity receives instruction from Government of Nepal.
- 41. Performance Security**
- 41.1 Within Fifteen (15) days of the receipt of Letter of Acceptance from the Employer, the successful Bidder shall furnish the performance security in accordance with the Conditions of Contract, as specified below from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal using Sample Form for the Performance Security included in Section 9 (Contract Forms), or another form acceptable to the Employer. The performance security issued by any foreign Bank outside Nepal must be counter guaranteed by Commercial Bank or Financial Institution eligible

to issue Bank Guarantee as per prevailing Law in Nepal.

i) If bid price of the bidder selected for acceptance is up to 15 (fifteen) percent below the approved cost estimate, the performance security amount shall be 5 (five) percent of the bid price.

ii) For the bid price of the bidder selected for acceptance is more than 15 (fifteen) percent below of the cost estimate, the performance security amount shall be determined as follows:

Performance Security Amount = [(0.85 x Cost Estimate – Bid Price) x 0.5] + 5% of Bid Price.

The Bid Price and Cost Estimate shall be **exclusive** of Value Added Tax.

41.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily. In such case, the award process shall be repeated according to ITB 40.

42. Signing of Contract

42.1 The Employer and the successful Bidder shall sign the Contract Agreement within the period as stated ITB 41.1.

42.2 Within thirty (30) days from the date of issuance of notification pursuant to ITB 40.1 unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, requests for debriefing.

42.3 If the bidder whose bid has been accepted fails to sign the contract as stated ITB 42.1, the Public Procurement Monitoring Office shall blacklist the bidder on recommendation of the Public Entity.

43. Complain and Review

43.1 If a Bidder is dissatisfied with the Procurement proceedings or the decision made by the Employer in the intention to award the Contract, it may file an application to the Chief of the Public Entity (Employer) within Seven (7) days of providing the notice under ITB 40.1 by the Public Entity, for review of the proceedings stating the factual and legal grounds.

43.2 Late application filed after the deadline pursuant to ITB 43.1 shall not be processed.

43.3 The chief of Public Entity(Employer) shall, within five (5) days after receiving the application, give its decision with reasons, in writing pursuant to ITB 43.1:

(a) whether to suspend the procurement proceeding and indicate the procedure to be adopted for further proceedings; or

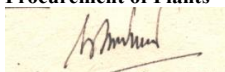
(b) to reject the application.

The decision of the chief of Public Entity shall be final for the Bid amount less than Rupees Twenty Million (NRs. 20,000,000).

43.4 If the Bidder is not satisfied with the decision given in accordance with ITB 43.3, or the decision is not given within five (5) days of receipt of application pursuant to ITB 43.1, it can, within seven (7) days of receipt of such decision, file an application to the Review Committee of the GoN, stating the reason of its disagreement on the decision and furnishing the relevant supporting documents. The application may be sent by hand, by post, by courier, or by electronic media

at the risk of the Bidder itself.

- 43.5 Late application filed after the deadline pursuant to ITB 43.4 shall not be processed
- 43.6 Within three (3) days of the receipt of application from the Bidder, pursuant to ITB 43.4, the Review Committee shall notify the concerning Public Entity to furnish its procurement proceedings, pursuant to ITB 43.3.
- 43.7 Within three (3) days of receipt of the notification pursuant to ITB 43.6, the Public Entity shall furnish the copy of the related documents to the Review Committee.
- 43.8 The Review Committee, after inquiring from the Bidder and the Public Entity, if needed, shall give its decision within one (1) month of the receipt of the application filed by the Bidder, pursuant to ITB 43.4.
- 43.9 The Bidder, filing application pursuant to ITB 43.4, shall have to furnish a cash amount or Bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law equivalent to **ten percent (10 %) of amount of bid security in case of complaint against decision pursuant to ITB 25.8 and one percent (1%) of its quoted amount in case of complaint against decision pursuant to ITB 40.1** with the validity period of at least ninety (90) days from the date of the filing of application pursuant to ITB 43.4.
- 43.10 If the claim made by the Bidder pursuant to ITB 43.4 is justified, the Review Committee shall return the security deposit pursuant to ITB 43 to the applicant, within seven (7) days of such decision made.

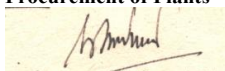


Section 2 - Bid Data Sheet

This section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section I. Instructions to Bidders.

A. General

ITB 1.1	The number of the Invitation for Bids is: Re-GOD/2079/080-03
ITB 1.1	The Employer is: Nepal Electricity Authority (NEA)
ITB 1.1	The name of the ICB is: "Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations" The identification number of the ICB is: Re-GOD/2079/080-03 The number and identification of lots comprising this ICB is: None
ITB 2.1	The name of the Project is: Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations The Development Partner(DP) is: Not Applicable The implementing agency is: Nepal Electricity Authority GoN Funded or DP Funded: Nepal Electricity Authority internal fund
ITB 4.1 (a)	For GoN/NEA Funded: Maximum number of partner in a joint venture shall be: 3 (three) In case of Foreign Bidder, Joint Venture with Nepalese Bidder is "Mandatory"
ITB 4.2	Eligible countries All countries are eligible unless otherwise restricted by the Government of Nepal (GoN).
ITB 4.4	A list of debarred firms is available at http://www.ppmo.gov.np and / or http://www.nea.org.np , official site of Nepal Electricity Authority.

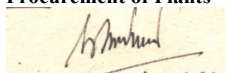


ITB 4.9	The domestic bidder shall submit the following documents at the time of Bid Submission: • Company/Business Registration Certificate, PAN/VAT registration certificate, Tax Clearance Certificate or Proof of submission of income return for the last fiscal year 2078/079 B.S. (2021/22A.D.) The foreign Bidder shall submit the following documents at the time of Bid submission: • Legal and Business registration certificate of the Bidder, and of each joint-venture partners in the case of a joint venture, issued by the government of the country where the Bidder or each joint venture partner is registered. The foreign Bidder shall declare to submit the following documents at the time of contract agreement or after 45 days of contract agreement: • PAN/VAT registration certificate of Nepal • Temporary Construction License But, Resident foreign Bidder shall submit PAN/VAT certificate and tax clearance certificate or proof of submission of Income Return for 2078/79 B.S. (2021/22 A.D)
ITB 4.10 & 4.11	For GoN/NEA Funded: Maximum number of running contracts that a Bidder, and all parties constituting the Bidder can have shall be : 5 (Five) [except for bidders participating as JV with maximum share 25 % and not having signed more than two (2) contracts for works of similar nature since 2078-12-03 i.e. March 17, 2022 in Nepal]² For DP Funded: Not Applicable

B. Bidding Document

ITB 6.1	Rearrange the sections in the following manner: Volume I: Invitation for Bids (IFB) Section 1: Instructions to Bidders (ITB) Section 2: Bid Data Sheet (BDS) Section 3: Evaluation and Qualification Criteria Section 4: Bidding Forms Section 7: General Conditions of Contract (GCC) Section 8: Special Conditions of Contract (SCC) Section 9 Contract Forms Volume II Section 5: Employer's work requirements, Technical Specifications and Drawings Volume III

²There is no limit on number of **running contracts** that a bidder can **have** for bidders participating as JV with maximum share 25 % and not having signed more than two (2) contracts for works of similar nature since 2078-12-03 i.e. March 17, 2022 in Nepal



	Section 6: Bill of Quantities (BOQ)
ITB 7.1	For <u>clarification purposes</u> only, the Employer's address is: Attention The Director, Grid Operation Department Transmission Directorate Nepal Electricity Authority Street Address: Min Bhawan, New Baneshwor, Kathmandu, Nepal. Telephone number: +977 (01) 4106919, 4106782, 4106965 Electronic mail address: gridoperation@nea.org.np
ITB 7.4	A Pre-Bid meeting will take place at Date:- July 07, 2023 Time: 12:00 hrs (Nepal Standard Time) Grid Operation Department Nepal Electricity Authority Street Address: Min Bhawan, New Baneshwor, Kathmandu, Nepal. Telephone number: +977 (01) 4106919, 4106782, 4106965 Electronic mail address: gridoperation@nea.org.np The Employer, upon the request from the potential Bidders, may arrange the group site visit immediately after the Pre-bid meeting. However, vehicle for the site visit of the Bidder and other logistics shall be arranged by the Bidders themselves.
ITB 7.5	Time period to submit any questions in writing for the purpose of clarification at the Pre-Bid meeting is: 3 days prior to Pre-bid meeting. Time for request: Requests for clarification should be received by the Employer no later than 15 days prior to the deadline for submission of bids.

C. Preparation of Bids

ITB 10.1	The language of the Bid is: <u>English</u>
ITB 11.2 (i)	The Bidder shall submit with its Technical Bid the following additional documents: 1. Notarized Company legal Registration Certificate. 2. Notarized Copy of Business Registration Certificate 3. Notarized JV agreement if Bidder is not a single firm or single entity. 4. Notarized copy of Work Completion Certificate (on the letter head of the End-User) for all relevant Projects completed in the last 10 years with contact person's address and Tel. no. 5. Audited Balance Sheet for the last three years 6. Manufacturers' Authorization Letter for major items as mentioned in Section 3:

	Evaluation and Qualification Criteria and Guaranteed loss declaration of transformer. 7. VAT Registration Certificate of the Bidder (For Domestic Bidder only) 8. Tax Clearance Certificate for: last fiscal year 2078/079 B.S. (Bidder and of each JV partner in the case of JV). (For domestic Bidder only) 9. Type Test Certificate for major items as mentioned in Section 3: Evaluation and Qualification Criteria 10. Original copies of original Bidding Documents with each page signed. 11. Details in respect of Local Agent If a foreign bidder has engaged a Nepalese agent, it will be required to give the following details in its bid as per the format enclosed in the Bidding Documents: i) The name and address of the local agent; ii) What Service the agent renders; and iii) The fixed amount of remuneration for the agent included in the offer; The agency commission shall be indicated in the space provided for in the Price Schedule and will be paid to the Bidder's agent in Nepal in Nepalese Rupees using the Nepal Rastra Bank (NRB) Exchange (Buying) Rate ruling on the date of notification of award and shall not be subject to any escalation or any further exchange variations.
ITB 11.3 (b)	In accordance with ITB 12 and ITB 14, the following schedules shall be submitted with the bid, including the priced Bill of Quantities for Unit Rate Contracts and Schedule of Prices for lump sum contracts: None
ITB 11.3 (d)	The Bidder shall submit with its bid the following additional documents: None
ITB 13.1	Alternative bids <i>“shall not be”</i> permitted.
ITB 13.2	Alternative times for completion <i>“shall not be”</i> permitted.
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: “Not Applicable”
ITB 14.6	The prices quoted by the Bidder shall be Adjustable for Power Transformer. “The formula for adjusting the prices and explanatory details is specified in the Special Conditions of Contract (SCC) Clause 11.2 and Appendix 2 of Contract Agreement, Section 9: Contract Forms. Bidder shall fill out the Tables of Adjustment Data in Section 4 (Bidding Forms)”
ITB 15.1	The unit rates and the prices shall be quoted by the bidder entirely in: Nepalese Rupees (NPR) or up to three convertible foreign currencies included in daily publication of Nepal Rastra Bank Foreign Currency exchange rate. It is further instructed, (a) Price Schedule No. 1 (Plant and Mandatory Spare Parts supplied from abroad) - The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only. (b) Price Schedule No. 2 (Plant and Mandatory Spare Parts supplied from within the Employer's Country) - The prices shall be quoted in Nepalese Rupees (NPR) only.

	(c) Price Schedule No. 3 (Design Services) - The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible foreign currencies only. (d) Price Schedule No. 4 (Construction and Installation Services) - The prices shall be quoted in Nepalese Rupees (NPR) only. The maximum ratio of Nepalese Currency to Foreign Currency with respect to the evaluated bid price shall not be more than: Not Applicable
ITB 18.1	The Bid validity period shall be: One Hundred Twenty (120) days.
ITB 19.1	The Bidder shall furnish a bid security, from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law with a minimum of USD 550,000.00 or an equivalent amount in NPR @exchange rate (sell) of Nepal Rastra Bank 30 days prior to the deadline for Bid Submission, which shall be valid for 30 days beyond the validity period of the bid. If the bank guarantee is issued by a foreign bank, it shall be counter guaranteed by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.
ITB 19.2 (b)	Account Name: NEA Transmission Directorate Bank Name: Kumari Bank Limited Bank Address: Putalisadak Branch, Kathmandu Account Number: 0010002263400001
ITB 20.1	Bidders shall have only the option of submitting their bids - electronically (in uploadable format). No bid shall be accepted by mail or by hand or by courier. The electronic bid submission procedures shall be as per latest e-GP Guidelines of PPMO.
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall indicate: (a) Power of attorney duly notarized in favor of person signing the bid; and (b) In the case of Bids submitted by an existing or intended JV, an undertaking signed by all parties (i) stating that all parties shall be jointly and severally liable, and (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution. The Power of Attorney in (a) and (b) above shall be notarized.

D. Submission and Opening of Bids

ITB 21.1

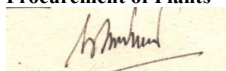
There is no provision of hard copy submission. Therefore, hard copy is not required. The bids submitted electronically are considered as original. However, if required as per ITB 27, the Bidder shall be required to submit original Bid Security letter/documents and other clarifications as required.

Correct the Table as follows:

1. Technical Bid:

S.N.	Document	Requirement	Remarks
1	Letter of Technical Bid	Mandatory	PDF
2	Bid Security (Bank Guarantee)	Mandatory	PDF

	3	Company/Firm Registration Certificate	Mandatory	PDF																	
	4	VAT registration	Mandatory (for domestic bidders and resident foreign bidders only)	PDF																	
	5	Business Registration (Licence) Certificate	Mandatory	PDF																	
	6	Tax clearances certificate / Tax return submission evidence / evidence of time extension	Mandatory (for domestic bidders and resident foreign bidders only)	PDF																	
	7	Power of Attorney of Bid signatory	Mandatory	PDF																	
	8	Bank Voucher for cost of bid document	Mandatory	PDF																	
	9	Joint venture agreement	Mandatory	PDF, Mandatory in case of JV Bids Only																	
	10	Qualification Information	Mandatory	Web Forms (Experience, Turnover, etc.)																	
	11	Manufacturer authorization letter for major equipment mentioned in clause 2.7 of Section 3. Evaluation and qualification Criteria.	Mandatory	PDF color scan																	
	12	Functional Guarantee	Mandatory	PDF																	
	Price Bid: <table border="1"> <thead> <tr> <th>S.N.</th> <th>Document</th> <th>Requirement</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Letter of Price Bid</td> <td>Mandatory</td> <td>PDF</td> </tr> <tr> <td>2</td> <td>Applicable Price Adjustment Table</td> <td>Mandatory If applicable</td> <td>PDF/Web Forms*</td> </tr> <tr> <td>3</td> <td>Completed BOQ or Price Schedule</td> <td>Mandatory</td> <td>PDF/Web Forms*</td> </tr> </tbody> </table> *Bidder shall get pdf format of BOQ in Bid document uploaded by Employer. They have to fill it as per instruction, put name, signature designation stamp on it and upload it as Price Bid with letter of Price Bid. <i>Note: The documents specified as “Mandatory” should be included in e-submission and non-submission of the documents shall be considered as non-responsive bid.</i>					S.N.	Document	Requirement	Remarks	1	Letter of Price Bid	Mandatory	PDF	2	Applicable Price Adjustment Table	Mandatory If applicable	PDF/Web Forms*	3	Completed BOQ or Price Schedule	Mandatory	PDF/Web Forms*
	S.N.	Document	Requirement	Remarks																	
1	Letter of Price Bid	Mandatory	PDF																		
2	Applicable Price Adjustment Table	Mandatory If applicable	PDF/Web Forms*																		
3	Completed BOQ or Price Schedule	Mandatory	PDF/Web Forms*																		
ITB 22.1	The deadline for bid submission is:																				



	Date: July 24, 2023 Time: 12.00 Hrs. (Noon) (Server Time of PPMO) Note: No hard copy submission permitted.
ITB 25.1	The Bid opening of Technical Bids shall take place at Place: Grid Operation Department Street Address: Minbhawan, New Baneshwor City: Kathmandu Country: Nepal The date & time for bid opening is: Date: July 24, 2023 Time: 12:30 Hrs (Nepal Standard Time)

E. Evaluation and Comparison of Bids

ITB 33.1	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices if permitted and expressed in various currencies into a single currency is: NPR The source of exchange rate shall be: Nepal Rastra Bank The date for the exchange rate shall be: 30 days prior to the deadline for submission of Bids.
ITB 34.1	Domestic preference shall apply and the application methodology shall be as stipulated in Section 3 (Evaluation and Qualification Criteria).
ITB 35.1	Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted in construction works is: 25% of the total contract amount.
ITB 36.4	Bidders are "not permitted" to quote separate prices for lots (Contracts), and a single Bidder will be awarded multiple lots (Contracts) based on provision of Paragraph 1.2, Multiple Contracts Section III (Evaluation and Qualification Criteria): Not Applicable
ITB 36.5	The amount of the performance security be increased by Eight (8) percent of the quoted bid price.

Section 3 - Evaluation and Qualification Criteria

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders if the bidding was preceded by post-qualification exercise. GoN requires bidders to be qualified by meeting predefined, precise minimum requirements. The method sets pass-fail criteria, which, if not met by the bidder, results in disqualification. In accordance with ITB 32 and ITB 36, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

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1. Evaluation

In addition to the criteria listed in ITB 36.2 (a) – (f) the following criteria shall apply:

1.1 Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity, to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section 5 (Works Requirements).

The Bidder shall give information about his past performance by stating in his Bid the names of the countries in which he has accomplished, within the last ten years, similar Work, by indicating the year, type of Work, quantity and Contract number.

The Bidder shall state in his Bid the full names and addresses, telephone, fax numbers of the Clients and the names of the Contact person.

For the purpose of verifying the information and data submitted by the Bidder, NEA reserves the right to collect necessary information from these Clients.

1.2 Multiple Contracts

Pursuant to Sub-Clause 36.4 of the Instructions to Bidders, if Works are grouped in multiple contracts, evaluation will be as follows: **“Not Applicable”**

1.3 In Case, other than Multiple Contracts

“Not Applicable”

1.4 Completion Time

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows:

“Not Applicable”

1.5 Alternative Technical Solutions

Alternative technical solutions, if permitted under ITB 13.4, will be evaluated as follows:

“Not Applicable”

1.6 Domestic Preference

1.6.1 In comparing domestic bids with foreign bids, a Domestic preference as per ITB 34.1 shall be granted to eligible domestic contractors, as defined below, in accordance with the following provisions.

(a) For application of domestic preference, all responsive bids shall first be classified into the following two categories:

- i) **Category I:** Bids offered by domestic contractors (domestic firms, intuitions, or company either in single or in joint venture (all partners)) and Joint Ventures eligible for the preference in accordance with the criteria set forth in Sub clause 1. 6.2 below; and
 - ii) **Category II:** Bids offered by other Contractors.
- (b) The lowest evaluated bid of each category shall then be determined by comparing all evaluated bids in each category among themselves.
- (c) Such lowest evaluated bids shall next be compared with each other and if, as a result of this comparison, a bid from **Category I** is found to be the lowest, it shall be selected for the award of contract.
- (d) If, however, as a result of the comparison under (c) above, the lowest bid is found to be from **Category II**, it shall be further compared with the lowest evaluated bid from **Category I**. For the purpose of this further comparison only an upward adjustment (domestic preference) shall be made to the lowest evaluated bid price of **Category II** by adding an amount equal to (five) 5% of the bid price. If, after such comparison, the **Category I** bid is determined to be the lowest, it shall be selected for the award of contract; if not, the lowest evaluated bid from **Category II** shall be selected.

1.6.2 Joint Ventures between a Domestic Contractor(s) and its foreign partner(s) shall eligible for the Domestic Preference Scheme only if domestic contractor(s) (domestic firms, intuitions, or company) have at least 25 % share in the Joint Venture.

1.7 Quantifiable Nonconformities, Errors and Omissions

The evaluated amount of quantifiable nonconformities, errors and/or omissions shall be determined by ascertaining the price of such effect on an equal basis by adjusting the same to the quoted price of the bid. A bid having minor deviations and having no material deviation to cause any serious effect upon the scope, quality, characteristics, terms and conditions, performance or any other requirements stated in the bidding documents and acceptable to the Employer can be considered to be substantially responsive.

1.8 Economic Evaluation

The following factors and methods will apply:

(a) Time Schedule:

The plant and equipment covered by this bidding are required to be shipped, installed and the successful completion of the Facilities shall have to be completed within **18 months** from the effective date of the Contract. Bidders are required to base their prices on the time schedule given in **Appendix 4** to the Form of Contract Agreement (Time Schedule) or, where no time schedule is given in **Appendix 4**, on the Completion date(s) given above. No credit will be given to earlier completion. **Bids offering completion beyond the named period will be rejected.** Bidder shall also consider provision of work program stated in GCC clause 18 to base their prices.

(b) Operating and Maintenance Costs: **NA**

(c) **Functional Guarantees of the facilities:**

a. Capitalization of Transformer Losses

When evaluating the individual bid received from various Bidders, the transformer shall be evaluated for the cost of losses based on the following relation:

$$P_E = P_b + K_L * L_L + K_{NL} * L_{NL} + K_{CL} * L_{CL}$$

P_E = Evaluated Price

P_b = Bid Price

K_L = Value of Load Loss

L_L = Guaranteed load losses at rated current (Maximum MVA base)

K_{NL} = Value of no load Loss

L_{NL} = Guaranteed no load losses at rated current

K_{CL} = Value of Cooling Fan losses

L_{CL} = Guaranteed Cooling Fan Losses

The transformer losses will be capitalized as follows for evaluation purpose:

i) No load losses: US\$ 4,684 per kW

ii) Load losses: US\$ 1,180 per kW

iii) Loss associated with cooling fan load: US\$ 393 per kW

b. Guaranteed Values Not Reached

If the individual losses of a power transformer as measured during test exceeds the values guaranteed in the Bid, then for each kilowatt of losses in excess of the losses guaranteed, an amount at the rates of twice the rates specified above for no-load losses and load-losses shall be deducted from the Contract Price of the successful Bidder.

c. Performance Guarantee

The performance figures quoted on Technical Data Sheet and/or Functional Guarantee Form shall be guaranteed within the tolerances permitted by relevant standards listed under section of General Technical Specifications, and shall become a part of the successful Tenderer's Contract. In case of loss capitalization, no tolerance shall be permitted for the guaranteed value.

The transformer shall be rejected if losses exceed the guaranteed value by an amount in excess of the following:

Total losses: 10% (must be within this limit)

Component losses: 15%

Note: The transformer will be rejected, if the measured no-load and load losses (excluding fan loss) exceed the guaranteed value by over 15 % even if the total losses do not exceed 10% as specified.

(d) **Work, services, facilities, etc., to be provided by the Employer: None**

2. Qualification

It is the legal entity or entities comprising the Bidder, and not the Bidder's parent companies, subsidiaries, or affiliates, that must satisfy the qualification criteria described below.

2.1 Eligibility

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

2.1.1 Conflict of Interest

No conflicts of interest in accordance with ITB Sub-Clause 4.3.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Bid

2.1.2 Government-owned Entity

Applicant required to meet conditions of ITB Sub-Clause 4.5.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Forms ELI -1, ELI - 2 with attachments

2.1.3 Development Partner Eligibility: “Not Applicable”

Not having been declared ineligible by Development Partner, as described in ITB Sub-Clause 4.4.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Application Submission Sheet

2.1.4 UN Eligibility

Not having been declared ineligible based on a United Nations resolution or Employer's country law, as described in ITB Sub-Clause 4.7.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Bid

2.1.5 Bidder's Running Contracts

Bidder's Running Contracts ³ not more than five (5) as described in ITB Sub-Clause 4.10.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	ELI-3

³ Note:(1) Only the contracts accepted since 2078-12-03 i.e. March 17, 2022 which are not substantially completed are considered. The contracts those are running under any type of foreign assistance are not accounted for this purpose.
(2) This criteria is not applicable for bidders participating as JV with maximum share 25 % and not having signed more than two (2) contracts for works of similar nature since 2078-12-03 i.e. March 17, 2022 in Nepal

2.1. 6 VAT and PAN Registration

a. Domestic Bidder	Bidders required to meet conditions of ITB Sub-Clause 4.9.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	PAN and VAT registration certificate
b. Foreign Bidder	Bidders required to meet conditions of ITB Sub-Clause 4.9.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Declaration to submit PAN and VAT Registration Certificate at the time of Contract agreement

2.2 Pending Litigation

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

2.2.1 Pending Litigation

All pending litigation shall be treated as resolved against the Applicant and so shall in total not represent more than 50 percent of the Applicant's net worth.	must meet requirement by itself or as partner to past or existing JV	not applicable	must meet requirement by itself or as partner to past or existing JV	not applicable	Form LIT – 1

Note:

- (1) The employer reserves the right to verify the pending litigation with respective department.

2.3 Financial Situation

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

2.3.1 Historical Financial Performance

Submission of audited balance sheets and income statements, for the last 3(Three) years to demonstrate the current soundness of the applicants financial position. As a minimum, a Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be positive.	must meet requirement	not applicable	must meet requirement	not applicable	Form FIN - 1 with attachments

2.3.2 Average Annual Construction Turnover

Minimum average annual construction turnover of USD 16.52 Million , calculated as total certified payments received for contracts in progress or completed, within best three years out of last ten fiscal years.	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 2

Only the net amount shall be calculated after deducting the amount for VAT and such amount shall be adjusted to present value by applying wholesale price index of Nepal Rastra Bank.

2.3.3 Financial Resources					
Using Forms FIN - 3 and FIN - 4 in Section IV (Bidding Forms) the Bidder must demonstrate access to, or availability of, financial resources such as liquid assets ⁴ , unencumbered real assets, and other financial resources, (other than any contractual advance payments) to meet the cash-flow requirement of USD 2.05 Million .	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 3

2.3.3 Required Bid Capacity					
The bidding capacity of the bidder should be equal to or more than the USD 18.50 Million .	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN -3,4

Note:

- Bidders shall fill the forms as mentioned above but notarized copy of the audit report is mandatory to verify the forms. The audited balance sheet must have the sign of the auditor with the stamp of the firm. For e-submission of bids, photocopy of audit report is not advised to be uploaded, bidders are to upload the original audit report. The Cover page of the Auditor's information and Contact Address (Phone no. & the mail address) shall be present.
- If the Turnover submitted by the bidder is in the name of a Joint Venture in the past, the bidder must submit the Joint Venture Agreement (notarized in case of Hard Copy bid, original scanned Copy for e-submission), stating the % of JV for the calculation of the turnover of the respective bidder.
- Due to limitations on file size for the e-submission bidders are requested to submit only the necessary & related files to qualify the above conditions.

⁴ **Liquid Assets mean cash and cash equivalents, short-term financial instruments, short term available-for-sale-securities, marketable securities, trade receivables, short-term financing receivables and other assets that can be converted into cash within ONE YEAR.**

2.4 Experience

Criteria	Compliance Requirements			Documents
Requirement	Single Entity	Joint Venture		Submission Requirements
		All Partners Combined	Each Partner	

2.4.1 General Construction Experience

Experience under construction contracts in the role of contractor, subcontractor, or management contractor for at least the last Five (5) years prior to the applications submission deadline.	Must meet requirement	Not applicable	Must meet requirement	Not applicable	Form EXP -1

2.4.2 Specific Construction Experience

(a) Contracts of Similar Size and Nature

Participation as a Prime contractor, Management contractor or Subcontractor, in at least 2 (two) EPC/Turnkey/ DB Contract within the last 10 (Ten) years, each with a value of at least USD 12.40 Million that have been successfully or are substantially completed and that are similar to the proposed works. For foreign Bidders, one of the above contracts must have been completed outside the Bidder's home country. <i>In above contract, the similarity of the Bidder's participation shall be based on Design, Supply, Installation, Testing and Commissioning of 110 kV or higher voltage Transformer bay.</i>	Must meet all requirement	Must meet requirement	Not applicable	Must meet requirement	Form EXP - 2(a)
Only the net amount worked out after deducting the amount for VAT shall be computed and such amount shall be adjusted to present value by applying updated price index of Nepal Rastriya Bank.					
Note: - Substantial completion of the projects here shall mean the 80% completion of total scope of works in all respect (technical as well as financial) and is applicable for the ongoing projects only. - For Contracts under which the Bidder participated as a joint venture member, only the Bidder's proportionate share value within the JV shall be considered to evaluate financial situation.					

2.4.2 (b) Construction Experience in Key Activities

For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum construction experience in the following key activities: <i>The Bidder shall have successfully executed as a Prime contractor, Management contractor, or</i>	Must meet all requirements	Must meet requirement	Not applicable	Must meet requirement	Form EXP-2(b)

Subcontractor and same should be of designed, supplied, installed, tested and commissioned of Power/Auto-Transformers with cumulative capacity of 400MVA or higher, 110kV or higher voltage.					

Note

1. Bidders shall submit all necessary documents required to prove their above specified legal, financial and experience eligibility requirements. To demonstrate the experience, the Bidder shall submit notarized end-user certificates (on the letter head of the end users) for all relevant projects undertaken by the Bidder and all JV partners.

In case of foreign Bidders, **Bidders shall submit all the specified legal and experience eligibility requirements which shall be notarized from the Bidder's home country and shall be in English.**

The end user issued certificates shall clearly indicate the contract amount, project size, scope of the work and the major plants and equipment supplied in the mentioned contract. A failure or omission of submitting the certificates at the first instance is considered a minor, non-material omission and shall be subject to clarification. The Bidder shall be required to submit all the necessary and relevant documents within the stipulated time. Bidder may submit same experience certificate for both clause 2.4.2(a) and 2.4.2(b) if it satisfies both conditions as stated above.

2. For Company formed by merger/de-merger of two or more companies or divisions of such companies, the financial data of the company shall be considered for the completed financial year for which it has been in existence (if financial results are available) and for balance period financial data of related business of Constituents (duly certified by the Company Secretaries of the constituents or a public accountant) shall be considered.
3. In case Bidder is a holding company, the financial position criteria referred to in clause 2.3.1, 2.3.2 and 2.3.3 above shall be of that holding company only (i.e excluding its subsidiary/ group companies) and *vice versa*.

Further, for holding company, the specific experience referred to in clause 2.4.2 (a) and (b) above shall be of that holding company only (i.e. excluding its subsidiary/group companies). In case Bidder is a subsidiary of a holding company, the technical experience referred to in clause 2.4.2 (a) and (b) above shall be of that subsidiary company only (i.e. excluding its holding companies).

4. Successful operation means certificate issued by the Employer end user) certifying the operation without any adverse remark.
5. For reckoning the sub-contractors experience, completion certificate from end user/completion certificate from the concerned Project Authority is only acceptable and those documents shall be duly notarized.
6. In case, the above required Financial, Experiences and other relevant documents are in other than English language; these documents shall be translated to English and duly notarized.

2.5 Personnel

The Bidder must demonstrate that it has the personnel for the key positions that meet the following Requirements:

No.	Position	Specific works Experience
1	Project Manager	A graduate Engineer with minimum 10 years of experience and specifically 5 years or more in 110 kV or above substation projects
2.	Electrical Engineer	A graduate in Electrical Engineer with minimum 5 years of site supervision experience in 110 kV or above substation projects.
3.	Project Engineer (Civil)	A graduate in Electrical Engineer with minimum 5 years of site supervision experience in 110 kV or above substation projects.

In case the Bidder proposes to consider Personnel that may be spared from committed/ongoing contracts for evaluation, the Bidder shall provide details of personnel which will be spared from such committed/ongoing contracts based on the physical progress at the date of bid submission. The details so submitted by the Bidder and the physical progress of the ongoing contracts only the spared personnel shall be taken into the consideration during evaluation.

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section 4 (Bidding Forms).

Should the proposed personnel be determined to be unacceptable, the Bid will not be rejected but the Bidder will be required to propose an acceptable substitute personnel meeting the proposed requirement above. Bidder must submit the necessary documents within the stipulated time.

2.6 Equipment

The Bidder must demonstrate that it has the key equipment listed hereafter:

Item No.	Equipment Type and Characteristics	Min. Number Required
1	Oil filter machine(≥ 80 kV)	1
2	Transformer Turns Ratio Testing Equipment	1
3	Insulation Resistance Tester	1
4	Protection testing and calibration equipment	1
5	Relay Testing Kit	1

Note: The above specified tools & Equipment are strictly to be present at the site during construction.

In case the Bidder proposes to consider Equipment that may be spared from committed/ongoing contracts for evaluation, the Bidder shall provide details of Equipment which will be spared

from committed/ongoing contracts clearly demonstrating the availability of such equipment with respect to the physical progress of the ongoing contracts on the date of bid submission. Based on the details so submitted by the Bidder, only the spared equipment proposed for the contract shall be considered for evaluation.

In case of equipment to be leased/ hired the same procedures as mentioned above shall apply. The Bidder must demonstrate that it has the required equipment and bidder shall provide details of the proposed equipment in the relevant information forms included in Section 4 (Bidding Forms).

The Bidder/Lease Owner shall be solely responsible for the data provided. However, this shall not limit the right of employer to verify the authenticity of submitted information.

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section 4 (Bidding Forms).

Should the proposed equipment be determined to be unacceptable, the Bid will not be rejected but the Bidder will be required to propose an acceptable substitute equipment meeting the proposed requirement above. Bidder must submit the necessary documents within the stipulated time.

2.7 Subcontractors / Manufacturers

Subcontractors or Manufacturers for the following major items of plant and services must meet the following minimum criteria, herein listed for that item. Failure to comply with this requirement will result in rejection of the subcontractor but not the Bidder.

The Employer reserves the right to choose /select subcontractors / manufacturers from the list of qualified subcontractors / manufacturers.

Item No.	Description of Item	Minimum Criteria to be met	Document Submission Required
1	i) 132/33kV, 100 MVA 3-phase Power Transformer ii) 132/33kV, 63 MVA, 3-phase Power Transformer iii) 132/66kV, 63 MVA, 3-phase Power Transformer iv) 132/66kV, 45 MVA, 3-phase Power Transformer v) 132/11kV, 45MVA, 3-phase Power Transformer vi) 66/11kV, 30MVA, 3-phase	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied Power Transformer of capacity 100 MVA or above, 110 kV or higher Voltage Class, at least twice the Bid quantity as a main supplier over last five (5) years period ending on the last date of Bid submission. For the above, at least twice the Bid quantity of Power Transformers shall be supplied outside the manufacturer's home country. Out of supplied quantity, a minimum half of the bid quantity shall have been in operation satisfactorily to the end users for at least one (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications iv) Must have successfully carried out the complete type test including Dynamic Short Circuit (DSC) test as per IEC over last 10 years period as on the originally scheduled date of Bid opening in Short-Circuit Testing Liaison (STL) - Accredited Laboratory OR must have successfully completed type test including DSC test conducted as per IEC	Form EXP-3

	Power Transformer	over last 10 (ten) years period as on the originally scheduled date of Bid opening in any internationally accredited Laboratory in the presence of STL representative and certified the same by STL representative as indicated below : • Type test and DSC test on <u>100MVA or higher capacity, 132 kV or higher voltage class</u> power transformer as specified in the Technical Data Sheet. However, <u>IF</u> the Bidder/Manufacturer has not conducted the complete type tests including the DSC in Short-Circuit Testing Liaison (STL) - Accredited Laboratory <u>OR</u> has not conducted completed type test including DSC test in the presence of STL representative in an internationally accredited Laboratory as mentioned above within last 10 (ten) years THEN the Bidder has to submit an undertaking letter along with the Bid to carry out the complete type test on the above mentioned ratings of transformer including DSC in Short-Circuit Testing Liaison (STL) - Accredited Laboratory <u>OR</u> to carry out the completed type test including DSC in the presence of STL representative and NEA representative in any international accredited laboratory without any cost to the Employer. Further design review of offered 132 kV class transformers shall be carried out based on design of short circuit tested 132kV or above voltage class transformer. v) OLTC & its Control equipment shall be from <i>MR Germany, ABB Sweden or equivalent.</i> The type test as per IEC 60214-1 must have been performed on OLTC by a Tap-Changer Testing & Inspection Center accredited in accordance with ISO/IEC 17025:2005 and both the type test and the Laboratory Accreditation Certificate should be submitted along with the bid.	
2	132kV & 66kV SF6 Circuit Breaker and 33kV Vacuum Circuit Breaker <i>(If the Bidder proposes different manufacturer for the 33 kV VCB, separate documents shall be submitted to fulfill all the</i>	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied SF6 Circuit Breaker of 132kV or higher Voltage level at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of Bid submission. Out of supplied quantity, a minimum of half the Bid quantity shall have been in operation satisfactorily to the end users for at least one (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried over last 10	Form EXP-3

	<i>criteria (i-iv), such that 132 kV is replaced by 33 kV in (i-iv)).</i>	years by reputed independent accredited testing laboratory (132 kV & 33 kV even if the manufacturer for the both is same).	
3	132kV, 66kV & 33kV Current Transformer <i>If the Bidder proposes different manufacturer, separate documents shall be submitted to fulfill all the criteria (i-iv), such that 132 kV is replaced by 66kV & 33 kV in (i-iv)).</i>	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied Current Transformer of 132 kV or higher Voltage level at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least One (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried over last 10 years by reputed independent accredited testing laboratory .	Form EXP-3
4	132kV, 66kV & 33kV Disconnecting Switch <i>(If the Bidder proposes different manufacturer, separate documents shall be submitted to fulfill all the criteria (i-iv), such that 132 kV is replaced by 66kV & 33 kV in (i-iv)).</i>	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied Disconnecting Switch of 132kV or higher Voltage level at least twice the Bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least One (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried over last 10 years by reputed independent accredited testing laboratory.	Form EXP-3
5	132 kV & 66kV Capacitive Voltage Transformer and 33 kV Potential Transformer <i>(If the Bidder proposes different manufacturer, separate documents shall be submitted to fulfill all the criteria (i-iv), such that 132 kV is replaced by 66kV & 33 kV in (i-iv)).</i>	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied at least twice the bid quantity of Capacitive Voltage Transformer for 132 kV or higher voltage Class, as a main supplier over last five (5) years period ending on the last date of bid submission Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least one (1) year on the date of bid opening. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried out by reputed independent accredited testing laboratory for the size offered (132 kV & 33 kV even if the manufacturer for the both is same).	Form EXP-3

6	132 kV, 66kV & 33kV Lightning Arrestor <i>(If the bidder proposes different manufacturer, separate documents shall be submitted to fulfill all the criteria (i-iv), such that 132 kV is replaced by 66kV & 33 kV in (i-iv)).</i>	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied Lightning Arrestor of 120 kV or higher voltage Class, at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least 1 (One) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried out over last 10 years by reputed Independent accredited testing laboratory.	Form EXP-3
7	Transformer Control & Relay Panel <i>(If the bidder proposes different manufacturer, separate documents shall be submitted to fulfill all the criteria (i-iv), such that 132 kV is replaced by 66kV & 33 kV in (i-iv)).</i>	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied Transformer Control & Relay Panel at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least One (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried out over last 10 years by reputed independent accredited testing laboratory.	Form EXP-3
8	33kV & 11kV XLPE Copper Power Cable	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied XLPE Copper Power Cable of 33 kV or higher voltage Class, at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least One (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried out over last 10 years by reputed independent accredited testing laboratory.	Form EXP-3
9	11kV Vacuum Circuit Breaker	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied Vacuum Circuit Breaker, 11 kV or higher Voltage Class, at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least One (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried out by	Form EXP-3

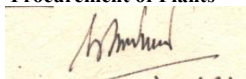
		reputed independent accredited testing laboratory.	
10	Steel Structure	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have successfully completed the design, manufacture, testing and supplied twice the bid quantity or higher fabricated steel structure as a main supplier over last five (5) years period ending on the last date of bid submission. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the test report carried out by reputed independent accredited laboratory for the steel structure eg. Tower, gantry or other structure.	
11	Control & Power Cable	i) Must have manufacturing experience of at least 10 (ten) years. ii) Must have designed, manufactured and supplied the 600V control and Power cable, at least twice the bid quantity as a main supplier over last five (5) years period ending on the last date of bid submission. Out of supplied quantity, a minimum of half the bid quantity shall have been in operation satisfactorily to the end users for at least One (1) year. iii) Must hold a valid ISO 9001:2000 (including design in scope of registration) certifications. iv) Must submit the type test report carried out over last 10 years by reputed independent accredited testing laboratory.	Form EXP-3

Note:

- 1) The capabilities of the manufacturers and subcontractors proposed in its Bid for the major items of plant and services to be used by the Bidders will be evaluated for acceptability in accordance with the above evaluation and qualification criteria. Their participation should be confirmed with a letter of intent between the parties, as needed and/or Manufacturer's Authorization Letter. Should a manufacturer or subcontractor be determined to be unacceptable, the Bid will not be rejected, but the Bidder will be required to propose, without changing its Bid price, an acceptable substitute manufacturer or subcontractor meeting the minimum technical specifications stated in Section 6 (Employer's Requirements). If a Bidder does not provide an acceptable substitute manufacturer or subcontractor by the date and time set in the Employer's request for substitution of manufacturer or subcontractor, its Bid may be rejected.
- 2) In the case of a Bidder who offers to supply and install major items of plant under the contract, which the Bidder did not manufacture or otherwise produce, the Bidder shall provide the Manufacturer's authorization, using the form provided in Section 4 (Bidding Forms), showing that the Bidder has been duly authorized by the Manufacturer or producer of the related plant and equipment or component to supply and install that item in the Employer's country. Failure to submit the Manufacturer's authorization at the first instance is considered a minor, nonmaterial omission and shall be subject to clarification. However, failure of the Bidder to submit the omitted authorization shall lead to rejection of the Subcontractor or Manufacturer of the item.
- 3) Sales record and user certificates as appropriate and other documentary evidence to support the experience of the manufacturer of the above items shall also be submitted along with the Bid to substantiate the experience of the proposed manufacturers. Failure to comply with

above requirement will result in rejection of the manufacturer/subcontractor. The manufacturers of above mentioned major items must hold valid ISO 9001 quality certificate.

- 4) The Bidder shall propose the type tested materials. The Successful Bidder shall also submit the type test certificates for each of the above mentioned items. The type test report shall meet the minimum criteria set forth in the Chapter 2- General Technical Requirement, Technical Specification of Section 6- Employers Requirement. In case the type test certificates are not as per the requirement, the successful Bidder shall upon the award of the contract, undertake to carry out the required type tests from an independent laboratory accredited by reputed accreditation agencies or in a laboratory nominated by the Client/Employer at no extra cost to the Client/Employer including any transportation or costs associated with performing such tests.
- 5) The Bidder shall fill the technical data sheet for all the major items as mentioned above. The failure to submit the technical data sheet for the major items shall cause the rejection of the Bid.
- 6) In case of OLTC for the manufacturer other than MR Germany or ABB Sweden:
 - a. The bidder must submit the type test report of the OLTC carried over the last 10 years tested by reputed independent testing laboratory accredited by ILAC or IAF.
 - b. The OLTC manufacturer must hold a valid ISO 9001:2000 certifications.
 - c. The Bidder shall also submit the supply record of the OLTC manufacturer. The OLTC manufacturer must have supplied the OLTC at least twice the Bid quantity of the Power Transformer outside the country of OLTC manufacturer.



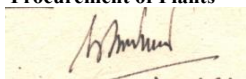
Section 4 - Bidding Forms

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

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Letter of Technical Bid

The Bidder must accomplish the Letter of Bid in its letterhead clearly showing the Bidder's complete

Date:

Bidding No.:

Invitation for Bid No.:

To:.....

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 8;
- (b) We offer to execute in conformity with the Bidding Documents the following Works:
.....
- (c) Our bid shall be valid for a period of . . . ***insert validity period as specified in ITB 18.1*** . . . days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
- (e) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries or any countries **[insert the nationality of the Bidder, including that of all parties that comprise the Bidder if the Bidder is a consortium or association, and the nationality of each Subcontractor and Supplier]; and meet the requirements of ITB 3.7, &3.8 ,**
- (f) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 4.3;
- (g) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.3, other than alternative offers submitted in accordance with ITB 13;
- (h) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by the law of Nepal or official regulations or by Development Partner (if applicable) or by an act of compliance with a decision of the United Nations Security Council;
- (i) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 4.5;⁵
- (j) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;

⁵ Use one of the two options as appropriate.

- (k) Commissions or gratuities, if any, paid or to be paid by us to agents relating to this bid, and to contract execution if we are awarded the contract, are listed below:

Name and address of agents	Amount and currency	Purpose of commission or gratuity
1.		
2.		
[if none, state "none"]		

- (l) We declare that, we including any subcontractors or suppliers for any part of the contract do not have any conflict of interest in the proposed procurement proceedings and we have not been blacklisted as per ITB 3.4 and punished for an offense relating to the concerned profession or business.
- (m) We agree to permit the Employer/DP or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the Employer.
- (n) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 3 (**Evaluation and Qualification Criteria**) and our technical proposal, or as otherwise agreed with the Employer.
- (o) We declare that we are solely responsible for the authenticity of the documents submitted by us. The document and information submitted by us are true and correct. If any document/information given is found to be concealed at a later date, we shall accept any legal actions by the Employer.
- (p) We declare that we have not running contracts more than five (5)⁶ in accordance with ITB 4.10.
- (q) We declare that if the contract is awarded to us, financing for the execution of works under the contract will be available from legal and valid sources.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

⁶ Note: Except contracts accepted and running under any type of foreign assistance, all the contracts accepted and running since 2078-12-03 i.e. March 17, 2022 which are not substantially completed needs to declare.

Letter of Price Bid

-- Note --

The bidder must accomplish the Letter of Price Bid in its letterhead clearly showing the bidder's complete name and address.

Date:

Name of the contract:

Invitation for Bid No.:

To: [. . . insert complete name of the employer . . .]

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Document, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to design, manufacture, test, deliver, install, pre-commission, and commission in conformity with the Bidding Document the following Plant and Services: [. . . insert narrative . . .]
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is the sum of

[amount of foreign currency in words], [amount in figures], and [amount of local currency in words], [amount in figures]

The total bid price from the Grand Summary (Schedule No. 5) should be entered by the Bidder inside this box. Absence of the total bid price in the Letter of Price Bid may result in the rejection of the bid.

- (d) The discounts offered and the methodology for their application are as follows: [. . . insert discounts and methodology for their application if any . . .]
- (e) Our Bid shall be valid for a period of [. . . insert bid validity period as specified in ITB 20.1 of the BDS . . .] days from the date fixed for the submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- (f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document.
- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: ⁷

Name of Recipient	Address	Reason	Amount
.....			
.....			

⁷ If none has been paid or is to be paid, indicate "None."

- (h) We understand that this bid, *together with your written acceptance thereof* included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (j) We declare that we are solely responsible for the authenticity of the documents submitted by us.
- (k) We agree to permit EMPLOYER/DP or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by EMPLOYER/DP.

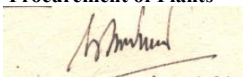
Name

In the capacity of

Signed

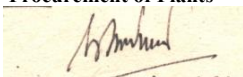
Duly authorized to sign the Bid for and on behalf of

Date



Price Schedules

(Provided in Volume III)



Tables of Adjustment Data

Table A - Local Currency

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	Bidder's Proposed Weighting
	Nonadjustable	---	---	---	a: <u>0.15</u> b: _____ c: _____
Total					1.00

To be entered by the Bidder

Table B - Foreign Currency

Name of Currency: _____

[Insert name of currency. If the Bidder wishes to quote in more than one foreign currency, this table should be repeated for each foreign currency.]

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
	Non-adjustable	---	---	---		a: <u>0.15</u> b: _____ c: _____
Total						1.00

To be entered by the Bidder

Note -

The base date shall be the date 28 days prior to the deadline for submission of the bid.

Tables of Adjustment Data shall only be included if prices are to be quoted as adjustable prices in accordance with ITB 14.6.

Bid Security Bank Guarantee

Bank's Name, and Address of Issuing Branch or Office

(On Letter head of the Commercial bank or any Financial Institution eligible to issue Bank Guarantee as per prevailing Law)

Beneficiary: name and address of Employer

Date:

Bid Security No.:

We have been informed that [insert name of the Bidder] (hereinafter called “the Bidder”) intends to submit its bid (hereinafter called “the Bid”) to you for the execution of name of Contract under Invitation for Bids No. (“the IFB”).

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we..... name of Bank. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of amount in figures (. amount in words) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has withdrawn or modifies its Bid during the period of bid validity specified by the Bidder in the Form of Bid; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter “the ITB”); or
- (c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, in accordance with the ITB.
- (d) is involved in fraud and corruption in accordance with the ITB

This guarantee will remain in force up to and including the date number..... days after the deadline for submission of Bids as such deadline is stated in the instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

This Bank guarantee shall not be withdrawn or released merely upon return of the original guarantee by the Bidder unless notified by you for the release of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758.

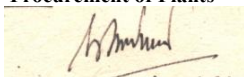
. . . Bank's seal and authorized signature(s) . . .

Note:

The bid security of has been counter guaranteed by the Bank on (Applicable for Bid Security of Foreign Banks).

Technical Proposal Format

1. Personnel
2. Equipment
3. Site Organization
4. Method Statement
5. Mobilization Schedule
6. Construction Schedule
7. Schedule of Sub Contractors
8. Manufacturer's Authorization
9. Functional Guarantee of the Proposed Facilities
10. Others



1. Personnel

Form PER – 1: Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements for each of the positions listed in Section 3 (Evaluation and Qualification Criteria). The data on their experience should be supplied using the Form below for each candidate.

No.	Name	Position*	Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
1.					
2.					
3.					
4.					
5.					

*As listed in Section 3 (Evaluation and Qualification Criteria).

Form PER – 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below.

Position[±]		
Personal Information	Name	Date of Birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager/personnel officer)
	Fax	E-mail
	Job title	Years with present employer

Summarize professional experience over the last twenty years in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From [±]	To [±]	Company, Project, Position and Relevant Technical and Management Experience [±]

2. Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III (Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder. The Bidder shall provide all the information requested below, to the extent possible.

For the equipment under Bidder's ownership

No.	Equipment Type and Characteristics	Total Nos. of Equipment under Bidder's Ownership	No. of Equipment engaged/proposed for ongoing/committed contracts	Nos. of Equipment proposed for this contract
1.				
2.				
3.				
4.				
5.				

(i) For the Equipment to be leased/hired

No.	Equipment Type and Characteristics	Total Nos. of Equipment under the ownership of lease/hire provider	No. of Equipment engaged/committed for other works	Nos. of Equipment proposed to be leased/hired for this contract
1.				
2.				
3.				
4.				
5.				

Type of Equipment*		
Equipment Information	Name of manufacturer	Model and power rating
	Capacity*	Year of manufacture
Current Status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured	

The following information shall be provided only for equipment not owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title

	Fax	email
Agreements	Details of rental / lease / manufacture agreements specific to the project	

Note:

In case of e-submission the “Agreements” shall be submitted on notification by the Employer as per ITB 27.1

3. Site Organization

The Bidder shall show here in an Organogram format the organization of his site personnel showing clearly designated duties and responsibilities and the chain of command throughout the structure. Included in the chart shall be the names of respective personnel.

4. Method Statement

The Bidder shall provide here a brief description of how the Works are to be undertaken. The description shall indicate how each activities are to be undertaken.

5. Mobilization Schedule

The Bidder shall provide here a general description of the arrangements and methods which he proposes to adopt for the execution of the Works which shall include but not be limited to:-

- i) Mobilization period including periods required for establishing the Contractor's offices, workshops etc. and the facilities required for the Engineer and his staff.
- ii) Sources of Contractor's equipment and mobilization periods for items of plant.
- iii) Mobilization procedure for the detailed site investigation and design works.

6. Construction Schedule

The Bidder shall provide here his proposed programme for construction of the Works within the Time for Completion. The programme shall be presented in the form of a bar chart showing main construction activities with **Milestones**. Associated groups of construction equipment shall be listed.

7. Schedule of Subcontractors

The bidder shall enter in the following table a list of the sections and appropriate value of the work for which he proposes to use subcontractors, together with the names and addresses of the proposed subcontractors. The bidder shall also enter a statement of similar works previously executed by the proposed subcontractors, including description, location and value of work, year completed, and name and address of the employer/engineer.

Item Nos.	Description of work	Approximate value (US\$ or equivalent)	Name and address of Subcontractor	Statement of similar works executed

Notwithstanding such information the bidder, if awarded the Contract, shall remain entirely and solely responsible for the satisfactory completion of the Works.

8. Others (insert additional requirement if applicable]

Bidder's Qualification

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

Form ELI – 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of JV, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents. 1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. 2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2. 3. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. 4. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITB 4.5.	

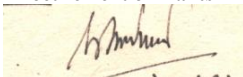
Signature of Bidder

Form ELI - 2: JV Information Sheet

Each member of a JV must fill out this form separately.

JV / Specialist Subcontractor Information	
Bidder's legal name	
JV Partner's or Subcontractor's legal name	
JV Partner's or Subcontractor's country of constitution	
JV Partner's or Subcontractor's year of constitution	
JV Partner's or Subcontractor's legal address in country of constitution	
JV Partner's or Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents. - Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. - Authorization to represent the firm named above, in accordance with ITB 20.2. - In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.	

Signature of the Bidder



FORM: POWER OF ATTORNEY FOR JOINT VENTURE

KNOW ALL MEN BY THESE PRESENTS THAT WE , the Partners whose details are given hereunder have formed a Joint Venture under the laws of(*)/intend to form a Joint Venture(*) [(*) delete whichever is not applicable] and having our Registered Office(s)/Head Office(s) at (hereinafter called the 'Joint Venture' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting through M/s being the Partner in-charge do hereby constitute, nominate and appoint M/s..... a Company incorporated under the laws of and having its Registered/Head Office at as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorized Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Joint Venture in regard to **IFB No. (Work name)**, the bids invited by Nepal Electricity Authority, Grid Operation Department (hereinafter called the 'Employer') to undertake the following acts:

- i) To sign and submit proposal and participate in the aforesaid Bid Specification of the Employer on behalf of the "Joint Venture".
- ii) To negotiate with the Employer the terms and conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the Employer for and on behalf of the "Joint Venture".
- iii) To do any other act or submit any document related to the above.
- iv) To receive, accept and execute the Contract for and on behalf of the "Joint Venture".

For the above purpose, the person(s) authorized by the Partner In-charge shall be the person(s) authorized to act on behalf of the "Joint Venture" as per the Power of Attorney given to him/her/them by the Partner In-Charge,

It is clearly understood that all the partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and the Partner In-charge (Lead Partner) shall ensure performance of the Contract(s) and if one or more Partner fail to perform their respective portions of the Contract(s), the same shall be deemed to be a default by all the Partners.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Defect Liability Period in terms of the Contract.

The Joint Venture hereby agrees and undertakes to ratify and confirm all the whatsoever the said Attorney/Authorized Representatives/Partner in-charge quotes in the bid, negotiates and signs the Contract with the Employer and/or proposes to act on behalf of the Joint Venture by virtue of this Power of Attorney and the same shall bind the Joint Venture as if done by itself.

IN WITNESS THEREOF the Partners Constituting the Joint Venture as aforesaid have executed these presents on this..... day of under the Common Seal(s) of their Companies.

For and on behalf of the

Partners of Joint Venture

.....

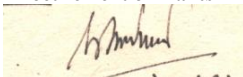
The Common Seal of the above Partners of the Joint Venture:

The Common Seal has been affixed there unto in the presence of:
WITNESS

1. Signature.....
Name
Designation
Occupation

2. Signature.....
Name
Designation
Occupation

Note: Bidder may use their own proforma for furnishing the Power of Attorney in support of person signing the in case of sole bidder.



FORM: FOR UNDERTAKING BY THE JOINT VENTURE PARTNERS

THIS JOINT DEED OF UNDERTAKING executed on this _____ day of _____ Two Thousand and _____ by _____ a company incorporated under the laws of _____ and having its Registered Office at _____ (hereinafter called the "Party No.1" which expression shall include its successors, executors and permitted assigns) and M/s _____ a company incorporated under the laws of _____ and having its Registered Office at _____ (Hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns) and M/s..... a Company incorporated under the laws of _____ and having its Registered Office at _____ (hereinafter called the "Party No.3" which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract"_{in case of award}] against the IFB No _____ for _____ (.) _____ associated with Nepal Electricity Authority, Grid Operation Department (hereinafter called the "Employer").

WHEREAS the Party No.1, Party No.2 and Party No.3 have entered into an Agreement dated _____

AND WHEREAS the Employer invited bids as per the above mentioned Specification for the design, manufacture, supply, erection, testing and commissioning of Equipment/ Materials stipulated in the bidding documents under (insert name of the IFB along with project/employer name)

AND WHEREAS Clause 4.1, Section-ITB and 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria forming part of the bidding documents, inter-alia, stipulates that an Undertaking of two or more qualified partners, meeting the requirements of 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria, as applicable may bid, provided, the Joint Venture fulfills all other requirements under Clause 4.1 (a) and (b) of ITB and 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria and in such a case, the Letter of Bid (Bid Form) shall be signed by the Partner –In Charge so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract and all obligations hereunder.

The above clause further states that this Undertaking shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Employer vide proposal No.....dated..... by Party No.1 based on this Undertaking between all the parties; under these presents and the bid in accordance with the requirements of Clause 4.1, Section-ITB and 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria, has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Deed of Undertaking do hereby declare and undertake:

1. In requirement of the award of the Contract by the Employer to the Joint Venture Partners, we, the Parties do hereby undertake that M/s..... the Party No.1, shall act as Lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Employer for the successful

performance of the Contract and shall be fully responsible for the design, manufacture, Supply, and successful performance of the equipment in accordance with the Contract:

2. In case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party (s) does hereby undertake to be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.
3. Further, if the Employer suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents undertake to promptly make good such loss or damages caused to the Employer, on its demand without any demur. It shall not be necessary or obligatory for the Employer to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(s), the Employer can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Employer.
4. The financial liability of the Parties of this Deed of Undertaking to the Employer, with respect to any of the claims rising out of the performance or non-performance of the obligations set forth in this Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of this Deed of Undertaking.
5. It is expressly understood and agreed between the Parties to this Undertaking that the responsibilities and obligations of each of the Parties shall be as delineated in **Appendix – I (to be suitably appended by the Parties along with this undertaking in its bid)**. It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract.
6. It is also understood that this Undertaking is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract if awarded and that this Undertaking shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Undertaking or on the Joint Venture, other than the express provisions of the Contract.
7. This Undertaking shall be construed and interpreted in accordance with the provisions of the Contract.
8. In case of an award of a Contract, we the parties to this Deed of Undertaking do hereby agree that we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favour of the Employer in the currency/currencies of the Contract.
9. It is further agreed that this Deed of Undertaking shall be irrevocable and shall form an integral part of the bid and shall continue to be enforceable till the Employer discharges the same or upon the completion of the Contract in accordance with its provisions, whichever is earlier. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Deed of Undertaking have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of _____ (For party No 1)

Has been affixed in our presence pursuant to Board of Director's Resolution

Dated _____

Name _____

Designation _____

for and on behalf of M/s _____

Signature _____

(Signature of the authorized representative)

WITNESS:

I.

II.

Common Seal of _____

(For party No 2)

Has been affixed in\our presence pursuant to Board of Director's Resolution

Dated _____

Name _____

Designation _____

Signature _____

for and on behalf of M/s _____

(Signature of the authorized representative)

WITNESS:

I.

II.

Common Seal of _____

(For party No 3)

Has been affixed in\our presence pursuant to Board of Director's Resolution

Dated _____

Name _____

Designation _____

Signature _____

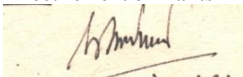
for and on behalf of M/s _____

(Signature of the authorized representative)

WITNESS:

I.

II.



FORM: LETTER OF INTENT BY JV PARTNERS TO ENTER INTO JV AGREEMENT

THIS LETTER OF INTENT signed on this _____ day of _____ Two Thousand and _____ by _____ a company incorporated under the laws of _____ and having its Registered Office at _____ (hereinafter called the "Party No.1" which expression shall include its successors, executors and permitted assigns) and M/s _____ a company incorporated under the laws of _____ and having its Registered Office at _____ (hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns) and M/s _____ a Company incorporated under the laws of _____ and having its Registered Office at _____ (hereinafter called the "Party No.3" which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" {in case of award}] against the IFB No _____ for _____ (.) _____ associated with _____ of Nepal Electricity Authority, Grid Operation Department (hereinafter called the "Employer").

WHEREAS the Party No.1, Party No.2 and Party No.3 intend to enter into a Joint Venture Agreement AND WHEREAS the Employer invited bids as per the above mentioned Specification for the design, manufacture, Supply of Equipment Materials stipulated in the bidding documents under _____ (.) _____ associated with _____.

AND WHEREAS Clause 4.1, Section-ITB and 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria forming part of the bidding documents, inter-alia, stipulates that two or more qualified partners, meeting the requirements of 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria, as applicable may bid, provided, they submit a Letter of Intent to enter into Joint Venture Agreement and the Joint Venture Partners fulfill all other requirements under Clause 4.1 (a) and (b) of ITB and 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria and in such a case, the Letter of Bid (Bid Form) shall be signed by all the proposed partners so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract by entering into Joint Venture Agreement as per proforma specified in this Section IV. Bidding Forms of the Bidding Documents which will be legally binding on all partners and all obligations hereunder.

The above clause further states that this Letter of Intent shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Employer vide proposal No _____ dated _____ by Party No.1 based on this Letter of Intent between all the parties; under these presents and the bid in accordance with the requirements of Clause 4.1, Section-ITB and 'Qualification Requirement of the Bidder', Section-Evaluation and Qualification Criteria, has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Letter of Intent do hereby declare and undertake:

1. In requirement of the award of the Contract by the Employer to the Joint Venture Partners, we, the Parties do hereby undertake that M/s..... the Party No.1, shall act as Lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Employer for the successful performance of the Contract and shall be fully responsible for the design, manufacture, Supply, and successful

performance of the equipment in accordance with the Contract for which we shall enter into Joint Venture Agreement as per proforma specified in this Section IV. Bidding Forms of the Bidding Documents which will be legally binding on all partners:

2. If the Contract is awarded to Joint Venture then in case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party(s) will be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.
3. Further, if the Employer suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents will promptly make good such loss or damages caused to the Employer, on its demand without any demur. It shall not be necessary or obligatory for the Employer to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(s), the Employer can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Employer.
4. The financial liability of the Parties of the Deed of Undertaking to the Employer in the event of award of Contract on the Joint Venture, with respect to any of the claims rising out of the performance or non-performance of the obligations set forth in the Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of the Deed of Undertaking.
5. It is expressly understood and agreed between the Parties to this Letter of Intent that the responsibilities and obligations of each of the Parties shall be as delineated in **Appendix – I (to be suitably appended by the Parties along with this Letter of Intent in its bid)**. It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract in the event of award on Joint Venture.
6. It is also understood that this Letter of Intent is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract if awarded and that this Letter of Intent shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Letter of Intent or on the Joint Venture, other than the express provisions of the Contract.
7. This Letter of Intent shall be construed and interpreted in accordance with the provisions of the Contract.
8. In case of an award of a Contract, we the parties to this Letter of Intent do hereby agree that we shall enter into Joint Venture Agreement as per proforma specified in this Section IV. Bidding Forms of the Bidding Documents which will be legally binding on all partners and we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favour of the Employer in the currency/currencies of the Contract.
9. It is further agreed that this Letter of Intent shall be irrevocable and shall form an integral part of the bid. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Letter of Intent have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of _____ (For party No 1)

Has been affixed in our presence pursuant to Board of Director's Resolution

Dated _____

Name _____

Designation _____

Signature _____

for and on behalf of M/s _____

(Signature of the authorized representative)

WITNESS:

I.

II.

Common Seal of _____ (For party No 2)

Has been affixed in our presence pursuant to Board of Director's Resolution

Dated _____

Name _____

Designation _____

Signature _____

for and on behalf of M/s _____

(Signature of the authorized representative)

WITNESS:

I.

II.

Common Seal of _____ (For party No 3)

Has been affixed in our presence pursuant to Board of Director's Resolution

Dated _____

Name _____

Designation _____

Signature _____

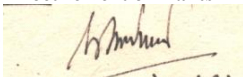
for and on behalf of M/s _____

(Signature of the authorized representative)

WITNESS:

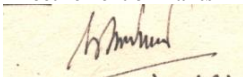
I.

II.



APPENDIX-I to the FORM OF JV AGREEMENT

SN	Description	Lead Partner in JV	Other partner in JV
1	Share Percentage in JV		
2	Roles and Responsibilities		



Form ELI - 3: Bidder's Running Contracts⁸ in Nepal

Each member of a JV must fill in this form

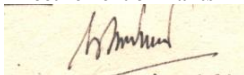
Bidder's Running Contracts				
Name of office	Contract Identification no.	Date of issuance of Letter of Acceptance	Status of contract**	Date of Issuance of Taking Over Certificate**

* Mention GON funded or DP funded or Other PE (Insert name) funded

** Mention "Yet to sign" if contract is not signed, "Running" if contract has been signed and contract is running and "Substantially completed" if taking over certificate has been issued.

** Insert date of issuance of taking over certificate if the awarded contract has been substantially completed and taking over certificate has been issued.

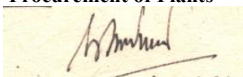
⁸ Only the contracts accepted since 2078-12-03 i.e. March 17, 2022 are to be mentioned.



Form LIT - 1: Pending Litigation

Each Bidder or member of a JV must fill in this form

Pending Litigation			
☐ ☐ ☐ No pending litigation in accordance with Criteria 2.2 of Section 3 (Evaluation and Qualification Criteria)			
☐ Pending litigation in accordance with Criteria 2.2 of Section 3 (Evaluation and Qualification Criteria)			
Year	Matter in Dispute	Value of Pending Claim in US\$ Equivalent	Value of Pending Claim as a Percentage of Net Worth



Form FIN - 1: Financial Situation

Each Applicant or member of a JV must fill in this form

Financial Data for Previous 5 Years [in NRs or Equivalent US\$]					
	Year 1	Year2	Year3	Year4	Year5

Information from Balance Sheet

Total Assets					
Total Liabilities					
Net Worth					
Current Assets					
Current Liabilities					

Information from Income Statement

Total Revenues					
Profits Before Taxes					
Profits After Taxes					

- ☐ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last two to five years, as indicated above, complying with the following conditions.
- All such documents reflect the financial situation of the Applicant or partner to a JV, and not sister or parent companies.
 - Historic financial statements must be audited by a certified accountant.
 - Historic financial statements must be complete, including all notes to the financial statements.
 - Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Note: Attested Financial reports, including balance sheets, profit and loss statements and auditors reports for the last 5 years should be attached.

In case of e-submission the attachments should not be uploaded but shall be submitted on notification by the Employer as per ITB 27.

Form FIN - 2: Average Annual Construction Turnover

Each Bidder or member of a JV must fill in this form

The information supplied should be the Annual Turnover of the Bidder or each member of a JV in terms of the amounts billed to clients for each year for work in progress or completed in NRs or in US Dollars in case of foreign bidders at the rate of exchange **at the end of the period reported.**

Annual Turnover Data for the Last 10 Years (Construction only)			
Year	Amount Currency	Exchange Rate	US\$ Equivalent
Average Annual Construction Turnover			

Form FIN - 3: Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Section III (Evaluation and Qualification Criteria).

Financial Resources		
No.	Source of financing	Amount (in NRS)
1		
2		
3		

Form FIN - 4: Bid Capacity

Each Bidder or member of a JV must fill in this form

$$\text{Bid Capacity} = [(5 \times A) - B]$$

A = Average Annual Turnover of best three years out of last ten fiscal years.

B = Annual Value of the existing commitments and works (ongoing) to be completed, calculated from **FIN-4**.

SN	Name of Bidder	PAN No.	A, in Million	B, in Million	Bid Capacity, in Million
1					
2					
3					

Total Bid Capacity:

Signature of Bidder

Form FIN-5: Current Contract Commitments / Works in Progress

Bidders and each partner to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments (For Calculation of B with reference of FIN-3)									
No.	Name of Contract	Name of the Contractor/s	Employer's Contact Address, Tel, Fax	Contract Share in % (a)	Contract Amount in Millions (b)	Contract Date (yyyy-mm) (c)	Initial or Revised Contract Duration (months) (d)	Value of outstanding works [In Millions, NRs]# (e)	Estimated Time in Month to Complete the outstanding works (f) = (c) + (d) – Date of Invitation of Bid (f)
1									
2									
3									
4									

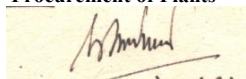
Signature of Bidder

The Outstanding Works means Contract Price (excluding Vat) minus Work Evaluated by Employer till the reference date. Bidder shall have to submit the relevant documentary evidence to substantiate the facts/figures.

Note 1: “B” shall be calculated as : $B = \sum \left[\frac{(e) \times (a)}{(f)} \right] \times 12$, If (f) is less than 12, then value of (f) shall be taken as 12.

Note 2: If Initial or Revised Contract Date is run out with respect to Date of Invitation of Bid, the Estimated Time in Month to Complete the outstanding works shall be taken equal to 12 months.

Procurement of Plants



Standard Bidding Document-ICB

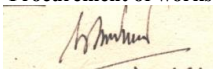


Form EXP – 1: General Construction Experience

Each Bidder or member of a JV must fill in this form

General Construction Experience				
Starting Month Year	Ending Month Year	Years	Contract Identification and Name Name and Address of Employer Brief Description of the Works Executed by the Bidder	Role of Bidder

Procurement of works




Standard Bidding Document-ICB

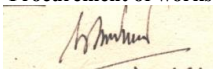


Form EXP – 2 (a): Specific Construction Experience

Fill up one (1) form per contract.

Contract of Similar Size and Nature			
Contract No of	Contract Identification		
Award Date		Completion Date	
Role in Contract	☐ Contractor	☐ Management Contractor	☐ Subcontractor
Total Contract Amount	US\$		
If partner in a JV or subcontractor, specify participation of total contract amount	Percent of Total	Amount	
Employer's Name Address Telephone/Fax Number E-mail			
Description of the similarity in accordance with Criteria 2.4.2(a) of Section 3			
must meet requirement			

Procurement of works




Standard Bidding Document-ICB

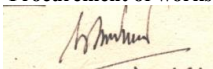


Form EXP – 2 (b): Specific Construction Experience in Key Activities

Fill up one (1) form per contract

Contract with Similar Key Activities			
Contract No of	Contract Identification		
Award Date		Completion Date	
Role in Contract	☐ Contractor	☐ Management Contractor	☐ Subcontractor
Total Contract Amount	US\$		
If partner in a JV or subcontractor, specify participation of total contract amount	Percent of Total	Amount	
Employer's Name Address Telephone Number Fax Number E-mail			
Description of the key activities in accordance with Criteria 2.4.2(b) of Section 3			

Procurement of works




Standard Bidding Document-ICB

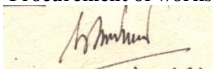


Form EXP - 3: Subcontractors / Manufacturers

Fill out one (1) form per contract.

Contract for the Major Items		
Contract No of	Contract Identification	
Award Date		Completion Date
Role in Contract	☐ Contractor ☐ Management Contractor ☐ Subcontractor	
Total Contract Amount	\$	
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's name Address Telephone number Fax number E-mail		
Description of the Major Items in Accordance with Criterion 2.7 of Section 3 (Evaluation and Qualification Criteria)		

Procurement of works




Standard Bidding Document-ICB



Manufacturer's Authorization

Date: *[insert date (as day, month and year) of bid submission]*

ICB No.: *[insert number of bidding process]*

To: *[insert complete name of the employer]*

WHEREAS

We *[insert complete name of the manufacturer or manufacturer's authorized agent]*, who are official manufacturers or agent authorized by the Manufacturer of *[insert type of goods manufactured]*, having factories at *[insert full address of manufacturer's factories]*, do hereby authorize *[insert complete name of the bidder]* to submit a bid the purpose of which is to provide the following goods, manufactured by us *[insert name and/or brief description of the goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 27 of the General Conditions of Contract, with respect to the goods offered by the above firm.

Signed: *[insert signature(s) of authorized representative(s) of the manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the manufacturer]*

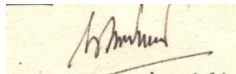
Title: *[insert title]*

Duly authorized to sign this Authorization on behalf of *[insert complete name of the manufacturer]*

Dated on day of, *[insert date of signing]*

--Note--

The bidder shall require the manufacturer to fillout this form in accordance with the instructions indicated. This letter of authorization should be signed by a person with the proper authority to sign documents that are binding on the manufacturer. The bidder shall include it in its bid, if so indicated in the BDS.



Functional Guarantees of the Proposed Facilities

The Bidder shall furnish guaranteed No Load, Full Load and the Cooling Fan Loss (if applicable) value at rated full load capacity of the Transformer along with the Technical Bid for all rating of the Power Transformers. Failure to submit the loss figures may result in rejection of the Bid.

1) 132/33kV, 80/100 MVA, 3-phase Power Transformer

S. No.	Functional Guarantee	Unit	Value of Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss at 75 degree C for full load Operation on Maximum MVA base	kW	
	Total Losses		

2) 132/66kV, 63MVA, 3-phase Power Transformer

S. No.	Functional Guarantee	Unit	Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss at 75 degree C for full load Operation on Maximum MVA base	kW	
	Total Losses		

3) 132/33kV, 63MVA, 3-phase Power Transformer

S. No.	Functional Guarantee	Unit	Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss at 75 degree C for full load Operation on Maximum MVA base	kW	
	Total Losses		

4) 132/66kV, 45MVA, 3-phase Power Transformer

S. No.	Functional Guarantee	Unit	Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss at 75 degree C for full load Operation on Maximum MVA base	kW	
	Total Losses		

5) 132/11kV, 45MVA, 3-phase Power Transformer

S. No.	Functional Guarantee	Unit	Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss at 75 degree C for full load Operation on Maximum MVA base	kW	
	Total Losses		

6) 66/11kV, 30MVA, 3-phase Power Transformer

S.No.	Functional Guarantee	Unit	Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss at 75 degree C for full load Operation on Maximum MVA base	kW	
	Total Losses		

Loss Capitalization

The guaranteed transformer losses will be capitalized as follows for evaluation purpose:

- i) No load losses: US\$ 4,684 per kW
- ii) Load losses: US\$ 1,180 per kW
- iii) Loss associated with cooling fan load: US\$ 393 per kW

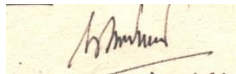
Guaranteed Values Not Reached

If the individual losses of a power transformer as measured during test exceeds the values guaranteed in the Bid, then for each kilowatt of losses in excess of the losses guaranteed, an amount at the rates of twice the rates specified above for no-load losses and load-losses shall be deducted from the Contract Price of the successful Bidder.

Performance Guarantee

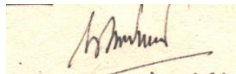
The performance figures quoted on Technical Data Sheet and/or Functional Guarantee Form shall be guaranteed within the tolerances permitted by relevant standards listed under section of General Technical Specifications, and shall become a part of the successful Tenderer's Contract. In case of loss capitalization, no tolerance shall be permitted for the guaranteed value.

Note: *The transformer will be rejected, if the measured no-load and load losses (excluding fan loss) exceed the guaranteed value by over 15 % even if the total losses do not exceed 10% as specified.*



Section 5 - Eligible Countries

All Countries are eligible unless otherwise restriction by the Government of Nepal (GoN).



Part II

Section 6 - Employer’s Requirements

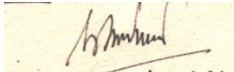
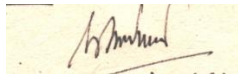


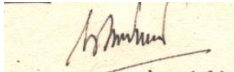
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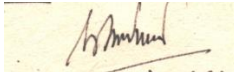
1. Scope of Supply of Plant and Services

(Provided in Volume II)



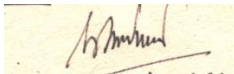
2. Specifications

(Provided in Volume II)



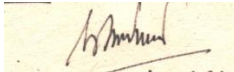
3. Drawings

(Provided in Volume II)

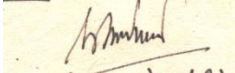


4. Supplementary Information

(Provided in Volume II)



5. Certificates



5.1 Form of Completion Certificate

Contract: [. . . .insert name of contract and contract identification details. . . .]

Date:

Certificate No.:

To: [. . . .insert name and address of contractor. . . .]

Dear Ladies and/or Gentlemen,

Pursuant to GCC Clause 24 (Completion of the Facilities) of the General Conditions of the Contract entered into between yourselves and the Employer dated [. . . .insert date. . . .], relating to the [. . . .brief description of the Facilities], we hereby notify you that the following part(s) of the Facilities was (were) complete on the date specified below, and that, in accordance with the terms of the Contract, the Employer hereby takes over the said part(s) of the Facilities, together with the responsibility for care and custody and the risk of loss thereof on the date mentioned below.

1. Description of the Facilities or part thereof: [. . . .description]
2. Date of Completion: [. . . .date]

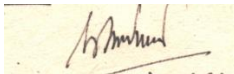
However, you are required to complete the outstanding items listed in the attachment hereto as soon as practicable.

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

[. . . .Signature]

Project Manager



5.2 Form of Operational Acceptance Certificate

Contract: [. . . .insert name of contract and contract identification details.]

Date:

Certificate No.:

To: [. . . .insert name and address of contractor.]

Pursuant to GCC Subclause 25.3 (Operational Acceptance) of the General Conditions of the Contract entered into between yourselves and the Employer dated [. . .date. . .], relating to the [. . .brief description of the facilities. . .], we hereby notify you that the Functional Guarantees of the following part(s) of the Facilities were satisfactorily attained on the date specified below.

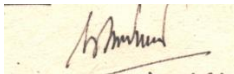
1. Description of the Facilities or part thereof: [. . . description . . .]
2. Date of Operational Acceptance: [. . . date . . .]

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

[. . . .Signature]

Project Manager



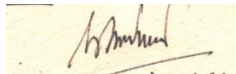
6. Change Orders

6.1 Change Order Procedure

- 6.1.1 General
- 6.1.2 Change Order Log
- 6.1.3 References for Changes

6.2. Change Order Forms

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- 6.2.2 Estimate for Change Proposal
- 6.2.3 Acceptance of Estimate
- 6.2.4 Change Proposal
- 6.2.5 Change Order
- 6.2.6 Pending Agreement Change Order
- 6.2.7 Application for Change Proposal



6.1. Change Order Procedure

6.1.1 General

This section provides samples of procedures and forms for implementing changes in the Facilities during the performance of the Contract in accordance with GCC Clause 39 (Change in the Facilities) of the General Conditions.

6.1.2 Change Order Log

The Contractor shall keep an up-to-date Change Order Log to show the current status of Requests for Change and Changes authorized or pending. Entries of the Changes in the Change Order Log shall be made to ensure that the log is up-to-date. The Contractor shall attach a copy of the current Change Order Log in the monthly progress report to be submitted to the Employer.

6.1.3 References for Changes

- (1) Request for Change as referred to in GCC Clause 39 shall be serially numbered CR-X-nnn.
- (2) Estimate for Change Proposal as referred to in GCC Clause 39 shall be serially numbered CN-X-nnn.
- (3) Acceptance of Estimate as referred to in GCC Clause 39 shall be serially numbered CA-X-nnn.
- (4) Change Proposal as referred to in GCC Clause 39 shall be serially numbered CP-X-nnn.
- (5) Change Order as referred to in GCC Clause 39 shall be serially numbered CO-X-nnn.

Note:

- (a) Requests for Change issued from the Employer’s Home Office and the Site representatives of the Employer shall have the following respective references:

Home Office	CR-H-nnn
Site	CR-S-nnn

- (b) The above number “nnn” is the same for Request for Change, Estimate for Change Proposal, Acceptance of Estimate, Change Proposal and Change Order.

6.2 Change Order Forms

6.2.1 Request for Change Proposal Form

[Employer's letterhead]

To: [Contractor's name and address]

Date:

Attention: [Name and title]

Contract Name: [Contract name]

Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

With reference to the captioned Contract, you are requested to prepare and submit a Change Proposal for the Change noted below in accordance with the following instructions within [number] days of the date of this letter [or on or before (date)].

1. Title of Change: [Title]
2. Change Request No./Rev.: [Number]
3. Originator of Change:
Employer: [Name]
Contractor (by Application for Change Proposal No. [Number Refer to Annex 6.2.7])
4. Brief Description of Change: [Description]
5. Facilities and/or Item No. of equipment related to the requested Change: [Description]
6. Reference drawings and/or technical documents for the request of Change:

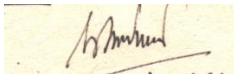
Drawing No./Document No.	Description
7. Detailed conditions or special requirements on the requested Change: [Description]
8. General Terms and Conditions:
 - (a) Please submit your estimate showing what effect the requested Change will have on the Contract Price.
 - (b) Your estimate shall include your claim for the additional time, if any, for completing the requested Change.
 - (c) If you have any opinion that is critical to the adoption of the requested Change in connection with the conformability to the other provisions of the Contract or the safety of the Plant or Facilities, please inform us in your proposal of revised provisions.
 - (d) Any increase or decrease in the work of the Contractor relating to the services of its personnel shall be calculated.
 - (e) You shall not proceed with the execution of the work for the requested Change until we have accepted and confirmed the amount and nature in writing.

[Employer's name]

[Signature]

[Name of signatory]

[Title of signatory]



6.2.2 Estimate for Change Proposal Form

[Contractor's letterhead]

To: [Employer's name and address]

Date:

Attention: [Name and title]

Contract Name: [Contract name]

Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

With reference to your Request for Change Proposal, we are pleased to notify you of the approximate cost to prepare the below-referenced Change Proposal in accordance with GCC Subclause 39.2.1 of the General Conditions. We acknowledge that your agreement to the cost of preparing the Change Proposal, in accordance with GCC Subclause 39.2.2, is required before estimating the cost for change work.

1. Title of Change: [Title]
2. Change Request No./Rev.: [Number]
3. Brief Description of Change: [Description]
4. Scheduled Impact of Change: [Description]
5. Cost for Preparation of Change Proposal: [insert costs, which shall be in the currencies of the contract]

(a) Engineering (Amount)

(i) Engineer _____ hours (hrs) x _____ rate/hr = _____

(ii) Draftsperson _____ hrs x _____ rate/hr = _____

Sub-total _____ hrs _____

Total Engineering Cost _____

(b) Other Cost _____

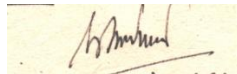
Total Cost (a) + (b) _____

[Contractor's name]

[Signature]

[Name of signatory]

[Title of signatory]



6.2.3 Acceptance of Estimate Form

[*Employer's letterhead*]

To: [*Contractor's name and address*]

Date:

Attention: [*Name and title*]

Contract Name: [*Contract name*]

Contract Number: [*Contract number*]

Dear Ladies and/or Gentlemen:

We hereby accept your Estimate for Change Proposal and agree that you should proceed with the preparation of the Change Proposal.

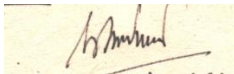
1. Title of Change: [*Title*]
2. Change Request No./Rev.: [*Request number/revision*]
3. Estimate for Change Proposal No./Rev.: [*Proposal number/revision*]
4. Acceptance of Estimate No./Rev.: [*Estimate number/revision*]
5. Brief Description of Change: [*Description*]
6. Other Terms and Conditions: In the event that we decide not to order the Change accepted, you shall be entitled to compensation for the cost of preparing the Change Proposal described in your Estimate for Change Proposal mentioned in para. 3 above in accordance with GCC Clause 39 of the General Conditions.

[*Employer's name*]

[*Signature*]

[*Name of signatory*]

[*Title of signatory*]



6.2.4 Change Proposal Form[*Contractor's letterhead*]To: [*Employer's name and address*]

Date:

Attention: [*Name and title*]Contract Name: [*Contract name*]Contract Number: [*Contract number*]

Dear Ladies and/or Gentlemen:

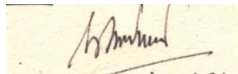
In response to your Request for Change Proposal No. [Number], we hereby submit our proposal as follows:

1. Title of Change: [*Name*]
2. Change Proposal No./Rev.: [*Proposal number / revision*]
3. Originator of Change: Employer: [*Name*] / Contractor: [*Name*]
4. Brief Description of Change: [*Description*]
5. Reasons for Change: [*Reason*]
6. Facilities and/or Item No. of Equipment related to the requested Change: [*Facilities*]
7. Reference drawings and/or technical documents for the requested Change:
[*Drawing/Document No./Description*]
8. Estimate of increase/decrease to the Contract Price resulting from the Change Proposal:

Amount

[*insert amounts in the currencies of the**Contract*]

(a) Direct material	_____
(b) Major construction equipment	_____
(c) Direct field labor (Total hrs)	_____
(d) Subcontracts	_____
(e) Indirect material and labor	_____
(f) Site supervision	_____
(g) Head office technical staff salaries	_____



Section 6 – Employer’s Requirement**6-16**

Process engineer _____ hrs @ _____ rate/hr _____
Project engineer _____ hrs @ _____ rate/hr _____

Equipment engineer _____ hrs @ _____ rate/hr _____

Procurement _____ hrs @ _____ rate/hr _____

Draftsperson _____ hrs @ _____ rate/hr _____
Total _____ hrs _____

- (h) Extraordinary costs (computer, travel, etc.) _____
(i) Fee for general administration, % of Items _____
(j) Taxes and customs duties _____

Total lump sum cost of Change Proposal [Sum of items (a) to (j)]

Cost to prepare Estimate for Change Proposal [Amount payable if Change is not accepted]

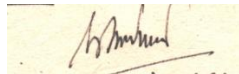
9. Additional time for Completion required due to Change Proposal
10. Effect on the Functional Guarantees
11. Effect on the other terms and conditions of the Contract
12. Validity of this Proposal: within [Number] days after receipt of this Proposal by the Employer
13. Other terms and conditions of this Change Proposal:
(a) You are requested to notify us of your acceptance, comments or rejection of this detailed Change Proposal within [Number] days from your receipt of this Proposal.
(b) The amount of any increase and/or decrease shall be taken into account in the adjustment of the Contract Price.
(c) Contractor's cost for preparation of this Change Proposal: [. . . .insert amount. This cost shall be reimbursed by the employer in case of employer's withdrawal or rejection of this Change Proposal without default of the contractor in accordance with GCC Clause 39 of the General Conditions]

[Contractor's name]

[Signature]

[Name of signatory]

[Title of signatory]



6.2.5 Change Order Form[*Employer's letterhead*]To: [*Contractor's name and address*]

Date:

Attention: [*Name and title*]Contract Name: [*Contract name*]Contract Number: [*Contract number*]

Dear Ladies and/or Gentlemen:

We approve the Change Order for the work specified in the Change Proposal (No. [*number*]), and agree to adjust the Contract Price, Time for Completion, and/or other conditions of the Contract in accordance with GCC Clause 39 of the General Conditions.

1. Title of Change: [*Name*]
2. Change Request No./Rev.: [*Request number / revision*]
3. Change Order No./Rev.: [*Order number / revision*]
4. Originator of Change: Employer: [*Name*] / Contractor: [*Name*]
5. Authorized Price:
Ref. No.: [*Number*] Date: [*Date*]
Foreign currency portion [*Amount*] plus Local currency portion [*Amount*]
6. Adjustment of Time for Completion
None Increase [*Number*] days Decrease [*Number*] days
7. Other effects, if any

Authorized by: _____

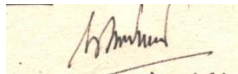
Date: _____

Employer

Accepted by: _____

Date: _____

Contractor



6.2.6 Pending Agreement Change Order Form

[*Employer's letterhead*]

To: [*Contractor's name and address*]

Date:

Attention: [*Name and title*]

Contract Name: [*Contract name*]

Contract Number: [*Contract number*]

Dear Ladies and/or Gentlemen:

We instruct you to carry out the work in the Change Order detailed below in accordance with GCC Clause 39 of the General Conditions.

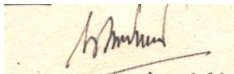
1. Title of Change: [*Name*]
2. Employer's Request for Change Proposal No./Rev.: [*number/revision*] dated: [*date*]
3. Contractor's Change Proposal No./Rev.: [*number / revision*] dated: [*date*]
4. Brief Description of Change: [*Description*]
5. Facilities and/or Item No. of equipment related to the requested Change: [*Facilities*]
6. Reference Drawings and/or technical documents for the requested Change:
[*Drawing / Document No. / Description*]
7. Adjustment of Time for Completion:
8. Other change in the Contract terms:
9. Other terms and conditions:

[*Employer's name*]

[*Signature*]

[*Name of signatory*]

[*Title of signatory*]



6.2.7 Application for Change Proposal Form

[Contractor's letterhead]

To: [*Employer's name and address*]

Date:

Attention: [*Name and title*]

Contract Name: [*Contract name*]

Contract Number: [*Contract number*]

Dear Ladies and/or Gentlemen:

We hereby propose that the work mentioned below be treated as a Change in the Facilities.

1. Title of Change: [*Name*]
2. Application for Change Proposal No./Rev.: [*Number / revision*] dated: [*Date*]
3. Brief Description of Change: [*Description*]
4. Reasons for Change:
5. Order of Magnitude Estimation (amount in the currencies of the Contract): [*Amount*]
6. Scheduled Impact of Change:
7. Effect on Functional Guarantees, if any:
8. Appendix:

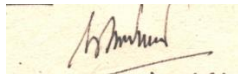
[Contractor's name]

[Signature]

[*Name of signatory*]

[Title of signatory]

PART III: CONDITIONS OF CONTRACT AND CONTRACT FORMS



Section 7 - General Conditions of Contract

The Conditions of Contract comprise two parts, this Section 7 - General Conditions of Contract (GCC) and the following Section 8 - Particular Conditions of Contract (PCC)

The General Conditions shall be the Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer, prepared by the Fédération Internationale des Ingénieurs-Conseil, or FIDIC (FIDIC MDB Harmonized Construction Contract) available at <http://www.fidic.org/>

The Conditions of Contract have been prepared for an ad measurement (unit price or unit rate) type of contract and cannot be used for other types of contract.

Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat
P. O. Box 86
1000 Lausanne 12
Switzerland
Web site: <http://www.fidic.org>

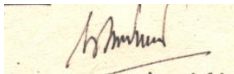
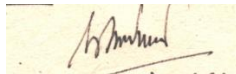
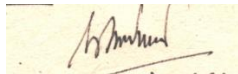


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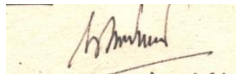
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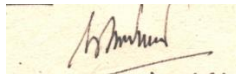
General Conditions of Contract

A. Contract and Interpretation

1. Definitions	1.1 The following words and expressions shall have the meanings hereby assigned them: “Contract” means the Contract Agreement entered into between the Employer and the Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term “the Contract” shall in all such documents be construed accordingly. “Contract Documents” means the documents listed in Article 1.1 (Contract Documents) of the Contract Agreement (including any amendments thereto). “GCC” means the General Conditions of Contract. “SCC” means the Special Conditions of Contract. “day” means calendar day. “year” means 365 days. “month” means calendar month. “Party” means the Employer or the Contractor, as the context requires. “Employer” means the person named as such in the SCC and includes the legal successors or permitted assigns of the Employer. “Project Manager” means the person appointed by the Employer in the manner provided in GCC Subclause 17.1 (Project Manager) hereof and named as such in the SCC to perform the duties delegated by the Employer. “Contractor” means the person(s) named as Contractor in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor. “Contractor’s Representative” means any person nominated by the Contractor and approved by the Employer in the manner provided in GCC Subclause 17.2 (Contractor’s Representative and Construction Manager) hereof to perform the duties delegated by the Contractor. “Construction Manager” means the person appointed by the Contractor’s Representative in the manner provided in GCC Subclause 17.2.4. “Subcontractor,” including manufacturers, means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant, is sub-contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns. “Dispute Board” means the person or persons named as such in the SCC appointed by agreement between the Employer and the Contractor to make a decision on or to settle any dispute or difference between the Employer and the Contractor referred to him or her by the parties pursuant to GCC Subclause 45.1 (Dispute Board) hereof. “The Bank” means the financing institution named in the SCC. “Contract Price” means the sum specified in Article 2.1 (Contract Price) of the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract. “Facilities” means the Plant to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract. “Plant” means permanent plant, equipment, machinery, apparatus, articles and



	things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor under GCC Sub clause 7.3 hereof), but does not include Contractor's Equipment. "Installation Services" means all those services ancillary to the supply of the Plant for the Facilities, to be provided by the Contractor under the Contract, such as transportation and provision of marine or other similar insurance, inspection, expediting, site preparation works (including the provision and use of Contractor's Equipment and the supply of all construction materials required), installation, testing, pre commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training, etc. as the case may require. "Contractor's Equipment" means all facilities, equipment, machinery, tools, apparatus, appliances, or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant, or other things intended to form or forming part of the Facilities. "Country of Origin" means the countries and territories eligible under the rules of the Bank as further elaborated in the SCC. "Site" means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site. "Effective Date" means the date of fulfillment of all conditions stated in Article 3 (Effective Date) of the Contract Agreement, upon which the period until the Time for Completion shall be counted from. "Time for Completion" means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained, as referred to in GCC Clause 8 and in accordance with the relevant provisions of the Contract. "Completion" means that the Facilities (or a specific part thereof where specific parts are specified in the Contract) have been completed operationally and structurally and put in a tight and clean condition, that all work in respect of Pre-commissioning of the Facilities or such specific part thereof has been completed, and that the Facilities or specific part thereof are ready for Commissioning as provided in GCC Clause 24 (Completion) hereof. "Pre-commissioning" means the testing, checking and other requirements specified in the Employer's Requirements that are to be carried out by the Contractor in preparation for Commissioning as provided in GCC Clause 24 (Completion) hereof. "Commissioning" means operation of the Facilities or any part thereof by the Contractor following Completion, which operation is to be carried out by the Contractor as provided in GCC Sub clause 25.1 (Commissioning) hereof, for the purpose of carrying out Guarantee Test(s). "Guarantee Test(s)" means the test(s) specified in the Employer's Requirements to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement in accordance with the provisions of GCC Subclause 25.2 (Guarantee Test) hereof. "Operational Acceptance" means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for



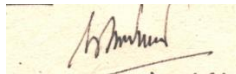
	acceptance of the Facilities in parts), which certifies the Contractor's fulfillment of the Contract in respect of Functional Guarantees of the Facilities (or the relevant part thereof) in accordance with the provisions of GCC Clause 28 (Functional Guarantees) hereof and shall include deemed acceptance in accordance with GCC Clause 25 (Commissioning and Operational Acceptance) hereof. "Defect Liability Period" means the period of validity of the warranties given by the Contractor commencing at Completion of the Facilities or a part thereof, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GCC Clause 27 (Defect Liability) hereof.
2. Contract Documents	2.1 Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.
3. Interpretation	3.1 In the Contract, except where the context requires otherwise, (a) words indicating one gender include all genders; (b) words indicating the singular also include the plural and words indicating the plural also include the singular; (c) provisions including the word "agree," "agreed," or "agreement" require the agreement to be record in writing; (d) the word "tender" is synonymous with "bid," "tenderer" with "Bidder," and "tender documents" with "Bidding Documents;" and (e) "written" or "in writing" means handwritten, typewritten, printed or electronically made, and resulting in a permanent record. The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions. 3.2 <u>Incoterms</u> Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms. "Incoterms" means international rules for interpreting trade terms published by the International Chamber of Commerce (latest edition), 38 Cours Albert 1^{er}, 75008 Paris, France. 3.3 <u>Entire Agreement</u> Subject to GCC Subclause 16.4 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations, and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract. 3.4 <u>Amendment</u> No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party hereto. 3.5 <u>Independent Contractor</u> The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture, or other joint relationship between the parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives, or Subcontractors

	engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives, or Subcontractors and the Employer. 3.6 <u>Non-Waiver</u> 3.6.1 Subject to GCC Subclause 3.6.2 below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract. 3.6.2 Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, must be dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived. 3.7 <u>Severability</u> If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract. 3.8 <u>Country of Origin</u> "Origin" means the place where the plant and component parts thereof are mined, grown, produced, or manufactured, and from which the services are provided. Plant components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.
4. Communications	4.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests, and discharges, these communications shall be (a) in writing and delivered against receipt; and (b) delivered, sent, or transmitted to the address for the recipient's communications as stated in the Contract Agreement. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Project Manager, a copy shall be sent to the Project Manager or the other Party, as the case may be.
5. Law and Language	5.1 The Contract shall be governed by and interpreted in accordance with laws of the country specified in the SCC. 5.2 The ruling language of the Contract shall be that stated in the SCC. 5.3 The language for communications shall be the ruling language unless otherwise stated in the SCC.
6. Fraud and Corruption	6.1 If the Employer determines that the Contractor and/or any of its personnel, or its agents, or its Subcontractors, sub-consultants, services providers, suppliers and/or their employees has engaged in corrupt, fraudulent, collusive coercive, or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days' notice to the Contractor, terminate

	the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 42 shall apply as if such expulsion had been made under Sub-Clause 42.2.1 (c). For the purposes of this Sub-Clause, (i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party; (ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party; (iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; (v) "obstructive practice" is (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a GoN investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or (bb) acts intended to materially impede the exercise of the GoN's inspection and audit rights provided for under Sub-Clause 9.6.

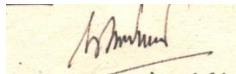
B. Subject Matter of Contract

7. Scope of Facilities	7.1 Unless otherwise expressly limited in the Employer's Requirements, the Contractor's obligations cover the provision of all Plant and the performance of all Installation Services required for the design, the manufacture (including procurement, quality assurance, construction, installation, associated civil works, pre-commissioning and delivery) of the Plant and the installation, completion, and commissioning of the Facilities in accordance with the plans, procedures, specifications, drawings, codes, and any other documents as specified in the section Employer's Requirements. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, spare parts (as specified in GCC Sub-clause 7.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures, and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage, except for those supplies, works, and services that will be provided or performed by the Employer, as set forth in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement. 7.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.



	7.3 In addition to the supply of Mandatory Spare Parts included in the Contract, the Contractor agrees to supply spare parts required for the operation and maintenance of the Facilities for the period specified in the SCC and the provisions, if any, specified in the SCC. However, the identity, specifications, and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor, and the price of such spare parts shall be that given in Price Schedule No. 6, which shall be added to the Contract Price. The price of such spare parts shall include the purchase price therefore and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts.
8. Time for Commencement and Completion	8.1 The Contractor shall commence work on the Facilities within the period specified in the SCC and without prejudice to GCC Subclause 26.2 hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule specified in the Appendix 4 (Time Schedule) to the Contract Agreement. 8.2 The Contractor shall attain Completion of the Facilities or of a part where a separate time for Completion of such part is specified in the Contract, within the time stated in the SCC or within such extended time to which the Contractor shall be entitled under GCC Clause 40 hereof.
9. Contractor's Responsibilities	9.1 The Contractor shall design, manufacture, including associated purchases and/or subcontracting, install, and complete the Facilities in accordance with the Contract. When completed, the Facilities should be fit for the purposes for which they are intended as defined in the Contract. 9.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Facilities, including any data as to boring tests provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site if access thereto was available and of other data readily available to it relating to the Facilities as of the date 30 days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Facilities. 9.3 The Contractor shall acquire and pay for all permits, approvals, and/or licenses from all local, state, or national government authorities or public service undertakings in the country where the Site is located, which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals, and/or licenses that are not the responsibility of the Employer under GCC Subclause 10.3 hereof and that are necessary for the performance of the Contract. 9.4 The Contractor shall comply with all laws in force in the country where the Facilities are to be implemented. The laws will include all local, state, national, or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties, and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Subclause 10.1 hereof. 9.5 Any plant and services that will be incorporated in or be required for the

	Facilities and other supplies shall have their origin as specified under GCC Clause 1 (Country of Origin). Any Subcontractors retained by the Contractor shall be from a country as specified in GCC Clause 1 (Country of Origin). 9.6 The Contractor shall permit GON/DP to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by GON/DP, if so required by GON/DP. 9.7 If the Contractor is a joint venture or consortium of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture or consortium. The composition or the constitution of the joint venture or consortium shall not be altered without the prior consent of the Employer. 9.8 Protection of the Environment (a) The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise, and other results of his operations. (b) The Contractor shall ensure that emissions, surface discharges, and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.
10. Employer's Responsibilities	10.1 All information and/or data to be supplied by the Employer as described in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement shall be deemed to be accurate, except when the Employer expressly states otherwise. 10.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in that Appendix. 10.3 The Employer shall acquire and pay for all permits, approvals, and/or licenses from all local, state, or national government authorities, or public service undertakings in the country where the Site is located which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract, and (c) are specified in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement. 10.4 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals, and/or licenses necessary for the execution of the Contract from all local, state, or national government authorities, or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain. 10.5 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, other materials and facilities; and shall perform all work and services of whatsoever nature,



	including those required by the Contractor to properly carry out Pre-commissioning, Commissioning, and Guarantee Tests, all in accordance with the provisions of the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement at or before the time specified in the program furnished by the Contractor under GCC Subclause 18.2 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor. 10.6 The Employer shall be responsible for the continued operation of the Facilities after Completion, in accordance with GCC Subclause 24.8, and shall be responsible for facilitating the Guarantee Test(s) for the Facilities, in accordance with GCC Subclause 25.2. 10.7 All costs and expenses involved in the performance of the obligations under this GCC Clause 10 shall be the responsibility of the Employer, except those incurred by the Contractor with respect to the performance of Guarantee Tests, in accordance with GCC Subclause 25.2. 10.8 In the event that the Employer shall be in breach of any of his obligations imposed by the Contract, then the additional cost reasonably incurred by the Contractor in consequence thereof shall be added to the Contract Price.

C. Payment

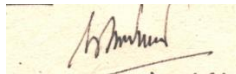
11. Contract Price	11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement. 11.2 Unless an adjustment clause is provided for in the SCC, the Contract Price shall be a firm lump sum not subject to any alteration, except in the event of a Change in the Facilities or as otherwise provided in the Contract. 11.3 Subject to GCC Subclauses 9.2, 10.1, and 35 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.
12. Terms of Payment	12.1 The Contract Price shall be paid as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement and in the Appendix (Terms and Procedures of Payment) to the Contract Agreement, which also outlines the procedures to be followed in making application for and processing payments. 12.2 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the Facilities or any part(s) thereof. 12.3 In the event that the Employer fails to make any payment by its respective due date or within the period set forth in the Contract, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate(s) shown in the Appendix (Terms and Procedures of Payment) to the Contract Agreement for the period of delay until payment has been made in full, whether before or after judgment or arbitrage award. 12.4 The currency or currencies in which payments are made to the Contractor under this Contract shall be specified in the Appendix (Terms and Procedures of Payment) to the Contract Agreement, subject to the general principle that payments will be made in the currency or currencies in which the Contract Price has been stated in the Contractor's bid.
13. Securities	13.1 <u>Issuance of Securities</u> The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner, and form specified below.

	13.2 <u>Advance Payment Security</u> 13.2.1 The Contractor shall, within 30 days of the notification of contract award, provide a security in an amount equal to the advance payment calculated in accordance with the Appendix (Terms and Procedures of Payment) to the Contract Agreement, and in the same currency or currencies. 13.2.2 The security shall be in the form provided in the Bidding Documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the Facilities executed by and paid to the Contractor from time to time, and shall automatically become null and void when the full amount of the advance payment has been recovered by the Employer. The security shall be returned to the Contractor immediately after its expiration. 13.3 <u>Performance Security</u> 13.3.1 The Contractor shall, within 30 days of the notification of contract award, provide a security for the due performance of the Contract in the amount specified in the SCC. 13.3.2 The security shall be denominated in the currency or currencies of the Contract, or in a freely convertible currency acceptable to the Employer, and shall be in one of the forms of bank guarantees provided in the Bidding Documents, as stipulated by the Employer in the SCC, or in another form acceptable to the Employer. 13.3.3 Unless otherwise specified in the SCC, the security shall be reduced by half on the date of the Operational Acceptance. The Security shall become null and void, or shall be reduced pro rata to the Contract Price of a part of the Facilities for which a separate Time for Completion is provided, 540 days after Completion of the Facilities or 365 days after Operational Acceptance of the Facilities, whichever occurs first; provided, however, that if the Defects Liability Period has been extended on any part of the Facilities pursuant to GCC Subclause 27.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration, provided, however, that if the Contractor, pursuant to GCC Subclause 27.10, is liable for an extended defect liability obligation, the performance security shall be extended for the period and up to the amount specified in the SCC.
14. Taxes and Duties	14.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies, and charges assessed on the Contractor, its Subcontractors, or their employees by all municipal, state, or national government authorities in connection with the Facilities in and outside of the country where the Site is located. 14.2 Notwithstanding GCC Subclause 14.1 above, the Employer shall bear and promptly pay all customs and import duties as well as other local taxes like, e.g., a value-added tax (VAT), imposed by the law of the country where the Site is located on the Plant specified in Price Schedule No. 1 and that are to be incorporated into the Facilities. 14.3 If any tax exemptions, reductions, allowances, or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent. 14.4 For the purpose of the Contract, it is agreed that the Contract Price specified in

	Article 2 (Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies, and charges prevailing at the date 30 days prior to the date of bid submission in the country where the Site is located (hereinafter called "Tax" in this GCC Subclause 14.4). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Subcontractors, or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 36 hereof.

D. Intellectual Property

15. License/Use of Technical Information	15.1 For the operation and maintenance of the Plant, the Contractor hereby grants a non-exclusive and nontransferable license (without the right to sublicense) to the Employer under the patents, utility models, or other industrial property rights owned by the Contractor or by a third party from whom the Contractor has received the right to grant licenses thereunder, and shall also grant to the Employer a nonexclusive and nontransferable right (without the right to sublicense) to use the know-how and other technical information disclosed to the Employer under the Contract. Nothing contained herein shall be construed as transferring ownership of any patent, utility model, trademark, design, copyright, know-how, or other intellectual property right from the Contractor or any third party to the Employer. 15.2 The copyright in all drawings, documents, and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.
16. Confidential Information	16.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during, or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data, and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GCC Clause 16. 16.2 The Employer shall not use such documents, data, and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data, and other information received from the Employer for any purpose other than the design, procurement of Plant, construction, or such other work and services as are required for the performance of the Contract. 16.3 The obligation of a party under GCC Sub clauses 16.1 and 16.2 above, however, shall not apply to that information, which (a) now or hereafter enters the public domain through no fault of that party; (b) can be proven to have been possessed by that party at the time of



	disclosure and which was not previously obtained, directly or indirectly, from the other party hereto; and (c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality. 16.4 The above provisions of this GCC Clause 16 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof. 16.5 The provisions of this GCC Clause 16 shall survive termination, for whatever reason, of the Contract.

E. Execution of the Facilities

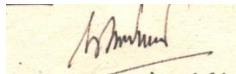
17. Representatives	17.1 <u>Project Manager</u> If the Project Manager is not named in the Contract, then within 14 days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as the Project Manager in place of the person previously so appointed, and shall give notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the Facilities. Such appointment shall only take effect upon receipt of such notice by the Contractor. The Project Manager shall represent and act for the Employer at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals, and all other communications under the Contract shall be given by the Project Manager, except as herein otherwise provided. All notices, instructions, information, and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager, except as herein otherwise provided. 17.2 <u>Contractor's Representative and Construction Manager</u> 17.2.1 If the Contractor's Representative is not named in the Contract, then within 14 days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within 14 days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within 14 days giving the reason therefor, then the Contractor shall appoint a replacement within 14 days of such objection, and the foregoing provisions of this GCC Subclause 17.2.1 shall apply thereto. 17.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the performance of the Contract and shall give to the Project Manager all the Contractor's notices, instructions, information, and all other communications under the Contract. All notices, instructions, information, and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided. The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's

	Representative, pursuant to the procedure set out in GCC Subclause 17.2.1. 17.2.3 The Contractor's Representative may, subject to the approval of the Employer which shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions, and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager. Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GCC Subclause 17.2.3 shall be deemed to be an act or exercise by the Contractor's Representative. 17.2.4 From the commencement of installation of the Facilities at the Site until Completion, the Contractor's Representative shall appoint a suitable person as the Construction Manager. The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick, or absent for reasons connected with the proper performance of the Contract. Whenever the Construction Manager is absent from the Site, the Contractor's Representative or the Construction Manager shall appoint a suitable person to act as the Construction Manager's deputy. 17.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under GCC Subclause 22.4. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Facilities. 17.2.6 If any representative or person employed by the Contractor is removed in accordance with GCC Subclause 17.2.5, the Contractor shall, where required, promptly appoint a replacement.
18. Work Program	18.1 <u>Contractor's Organization</u> The Contractor shall supply to the Employer and the Project Manager a chart showing the proposed organization to be established by the Contractor for carrying out work on the Facilities within 21 days of the Effective Date. The chart shall include the identities of the key personnel, and the curricula vitae of such key personnel to be employed shall be supplied together with the chart. The Contractor shall promptly inform the Employer and the Project Manager in writing of any revision or alteration of such an organization chart. 18.2 <u>Program of Performance</u> Within 30 days after the Effective Date, the Contractor shall submit to the Project Manager a detailed program of performance of the Contract, made in a form acceptable to the Project Manager and showing the sequence in which it proposes to design, manufacture, transport, assemble, install, and pre-commission the Facilities, as well as the date by which the Contractor reasonably requires that the Employer shall have fulfilled its obligations under the Contract so as to enable the Contractor to execute the Contract in

	accordance with the program and to achieve Completion, Commissioning, and Acceptance of the Facilities in accordance with the Contract. The program so submitted by the Contractor shall accord with the Time Schedule included in the Appendix (Time Schedule) to the Contract Agreement and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the Project Manager, but without modification in the Times for Completion given in the SCC and any extension granted in accordance with GCC Clause 40, and shall submit all such revisions to the Project Manager. 18.3 <u>Progress Report</u> The Contractor shall monitor progress of all the activities specified in the program referred to in GCC Sub clause 18.2 above, and supply a progress report to the Project Manager every month. The progress report shall be in a form acceptable to the Project Manager and shall indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken. 18.4 <u>Progress of Performance</u> If at any time the Contractor's actual progress falls behind the program referred to in GCC Subclause 18.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager, prepare and submit to the Project Manager a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion under GCC Subclause 8.2, any extension thereof entitled under GCC Subclause 40.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor. 18.5 <u>Procedures</u> The Contract shall be executed in accordance with the Contract Documents including the procedures given in the Forms and Procedures of the Employer's Requirements. The Contractor may execute the Contract in accordance with its own standard project execution plans and procedures to the extent that they do not conflict with the provisions contained in the Contract.
19.Subcontracting	19.1 The Appendix 5 (List of Major Items of Plant and Services and List of Approved Subcontractors) to the Contract Agreement specifies major items of plant and services and a list of approved Subcontractors against each item, including manufacturers. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time propose any addition to or deletion from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient time so as not to impede the progress of work on the Facilities. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties, or responsibilities under the Contract. 19.2 The Contractor shall select and employ its Subcontractors for such major items from those listed in the lists referred to in GCC Sub clause 19.1. 19.3 For items or parts of the Facilities not specified in the Appendix (List of Major Items of Plant and Services and List of Approved Subcontractors for

	Major Items) to the Contract Agreement, the Contractor may employ such Subcontractors as it may select, at its discretion. 19.4 Each subcontract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GCC 19.5 (if and when applicable), or in event of termination by the Employer under GCC 42.2. 19.5 If a Sub-contractor's obligations extend beyond the expiry date of the relevant Defects Liability Period and the Project Manager, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.
20. Design and Engineering	20.1 <u>Specifications and Drawings</u> 20.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good engineering practice. The Contractor shall be responsible for any discrepancies, errors, or omissions in the specifications, drawings, and other technical documents that it has prepared, whether such specifications, drawings, and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors, or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer. 20.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification, or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager. 20.2 <u>Codes and Standards</u> Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date 30 days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied subject to approval by the Employer and shall be treated in accordance with GCC Clause 39. 20.3 <u>Approval/Review of Technical Documents by Project Manager</u> 20.3.1 The Contractor shall prepare or cause its Subcontractors to prepare, and furnish to the Project Manager the documents listed in the Appendix (List of Documents for Approval or Review) to the Contract Agreement for its approval or review as specified and in accordance with the requirements of GCC Subclause 18.2 (Program of Performance). Any part of the Facilities covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof. GCC Subclauses 20.3.2 through 20.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only. 20.3.2 Within 14 days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GCC Sub clause 20.3.1, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the

	Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes. If the Project Manager fails to take such action within the said 14 days, then the said document shall be deemed to have been approved by the Project Manager. 20.3.3 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with the Contract or that it is contrary to good engineering practice. If the Project Manager disapproves a document, he shall specify the reasons for his decision. 20.3.4 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager's approval in accordance with GCC Sub clause 20.3.2. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), whereupon the document shall be deemed to have been approved. 20.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be referred to a Dispute Board for determination in accordance with GCC Sub clause 45.3 hereof. If such dispute or difference is referred to a Dispute Board, the Project Manager shall give instructions as to whether and, if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Dispute Board upholds the Contractor's view on the dispute and if the Employer has not given notice under Subclause 45.3 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Dispute Board shall decide, and the Time for Completion shall be extended accordingly. 20.3.6 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager. 20.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval thereof, pursuant to the provisions of this GCC Subclause 20.3. If the Project Manager requests any change in any already approved document and/or in any document based thereon, the provisions of GCC Clause 39 shall apply to such request.
21. Procurement	21.1 <u>Materials</u> Subject to GCC Subclause 14.2, the Contractor shall procure and transport all materials in an expeditious and orderly manner to the Site. 21.2 <u>Employer-Supplied Materials</u> If the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement provides that the Employer shall furnish any specific items to the Contractor, the following provisions shall apply:



	21.2.1 The Employer shall, at its own risk and expense, transport each item to the place on or near the Site as agreed upon by the parties and make such item available to the Contractor at the time specified in the program furnished by the Contractor, pursuant to GCC Subclause 18.2, unless otherwise mutually agreed. 21.2.2 Upon receipt of such item, the Contractor shall inspect the same visually and notify the Project Manager of any detected shortage, defect, or default. The Employer shall immediately remedy any shortage, defect, or default, or the Contractor shall, if practicable and possible, at the request of the Employer, remedy such shortage, defect, or default at the Employer's cost and expense. After inspection, such item shall fall under the care, custody, and control of the Contractor. The provision of this GCC Subclause 21.2.2 shall apply to any item supplied to remedy any such shortage or default or to substitute for any defective item, or shall apply to defective items that have been repaired. 21.2.3 The foregoing responsibilities of the Contractor and its obligations of care, custody, and control shall not relieve the Employer of liability for any undetected shortage, defect, or default, nor place the Contractor under any liability for any such shortage, defect or default whether under GCC Clause 27 or under any other provision of Contract. 21.3 <u>Transportation</u> 21.3.1 The Contractor shall at its own risk and expense transport all the materials and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances. 21.3.2 Unless otherwise provided in the Contract, the Contractor shall be entitled to select any safe mode of transport operated by any person to carry the materials and the Contractor's Equipment. 21.3.3 Upon dispatch of each shipment of materials and the Contractor's Equipment, the Contractor shall notify the Employer by telex, cable, facsimile, or electronic means, of the description of the materials and of the Contractor's Equipment, the point and means of dispatch, and the estimated time and point of arrival in the country where the Site is located, if applicable, and at the Site. The Contractor shall furnish the Employer with relevant shipping documents to be agreed upon between the parties. 21.3.4 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the materials and the Contractor's Equipment to the Site. The Employer shall use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining such approvals, if requested by the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any claim for damage to roads, bridges, or any other traffic facilities that may be caused by the transport of the materials and the Contractor's Equipment to the Site. 21.4 <u>Customs Clearance</u> The Contractor shall, at its own expense, handle all imported materials and Contractor's Equipment at the point(s) of import and shall handle any formalities for customs clearance, subject to the Employer's obligations under GCC Subclause 14.2, provided that if applicable laws or regulations require any application or act to be made by or in the name of the Employer, the

	Employer shall take all necessary steps to comply with such laws or regulations. In the event of delays in customs clearance that are not the fault of the Contractor, the Contractor shall be entitled to an extension in the Time for Completion, pursuant to GCC Clause 40.
22. Installation	22.1 Setting Out/Supervision 22.1.1 <u>Benchmark</u> (a) The Contractor shall be responsible for the true and proper setting-out of the Facilities in relation to bench marks, reference marks, and lines provided to it in writing by or on behalf of the Employer. (b) If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level, or alignment of the Facilities, the Contractor shall forthwith notify the Project Manager of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Project Manager. If such error is based on incorrect data provided in writing by or on behalf of the Employer, the expense of rectifying the same shall be borne by the Employer. 22.1.2 <u>Contractor's Supervision</u> The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand. 22.2 Labor 22.2.1 <u>Engagement of Staff and Labor</u> (a) Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labor, local or otherwise, and for their payment, housing, feeding, and transport. (b) The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi-skilled, and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills. (c) The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor and personnel to be employed on the Site into the country where the Site is located. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel. (d) The Contractor shall at its own expense provide the means of repatriation to all of its and its Subcontractor's personnel employed on the Contract at the Site to the place where they were recruited or to their domicile. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in

providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

22.2.2 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labor from amongst the Employer's Personnel.

22.2.3 Labor Laws

- (a) The Contractor shall comply with all the relevant labor Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration, and emigration, and shall allow them all their legal rights.
- (b) The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous, or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.
- (c) The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious, or other customs and all local laws and regulations pertaining to the employment of labor.

22.2.4 Rates of Wages and Conditions of Labor

- (a) The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.
- (b) The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, and allowances as are chargeable under the Laws for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.

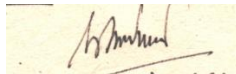
22.2.5 Working Hours

- (a) No work shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours stated in the SCC, unless
 - (i) otherwise stated in the Contract;
 - (ii) the Project Manager gives consent; or
 - (iii) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Project Manager.
- (b) If and when the Contractor considers it necessary to carry out work at night or on public holidays so as to meet the Time for Completion and requests the Project Manager's consent thereto, the Project Manager shall not unreasonably withhold such consent.

	(c) This Subclause shall not apply to any work which is customarily carried out by rotary or double shifts. 22.2.6 <u>Facilities for Staff and Labor</u> (a) Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification. (b) The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works. 22.2.7 <u>Health and Safety</u> (a) The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay, and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. (b) The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the performance of the Contract, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority. (c) The Contractor shall send to the Project Manager, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety, and welfare of persons, and damage to property, as the Project Manager may reasonably require. 22.2.8 <u>Funeral Arrangements</u> In the event of the death of any of the Contractor's personnel or accompanying members of their families, the Contractor shall be responsible for making the appropriate arrangements for their return or burial, unless otherwise specified in the SCC. 22.2.9 <u>Records of Contractor's Personnel</u> The Contractor shall keep accurate records of the Contractor's personnel, including the number of each class of Contractor's Personnel on the Site and the names, ages, gender, hours worked, and wages paid to all workers. These records shall be summarized on a monthly basis in a form approved by the Project Manager and shall be available for inspection by the Project Manager until the Contractor has completed all work. 22.2.10 <u>Supply of Foodstuff</u> The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in

	connection with the Contract. 22.2.11 <u>Supply of Water</u> The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel. 22.2.12 <u>Measures against Insect and Pest Nuisance</u> The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide. 22.2.13 <u>Alcoholic Liquor or Drugs</u> The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give barter, or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift barter, or disposal by Contractor's Personnel. 22.2.14 <u>Arms and Ammunition</u> The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so. 22.2.15 <u>Prohibition of All Forms of Forced or Compulsory Labor</u> The contractor shall not employ "forced or compulsory labor" in any form. "Forced or compulsory labor" consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty. 22.2.16 <u>Prohibition of Harmful Child Labor</u> The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. 22.3 <u>Contractor's Equipment</u> 22.3.1 All Contractor's Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Project Manager's consent that such Contractor's Equipment is no longer required for the execution of the Contract. 22.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site and any surplus materials remaining thereon. 22.3.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's Equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract. 22.4 <u>Site Regulations and Safety</u> The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall

	comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Project Manager, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld. Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety of the Facilities, gate control, sanitation, medical care, and fire prevention. 22.5 Opportunities for Other Contractors 22.5.1 The Contractor shall, upon written request from the Employer or the Project Manager, give all reasonable opportunities for carrying out the work to any other contractors employed by the Employer on or near the Site. 22.5.2 If the Contractor, upon written request from the Employer or the Project Manager, makes available to other contractors any roads or ways the maintenance for which the Contractor is responsible, permits the use by such other contractors of the Contractor's Equipment, or provides any other service of whatsoever nature for such other contractors, the Employer shall fully compensate the Contractor for any loss or damage caused or occasioned by such other contractors in respect of any such use or service, and shall pay to the Contractor reasonable remuneration for the use of such equipment or the provision of such services. 22.5.3 The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other contractors. The Project Manager shall determine the resolution of any difference or conflict that may arise between the Contractor and other contractors and the workers of the Employer in regard to their work. 22.5.4 The Contractor shall notify the Project Manager promptly of any defects in the other Contractors' work that come to its notice, and that could affect the Contractor's work. The Project Manager shall determine the corrective measures, if any, required to rectify the situation after inspection of the Facilities. Decisions made by the Project Manager shall be binding on the Contractor. 22.6 Emergency Work If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Facilities, the Contractor shall immediately carry out such work. If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine is necessary in order to prevent damage to the Facilities. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefor. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. Otherwise, the cost of such remedial work shall be borne by the Employer. 22.7 Site Clearance 22.7.1 Site Clearance in Course of Performance In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store, or

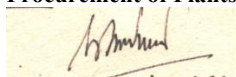


	remove any surplus materials, clear away any wreckage, rubbish, or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract. 22.7.2 <u>Clearance of Site after Completion</u> After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish, and debris of any kind from the Site, and shall leave the Site and Facilities in a clean and safe condition. 22.8 <u>Watching and Lighting</u> The Contractor shall provide and maintain at its own expense all lighting, fencing, and watching when and where necessary for the proper execution and the protection of the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.
23. Test and Inspection	23.1 The Contractor shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and any part of the Facilities as are specified in the Contract. 23.2 The Employer and the Project Manager or their designated representatives shall be entitled to attend the aforesaid test and/or inspection, provided that the Employer shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses. 23.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give a reasonable advance notice of such test and/or inspection and of the place and time thereof to the Project Manager. The Contractor shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Employer and the Project Manager or their designated representatives to attend the test and/or inspection. 23.4 The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection. If the Employer or Project Manager or their designated representatives fails to attend the test and/or inspection, or if it is agreed between the parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a certified report of the results thereof. 23.5 The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of work on the Facilities and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected. 23.6 If any Plant or any part of the Facilities fails to pass any test and/or inspection, the Contractor shall either rectify or replace such Plant or part of the Facilities and shall repeat the test and/or inspection upon giving a notice under GCC Subclause 23.3. 23.7 If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Plant or part of the Facilities that cannot be settled between the parties within a reasonable period of time, it may be referred to an Dispute Board for determination in

	accordance with GCC Subclause 45.3. 23.8 The Contractor shall afford the Employer and the Project Manager, at the Employer's expense, access at any reasonable time to any place where the Plant are being manufactured or the Facilities are being installed, in order to inspect the progress and the manner of manufacture or installation, provided that the Project Manager shall give the Contractor a reasonable prior notice. 23.9 The Contractor agrees that neither the execution of a test and/or inspection of Plant or any part of the Facilities, nor the attendance by the Employer or the Project Manager, nor the issue of any test certificate pursuant to GCC Subclause 23.4, shall release the Contractor from any other responsibilities under the Contract. 23.10 No part of the Facilities or foundations shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the Project Manager whenever any such parts of the Facilities or foundations are ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract. 23.11 The Contractor shall uncover any part of the Facilities or foundations, or shall make openings in or through the same as the Project Manager may from time to time require at the Site, and shall reinstate and make good such part or parts. If any parts of the Facilities or foundations have been covered up at the Site after compliance with the requirement of GCC Subclause 23.10 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.
24. Completion of the Facilities	24.1 As soon as the Facilities or any part thereof has, in the opinion of the Contractor, been completed operationally and structurally and put in a tight and clean condition as specified in the Employer's Requirements, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer in writing. 24.2 Within 7 days after receipt of the notice from the Contractor under GCC Subclause 24.1, the Employer shall supply the operating and maintenance personnel specified in the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement for Pre-commissioning of the Facilities or any part thereof. Pursuant to the Appendix (Scope of Works and Supply by the Employer) to the Contract Agreement, the Employer shall also provide, within the said 7-day period, the raw materials, utilities, lubricants, chemicals, catalysts, facilities, services, and other matters required for Pre-commissioning of the Facilities or any part thereof. 24.3 As soon as reasonably practicable after the operating and maintenance personnel have been supplied by the Employer and the raw materials, utilities, lubricants, chemicals, catalysts, facilities, services, and other matters have been provided by the Employer in accordance with GCC Subclause 24.2, the Contractor shall commence Pre-commissioning of the Facilities or the relevant part thereof in preparation for Commissioning, subject to GCC Subclause 25.5. 24.4 As soon as all works in respect of Pre-commissioning are completed and, in the opinion of the Contractor, the Facilities or any part thereof is ready for Commissioning, the Contractor shall so notify the Project Manager in writing.

	24.5 The Project Manager shall, within 14 days after receipt of the Contractor's notice under GCC Subclause 24.4, either issue a Completion Certificate in the form specified in the Employer's Requirements (Forms and Procedures), stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's notice under GCC Subclause 24.4, or notify the Contractor in writing of any defects and/or deficiencies. If the Project Manager notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in GCC Subclause 24.4. If the Project Manager is satisfied that the Facilities or that part thereof have reached Completion, the Project Manager shall, within 7 days after receipt of the Contractor's repeated notice, issue a Completion Certificate stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's repeated notice. If the Project Manager is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within 7 days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated. 24.6 If the Project Manager fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within 14 days after receipt of the Contractor's notice under GCC Subclause 24.4 or within 7 days after receipt of the Contractor's repeated notice under GCC Subclause 24.5, or if the Employer makes use of the Facilities or part thereof, then the Facilities or that part thereof shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be. 24.7 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor. 24.8 Upon Completion, the Employer shall be responsible for the care and custody of the Facilities or the relevant part thereof, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof.
25. Commissioning and Operational Acceptance	25.1 <u>Commissioning</u> 25.1.1 Commissioning of the Facilities or any part thereof shall be commenced by the Contractor immediately after issue of the Completion Certificate by the Project Manager, pursuant to GCC Subclause 24.5, or immediately after the date of the deemed Completion, under GCC Subclause 24.6. 25.1.2 The Employer shall supply the operating and maintenance personnel and all raw materials, utilities, lubricants, chemicals, catalysts, facilities, services, and other matters required for Commissioning. 25.1.3 In accordance with the requirements of the Contract, the Contractor's and Project Manager's advisory personnel shall attend the Commissioning, including the Guarantee Test, and shall advise and assist the Employer. 25.2 <u>Guarantee Test</u> 25.2.1 Subject to GCC Subclause 25.5, the Guarantee Test and repeats thereof shall be conducted by the Contractor during Commissioning of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees

	specified in the Appendix (Functional Guarantees) to the Contract Agreement. The Employer shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and results of the Guarantee Test and any repeats thereof. 25.2.2 If for reasons not attributable to the Contractor, the Guarantee Test of the Facilities or the relevant part thereof cannot be successfully completed within the period from the date of Completion specified in the SCC or any other period agreed upon by the Employer and the Contractor, the Contractor shall be deemed to have fulfilled its obligations with respect to the Functional Guarantees, and GCC Subclauses 28.2 and 28.3 shall not apply. 25.3 <u>Operational Acceptance</u> 25.3.1 Subject to GCC Subclause 25.4 below, Operational Acceptance shall occur in respect of the Facilities or any part thereof when (a) the Guarantee Test has been successfully completed and the Functional Guarantees are met; or (b) the Guarantee Test has not been successfully completed or has not been carried out for reasons not attributable to the Contractor within the period from the date of Completion specified in the SCC, or any other agreed upon period as specified in GCC Subclause 25.2.2 above; or (c) the Contractor has paid the liquidated damages specified in GCC Subclause 28.3 hereof; and (d) any minor items mentioned in GCC Subclause 24.7 hereof relevant to the Facilities or that part thereof have been completed. 25.3.2 At any time after any of the events set out in GCC Subclause 25.3.1 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Operational Acceptance Certificate in the form provided in the Employer's Requirements (Forms and Procedures) in respect of the Facilities or the part thereof specified in such notice as of the date of such notice. 25.3.3 The Project Manager shall, after consultation with the Employer, and within 7 days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate. 25.3.4 If within 7 days after receipt of the Contractor's notice, the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the Facilities or the relevant part thereof shall be deemed to have been accepted as of the date of the Contractor's said notice. 25.4 <u>Partial Acceptance</u> 25.4.1 If the Contract specifies that Completion and Commissioning shall be carried out in respect of parts of the Facilities, the provisions relating to Completion and Commissioning including the Guarantee Test shall apply to each such part of the Facilities individually, and the Operational Acceptance Certificate shall be issued accordingly for each such part of the Facilities. 25.4.2 If a part of the Facilities comprises facilities such as buildings, for which no Commissioning or Guarantee Test is required, then the Project Manager shall issue the Operational Acceptance Certificate for

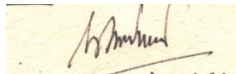


	such facility when it attains Completion, provided that the Contractor shall thereafter complete any outstanding minor items that are listed in the Operational Acceptance Certificate. 25.5 <u>Delayed Pre-Commissioning and/or Guarantee Test</u> 25.5.1 In the event that the Contractor is unable to proceed with the Pre-commissioning of the Facilities pursuant to Subclause 24.3, or with the Guarantee Test pursuant to Subclause 25.2, for reasons attributable to the Employer either on account of non availability of other facilities under the responsibilities of other contractor(s), or for reasons beyond the Employer's control, the provisions leading to "deemed" completion of activities such as Completion, pursuant to GCC Subclause 24.6, and Operational Acceptance, pursuant to GCC Subclause 25.3.4, and Contractor's obligations regarding Defect Liability Period, pursuant to GCC Subclause 27.2, Functional Guarantee, pursuant to GCC Clause 28, and Care of Facilities, pursuant to GCC Clause 32, and GCC Clause 41.1, Suspension, shall not apply. In this case, the following provisions shall apply. 25.5.2 When the Contractor is notified by the Project Manager that he will be unable to proceed with the activities and obligations pursuant to above Subclause 25.5.1, the Contractor shall be entitled to the following: (a) the Time of Completion shall be extended for the period of suspension without imposition of liquidated damages pursuant to GCC Subclause 26.2; (b) payments due to the Contractor in accordance with the provision specified in the Appendix (Terms and Procedures of Payment) to the Contract Agreement, which would not have been payable in normal circumstances due to noncompletion of the subject activities, shall be released to the Contractor against submission of a security in the form of a bank guarantee of equivalent amount acceptable to the Employer, and which shall become null and void when the Contractor will have complied with its obligations regarding those payments, subject to the provision of Subclause 25.5.3 below; (c) the expenses towards the above security and extension of other securities under the contract, of which validity needs to be extended, shall be reimbursed to the Contractor by the Employer; (d) the additional charges towards the care of the Facilities pursuant to GCC Subclause 32.1 shall be reimbursed to the Contractor by the Employer for the period between the notification mentioned above and the notification mentioned in Subclause 25.5.4 below. The provision of GCC Subclause 33.2 shall apply to the Facilities during the same period. 25.5.3 In the event that the period of suspension under above Subclause 25.5.1 actually exceeds 180 days, the Employer and Contractor shall mutually agree to any additional compensation payable to the Contractor. 25.5.4 When the Contractor is notified by the Project Manager that the plant is ready for Pre-commissioning, the Contractor shall proceed without delay in performing all the specified activities and obligations under the contract.

F. Guarantees and Liabilities

26. Completion Time Guarantee	26.1 The Contractor guarantees that it shall attain Completion of the Facilities (or a part for which a separate time for completion is specified) within the Time for Completion specified in the SCC pursuant to GCC Subclause 8.2, or within such extended time to which the Contractor shall be entitled under GCC Clause 40 hereof. 26.2 If the Contractor fails to attain Completion of the Facilities or any part thereof within the Time for Completion or any extension thereof under GCC Clause 40, the Contractor shall pay to the Employer liquidated damages in the amount specified in the SCC as a percentage rate of the Contract Price or the relevant part thereof. The aggregate amount of such liquidated damages shall in no event exceed the amount specified as “Maximum” in the SCC as a percentage rate of the Contract Price. Once the “Maximum” is reached, the Employer may consider termination of the Contract, pursuant to GCC Subclause 42.2.2. Such payment shall completely satisfy the Contractor’s obligation to attain Completion of the Facilities or the relevant part thereof within the Time for Completion or any extension thereof under GCC Clause 40. The Contractor shall have no further liability whatsoever to the Employer in respect thereof. However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the Facilities or from any other obligations and liabilities of the Contractor under the Contract. Save for liquidated damages payable under this GCC Subclause 26.2, the failure by the Contractor to attain any milestone or other act, matter or thing by any date specified in the Appendix (Time Schedule) to the Contract Agreement and/or other program of work prepared pursuant to GCC Subclause 18.2 shall not render the Contractor liable for any loss or damage thereby suffered by the Employer. 26.3 If the Contractor attains Completion of the Facilities or any part thereof before the Time for Completion or any extension thereof under GCC Clause 40, the Employer shall pay to the Contractor a bonus in the amount specified in the SCC. The aggregate amount of such bonus shall in no event exceed the amount specified as “Maximum” in the SCC.
27. Defect Liability	27.1 The Contractor warrants that the Facilities or any part thereof shall be free from defects in the design, engineering, materials, and workmanship of the Plant supplied and of the work executed. 27.2 The Defect Liability Period shall be 540 days from the date of Completion of the Facilities (or any part thereof) or 1 year from the date of Operational Acceptance of the Facilities (or any part thereof), whichever first occurs, unless specified otherwise in the SCC pursuant to GCC Subclause 27.10. If during the Defect Liability Period any defect should be found in the design, engineering, materials, and workmanship of the Plant supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace, or otherwise make good as the Contractor shall determine at its discretion, such defect as well as any damage to the Facilities caused by such defect. The Contractor shall not be responsible for the repair, replacement, or making good of any defect or of any damage to the Facilities arising out of or resulting from any of the following causes: (a) improper operation or maintenance of the Facilities by the Employer, (b) operation of the Facilities outside specifications provided in the Contract, or

	(c) normal wear and tear. 27.3 The Contractor's obligations under this GCC Clause 27 shall not apply to: (a) any materials that are supplied by the Employer under GCC Subclause 21.2, are normally consumed in operation, or have a normal life shorter than the Defect Liability Period stated herein; (b) any designs, specifications or other data designed, supplied, or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility herein; or (c) any other materials supplied or any other work executed by or on behalf of the Employer, except for the work executed by the Employer under GCC Subclause 27.7. 27.4 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect. 27.5 The Employer shall afford the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations under this GCC Clause 27. The Contractor may, with the consent of the Employer, remove from the Site any Plant or any part of the Facilities that are defective if the nature of the defect, and/or any damage to the Facilities caused by the defect, is such that repairs cannot be expeditiously carried out at the Site. 27.6 If the repair, replacement or making good is of such a character that it may affect the efficiency of the Facilities or any part thereof, the Employer may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests. If such part fails the tests, the Contractor shall carry out further repair, replacement or making good, as the case may be, until that part of the Facilities passes such tests. The tests shall be agreed upon by the Employer and the Contractor. 27.7 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than 15 days), the Employer may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer from any monies due the Contractor or claimed under the Performance Security. 27.8 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons. 27.9 Except as provided in GCC Clauses 27 and 33, the Contractor shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Facilities or any part thereof, the Plant, design, or engineering, or work executed that appear after Completion of the Facilities or any part thereof, except where such defects are the result of the gross negligence, fraud, criminal, or willful action of the Contractor. 27.10 In addition, any such component of the Facilities and during the period of



	time as may be specified in the SCC shall be subject to an extended Defect Liability Period. Such obligation of the Contractor shall be in addition to the Defect Liability Period specified under GCC Subclause 27.2.
28. Functional Guarantees	28.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement, subject to, and upon the conditions therein specified. 28.2 If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications, and/or additions to the Plant or any part thereof as may be necessary to meet at least the minimum level of such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications, and/or additions, and shall request the Employer to repeat the Guarantee Test until the minimum level of the Guarantees has been met. If the Contractor eventually fails to meet the minimum level of Functional Guarantees, the Employer may consider termination of the Contract, pursuant to GCC Subclause 42.2.2. 28.3 If, for reasons attributable to the Contractor, the Functional Guarantees specified in the Appendix (Functional Guarantees) to the Contract Agreement are not attained either in whole or in part, but the minimum level of the Functional Guarantees specified in the said Appendix to the Contract Agreement is met, the Contractor shall, at the Contractor's option, either (a) make such changes, modifications, and/or additions to the Facilities or any part thereof that are necessary to attain the Functional Guarantees at its cost and expense, and shall request the Employer to repeat the Guarantee Test or (b) pay liquidated damages to the Employer in respect of the failure to meet the Functional Guarantees in accordance with the provisions in the Appendix (Functional Guarantees) to the Contract Agreement. 28.4 The payment of liquidated damages under GCC Subclause 28.3, up to the limitation of liability specified in the Appendix (Functional Guarantees) to the Contract Agreement, shall completely satisfy the Contractor's guarantees under GCC Subclause 28.3, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof. Upon the payment of such liquidated damages by the Contractor, the Project Manager shall issue the Operational Acceptance Certificate for the Facilities or any part thereof in respect of which the liquidated damages have been so paid.
29. Patent Indemnity	29.1 The Contractor shall, subject to the Employer's compliance with GCC Subclause 29.2, indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions, or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Employer may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of (a) the installation of the Facilities by the Contractor or the use of the Facilities in the country where the Site is located, and (b) the sale of the products produced by the Facilities in any country. Such indemnity shall not cover any use of the Facilities or any part thereof other than for the purpose indicated by or to be reasonably inferred from the

	Contract, any infringement resulting from the use of the Facilities or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Contractor, pursuant to the Contract Agreement. 29.2 If any proceedings are brought or any claim is made against the Employer arising out of the matters referred to in GCC Subclause 29.1, the Employer shall promptly give the Contractor a notice thereof, and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Contractor fails to notify the Employer within 30 days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the 30-day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing. 29.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Contractor may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Employer.
30. Limitation of Liability	30.1 Except in cases of criminal negligence or willful misconduct, (a) the Contractor shall not be liable to the Employer, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Employer, and (b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed a multiple of the Contract Price specified in the SCC or, if a multiple is not so specified, the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Contractor to indemnify the Employer with respect to patent infringement.

G. Risk Distribution

31. Transfer of Ownership	31.1 Ownership of the Plant (including spare parts) to be imported into the country where the Site is located shall be transferred to the Employer upon loading on to the mode of transport to be used to convey the Plant from the country of origin to that country. 31.2 Ownership of the Plant (including spare parts) procured in the country where the Site is located shall be transferred to the Employer when the Plant are brought on to the Site. 31.3 Ownership of the Contractor's Equipment used by the Contractor and its

	Subcontractors in connection with the Contract shall remain with the Contractor or its Subcontractors. 31.4 Ownership of any Plant in excess of the requirements for the Facilities shall revert to the Contractor upon Completion of the Facilities or at such earlier time when the Employer and the Contractor agree that the Plant in question are no longer required for the Facilities. 31.5 Notwithstanding the transfer of ownership of the Plant, the responsibility for care and custody thereof together with the risk of loss or damage thereto shall remain with the Contractor pursuant to GCC Clause 32 (Care of Facilities) hereof until Completion of the Facilities or the part thereof in which such Plant are incorporated.
32. Care of Facilities	32.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Completion of the Facilities pursuant to GCC Clause 24 or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 27. Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Facilities or that part thereof caused by reason of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GCC Subclauses 32.2 and 38.1. 32.2 If any loss or damage occurs to the Facilities or any part thereof or to the Contractor's temporary facilities by reason of (a) insofar as they relate to the country where the Site is located, nuclear reaction, nuclear radiation, radioactive contamination, pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance, including War Risks and Political Risks, taken out under GCC Clause 34 hereof; or (b) any use or occupation by the Employer or any third party other than a Subcontractor, authorized by the Employer of any part of the Facilities; or (c) any use of or reliance upon any design, data, or specification provided or designated by or on behalf of the Employer, or any such matter for which the Contractor has disclaimed responsibility herein, the Employer shall pay to the Contractor all sums payable in respect of the Facilities executed, notwithstanding that the same be lost, destroyed, or damaged, and will pay to the Contractor the replacement value of all temporary facilities and all parts thereof lost, destroyed, or damaged. If the Employer requests the Contractor in writing to make good any loss or damage to the Facilities thereby occasioned, the Contractor shall make good the same at the cost of the Employer in accordance with GCC Clause 39. If the Employer does not request the Contractor in writing to make good any loss or damage to the Facilities thereby occasioned, the Employer shall either request a change in accordance with GCC Clause 39, excluding the performance of that part of the Facilities thereby lost, destroyed or damaged, or, where the loss or damage affects a substantial part of the Facilities, the Employer shall terminate the

	Contract pursuant to GCC Subclause 42.1 hereof. 32.3 The Contractor shall be liable for any loss of or damage to any Contractor's Equipment, or any other property of the Contractor used or intended to be used for purposes of the Facilities, except (i) as mentioned in GCC Subclause 32.2 with respect to the Contractor's temporary facilities, and (ii) where such loss or damage arises by reason of any of the matters specified in GCC Subclauses 32.2 (b) and (c) and 38.1. 32.4 With respect to any loss or damage caused to the Facilities or any part thereof or to the Contractor's Equipment by reason of any of the matters specified in GCC Subclause 38.1, the provisions of GCC Subclause 38.3 shall apply.
33. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification	33.1 Subject to GCC Subclause 33.3, the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions, or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property other than the Facilities whether accepted or not, arising in connection with the supply and installation of the Facilities and by reason of the negligence of the Contractor or its Subcontractors, or their employees, officers, or agents, except any injury, death, or property damage caused by the negligence of the Employer, its contractors, employees, officers, or agents. 33.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GCC Subclause 33.1, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Contractor fails to notify the Employer within 30 days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the 30-day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing. 33.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers, and Subcontractors from any liability for loss of or damage to property of the Employer, other than the Facilities not yet taken over, that is caused by fire, explosion, or any other perils, in excess of the amount recoverable from insurances procured under GCC Clause 34, provided that such fire, explosion, or other perils were not caused by any act or failure of the Contractor. 33.4 The party entitled to the benefit of an indemnity under this GCC Clause 33 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the party fails to take such measures, the other party's liabilities shall be correspondingly reduced.
34. Insurance	34.1 To the extent specified in the Appendix (Insurance Requirements) to the Contract Agreement, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified in the said Appendix. The

	identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval. (a) <u>Cargo Insurance During Transport</u> Covering loss or damage occurring while in transit from the Contractor's or Subcontractor's works or stores until arrival at the Site, to the Plant (including spare parts therefor) and to the Contractor's Equipment. (b) <u>Installation All Risks Insurance</u> Covering physical loss or damage to the Facilities at the Site, occurring prior to Completion of the Facilities, with extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the Defect Liability Period while the Contractor is on the Site for the purpose of performing its obligations during the Defect Liability Period. (c) <u>Third Party Liability Insurance</u> Covering bodily injury or death suffered by third parties including the Employer's personnel, and loss of or damage to property occurring in connection with the supply and installation of the Facilities. (d) <u>Automobile Liability Insurance</u> Covering use of all vehicles used by the Contractor or its Subcontractors, whether or not owned by them, in connection with the execution of the Contract. (e) <u>Workers' Compensation</u> In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed. (f) <u>Employer's Liability</u> In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed. (g) <u>Other Insurances</u> Such other insurances as may be specifically agreed upon by the parties hereto as listed in the Appendix (Insurance Requirements) to the Contract Agreement. 34.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1, except for the Third Party Liability, Workers' Compensation, and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1 except for the Cargo Insurance During Transport, Workers' Compensation, and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies. 34.3 The Contractor shall, in accordance with the provisions of the Appendix (Insurance Requirements) to the Contract Agreement, deliver to the Employer certificates of insurance or copies of the insurance policies as evidence that the required policies are in full force and effect. The certificates shall provide that no less than 21 days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy. 34.4 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such

	Subcontractors are covered by the policies taken out by the Contractor. 34.5 The Employer shall at its expense take out and maintain in effect during the performance of the Contract those insurances specified in the Appendix (Insurance Requirements) to the Contract Agreement, in the sums and with the deductibles and other conditions specified in the said Appendix. The Contractor and the Contractor's Subcontractors shall be named as co-insureds under all such policies. All insurers' rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies. The Employer shall deliver to the Contractor satisfactory evidence that the required insurances are in full force and effect. The policies shall provide that not less than 21 days' notice shall be given to the Contractor by all insurers prior to any cancellation or material modification of the policies. If so requested by the Contractor, the Employer shall provide copies of the policies taken out by the Employer under this GCC Subclause 34.5. 34.6 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GCC Subclause 34.1, the Employer may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Contractor under the Contract any premium that the Employer shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Contractor. If the Employer fails to take out and/or maintain in effect the insurances referred to in GCC 34.5, the Contractor may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Employer under the Contract any premium that the Contractor shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Employer. If the Contractor fails to or is unable to take out and maintain in effect any such insurances, the Contractor shall nevertheless have no liability or responsibility towards the Employer, and the Contractor shall have full recourse against the Employer for any and all liabilities of the Employer herein. 34.7 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GCC Clause 34, and all monies payable by any insurers shall be paid to the Contractor. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.
35. Unforeseen Conditions	35.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions other than climatic conditions, or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract Agreement by an experienced contractor on the basis of reasonable examination of the data relating to the Facilities including any data as to boring tests, provided by the Employer, and on the basis of information that it could have obtained from a visual inspection of the Site if access thereto was available, or other data readily available to it relating to the Facilities, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered,

	the Contractor shall promptly, and before performing additional work or using additional Plant or Contractor's Equipment, notify the Project Manager in writing of (a) the physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen; (b) the additional work and/or Plant and/or Contractor's Equipment required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions; (c) the extent of the anticipated delay; and (d) the additional cost and expense that the Contractor is likely to incur. On receiving any notice from the Contractor under this GCC Subclause 35.1, the Project Manager shall promptly consult with the Employer and Contractor and decide upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the Project Manager shall instruct the Contractor, with a copy to the Employer, of the actions to be taken. 35.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the Project Manager to overcome such physical conditions or artificial obstructions referred to in GCC Subclause 35.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price. 35.3 If the Contractor is delayed or impeded in the performance of the Contract because of any such physical conditions or artificial obstructions referred to in GCC Subclause 35.1, the Time for Completion shall be extended in accordance with GCC Clause 40.
36. Change in Laws and Regulations	36.1 If, after the date 30 days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated, or changed, which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the SCC, pursuant to GCC Subclause 11.2.
37. Force Majeure	37.1 "Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following: (a) war, hostilities, or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war; (b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion, and terrorist acts; (c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority; (d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication,

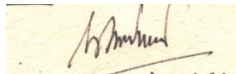
	industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine, and plague; (e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear, and pressure waves or other natural or physical disaster; and (f) shortage of labor, materials, or utilities where caused by circumstances that are themselves Force Majeure. 37.2 If either party is prevented, hindered, or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 14 days after the occurrence of such event. 37.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered, or delayed. The Time for Completion shall be extended in accordance with GCC Clause 40. 37.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either party's right to terminate the Contract under GCC Subclauses 37.6 and 38.5. 37.5 No delay or nonperformance by either party hereto caused by the occurrence of any event of Force Majeure shall (a) constitute a default or breach of the Contract; or (b) give rise to any claim for damages or additional cost or expense occasioned thereby, subject to GCC Subclauses 32.2, 38.3 and 38.4 if and to the extent that such delay or nonperformance is caused by the occurrence of an event of Force Majeure. 37.6 If the performance of the Contract is substantially prevented, hindered, or delayed for a single period of more than 60 days or an aggregate period of more than 120 days on account of one or more events of Force Majeure during the currency of the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other, but without prejudice to either party's right to terminate the Contract under GCC Subclause 38.5. 37.7 In the event of termination pursuant to GCC Subclause 37.6, the rights and obligations of the Employer and the Contractor shall be as specified in GCC Subclauses 42.1.2 and 42.1.3. 37.8 Notwithstanding GCC Subclause 37.5, Force Majeure shall not apply to any obligation of the Employer to make payments to the Contractor herein.
38. War Risks	38.1 "War Risks" shall mean any event specified in paragraphs (a) and (b) of GCC Subclause 37.1 and any explosion or impact of any mine, bomb, shell, grenade, or other projectile, missile, munitions or explosive of war, occurring or existing in or near the country (or countries) where the Site is located. 38.2 Notwithstanding anything contained in the Contract, the Contractor shall have no liability whatsoever for or with respect to (a) destruction of or damage to Facilities, Plant, or any part thereof; (b) destruction of or damage to property of the Employer or any third party; or

	(c) injury or loss of life if such destruction, damage, injury or loss of life is caused by any war risks, and the Employer shall indemnify and hold the Contractor harmless from and against any and all claims, liabilities, actions, lawsuits, damages, costs, charges, or expenses arising in consequence of or in connection with the same. 38.3 If the Facilities or any Plant or Contractor's Equipment or any other property of the Contractor used or intended to be used for the purposes of the Facilities shall sustain destruction or damage by reason of any war risks, the Employer shall pay the Contractor for (a) any part of the Facilities or the Plant so destroyed or damaged to the extent not already paid for by the Employer and so far as may be required by the Employer, and as may be necessary for completion of the Facilities; (b) replacing or making good any Contractor's Equipment or other property of the Contractor so destroyed or damaged; and (c) replacing or making good any such destruction or damage to the Facilities or the Plant or any part thereof. If the Employer does not require the Contractor to replace or make good any such destruction or damage to the Facilities, the Employer shall either request a change in accordance with GCC Clause 39, excluding the performance of that part of the Facilities thereby destroyed or damaged or, where the loss, destruction, or damage affects a substantial part of the Facilities, shall terminate the Contract, pursuant to GCC Subclause 42.1. If the Employer requires the Contractor to replace or make good on any such destruction or damage to the Facilities, the Time for Completion shall be extended in accordance with GCC 40. 38.4 Notwithstanding anything contained in the Contract, the Employer shall pay the Contractor for any increased costs or incidentals to the execution of the Contract that are in any way attributable to, consequent on, resulting from, or in any way connected with any war risks, provided that the Contractor shall as soon as practicable notify the Employer in writing of any such increased cost. 38.5 If during the performance of the Contract any war risks shall occur that financially or otherwise materially affect the execution of the Contract by the Contractor, the Contractor shall use its reasonable efforts to execute the Contract with due and proper consideration given to the safety of its and its Subcontractors' personnel engaged in the work on the Facilities, provided, however, that if the execution of the work on the Facilities becomes impossible or is substantially prevented for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of any war risks, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other. 38.6 In the event of termination pursuant to GCC Subclauses 38.3 or 38.5, the rights and obligations of the Employer and the Contractor shall be specified in GCC Subclauses 42.1.2 and 42.1.3.

H. Change in Contract Elements

39. Change in the Facilities	39.1 <u>Introducing a Change</u> 39.1.1 Subject to GCC Subclauses 39.2.5 and 39.2.7, the Employer shall have the right to propose, and subsequently require, that the Project Manager order the Contractor from time to time during the performance of the Contract to make any change, modification,

	addition, or deletion to, in or from the Facilities hereinafter called "Change," provided that such Change falls within the general scope of the Facilities and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Facilities and the technical compatibility of the Change envisaged with the nature of the Facilities as specified in the Contract. 39.1.2 The Contractor may from time to time during its performance of the Contract propose to the Employer with a copy to the Project Manager, any Change that the Contractor considers necessary or desirable to improve the quality, efficiency, or safety of the Facilities. The Employer may at its discretion approve or reject any Change proposed by the Contractor, provided that the Employer shall approve any Change proposed by the Contractor to ensure the safety of the Facilities. 39.1.3 Notwithstanding GCC Subclauses 39.1.1 and 39.1.2, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion. 39.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Subclauses 39.2 and 39.3, and further details and forms are provided in the Employer's Requirements (Forms and Procedures). 39.2 <u>Changes Originating from Employer</u> 39.2.1 If the Employer proposes a Change pursuant to GCC Subclause 39.1.1, it shall send to the Contractor a "Request for Change Proposal," requiring the Contractor to prepare and furnish to the Project Manager as soon as reasonably practicable a "Change Proposal," which shall include the following: (a) brief description of the Change, (b) effect on the Time for Completion, (c) estimated cost of the Change, (d) effect on Functional Guarantees (if any), (e) effect on the Facilities, and (f) effect on any other provisions of the Contract. 39.2.2 Prior to preparing and submitting the "Change Proposal," the Contractor shall submit to the Project Manager an "Estimate for Change Proposal," which shall be an estimate of the cost of preparing and submitting the Change Proposal. Upon receipt of the Contractor's Estimate for Change Proposal, the Employer shall do one of the following: (a) accept the Contractor's estimate with instructions to the Contractor to proceed with the preparation of the Change Proposal, (b) advise the Contractor of any part of its Estimate for Change Proposal that is unacceptable and request the Contractor to review its estimate (c) advise the Contractor that the Employer does not intend to proceed with the Change. 39.2.3 Upon receipt of the Employer's instruction to proceed under GCC



	Subclause 39.2.2 (a), the Contractor shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GCC Subclause 39.2.1. 39.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If such rates and prices are inequitable, the parties thereto shall agree on specific rates for the valuation of the Change. 39.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance therewith and with all other Change Orders that have already become binding upon the Contractor under this GCC Clause 39 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price) of the Contract Agreement by more than 15%, the Contractor may give a written notice of objection thereto prior to furnishing the Change Proposal as aforesaid. If the Employer accepts the Contractor's objection, the Employer shall withdraw the proposed Change and shall notify the Contractor in writing thereof. The Contractor's failure to so object shall neither affect its right to object to any subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Contractor represents. 39.2.6 Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters therein contained. Within 14 days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order. If the Employer is unable to reach a decision within 14 days, it shall notify the Contractor with details of when the Contractor can expect a decision. If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of 14 days, notify the Contractor accordingly. Under such circumstances, the Contractor shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Contractor in its Estimate for Change Proposal submitted in accordance with GCC Subclause 39.2.2. 39.2.7 If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters identified in the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order." Upon receipt of a Pending Agreement Change Order, the Contractor shall immediately proceed with effecting the Changes covered by such Order. The parties shall thereafter attempt to reach agreement on the outstanding issues under the Change Proposal. If the parties cannot reach agreement within 60 days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Dispute Board in accordance with the provisions of GCC Subclause 45.3. 39.3 <u>Changes Originating from Contractor</u> 39.3.1 If the Contractor proposes a Change pursuant to GCC Subclause 39.1.2, the Contractor shall submit to the Project Manager a written

	“Application for Change Proposal,” giving reasons for the proposed Change and including the information specified in GCC Subclause 39.2.1. Upon receipt of the Application for Change Proposal, the parties shall follow the procedures outlined in GCC Subclauses 39.2.6 and 39.2.7. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Application for Change Proposal.
40. Extension of Time for Completion	40.1 The Time(s) for Completion specified in the SCC shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following: (a) any Change in the Facilities as provided in GCC Clause 39; (b) any occurrence of Force Majeure as provided in GCC Clause 37, unforeseen conditions as provided in GCC Clause 35, or other occurrence of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GCC Subclause 32.2; (c) any suspension order given by the Employer under GCC Clause 41 hereof or reduction in the rate of progress pursuant to GCC Subclause 41.2; or (d) any changes in laws and regulations as provided in GCC Clause 36; or (e) any default or breach of the Contract by the Employer, or any activity, act or omission of the Employer, or the Project Manager, or any other contractors employed by the Employer; or (f) any other matter specifically mentioned in the Contract; or (g) any delay on the part of a sub-contractor, provided such delay is due to a cause for which the Contractor himself would have been entitled to an extension of time under this Subclause by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor. 40.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Project Manager a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer’s estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to a Dispute Board, pursuant to GCC Subclause 45.3. 40.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract. In all cases where the Contractor has given a notice of a claim for an extension of time under GCC 40.2, the Contractor shall consult with the Project Manager in order to determine the steps (if any) which can be taken to overcome or minimize the actual or anticipated delay. The Contractor shall there after comply with all reasonable instructions, which the Project Manager shall give in order to minimize such delay. If compliance with such instructions shall cause the Contractor to incur extra costs and the Contractor is entitled to an extension of time under GCC 40.1, the amount of such extra costs shall be added to the Contract Price.

41. Suspension

41.1 The Employer may request the Project Manager, by notice to the Contractor, to order the Contractor to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefor. The Contractor shall thereupon suspend performance of such obligation, except those obligations necessary for the care or preservation of the Facilities, until ordered in writing to resume such performance by the Project Manager.

If, by virtue of a suspension order given by the Project Manager, other than by reason of the Contractor's default or breach of the Contract, the Contractor's performance of any of its obligations is suspended for an aggregate period of more than 90 days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the Project Manager requiring that the Employer shall, within 30 days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GCC Clause 39, excluding the performance of the suspended obligations from the Contract.

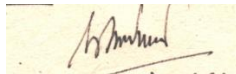
If the Employer fails to do so within such period, the Contractor may, by a further notice to the Project Manager, elect to treat the suspension, where it affects a part only of the Facilities, as a deletion of such part in accordance with GCC Clause 39 or, where it affects the whole of the Facilities, as termination of the Contract under GCC Subclause 42.1.

41.2 If

- (a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix (Terms and Procedures of Payment) to the Contract Agreement, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GCC Subclause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, or fails to remedy the breach or take steps to remedy the breach within 14 days after receipt of the Contractor's notice; or
- (b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas in accordance with GCC Subclause 10.2, or failure to obtain any governmental permit necessary for the execution and/or completion of the Facilities,

then the Contractor may by 14 days' notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.

41.3 If the Contractor's performance of its obligations is suspended, or the rate of progress is reduced pursuant to this GCC Clause 41, then the Time for Completion shall be extended in accordance with GCC Subclause 40.1, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default



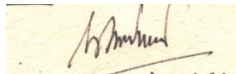
	or breach of the Contract. 41.4 During the period of suspension, the Contractor shall not remove from the Site any Plant, any part of the Facilities or any Contractor's Equipment, without the prior written consent of the Employer.
42. Termination	42.1 In no case, the contractor shall terminate the contract unilaterally, without duly notifying the Employer. 42.2 The Employer may terminate the Contract at any time if the contractor : - does not commence the work as per the Contract, - abandons the work without completing, - fails to achieve progress as per the Contract. 42.3 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. 42.4 Fundamental breaches of Contract shall include, but shall not be limited to, the following : - The Contractor uses the advance payment for matters other than the contractual obligations, - the Contractor stops work for 30 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager; - the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days; - the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation. - a payment certified by the Project Manager is not paid by the Employer to the Contractor within 90 days of the date of the Project Manager's certificate; - the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager; - the Contractor does not maintain a Security, which is required; and - the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the SCC. - If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, pursuant to GCC 6.1. 42.5 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC 42.2 above, the Project Manager shall decide whether the breach is fundamental or not. 42.6 Notwithstanding the above, the Employer may terminate the Contract for convenience. 42.7 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible. 42.8 Payment upon Termination If the Contract is terminated because of fundamental breach of Contract or for any other fault by the Contractor, the performance security shall be forfeited by the Employer. In such case, amount to complete the remaining works as per the Contract shall be recovered from the Contractor as Government dues.
43. Assignment	43.1 Neither the Employer nor the Contractor shall, without the express prior

	written consent of the other party which consent shall not be unreasonably withheld, assign to any third party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

I. Claims, Disputes, and Arbitration

44. Contractor's Claims	44.1 If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall submit a notice to the Project Manager, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 30 days after the Contractor became aware, or should have become aware, of the event or circumstance. If the Contractor fails to give notice of a claim within such period of 30 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Subclause shall apply. The Contractor shall also submit any other notices, which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance. The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Project Manager. Without admitting the Employer's liability, the Project Manager may, after receiving any notice under this Subclause, monitor the record keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Project Manager to inspect all these records, and shall (if instructed) submit copies to the Project Manager. Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Project Manager, the Contractor shall send to the Project Manager a fully detailed claim, which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect, (a) this fully detailed claim shall be considered as interim; (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Project Manager may reasonably require; and (c) the Contractor shall send a final claim within 30 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Project Manager. Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Project Manager and approved by the Contractor, the Project Manager shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time. Each payment certificate shall include such amounts for any claim as have

	been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate. The Project Manager shall agree with the Contractor or estimate: (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with GCC Clause 40, and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract. The requirements of this Subclause are in addition to those of any other Subclause, which may apply to a claim. If the Contractor fails to comply with this or another Subclause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Subclause. In the event that the Contractor and the Employer cannot agree on any matter relating to a claim, either party may refer the matter to the Dispute Board pursuant to GCC 45 hereof.
45. Disputes and Arbitration	45.1 The Employer and the Contractor shall attempt to settle amicably by direct negotiation any disagreement or dispute arising between them under or in connection with the Contract. 45.2 Any dispute between the Parties as to matters arising pursuant to this Contract which cannot be settled amicably within thirty (30) days after receipt by one Party of the other Party's request for such amicable settlement may be referred to Arbitration within 30 days after the expiration of amicable settlement period. 45.3 In case of arbitration, the arbitration shall be conducted in accordance with the arbitration procedures published by the Nepal Council of Arbitration (NEPCA) at the place given in the SCC.



Section 8 –Special Conditions of Contract (SCC)

The following Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC. The clause number of the SCC is the corresponding clause number of the GCC.

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1. Definitions	The Employer is: Grid Operation Department, Nepal Electricity Authority The Project Manager is: The Director, Grid Operation Department The Contractor is: [to be inserted] The Contractor's Representative is: [to be inserted]
5.Law and Language	5.1 The Contract shall be interpreted in accordance with the laws of: Nepal 5.2 The ruling language is: English 5.3 The language for communications is: English
7.Scope of Facilities	7.3 The Contractor shall ensure the availability of spare parts for the supplied items for a minimum period of five (5) years from the operational acceptance by the Employer. Add sub-clause 7.4 7.4 The Contractor shall carry sufficient inventories to ensure an ex-stock supply of consumable spares for the Plant. Other spare parts and components shall be supplied as promptly as possible, but at the most within six (6) months of placing the order and opening the letter of credit. In addition, in the event of termination of the production of spare parts, advance notification will be made to the Employer of the pending termination, with sufficient time to permit the Employer to procure the needed requirement. Following such termination, the Contractor will furnish to the extent possible and at no cost to the Employer the blueprints, drawings and specifications of the spare parts, if requested.
8.Time for Commencement and Completion	8.1 The Contractor shall commence work on the Facilities within 15 days from the Effective Date for determining Time for Completion as specified in the Contract Agreement. 8.2 The Time for Completion of the whole of the Facilities shall be 18 months from the Effective Date as described in the Contract Agreement.
9.Contractor's Responsibilities	Add the following new Sub-Clause: 9.9 The Contractor shall be responsible for selecting and constructing appropriate communication means necessary for the executing of the project at his own expense. If required, the Employer will assist the Contractor in obtaining licenses / permits from the concerned government agencies. 9.10 The Contractor shall be responsible for the arrangement of water supply for drinking and construction purposes at his own cost. 9.11 The Contractor shall be responsible for the arrangement of electricity supply for construction and any other purposes at his own cost. 9.12 Commissioning and pre-commissioning The Contractor shall provide sufficient, properly qualified personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, other materials and facilities; and shall perform all work and services of whatsoever nature required to properly carry out Pre-commissioning, Commissioning and Guarantee Test all in accordance with the provisions of the Contract.
11.Contract Price	11.2 The Contract price shall be adjusted in accordance with the provisions of Appendix 2 (Price Adjustment) to the Contract Agreement
13. Securities	13.3.1 Replace "30days" with "15days". The Performance Security shall be for the following minimum amounts equivalent

	as a percentage of the Contract Price: - Five percent (5%) (Clause ITB 44.1) if the bid price is below 15% of the office estimate. - If the bid price is more than 15% below of the office estimate then the Performance Security shall be additional 50% of the amount which is below 15% of the office estimate as follows. $\text{Performance Security} = 5\% \text{ of Bid price} + 50\% \text{ of } (0.85 * \text{Office Estimate} - \text{Bid Price})$ - an additional amount of 8% of the Contract price if the Employer has increased the Performance Security amount pursuant to ITB Sub Clause ITB 39.5 13.3.2 The Performance Security shall be in the form of the Bank Guarantee (Unconditional) attached hereto in Section X, Contract Forms. The Performance Security shall be issued by any registered bank in Nepal, in complete accordance with the specimen provided herein. The Performance Security shall be valid for a period of ninety (90) days beyond the expiration of warranty period and will be discharged by the purchaser and returned to the supplier not later than thirty (30) days following the date of completion of the supplier's performance obligations under the contract including any warranty obligations and submission to purchaser by the supplier of Income Tax clearance certificate issued by the concerned GON office. The supplier shall promptly extend the validity suitably to cover agreed extension of the warranty period of the supplied goods. 13.3.3 The Performance Security shall not be reduced on the date of the Operational Acceptance. Add the following Sub Clauses: 13.3.4 "In case of award of the Contract to a Joint Venture, the performance security shall be submitted in the name of the Joint Venture and not in the name of the Lead Partner or any Partner(s) of the Joint Venture alone" 13.3.5 For the Power Transformer and its components from all the manufacturer, the Contractor must offer the Performance Security in the form of the Bank Guarantee (Unconditional) for 5 (Five) years from the date of commissioning of the total work. To cover the Performance Security, the Contractor shall issue a separate Bank Guarantee to NEA for the amount of 15% of the total quoted CIP Project Site Price of Power Transformer at least 30 days before the expiry of the main Performance Security else the main Performance Security may be forfeited.
14. Taxes and Duties	Add the following sub-clause 14.5, - In the country of Origin The prices bid by the Contractor shall include all taxes, duties and other charges imposed outside the Employer's country on the production, manufacture, sale and transport of the Contractor's Equipment, Plant, Materials and supplies to be used on or furnished under the Contract, and on the services performed under the Contract. - In Nepal General: - Unless otherwise specifically declared in the contract documents, the prices bid by the Contractor and its suppliers and subcontractors shall include business taxes and other taxes except VAT and Custom duty that shall be levied in accordance with the prevailing laws and regulations of Nepal. Whatsoever provisions made in the Contract document shall not relieve the Contractor, its suppliers and subcontractors from their responsibility to pay income tax that may be levied in the Employer's country on profits made by the Contractor, its suppliers and subcontractors in respect of the Contract. - Value Added Tax (VAT): if not included in the costs while submitting bids by the Contractor, sub-contractor or its nominated sub-contractor shall be eligible for refund on all imported equipment and materials to be supplied and delivered

	exclusively for use in the Project. <u>Staff Income Tax:</u> The Contractor's staff, personnel and labourers, and those of its subcontractors, will be liable to pay personal income taxes in the Employer's country, irrespective of whether they are local or foreign nationals on income earned including salaries and wages as applicable under the laws and regulations of Nepal. The Contractor shall perform such duties in regard to Tax Deduction at Source (TDS) thereof as may be applicable by such laws and regulations. <u>Import License:</u> The Contractor shall inform the Employer and the Project Manager in writing the details of the equipment and materials to be imported into Nepal for use on the Works at least 56 days prior to arrival of shipment at disembarkation port, and shall submit a formal written request for assistance from the Employer for importation processing. The Employer will assist the Contractor to obtain necessary permits for import of such equipment and materials into Nepal. Import license fees or any other charges shall be at the cost of the Contractor. The Contractor shall be responsible for transport from the Port of disembarkation to the Site or location of the Works. The Contractor shall be fully responsible to determine these rates and the amount payable at the time of preparing tender document and include such costs in its bids. In failing to do so, the Employer shall not be liable to pay such costs and the Contractor shall pay such charges as local or any customs authorities en-route may impose, which will not be an eligible item for refund from the Employer. <u>Duties on Equipment, Plant, Materials and Supplies:</u> (a) Notwithstanding the provisions of this document, the Contractor's Plant and Equipment, including essential tools thereof, imported for the sole purpose of executing the Contract on condition of re-export upon completion of the Works, shall be exempt from payment of customs duties, VAT and applicable taxes. However, the Contractor shall deposit the amount or provide a Bank Guarantee to the GoN Customs office equal to amount of customs duties and other taxes as per the prevailing laws, rules and regulations of Nepal for those imported equipment, plant, materials and supplies at the time of import. Such deposited amounts shall be refunded, or the Bank guarantee cancelled by the Customs Office after Re-export of those imported equipment, plant, materials and supplies. (b) Any plant, materials or supplies imported by the Contractor for the performance of the Works but not incorporated in the Works shall be taken out of Nepal within 90 (Ninety) days from the date of issuance of the Performance Certificate. If the Contractor disposes off or consumes any equipment, spare parts, materials or supplies within Nepal, it shall pay all customs duties, VAT, income tax on the sales proceeds and taxes applicable on such items under the laws and regulation of Nepal in force. (c) Equipment, plant, materials and supplies, imported by the Contractor for execution of the Works, shall be subject to payment of customs duty at a special rate of one percent (1%) or as per the prevailing laws, rules and regulations of Nepal of CIP or Customs entry point value. This customs duty shall be paid by the Contractor at the time of import and will be reimbursed by the Employer to the Contractor upon submission of the original receipt issued by the Customs Department. VAT shall be exempted on all imported materials & equipment purchased for the use in the Works (shall be reimbursed by the Employer in case the Employer is unable to avail exempt facility) (d) VAT applicable on plant & equipment supplied directly from manufacturing plant in Nepal shall be paid by the Employer. (e) The Contractor shall maintain records satisfactory to the Employer documenting use of all Plant, Materials and Supplies imported into and/or procured for the performance of the Works. If any of such Plant, Materials and/or Supplies, imported into Nepal or otherwise supplied to the Project at a special or preferential rate of Customs Duties or taxes, are misused or found to be used or appropriated for any purpose other than the Project, the Contractor shall be held fully responsible, and liable to pay customs duties, VAT and other taxes and/or any penalties as may be imposed in accordance with the prevailing laws and

	regulations of Nepal. (f) Income tax assessed in accordance with the prevailing Income Tax Act of Nepal and as per the provision of any specific Double Taxation Agreement, shall be imposed on the Contractor, its sub-contractors and nominated sub- contractors. An advance income tax as per the prevailing income Tax Act and Finance Act shall be deducted from the monthly progress payment of the Contractor. (g) The Contractor shall pay all duties, taxes, fees and contributions levied in Nepal in Nepalese Rupees as directed by the relevant governmental department or office, or any other local statutory agency or body in accordance with the relevant rules and regulations. (h) The provisions of this clause shall apply equally to foreign subcontractors or nominated subcontractors of the Contractor employed for the Works. (i) The Contractor and any foreign subcontractors or nominated subcontractors employed on the Works, if not already registered in Nepal, shall be required to get registered with the Inland Revenue Department (IRD) for the purpose of the Contract, which shall be undertaken within 28 days after signing of the Contract Agreement. The Contractor, sub-contractor or the nominated subcontractor shall submit Certified copies of the Registration Certificate(s) to the Project Manager within 14 days of registration. (j) Other local fees and charges (toll taxes) shall be applied in accordance with the prevailing laws and regulations of Nepal. (k) Locally available goods, construction materials including fuel, lubricating oil, cement, timber, iron and steel goods, etc. shall be procured locally. All taxes for such goods procured from the local market shall be included in the Contract Rates and Prices and no reimbursement or payment in that respect shall be made to the Contractor.
15.Licenses / Use of Technical Information	Add the following second paragraph under Sub-clause 15.2. The Employer shall however shall have the right to reproduce any or all drawings, documents and other materials furnished to the Employer for the purpose of the Contract and in addition, if required, for operation and maintenance.
18 Work Program 18.2 Program of Performance	Include the following paragraph in this sub Clause. Before starting procurement of plants and equipment as in schedule 1, Contractor shall complete following works as far as practicable: - The contractor shall complete site clearance, final layout drawing of substation and switchyard, final civil design and drawing of drain, fence works. - The Contractor shall mobilize sufficient manpower in site with camping facilities and start civil works as per working program. The contractor shall consider these conditions while making detail Programs.
19.Subcontracting	Add the following paragraph at the end of this sub Clause Bidders are requested to propose the sub-contractors for major electrical equipment/plants and materials including sub-contractor for major civil construction works. “The Contactor is not encouraged to add or the delete the list finalized during the contract signing unless special circumstance which is not in the control of the contractor is evidenced. If such situation arise, the qualification requirement of the manufacturer of the major items and sub-contractor of the major civil work, shall be as that stipulated in “Part I, “Evaluation and Qualification Requirement” of the bidding document.
20.Design and Engineering	20.1.1 Add the following paragraph at the end of this sub Clause The Contractor shall provide detail condition and specification or parameters taken under consideration for design / re-design (wherever applicable) of the substation and its cost shall be deemed to be included in the contract price” 20.1.2 Delete this sub clause.

	20.3.2 Change “14 days” to 21 days in both paragraph of this sub clauses. 20.3.2 ADD Project Manager shall make delay in approval of document if by approving document contradicts the detail program prepared by contractor as per the SCC sub clause 18.2.
21. Procurement	21.3.2 Add the following at the end of this Sub-Clause: The Employer shall in no way be responsible for the condition of road and access thereto. The contractor has to make alternative route if required in their own cost. 21.3.4 Add the following at the end of this Sub-Clause: In case of any damage, the Contractor shall restore all such facilities, as far as possible, to its original condition at its own expense and to the satisfaction of the Employer/Owner. 21.4 Custom Clearances; Add the following paragraph at the beginning of this Sub-Clause: The Contractor shall familiarize himself with the rules and regulations of Nepal with regard to customs, duties, taxes, importation and clearing of goods and equipment and the Contractor shall follow the required procedures regardless of the relief provided by the Employer. The Employer will provide assistance whenever possible.
22. Installation	22.1.1 Add the following at the end of the second paragraph: The checking of any setting-out by the Employer shall not relieve the Contractor of his responsibility for the accuracy thereof. 22.1.3 Add the following Sub Clause: Expatriate personnel engaged for work in Nepal may require work permit issued by the Nepalese Authorities. The Contractor shall be responsible for applying and obtaining such permits. Such applications shall be made in good time so as to enable the completion of the work in accordance with the approved Work Program. The Employer shall provide letters to the concerned government agencies (if required) to facilitate the work permit process. 22.2 Labor 22.2.5 Working Hours (a) Normal working hours are: The Contractor shall be responsible for following the normal working hours to specific location and rules. 22.2.7 Health and Safety (d) The Contractor shall throughout the contract (including the Defect Liability Period): (i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labour (including all the Contractor's employees, all Sub-Contractors and Employer's and Project Manager's employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behaviour with respect to of Sexually Transmitted Diseases (STD)—or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labour as appropriate; and (iii) Provide for STI and HIV/AIDS screening, diagnosis, counselling and referral to a dedicated national STI and HIV/AIDS program, (unless otherwise agreed) of all Site staff and labour. The Contractor shall include in the program to be submitted for the execution of the Facilities under Sub- clause 18.2 an alleviation program for Site staff and labour and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The

STI, STD and HIV/AIDS alleviation program shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-clause and the related specification. For each component, the program shall detail the resources to be provided or utilized and any related sub-contracting proposed. The program shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for the preparation and implementation this program shall not exceed the amount dedicated for this purpose.

(iv) Ensure Health, Security and safety practices to address communicable diseases that may arise during execution of the project as per the prevailing Government guidelines.

22.3.4 Add the Sub Clause 22.3.4 "Duties on Contractor's

Equipment, Plant, Materials and Supplies"

Notwithstanding the provision of this document, Contractor's Plant and Equipment, including essential tools and spare parts thereof, imported by the contractor for the sole purpose of executing the Contract, and taken out of Nepal upon completion of the Works shall, except for Plant and Mandatory Spare Parts to be supplied from abroad in Price Schedule No.1, be exempt from payment of customs duties and taxes levied in Nepal. However, the Contractor shall deposit the amount or provide a Bank Guarantee to the GoN, Customs Department equal to the amount of customs duties at the prevailing laws, rules and regulations of Nepal for those imported equipment, plant, materials and supplies at the time of import. The amount of the deposit so provided will be refunded in Nepalese Rupees, or the Bank guarantee cancelled by the Employer, after the submission of the re-export certificate issued by the Customs Department to the Employer.

If the Contractor disposes of any Contract's Equipment, spare parts, materials or supplies in Nepal, it shall pay all customs duties and taxes applicable on such items under the laws and regulations of Nepal in force at the time and shall repay to the Employer the amount of any customs duties and taxes which may have been reimbursed to the Contractor by the Employer in connection with importation of such items.

Contractor shall re-export all the equipment, plant, materials, and supplies within 90(Ninety) days after completion of the project.

22.4 .1 Add the following Sub-Clause

Site Regulations and Safety

The Contractor shall comply with all the National Legislatures, Environmental Acts, proposed Environmental legislatures and the proposed mitigation measures in preparing proposed site regulations and plan for approval.

The Contractor shall take all reasonable steps to protect the environment on and off the Site and avoid damage or nuisance to persons to persons or to property of the public or others resulting from pollution, noise or other causes as a consequence of his method of operation.

During the progress of the Contract, the Contractor and his Sub-contractors shall abide at all times by all existing Acts on environmental protection and rules made there under, regulations, notifications bye-laws of the Government of Nepal, and any other law, bye-law, regulations that may be passed or notifications that may be issued in this respect in future.

The mitigation measures to be undertaken by the Contractor for the adverse environmental impacts have been detailed in Technical Specifications (Volume II).

22.4.2 Add the following Sub-Clause

Use of Explosives;

No blasting or work involving the use of explosives will be permitted in the substation area or adjacent areas under this Contract.

22.6 Add the following at the end of first paragraph:

The materials to be removed shall be incinerated or disposed off at places

	which will not be unsightly or objectionable to the inhabitants of the area following all environmental requirements.
23. Tests and Inspections	23.2 Add the following at the end of this Sub-Clause: The Employer and the Project Manager or their designated representatives shall be entitled to attend at his own cost to witness the tests for the following equipment as specified in the Section 6- Employers Requirements (Volume II, Technical Specifications) at Manufacturer's/Contractor's factory. - Power Transformers - Core & Coil Stage Inspection - 2 persons per visit for each identical transformers type - Final Factory Acceptance Test - 2 persons per visit for each identical transformers type - Control and Relay Panels - Factory Acceptance Test- 2 persons per visit; 2 trips - Circuit Breakers - Factory Acceptance Test- 2 persons per visit; 2 trips - Disconnecting Switches - Factory Acceptance Test- 2 persons per visit; 2 trips - Instrument Transformers and Lighting Arrestors - Factory Acceptance Test- 2 persons per visit; 2 trips 33kV & 11kV Copper Power Cable - Factory Acceptance Test- 2 persons per visit; 1 trip 11kV Switchgears - Factory Acceptance Test- 2 persons per visit; 1 trip - Steel Structures - Factory Acceptance Test- 2 persons per visit; 1 trip - Others: as per Employers Requirements (Technical Specifications) In case of Transformer testing and inspection (Core & coil stage inspection & Final Factory acceptance Test), technical representative from separate independent body or lab recognized (associated with power transformer or its testing) also should be present, whose cost shall be incurred by the Contractor, Employer won't be liable to pay those charges. Independent body or lab should be member in the group of Short Circuit Testing Liaison (STL) of Europe and should be involved in transformer testing for at least 10 years. 23.3 Supplementing Sub Clause 23.3 The Contractor shall intimate the Project Manager the detailed program about the tests and/or inspection and of the place and time thereof at least fifteen (15) days in advance in case of domestic supplies & thirty (30) days in advance in case of foreign supplies. 23.4 Supplementing Sub-Clause GC 23.4 The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection within fifteen (15) days after completion of tests" 23.6 Add the following at the end of this Sub-Clause: All costs incurred by the Employer including all travelling and board and lodging expenses by the repetition of the tests for the causes not attributable to the Employer or false call for tests shall be borne by the Contractor pursuant to GCC Sub-Clause 23.2. Any delay in delivery due to retest or false call shall

	not constitute a release of the Contractor from his responsibilities for delay. 23.12 Add the following sub clause Type Test The Bidders shall have to furnish copies of type test certificate of all the equipment/material as applicable supplied against this specification for the tests carried out during last ten years. If the successful bidder fails to submit the type test reports, type test would be conducted by the contractor in the presence of authorized representative of the Employer at no additional cost implications to the Employer. In case of Power Transformer, type test shall be witnessed by technical representative from separate independent body or lab recognized (associated with power transformer or its testing) at no additional cost to the Employer. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited by the national accreditation body of the country where laboratory is located) or any government approved laboratory. 23.13 Add the following sub clause Routine Tests These tests would be conducted on raw materials and other finished materials in accordance with provisions of IEC Standards. Proper record of all Routine tests has to be maintained and made available to the Employer on demand. 23.14 Add the following sub clause Acceptance Tests These tests would be conducted as per Quality Assurance Programme approved by the Employer on each and every lot of finished material, which is ready for dispatch. The tests shall be conducted in the presence of Employer authorized representative(s). Note: For all type, routine and acceptance test, the acceptance values shall be the values guaranteed by the bidder in the guaranteed technical particulars of his proposal or the acceptance test value specified in this specification, whichever is more stringent for that particular test. Correct grade and quality of all the materials including steel and zinc shall be used by the Contractor. Employer reserves the right of carrying out any inspection or test of reasonable nature at Contractor's/ Manufacturer's works, or at site, or at any approved laboratory in addition to the tests as specified above to satisfy himself that the materials comply with the specifications without any extra cost. 23.15 Add the following sub clause Material Dispatch Clearances After the materials have been found acceptable, a Material Dispatch Clearance (MDC) shall be issued in writing by the Owner representative without which no materials shall be dispatched. Necessary procedure for packing shall be followed before dispatch of material as given in Technical Specifications.
24.Completion of Facilities	24.2 Add the following paragraph at the end of this clause: If Appendix to the Contract Agreement titled "Scope of Works and Supply by the Employer "does not specify the personnel and other necessary materials required for the Pre-commissioning the facilities, the supply and management of same shall be the responsibility of the Contractor. The Contractor is responsible for providing the Pre-commissioning training to the NEA with no extra cost for the same. 24.8 Delete this Sub-Clause in its entirety and replace by the following:

	The issue of the completion certificate does not relieve the Contractor from his responsibilities for the care and custody of the Facilities or the relevant parts thereof together with the risk of loss or damage thereto.
25.Commissioning and Operational Acceptance	25.2.2 The Guarantee Test of the Facilities shall be successfully completed within 7 days from the date of Completion. 25.3.1(e) Add the following new Sub-Clause: Four (4) sets of as built drawings, operating and maintenance manuals and CD's, USB drives etc. as per Technical Specifications of the Bidding Documents shall be furnished. 25.3.3 Change "seven (7) days" to "twenty one (21) days" 25.3.4 Change "seven (7) days" to "twenty one (21) days"
26.Completion Time Guarantee	26.2 Applicable rate for liquidated damages: 0.05% of Contract Price per day of delay. Maximum deduction for liquidated damages: 10% of Contract Price 26.3 No bonus will be given for earlier Completion of the Facilities or part thereof.
27.Defect Liability	27.2 Delete first paragraph of the Sub-Clause and replace with the following: The Defect Liability period shall be twelve (12) months from the date of issuance of Operational Acceptance. 27.8 Add the following paragraph at the end of this Sub-Clause: Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the Defect Liability Period extended by a period of twelve (12) months from the time such repair/replacement of the Facilities or any part thereof. 27.9 Change "Completion" in line 5 of the Sub Clause to "Operational Acceptance" 27.10 Time Period shall be 18 Months 27.11 Add the following new Sub Clause: The Defect Liability period for the Power Transformer and its components shall be 5 (Five) years from the date of issuance of Operational Acceptance.
30. Limitation of Liability	30.1 (b) The multiplier of the Contract Price is: One
31. Transfer of Ownership	31.1 Add "and upon endorsement of the dispatch documents in favor of the Employer." at the end of this Sub-Clause. 31.5 In the 4th line, replace "Completion of the Facilities" by "Operational Acceptance of the Facilities".
32. Care of Facilities	32.1 Replace all "Completion" by "Operational Acceptance".
33. Loss of Damage	33.1 Add "and defective design, material or workmanship of the contractor" after "the supply and installation of the Facilities".
34. Insurance	34.1(c) Add "including property of the Employer" after the word "property".
36. Change in Laws and Regulations	36.1 Add the following after " obligation under the Contract." in this Sub-Clause: However, these adjustments would be restricted to direct transactions between the Employer and the Contractor and not on procurement of raw materials, intermediary components, etc. by the Contractor.
37. Force Majeure	37.6 Replace "either party may terminate." in line 5-7 by "the dispute will be resolved in accordance with GC Clause 45." in this Sub-Clause. 37.7 Delete this Sub-Clause in its entirety.
39. Change in the Facilities	39.1.2 Interchange the words "Employer" and "Project Manager" in lines 2 and 3 in this Sub-Clause. 39.2.2 Delete this Sub-Clause in its entirety and replace with the following:

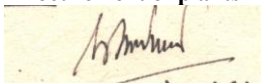
	“Upon instruction from the Project Manager, the Contractor shall prepare the ‘Change Proposal’ without any cost to the Employer”. 39.2.5 Replace "shall withdraw the proposed Change and shall notify the Contractor in writing thereof." at the end of the first paragraph by "and the Contractor shall agree on specific rates for valuation of the Change." in this Sub-Clause. 39.4 Add this new Sub-Clause as follows: The scope of work under the package shall be as per the Volume -II “Employer’s Requirement” of Bidding Documents. The quantity variation applicable for the existing scope shall be generally as per the following. The Employer reserves the right to increase or decrease the quantity of different items of the specified goods and services to the extent of fifteen percent (15%) of the revised contract price pursuant to the GC Clause 11.1, by way of suitable amendment to the Contract, without any change in unit rate/price and/or other terms and conditions of the Contract. However, the quantities of individual items of goods and services may vary up to any extent.
40. Extension of Time for Completion	40.2 Delete “as soon as reasonably practicable circumstance.” and replace with “within 21 days of the identification of the event of such change known to the Contractor”.
42. Termination	42.4 (h) The maximum number of days is: 200
45. Disputes and Arbitration	45.3 The place of arbitration shall be: Kathmandu, Nepal
Add this new Clause SCC 46 (Supplementing to GCC) Construction of the Contract Document	46.1 The Contract will be signed in two (2) originals and the Contractor shall be provided with one signed original and the other will be retained by the Employer. 46.2 Subsequent to signing of the Contract, the Contractor at his own cost shall provide the Employer with true copies of Contract Agreement within seven (7) days after signing of the Contract. The number of copies shall be decided by the Employer.
Add this new Clause SCC 47 (Supplementing to GCC) Debarring manufacturer	47.1 If 2(Two) or more nos. of Power Transformers supplied by the manufacturer of Power Transformer is damaged within 2 (Two) years from the date of issue of Operational Acceptance, then the manufacturer shall be debarred to participate in any competitive bidding of NEA for next 2 (Two) years.

Section 9 - Contract Forms

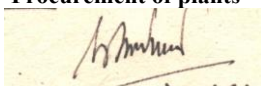
This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

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Letter of Intent

[on letterhead paper of the Employer]

..... *date.*

To: *name and address of the Contractor*

Subject: *Issuance of letter of intent to award the contract*

This is to notify you that, it is our intention to award the contract *dated* for execution of the *name of the contract and identification number, as given in the Contract Data/SCC* to you as your bid price *amount in figures and words in Nepalese Rupees/US\$* as corrected and modified in accordance with the Instructions to Bidders is hereby selected as substantially responsive lowest evaluated bid.

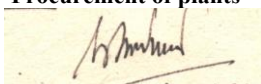
Authorized Signature:

Name:

Title:

CC:

[Insert name and address of all other Bidders, who submitted the bid]



Letter of Acceptance

[on letterhead paper of the Employer]

..... *date*

To: *name and address of the Contractor*

Subject: *Notification of Award*

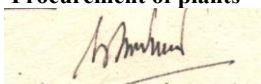
This is to notify that your Bid dated *date* for execution of the *name of the contract and identification number, as given in the Contract Data/SCC* for the Contract price of the equivalent of *[amount in figures and words in the currency.....]*, as corrected in accordance with the Instructions to Bidders is hereby accepted by our Agency..

You are hereby instructed to contact this office to sign the formal contract agreement within 15 days. As per the Conditions of Contract, you are also required to submit Performance Security, as specified in SCC, consisting of a Bank Guarantee in the format included in Section 9 (Contract Forms) of the Bidding Document.

The Employer shall forfeit the bid security, in case you fail to furnish the Performance Security and to sign the contract within specified period.

Authorized Signature:

Name and Title of Signatory:



Contract Agreement

THIS AGREEMENT is made the _____ day of _____, _____,
 BETWEEN (1) _____, a corporation incorporated under the laws of _____ and having
 its principal place of business at _____ (hereinafter called "the Employer"), and (2)
 _____, a corporation incorporated under the laws of _____ and having
 its principal place of business at _____ (hereinafter called "the Contractor").

WHEREAS the Employer desires to engage the Contractor to design, manufacture, test, deliver, install, complete and commission certain Facilities, viz. _____ ("the Facilities"), and the Contractor has agreed to such engagement upon and subject to the terms and conditions hereinafter appearing.

NOW IT IS HEREBY AGREED as follows:

Article 1.

Contract Documents

1.1 Contract Documents (Reference GC Clause 2)

The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:

- (a) This Contract Agreement and the Appendices hereto including letter of acceptance
- (b) Letter of technical and financial (price) bid
- (c) The addenda (insert nos of addenda if any)
- (d) Special condition of contract (SCC)
- (e) General condition of Contract (GCC)
- (f) Bill of Quantities (BOQ)
- (g) Employers' work requirement
- (h) The drawings
- (i) The complete schedules
- (j) The complete bidding forms submitted with the bid
- (k) Any other documents
- (l) Minute of Contract Negotiation Meeting

1.2 Order of Precedence (Reference GC Clause 2)

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above.

1.3 Definitions (Reference GC Clause 1)

Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions.

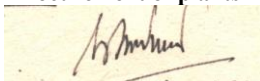
Article 2. Contract Price and Terms of Payment

2.1 Contract Price (Reference GC Clause 11)

The Employer hereby agrees to pay to the Contractor the Contract Price in consideration of the performance by the Contractor of its obligations hereunder. The Contract Price shall be the aggregate of: _____, _____ as specified in Price Schedule No. 5 (Grand Summary), and _____, _____, or such other sums as may be determined in accordance with the terms and conditions of the Contract.

2.2 Terms of Payment (Reference GC Clause 12)

The terms and procedures of payment according to which the Employer will



reimburse the Contractor are given in the Appendix (Terms and Procedures of Payment) hereto.

Article 3. Effective Date**3.1 Effective Date (Reference GC Clause 1)**

The Effective Date from which the Time for Completion of the Facilities shall be counted is the date when all of the following conditions have been fulfilled:

- (a) This Contract Agreement has been duly executed for and on behalf of the Employer and the Contractor;
- (b) The Contractor has submitted to the Employer the performance security and the advance payment guarantee;
- (c) The Employer has paid the Contractor the advance payment.

Each party shall use its best efforts to fulfill the above conditions for which it is responsible as soon as practicable.

The Time of Completion of the Facilities shall be determined from the date of advance payment or after forty-five (45) days from the signing of the Contract, whichever is earlier. The day on which the Employer sends payment recommendation to the Bank shall be considered the date of payment.

- 3.2** If the conditions listed in article 3.1 above, are not fulfilled within two (2) months from the date of this Contract notification because of reasons not attributable to the Contractor, the Parties shall discuss and agree on an equitable adjustment to the Contract Price and the Time for Completion and/or other relevant conditions of the Contract.

Article 4. Communications

- 4.1** The address of the Employer for notice purposes, pursuant to GC 4.1 is:

Grid Development Department,
Transmission Directorate,
Nepal Electricity Authority
Min Bhawan, New Baneshwor, Kathmandu
Tel.: +977
Email: gridoperation@nea.org.np

- 4.2** The address of the Contractor for notice purposes, pursuant to GC 4.1 is:

_____.

Article 5. Appendices

- 5.1** The Appendices listed in the attached List of Appendices shall be deemed to form an integral part of this Contract Agreement.
- 5.2** Reference in the Contract to any Appendix shall mean the Appendices attached hereto, and the Contract shall be read and construed accordingly.

IN WITNESS WHEREOF the Employer and the Contractor have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Employer

[Signature]

[Title]

in the presence of _____

Signed by, for and on behalf of the Contractor

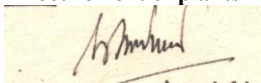
[Signature]

[Title]

in the presence of _____

APPENDICES

Appendix 1	Term and Procedures of Payment
Appendix 2	Price Adjustment
Appendix 3	Insurance Requirements
Appendix 4	Time Schedule
Appendix 5	List of Major Items of Plant and Installation Services and List of Approved Subcontractors
Appendix 6	Scope of Works and Supply by the Employer
Appendix 7	List of Documents for Approval or Review
Appendix 8	Functional Guarantees
Appendix 9	Minutes of Contract Negotiation Meeting held prior to Contract Signing
Appendix 10	Price Schedules



Appendix 1 - Terms and Procedures of Payment

In accordance with the provisions of GCC Clause 12 (Terms of Payment), the Employer shall pay the Contractor in the following manner and at the following times, based on the Price Breakdown given in the section on Price Schedules. Payments will be made in the currencies quoted by the Bidder unless otherwise agreed between the parties. Applications for payment in respect of part deliveries may be made by the Contractor as work proceeds.

(A) Terms of Payment

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

In respect of plant and mandatory spare parts supplied from abroad, the following payments shall be made in USD or NRs. as applicable.

Ten percent (10%) of the total CIP amount as an advance payment against receipt of invoice and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of the plant and mandatory spare parts delivered to the site, as evidenced by delivery documents.

Fifty Percent (50%) of the total or pro rata CIP amount upon Incoterm "CIP", upon delivery to the carrier within forty-five (45) days after receipt of following invoice and documents through irrevocable letter of credit opened in favor of Contractor's bank:

- i) 6 copies of contractor's invoice certified by the Employer showing contract no. goods description, quantity, unit price and total amount.
- ii) Payment Authorization as per the specified format duly signed by the authorized official (s), designated by the government of Nepal to operate the Line of Credit.
- iii) Original and 6 copies of negotiable, clean, on-board bill of lading marked freight prepaid and 6 copies of non-negotiable bill of lading.
- iv) 6 copies of Detailed Packing list identify contents of each package.
- v) Insurance Policy/Certificate.
- vi) Manufacturer's / supplier's warranty certificate.
- vii) Dispatch authorization issued by the employer with the factory inspection report.
- viii) Certificate of origin

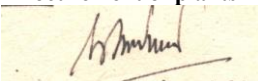
Thirty percent (30%) of the total or pro rata CIP or amount upon Incoterm "CIP," upon delivery to the site within 45 days after receipt of invoice with Delivery Completion Certificate (DCC) issued by the Employer showing contract no. goods description, quantity through irrevocable letter of credit opened in favor of Contractor's bank.

Five percent (5%) of the total or pro rata CIP or amount upon issue of the Completion Certificate, within 45 days after receipt of invoice.

Five percent (5%) of the total or pro rata CIP or amount upon completion of defect liability period, within 45 days after receipt of invoice.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Within the Employer's Country

In respect of plant and mandatory spare parts supplied from within the Employer's country, the following payments shall be made in NPR only.



Ten percent (10%) of the total EXW amount as an advance payment against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of the plant and mandatory spare parts delivered to the site, as evidenced by delivery documents.

Fifty percent (50%) of the total or pro rata EXW amount upon Incoterm “Ex-Works,” upon delivery to the carrier within forty-five (45) days after receipt of following invoice and documents through irrevocable letter of credit opened in favor of supplier bank: -

- i) 6 copies of contractor’s invoice certified by the Employer showing contract no. goods description, quantity, unit price and total amount.
- ii) Payment Authorization as per the specified format duly signed by the authorized official (s), designated by the government of Nepal to operate the Line of Credit
- iii) Original and 6 copies of negotiable, clean, on-board bill of lading marked freight prepaid and 6 copies of non-negotiable bill of lading.
- iv) 6 copies of Detailed Packing list identify contents of each package.
- v) Insurance Policy/Certificate.
- vi) Manufacturer’s / supplier’s warranty certificate.
- vii) Dispatch authorization issued by the employer with the factory inspection report.
- viii) Delivery certificate issued by Employer.

Thirty percent (30%) of the total or pro rata EXW amount upon Incoterm “Ex-Works,” upon delivery of goods at site within forty-five (45) days after receipt invoice with Delivery Completion Certificate (DCC) issued by the Employer showing contract no. goods description, quantity through irrevocable letter of credit opened in favor of supplier bank.

Five percent (5%) of the total or pro rata EXW amount upon issue of the Completion Certificate, within 45 days after receipt of invoice.

Five percent (5%) of the total or pro rata EXW amount upon completion of defect liability period, within 45 days after receipt of invoice.

Schedule No. 3 - Design Services

The amount of Design Services should be built in the quoted price for Supply and Services.

Schedule No. 4 - Installation and Other Services

In respect of installation services for both the foreign and local currency portions, the following payments shall be made in **NPR only by direct payment through Cheque**.

Ten percent (10%) of the total installation and other services amount as an advance payment against receipt of invoice and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of work performed by the Contractor as evidenced by the invoices for installation services.

Eighty percent (80%) of the measured value of work performed by the Contractor, as identified in the said Program of Performance, during the preceding month, as evidenced by the Employer’s authorization of the Contractor’s application, will be made monthly within 45 days after receipt of invoice.

Five percent (5%) of the total or pro rata value of installation services performed by the Contractor as evidenced by the Employer’s authorization of the Contractor’s monthly applications, upon issue of the Completion Certificate, within 45 days after receipt of invoice.

Five percent (5%) of the total or pro rata value of installation services performed by the Contractor as evidenced by the Employer's authorization of the Contractor's monthly applications, upon completion of defect liability period, within 45 days after receipt of invoice.

(B) Payment Procedures:

The procedures to be followed in applying for certification and making payments shall be as follows:

The procedures to be followed in applying for certification and making payments are as explained in above respective paras. The Employer shall make payments promptly within forty five (45) days of submission of an invoice by the Contractor.

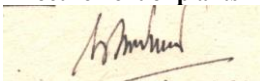
Payment of Taxes & duties:

Provisions in PC 14 shall apply in respect to Taxes & Duties.

Additional Sub-Clause for Submission of Bills for Payment:

- i. All Payments for the works in part or full shall be based upon measurements or otherwise as per the Contract. Immediately after execution of foundation of any structure or otherwise, but before filling the trench or foundation, the Contractor shall take and record measurements in presence of the authorized representatives of the Employer.
- ii. All Measurements recorded in a Measurement Book (MB) issued by the Employer should be signed with date by the Contractor and the Employer.
- iii. The Value of work executed shall be determined by the Employer.
- iv. The Contractor seeking any payment shall submit the bills with the relevant MBs and other requisite documents, duly signed by the site representatives of the Employer, to the Employer. The Employer will then verify the bills and approve for release of payment.

Note: No interest shall be paid on delayed payment in terms of GC sub-clause 12.3



Appendix 2: Price Adjustment

1.1 Bidders may please note that price adjustment will be applicable only on:

- the copper, ferrous material (tank and accessories) of Power Transformer.

Prices of all other items of supply, delivery, installation, testing and commissioning activities under the Contract, for all purpose, will remain 'FIRM' in all respects.

1.2 Also, since advance payment will be made to the Contractor, price adjustment will not be allowed on this amount and accordingly, price adjustment shall be permitted for 90% (if 10% advance is taken) cost of the Material only.

1.3 The Base date for indices, for the purpose of price adjustment, shall be taken as 28 days prior to the deadline for submission of the Bid. For final date for indices, for price adjustment, the same will be governed by 60 days prior to the date of dispatch of different lot, which is committed by the Contractor for various plants in the bar chart (work Schedule) and approved & accepted by the employer at the time of signing of contract agreement.

Prices payable to the Contractor, in accordance with the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of labor and material components, in accordance with the following formula:

1.3.1. For Power transformer:

$$P_1 = P_0 \times \left(a + b \frac{L_1}{L_0} + c \frac{M_1}{M_0} \right) - P_0$$

in which:

- P_1 = adjustment amount payable to the Contractor in accordance with above formula
 P_0 = Contract price quoted/confirmed
 a = percentage of fixed element as listed in table below
 b = percentage of copper component of power transformer as listed in table below
 c = percentage of ferrous component of power transformer as listed in table below

Item	% of Fixed Component (a)	% of copper component (b)	% of ferrous component (c)
Power Transformer	64	29	7

PRICE INDICES:

L_0, L_1 = London Metal Exchange (LME) price of Copper wire bars as applicable on the base date & on the date for adjustment respectively.

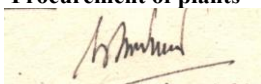
M_0, M_1 = LME price for Steel bar as applicable on the base date & on the date for adjustment respectively.

1.3.2 Additional Conditions Applicable to Price Adjustment of supplied power transformers:

- Price adjustment will be applied only if the resulting increment or decrement is more than 10% of the base material Price of the Copper and Steel for Power Transformer. And the price

will be adjusted by deducting 10% of increased or decreased amount from the base material price.

- No price adjustment shall be payable on the portion of the Contract Price paid to the contractor as Advance payment as indicated above in clause 1.2.
- No price increase will be allowed beyond the original dispatch date of different lots of equipment unless covered by an extension of time awarded by the Employer under the terms of the Contract. No price increase will be allowed for periods of delay for which the Contractor is responsible. The Employer will, however, be entitled to any price decrease occurring during such periods of delay.
- If the currency in which the Contract price, P_0 , is expressed is different from the currency of the materials indexes, a correction factor will be applied to avoid incorrect adjustments of the Contract price. The correction factor shall correspond to the ratio of exchange rates between the two currencies on the base date and the date for adjustment as defined above.



Appendix 3

Insurance Requirements

(A) Insurances To Be Taken Out By The Contractor

In accordance with the provisions of GCC Clause 34, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, such approval not to be unreasonably withheld.

(a) Cargo Insurance

Covering loss or damage occurring, while in transit from the supplier's or manufacturer's works or stores until arrival at the Site, to the Facilities (including spare parts therefore) and to the construction equipment to be provided by the Contractor or its Subcontractors.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [name]	From [place]	To [place]
110% of total price for plant and equipment	(*)	Contractor	Manufacturer place/cargo warehouse	Site Delivery

(*) Excess 5% of claimed amount subject to minimum of NRs. 20,000 or its equivalent for Normal and NRs. 80,000 or its equivalent for act of God perils and collapse.

(b) Installation All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to completion of the Facilities, with an extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the defect liability period while the Contractor is on the Site for the purpose of performing its obligations during the defect liability period.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [name]	From [place]	To [place]
110% of total price for plant and equipment	(*)	Contractor	Site Delivery	Final Acceptance

(*) Excess 5% of claimed amount subject to minimum of NRs. 10,000 or its equivalent for Normal and NRs. 30,000 or its equivalent for testing period.

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply and installation of the Facilities.

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured [name]	From [place]	To [place]
NRs. 1,000,000 or its equivalent as in (b) above		Contractor's Employee	Commencement of work	Final Acceptance
NRs. 1,000,000 or its equivalent as in (b) above		Third Party Personnel	Commencement of work	Final Acceptance
NRs. 1,000,000 or its equivalent as in (b) above		Employer's Property	Commencement of work	Final Acceptance

(d) Automobile Liability Insurance

Covering use of all vehicles used by the Contractor or its Subcontractors (whether or not owned by them) in connection with the supply and installation of the Facilities. Comprehensive insurance in accordance with statutory requirements.

(e) Workers' Compensation

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed.

(f) Employer's Liability

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed.

(f) Other Insurance

The Contractor is required to take out and maintain at its own cost the following types of insurance:

Details:

Amount [in currency (ies)]	Deductible limits [in currency(ies)]	Parties insured [named]	From [place]	To [place]

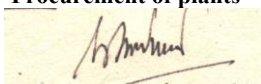
The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1, except for the Third Party Liability, Worker's Compensation, and Employer's Liability Insurance, and the Contractor's Subcontractors shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Subclause 34.1, except for the Cargo, Worker's Compensation and Employer's Liability Insurance. All insurer's rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.

(B) Types of Insurance to be Taken Out by the Employer

The Employer shall at its expense take out and maintain in effect during performance of the Contract the following insurance policies.

Details:

Amount [in currency (ies)]	Deductible limits [in currency(ies)]	Parties insured [named]	From [place]	To [place]



Appendix 4

Time Schedule

4.1 Description of Facilities: Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations.

Name of Facilities	Completion Time required by the Employer from the Effective Date	Completion date guaranteed by the Bidder from the Effective Date
Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at various Substations	Eighteen (18) months	

- 4.2** The activity (ies) under the Contractor's programme for Project Completion shall be in the form of a master network (MNV) and shall identify the various activities like design, engineering, manufacturing, supply, installation, factory testing, transportation to site, site testing and commissioning, trial operation and Taking Over etc. of the Facilities or specific part thereof (where specific parts are specified in GCC). The network shall conform to the above Project Completion Schedule. This master network will be discussed and agreed before Award in line with above, engineering drawing and data submission schedule shall also be discussed and finalized before Award.
- 4.3** The Employer reserves the right to request minor changes in the work schedule at the time of Award of Contract to the successful Bidder.
- 4.4** The successful Bidder shall be required to prepare detailed Network(s) and project implementation plans & programmes and finalize the same with the Employer as per the requirement specified in Technical Specifications, which shall form a part of the Contract. The detailed Network(s) and project implementation plans & programmes shall preferably be preferably prepared in Primavera or in MS Project or in the latest Project Management tool as convenient to Employer.

Appendix 5

List of Major Items of Plant and Services and List of Approved Subcontractors

A list of major items of plant and services is provided below.

The following Subcontractors and Manufacturers are approved for carrying out the item of the facilities indicated. Where more than one Subcontractor is listed, the Contractor is free to choose between them, but it must notify the Employer of its choice in good time prior to appointing any selected Subcontractor. In accordance with GCC Sub-clause 19.1, the Contractor is free to submit proposals for Subcontractors for additional items from time to time. No Subcontracts shall be placed with any such Subcontractors for additional items until the Subcontractors have been approved in writing by the Employer and their names have been added to this list of Approved Subcontractors.

Major Items of Plant and Services	Approved Subcontractors and Manufacturers	Nationality

Appendix 6

Scope of Works and Supply by the Employer

The following personnel, facilities, works, and supplies will be provided or supplied by the Employer, and the provisions of GCC Clauses 10, 21, and 24 shall apply as appropriate.

All personnel, facilities, works, and supplies will be provided by the Employer in good time so as not to delay the performance of the Contractor, in accordance with the approved Time Schedule and Program of Performance pursuant to GCC Subclause 18.2.

Unless otherwise indicated, all personnel, facilities, works, and supplies will be provided free of charge to the Contractor.

Personnel	Charge to Contractor (if any)
None	

Facilities	Charge to Contractor (if any)
The employer shall assist for providing shutdown of Transmission Line, Distribution Lines and / or Substations.	as per the rules of NEA
The employer shall assist the contractor to obtain all permits, approval and/or Licenses from all Local, State or National government authorities or public service undertaking in the country where site is located.	The expenses to obtain all permits, approval and /or service licenses mentioned shall be borne by Contractor

Works	Charge to Contractor (if any)
None	

Supplies	Charge to Contractor (if any)
None	

Appendix 7**List of Documents for Approval or Review**

Pursuant to GC Sub-Clause 20.3.1, the Contractor shall prepare, or cause its Subcontractor to prepare, and present to the Project Manager in accordance with the requirements of GC Sub-Clause 18.2 (Program of Performance), the following documents for

A. Approval

As mentioned in the relevant chapter/Section of the Technical Specifications of the Bidding documents and the following

- a. Name of manufacturers, prior to placing of order
- b. Name of subcontractors
- c. Work Program (Detail Work Schedule)
- d. Work Procedure
- e. Design, calculations and drawings of Plant and Equipments as applicable
- f. All civil design and drawings
- g. Programme of Manufacturer quality plan and inspection, testing procedures and testing methods
- h. All kinds of test reports
- i. Corrosion protection and painting
- j. Aggregate and grading of aggregates
- k. Use of admixtures, concrete mixing, steel reinforcement and formwork
- l. Marking and labeling of equipment
- m. Any other documents as desired by the Employer

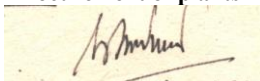
B. Review:

As mentioned in the relevant chapter/Section of the Technical Specifications of the Bidding documents and the following

- a. Designed and calculation procedures for each component forming part of the Plant
- b. All drawings prepared by the Contractor
- c. Operations and maintenance instructions
- d. Procedure for Test on Completion
- e. Protection calculation / recalculation and setting.
- f. Any other documents as desired by the Employer

Note:

Bidder shall furnish the exhaustive list, which shall be discussed and finalized for incorporation into the Contract Agreement.



Appendix 8

Functional Guarantees

The Bidder shall furnish guaranteed No Load, Full Load and the Cooler Fan Loss (if applicable) value at rated full load capacity of the Transformer along with the Technical Bid for all rating of the Power Transformers. Failure to submit the loss figures may result in rejection of the Bid.

S.No.	Functional Guarantee	Unit	Functional Guarantee Value Offered by the Bidder.
1	No Load Loss at rated Voltage & Frequency on Maximum MVA base	kW	
2	Load Loss at rated Current & 75 degree C on Maximum MVA base	kW	
3	Cooler Loss for full load Operation on Maximum MVA base	kW	
	Total Losses		

Performance Security

.....*Bank's Name, and Address of Issuing Branch or Office*.....

Beneficiary:*Name and Address of Employer*

Date:.....

Performance Guarantee No.:

We have been informed that *name of the Contractor*. (hereinafter called "the Contractor") has entered into Contract No. *reference number of the Contract*. dated with you, for the execution of *name of contract and brief description of Works*. (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we *name of the Bank*. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *name of the currency and amount in figures**. (. *amount in words*.) such sum being payable in Nepalese Rupees, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

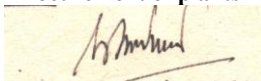
This guarantee shall expire, no later than the Day of , ... **, and any demand for payment under it must be received by us at this office on or before that date.

.....
Seal of Bank and Signature(s)

Note: *All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.*

*** The Guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract in Nepalese Rupees.**

**** Insert the date thirty days after the end of Defect Notification Period. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee".**



Letter of Commitment for Bank's Undertaking for Line of Credit

Bank's Name, and Address of Issuing Branch or Office

(On Letter head of the Commercial bank or any Financial Institution eligible to issue Bank Guarantee as per prevailing Law)

Date:

Contract No:

Name of Contract:

To:

[Name and address of the Employer]

CREDIT COMMITMENT No: *[insert number]*

We are pleased to know that *[name of Contractor]* (hereinafter called "the Contractor") has been awarded the Contract for the execution of the Works of *[description of works]* for above contract.

Furthermore, we understand that, according to your conditions, the Contractor's Financial Capacity i.e. Liquid Asset must be substantiated by a Letter of Commitment of Bank's Undertaking for Line of Credit.

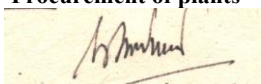
At the request of, and arrangement with, the Contractor, we *[name and address of the Bank]* do hereby agree and undertake that *[name and address of the Contractor]* will be provided by us with a revolving line of credit, for execution of the Works viz. *[insert name of the works]*, for an amount not less than NRs*[in figure]* (*in words*) for the sole purpose of the execution of the above Contract. This Revolving Line of Credit will be maintained by us until *[Insert "Initial Contract Period"]* months by the Procuring Entity.

This committed line of credit shall not be terminated or cancelled without the prior written approval of Employer.

In witness whereof, authorised representative of the Bank has hereunto signed and sealed this Letter of Commitment.

Signature
Name:
Designation:

Signature
Name:
Designation:



Advance Payment Security

.....*Bank's Name, and Address of Issuing Branch or Office*.....

Beneficiary:*Name and Address of Employer*

Date:

Advance Payment Guarantee No.:

We have been informed that *name of the Contractor*. (hereinafter called "the Contractor") has entered into Contract No. *reference number of the Contract*. dated with you, for the execution of *name of contract and brief description of Works*. (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum *name of the currency and amount in figures**. (*amount in words*.) is to be made against an advance payment guarantee.

At the request of the Contractor, we *name of the Bank*. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *name of the currency and amount in figures**. (*amount in words*.) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number *Contractor's account number*. at *name and address of the Bank*.

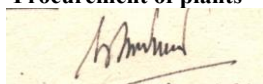
The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the . . . day of , ... **, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

.....
Seal of Bank and Signature(s)

Note: *All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.*

*** The Guarantor shall insert an amount representing the amount of the advance payment in Nepalese Rupees of the advance payment as specified in the Contract.**

**** Insert the date Thirty days after the expected completion date. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee"**



Retention Money Security

(On letterhead paper of the Bank)

..... *Bank's Name, and Address of Issuing Branch or Office*.....

Beneficiary: _____ *[Insert name and Address of Employer]*

Date: _____ *[Insert date of issue]*

RETENTION MONEY GUARANTEE No.: *[Insert guarantee reference number]*

We have been informed that _____ *[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. _____ *[insert reference number of the contract]* dated _____ with the Beneficiary, for the execution of _____ *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, the Beneficiary retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when at least eighty (80) percent of the whole works have been completed, progress of the works is satisfactory in accordance with the Contract as per approved work schedule and it can be assured that the works can be completed at the intended completion date, payment of *[insert the amount of the Retention Money]* is to be made against a Retention Money guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ *[insert amount in figures]* (_____) *[amount in words]*¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without your needing to prove or show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the day of, 2...², and any demand for payment under it must be received by us at the office indicated above on or before that date.

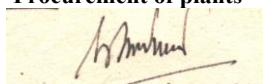
This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758.

[Seal of Bank and signature(s)]

Note: *All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

¹ The Guarantor shall insert the amount of the Retention Money.

² Insert the same expiry date which is 30 days more than the end of Defect Liability Period. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.



NEPAL ELECTRICITY AUTHORITY

(An Undertaking of Government of Nepal)

**TRANSMISSION DIRECTORATE
GRID OPERATION DEPARTMENT**



BIDDING DOCUMENT FOR

PROCUREMENT OF SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF
POWER TRANSFORMERS AT VARIOUS SUBSTATIONS

INTERNATIONAL COMPETITIVE BIDDING (ICB) (SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE)

Invitation for Bid (IFB) No.: Re-GOD/2079/080-03

VOLUME –II OF III (Technical Specification)

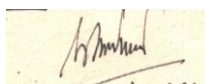
Nepal Electricity Authority
Grid Operation Department
Min Bhawan, New Baneshwor, Kathmandu, Nepal
Tel. : + 977 (01) 4621465, 4620486, 4620619
Fax : + 977 (01) 4620586
Electronic mail address: gridoperation@nea.org.np

June 2023

Abbreviations

BD	Bidding Document
BDF.....	Bidding Forms
BDS.....	Bid Data Sheet
BOQ	Bill of Quantities
COF	Contract Forms
DP	Development Partners
ELI	Eligibility
EQC	Evaluation and Qualification Criteria
EXP	Experience
FIN	Financial
GCC	General Conditions of Contract
GoN	Government of Nepal
ICB	International Competitive Bidding
ICC.....	International Chamber of Commerce
ITB	Instructions to Bidders
JV	Joint Venture
LIT	Litigation
NCB	National Competitive Bidding
NEA.....	Nepal Electricity Authority
PAN	Permanent Account Number
PPA	Public Procurement Act
PPMO	Public Procurement Monitoring Office
PPR	Public Procurement Regulations
PL	Profit and Loss
SBD.....	Standard Bidding Document
SCC	Special Conditions of Contract
TS.....	Technical Specifications
VAT	Value Added Tax
ERQ	Employer's Requirements

SECTION-I, PART 1 GENERAL TECHNICAL SPECIFICATION



SECTION-I, PART-1

GENERAL TECHNICAL SPECIFICATION

1.0 GENERAL SCOPE OF WORK:

Procurement for Design, Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations.

Background:

A.1 Nepal Electricity Authority (NEA), Grid Operation Department (GOD) has executed numbers of transformer reinforcement/upgrading works at various substations. Upgradation, reactive power compensation and rehabilitation of power system equipment are being carried out to meet increasing power demand and reduce the voltage drop problem. Various works executed by GOD have supported to reduce the power interruption due to inadequate substation capacity. In this view, NEA wishes to invite the Bid for the upgradation/reinforcement the substation capacity at the various substations for the following Works:

Package 1

Supply, Delivery, Installation, Testing and Commissioning of 1 no. of 132/33kV, 63MVA Power Transformer at **Nawalpur Substation** along with 33kV Incomer bay, 4 nos. of 33kV line bay and bus coupler for coupling with existing 33kV bus.

Package 2

Supply, Delivery, Installation, Testing and Commissioning of 1 no. of 132/33kV, 63MVA Power Transformer at **Rupani Substation** along with 33kV Incomer bay, 4 nos. of 33kV line bay and bus coupler for coupling with existing 33kV bus.

Package 3

Supply, Delivery, Installation, Testing and Commissioning of 2 nos. of 132/66kV, 45MVA Power Transformers at **Hetauda Substation**. One of which will replace the existing 132/66kV, 20MVA transformer.

Package 4

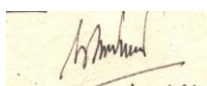
Supply, Delivery, Installation, Testing and Commissioning of 1 no. of 132/33kV, 100MVA Power Transformer at **Piluwa Substation** along with 33kV Incomer bay, 5 nos. of 33kV line bay and bus coupler for coupling with existing 33kV bus.

Package 5

Supply, Delivery, Installation, Testing and Commissioning of 1 no. of 132/33kV, 100MVA Power Transformer at **Mainihaya Substation** along with 33kV Incomer bay, 5 nos. of 33kV line bay and bus coupler for coupling with existing 33kV bus.

Package 6

Supply, Delivery, Installation, Testing and Commissioning of 1 no. of 66/11kV, 30MVA Power Transformer at **Birgunj Substation** along with one 11kV Incomer, three 11kV outgoing feeder, one bus coupler and one trunking chamber.



Package 7

Supply, Delivery, Installation, Testing and Commissioning of 1 no. of 66/11kV, 30MVA Power Transformer at **Simara Substation** along with one 11kV Incomer, three 11kV outgoing feeder, one bus coupler and one trunking chamber.

Package 8

Supply, Delivery, Installation, Testing and Commissioning of 2 nos. of 132/11kV, 45MVA Power Transformers at **New Bharatpur Substation** along with two 11kV Incomer, three 11kV outgoing feeder, one bus coupler and one trunking chamber for each incomer.

Package 9

Supply, Delivery, Installation, Testing and Commissioning of 1 nos. of 132/11kV, 45MVA Power Transformers at **Pokhara Substation** along with one 11kV Incomer, three 11kV outgoing feeder, one bus coupler and one trunking chamber.

Package 10

Supply, Delivery, Installation, Testing and Commissioning of 2 nos. of 132/66kV, 63MVA Power Transformer, one no. of 132/33kV, 63MVA Power Transformer and 3 nos. of 132/11kV, 45MVA Power Transformers at **Parwanipur Substation** along with 33kV Incomer bay, 4 nos. of 33kV line bays and bus coupler for coupling with existing 33kV bus.

The 3 nos. of 132/11kV, 45MVA Power Transformers will replace the existing 22.5MVA transformers at Parwanipur Substation.

- A.2** The Equipment supplied shall confirm, in all respects to the high standards of Engineering design and workmanship and be capable of performing in continuous commercial operation in a manner acceptable to the owner who can interpret the meaning of specifications and shall have the power to reject any work or material, which in his judgment are not in full accordance therewith.

A.3 Scope of work

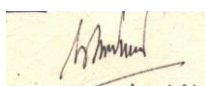
The scope of work under this Tender covers, as per specification as mentioned in the Technical Proposal. Any Omission in the Specification for the items which are necessary for the completion of the work shall be clearly mentioned in the Technical proposal by the Bidder. **If the Bidder fails to mention the omission, any minor items not present in the specification or price schedule but necessary for the completion of the work are deemed to be included in the quoted price by the Bidder. The Bidder in such case, will not be liable for any claims.**

A.3.1 Supply and Commissioning Works

The scope of supply and commissioning works for all packages shall not be limited for the items given in the Bill of Quantity (BoQ) for the successful testing and commissioning of the facilities.

A.3.2 Operational Requirement

- 1.1 Dimensions and colors of the new equipment should be as per the existing equipments.
- 1.2 All control signals and indications facilities of the existing equipments shall be properly provided in the panels.



- 1.3 The new system shall be suitably and properly integrated with the existing system for proper functioning.

A.3.3 Civil Works/Steel Structure

- 1) The scope of works includes all the civil works such as supply of new structures, construction of new foundations or modification of foundation for all equipments as specified.
- 2) Clearing and striping, Site grading, Leveling, Crushed Rock Surfacing for Switchyard, Exploration Works like Laboratory Test, Soil Test, Resistivity Test and construction of new Cable Trench, Duct Bank, Conduit, Hand Hole, Cable Tray etc.
- 3) Steel Structure for post, beam and equipment supporting frame complete with bolts, nuts and all accessories.
- 4) Dismantling and Removal works of existing structures, if any as required, to complete the scope of works.

A.3.4 Testing and Commissioning

Testing and Commissioning of the **Power Transformers and other plant and equipments** as per the Specification should be performed to the satisfaction of the Employer.

All the scope of works shall be performed in such a way that the shutdown period should be minimum. So, the Bidder is required to submit the proposal regarding the work methodology.

A.3.5 The scope of the shifting of Power Transformers shall be as below:

- a) Power transformers with all its accessories shall be loaded and transported from source and reinstall, refill the insulating oil after filtration, testing and commissioning at the designated substation. During transportation, power transformer should be properly sealed with dummy plates and gaskets such as to prevent any chance of moisture ingress inside the tank or leakage of oil.

Means like trolley, crane and other accessories required during the whole work are required to be arranged by the Contractor. The Bidders shall submit the proof of ownership of the crane/trolley or shall enclose certificate from the owner providing them on hire basis if they were awarded the tender.

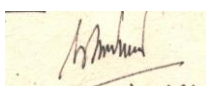
- b) After satisfactory refitting of all parts and accessories, refilling of Transformer Oil etc the transformer should be subjected to hot oil circulation & other suitable methods until satisfactory IR value, PI Value and Oil breakdown strength is achieved.

The filtration work should be done by the Contractor at NEA's facilities and electrical energy charges shall be borne by the Contractor, if NEA Power is utilized.

- c) Testing and calibration of all protection, Indicators like Buchholz relay, differential relay, OTI, WTI, oil level indicators etc are to be successfully executed.

Insurance & Guarantee

The Transformers are to be shifted and transported to destination after dismantling of all parts like Radiators, Bushings, Conservator tank as mentioned above.



- a) The transformer should be insured with reputable company, for any damage during Dismantling, Transportation, Assembly, Erection, etc.
- b) The Contractor shall provide and maintain insurance applying to all shipments of Goods & Services with continuous coverage from existing site to destination Site as specified in the Bid Package, for the period of **3 months beyond the date of Commissioning of Transformer at NEA's site.**
- c) The Insurance shall cover the following risks, and not limited to them, during Handling, Transportation, Testing, and Commissioning & in operation of the Power Transformer. In Case of Damage to Transformer, all the cost needed for rectification / replacement by new one, shall be borne by the Insurance.
- i) Loading and Unloading
 - ii) Dismantling and assembly of transformer
 - iii) Transportation of Transformer
 - iv) Testing and commissioning
 - v) Smooth Operation up to Defect Liability Period. The defect liability period for shifting and successful operation is three (3) month from the Date of Commissioning.
 - vi) In case of damage to the transformer or any problem during transit and during three months of operation, all the cost required for rectification / replacement by new one, shall be borne by the Insurance. In such case, the defect liability period for such repaired transformer shall be 6 months from date of commissioning of repaired transformer.
- d) The estimated cost of each Power Transformers which are to be shifted is as follow:

SN	Transformer Ratings	Depreciated value in NPR. (Million)
1	132/33kV, 63MVA, 3-phase power transformer	62
2	132/33kV, 30MVA, 3-phase power transformer	36
3	132/11kV, 30MVA, 3-phase power transformer	36
4	132/11kV, 22.5MVA, 3-phase power transformer	32
5	33/11kV, 16.6MVA, 3-phase power transformer	24

- e) The insurance provided shall cover all risks including marine insurance if applicable, and the minimum limits of insurance shall be the depreciated value plus 10% of the materials delivered to the NEA warehouse sites as specified in the Bid Packages. .

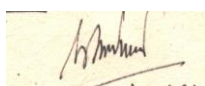
Gasket sets:

The Gaskets to be used should be of type 'B' conforming to IS: 4253 (part-II) and any amendments thereof. The gaskets to be used should be of high quality. The gaskets shall have an International Standard certification mark.

In order to prevent oil leakage from tank top, conservator and radiator valves, rubberized cork sheet shall be used.

Tests:

The above transformer shall be subjected to acceptance tests:



1. Measurement of Insulation Resistance, Before Dismantling, after placing on the foundation, during filtration, after filtration, before commissioning.
2. Measurement of Dielectric Strength of oil: Before Dismantling, during filtration & before Commissioning.
3. Operational Check & Test, complete for protection, OLTC, Fan control etc.
4. Testing and Calibration of protection relays, pressure device, OTI, WTI, Oil level Indicators etc.
5. Testing and Calibration of the Control Panel Equipment and Instrumentation, OLTC Panel Equipment & Instrumentation.
6. The fresh transformer oil filled shall be tested for dielectric breakdown strength in accordance with the IS: 1866 and any amendments thereof.
7. LV Power Cables, Control Cables and necessary Wires complete, with terminal lugs and accessories for Control, metering, relaying, alarms, AC /DC Supply and any other cable and wires required for interconnection with New & Existing Equipment.

Operational Requirement:

All control signals and indications facilities of the existing equipments shall be properly provided in the panels.

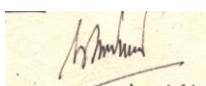
Testing & Commissioning:

Testing and Commissioning of the Complete Bay as per the Specification should be performed to the satisfaction of the Owner.

All the work mentioned above is to be done in such a way that the shutdown period should be minimum. So, the Bidder is required to submit the proposal regarding the work methodology.

Note:

The bidder shall make necessary site visits to familiarize with the condition of the road and existing bridges and culverts. The existing bridges may require temporary supports or strengthening works to transport the Power Transformers. The bidder is fully responsible for that strengthening works and the cost of such reinforcement work shall be included in the transportation part of the transformer.



GENERAL REQUIREMENTS

1.1 Wiring

Wiring shall be done in accordance with the following general requirement:

1.1.1 All wiring shall be done in general purpose 600V PVC Copper wire complying with IEC. The Wire size shall not be less than 2.5Sq.mm for control circuit and 4Sq.mm for Power circuit. All wire cores shall be multi-stranded and flexible.

1.1.2 Wires should be neatly bunched and adequately supported so as to prevent sagging and strain on termination.

1.1.3 Joints and splices in wiring will not be acceptable.

1.1.4 All termination shall be made with compression type connectors. Wires shall not be spliced or tapped between terminal points.

1.1.5 Not more than two wires should be connected to any terminal points. If required, numbers of terminals shall be jumped together to provide additional wiring points.

1.1.6 Wiring leads and cable cores shall be permanently marked at both ends with an approved type of marking device having black letters and numbers impressed on white background.

1.2 Cable Termination

Marshaling box shall be designed to facilitate cable entry from bottom. Removable plates shall be furnished with compression type cable glands to make entry dust proof and no weight is transferred to the terminal. The glands shall be suitable for terminating Cable Armor.

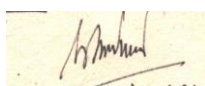
Sufficient space shall be provided to avoid sharp bending and for easy connection. A minimum space of 200 mm from the gland plate to the nearest terminal block should be provided.

1.3 Terminal Blocks

1.3.1 Multi-way Terminal Blocks complete with screws, nuts, washers and marking strips for terminal identification shall be furnished for terminating the internal wiring and outgoing cables.

1.3.2 Control Terminals shall be Washer head screw type, each suitable for connection of at least two numbers of copper conductor cables of requisite cross section at each end through compression type (solder less) lugs. Screw type terminal with screw directly impinging on conductor or any other type of terminal, which does not accept compression type lugs, are not acceptable. The successful Bidder shall have to take prior approval of the terminals to be used in the Block from the Owner.

1.3.3 Each Terminal shall be marked with designations obtained from schematic diagrams. At least 20 % spare Terminals shall be provided in the Terminal Blocks.



1.3.4 **Terminal blocks to be used with the Current Transformer secondary wiring**, both at the panels and cubicles, shall be provided with the shorting links with facility to open circuit or short circuit the CT secondary.

1.4 Painting Works

1.4.1 All sheet steel works shall be phosphated in accordance with the following procedure and in according with IEC.

1.4.2 Oil, Grease, Dirt shall be thoroughly cleaned by emulsion cleaner.

1.4.3 Pickling with dilute acid followed by washing with running water, rinse with slightly alkaline hot water and drying shall remove rust and Scales.

1.4.4 After Phosphating, thorough rinsing shall be carried out with clean water, followed by final rinsing with dilute dichromate solution and even drying.

1.4.5 The Phosphate coating shall be sealed by the application of Two Coats of staving type Zinc Chromate primer. The first coat may be "flash dried" while the second coat shall be staved.

1.4.6 After application of the Primer, Two coats of finishing synthetic Enamel Paint shall be applied, each coat followed by staving. Touch up shall be applied after completion of Tests. The color for the finishing paint shall be light Grey or as approved by the Owner.

1.4.7 The Final finished thickness of paint film on steel shall not be less than 100 microns.

1.4.8 Finished painted surface shall present aesthetically pleasing appearance from runs and drips.

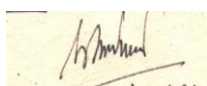
1.4.9 A small quantity of finishing paint shall be supplied for minor touching up required at site after the installation.

2.0 CODES & STANDARDS

2.1 All Equipments supplied under this Contract Shall confirm to or be of Higher quality than the latest applicable standard as per relevant IEC.

2.2 If the Specification contained in this Contract conflict in any way with the reference Standards, the Specification shall take precedence. If there are conflicts between different specified standards covering the same materials or equipment, the standard, which will provide the highest quality and most suitable application, as determined by the Employer shall prevail.

2.3 The Contractor may propose alternative standard or equipment, which shall be equal to those specified. If the Contractor for any reason proposes alternatives to or deviations from the above standards, the Contractor shall state the exact nature of the change, the reason for making the change and shall submit with relevant Specifications of the Equipment in the original Language, and in case that these are written in languages other than English, the English version shall be attached and shall govern.



3.0 CONDITIONS OF SERVICE

3.1 All Plants and Equipments supplied under this Contract shall be suitable for the following Site and System Conditions.

3.1.1 System Electrical parameters

For 132kV Equipments:

Rated Service Voltage	: 132kV
Highest System Voltage	: 145kV
Impulse Voltage Withstand Level	: 650kV
Power Frequency Withstand Voltage	: 275kV
Number of Phases	: 3
Frequency	: 50Hz

For 66kV Equipments:

Rated Service Voltage	: 66kV
Highest System Voltage	: 72.5kV
Impulse Voltage Withstand Level	: 325kV
Power Frequency Withstand Voltage	: 140kV
Number of Phases	: 3
Frequency	: 50Hz

For 33kV Equipments:

Rated Service Voltage	: 33kV
Highest System Voltage	: 36kV
Impulse Voltage Withstand Level	: 170kV
Power Frequency Withstand Voltage	: 70kV
Number of Phases	: 3
Frequency	: 50Hz

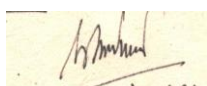
3.1.2 Climatic Conditions

3.1.2.1 All Plants and Equipment supplied under the Contract shall be entirely suitable for the Climatic Conditions prevailing at Site.

The Seismic Factor is 0.15g.

Atmospheric pollution is Moderate.

Maximum ambient Shade Temperature	: 45 °C
Minimum Ambient Shade Temperature	: 0 °C
Annual Average Temperature	: 32 °C
Maximum Wind Velocity for design purpose	: 34.4m/sec
Rainfall	: 1500mm/annum
Relative Humidity	



Maximum	: 100 %
Minimum	: 20 %
Altitude	: 1500m from MSL
Atmospheric Pollution	: Moderate

The Information provided in this Clause is given solely for the General Assistance of the Bidder and neither responsibility for it will be accepted nor will any claim based on this clause be considered.

4 The Bidder is advised to survey the sites covered under this Contract to acquaint with the Site Conditions.

4.1 The Contractor shall be responsible for surveying, boring, geological and subsoil conditional for all foundation, and for the precise location of the substation in the Project.

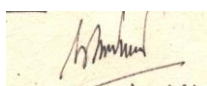
4.2 All Necessary soil tests, wherever necessary, to determine the Earth Resistivity. The Design of the Ground Grid and all foundations shall be performed by the contractor at the Substation Site.

4.3 The Contractor shall locate and record on the construction drawings, all interfacing utility lines or other obstruction. Damage to existing equipment and the Contractor at his own expense shall repair structures.

5.0 DRAWINGS, INSTRUCTION AND MAINTENANCE MANUALS (As Applicable)

The Contractor shall submit Detailed Drawings, Instruction and Maintenance manuals and parts list with recommended stock quantities for the equipment furnished, prepare and submit detailed engineering, Design and Construction drawings pertaining to all mechanical and Electrical Equipment and Installations in the substation. The Drawings / Manual submitted by the Contractor should also be in the form of digitized form (Compact Disk). The Drawings to be furnished by the Contractor shall include, but not be limited to the following:

- 5.1 Single Line and Three Lines Diagram.
- 5.2 Schematic electrical diagram of substations including interconnection with existing system
- 5.3 Layout of equipment in control room.
- 5.4 Plan and elevation of switchyards
- 5.5 Structural Erection and Fabrication Details, wherever necessary.
- 5.6 Substation Grounding Calculations, Plans, Elevation and Details, wherever necessary.
- 5.7 Detailed Cable Schedule list and cable summary, specifying cable identification number, routing and length of the cable for the Substation.
- 5.8 Details of relay and control panel. Switchgear and Panel front and rear elevation drawings showing dimension and identification of each device and complete name plate schedule.



5.9 Control & Protection Schemes. Calculation and co-ordination for selecting Operation of Protective Relays.

5.10 Instruction Book, spare Parts' lists, Materials lists and any other documents pertaining to the Substation and required for Construction, Operation, Maintenance and Repair.

The successful Bidder will be required, at the time of signing of the Contract; to supply additional copies of the above drawings as may be selected by the Employer. These drawings, together with such drawings originally issued with the Tender documents will then form part of the Contract Document and be signed both by the Employer and the Contractor for identification purposes.

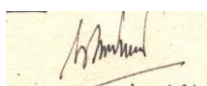
a. Prior to commencement of the work, the Contractor shall submit detailed design drawings and data to the Employer for approval. Should the Employer direct that modifications be made in order to satisfy the requirements of the Specifications, the Contractor shall submit revised drawings for approval. Alteration in the Contract price shall not be allowed by reason of the drawings modifications.

b. The Contractor shall prepare and furnish to the Employer such drawings, calculations, and data on materials and equipment (hereinafter in this provision called data) as are required for the proper control and completion of the work, including but not limited to those drawings, data and calculations specifically required elsewhere in the Technical Specifications.

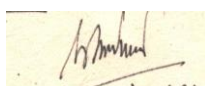
c. The Metric System shall be used and notations shall be in English. Drawings, calculations, and data shall be furnished as specified. All drawings and data will be subjected to review by the Employer for conformity with the Technical Specification and Contract Drawings and upon meeting review requirements shall become the property of the Employer.

d. The Contractor shall submit detailed drawings, instruction and maintenance books, and parts lists with recommended stock quantities for the equipment furnished, prepare and submit detailed engineering design and construction drawings pertaining to all mechanical and electrical equipment and installations in the substation. The drawings to be furnished by the Contractor shall include, but not be limited to the following:

- a) ElectricalSystemDesign
 - Design Basis Report
 - Cable Schedules
 - Cable Interconnecting Diagrams
 - Relay and Metering Single Line Diagram.
 - Direct Stroke Lightning Protection (DSLPP) Calculation.
 - Sizing calculation of Battery & Battery-Charger.
 - Design Calculation for in door and outdoor Illumination System
 - Cable Sizing Calculation
 - Calculation and coordination for selecting operation of protection relays
 - Control System Architecture
 - Detailed material list
- b) Plot Plan of Substation Premises
- c) Substation Layout
 - Electrical layout (Plan and section) of substations
 - Electrical Clearance diagram.
 - Erection key diagram for substations
 - Electrical Layout of Control Building



- Cabling Layout including cable trench, cable tray, wire gutters, conduits, and specifying location.
 - Substation grounding Layout, plans, elevations and details
 - Control Room grounding Layout, plans, elevations and details
 - Cable trench, duct and conduit layout plan, elevation and details.
 - Substation lighting and convenience outlet plan, elevation, and details
 - Installation details for equipment
 - Cable schedule, specifying cable identification number, routing and length of the cable for the substation and cable summary.
 - Detailed interconnection diagram for all substation equipment, AC and DC station service equipment and all building equipment.
- d) Equipment drawings
- Dimensioned General arrangement drawings showing front and rear elevations and identification of each device and complete nameplate schedule
 - Foundation Loading Details
 - AC and DC diagram for control, metering, relaying, communication, alarm, etc. required to describe in detail the operation of all systems in the substation. Wire numbers and terminal numbers for each device shall be clearly marked on all AC and DC elementary and schematic diagram
 - Communication system drawings
 - Technical Catalogues
 - Instruction Manuals for Erection, Testing and Commissioning
 - Operation and Maintenance Manuals.
 - Instruction books, spareparts lists, materialists and any other documents pertaining to the substation and required for construction, operation, maintenance and repair
- e) Civil, Structural and Architectural Works
- Excavation and Backfilling.
 - Details of veiling and grading of substation area.
 - Construction Design/calculation of all Civil structural works
 - Drainage System detailed construction layouts and design
 - Foundation Layout of Substations, plans and elevations indicating top of Foundations, details for anchor bolt installation, plus all data required for civil works
 - Construction Design and Civil, Structural and architectural drawings for the Control building.
 - Details of cable trenches, and cable ducts
 - Details of stone spreading within substation area.
- f) General Documentations
- Commissioning Manual
 - Testing Programs
 - QA/QC Documentation including MQP and FQP for all Equipment & systems
 - Testing and commissioning procedure of each equipment
 - Design(Type) Test Reports as specified in EQC.
 - Routine Test Reports of all Equipment
 - Field Test Reports



Drawings and Documents Submission Schedule

The Contractor shall submit the drawings and data to the Employer for approval in the following manner and designated deadlines.

The Contractor's Works Identification System shall be submitted for the Employer's approval prior to implementation. The Employer may select one joint Identification System for the entire Works and reserves the right to deviate from the Contractor's proposal.

Table 0.1: For Supply of Equipment and/or Installation Works

Item	No. of copies	Deadline&Remarks
Proposed work program	2	Within 30 days from the Effective date of the Contract
Principal equipment drawings for approval	2	Within 90 days from the Effective date of the Contract
Principal installation drawings for approval	2	Within 30 days from the Effective date of the Contract
Revised drawings for approval	2	Within 14 days after receiving drawing for revision.
Final drawings with reproducible copies	3	Within 14 days after receiving approval
AutoCAD files of Final Drawings in USB flash drive	2	Within 14 days after receiving approval
Schedule of manufacturing and transportation	2	Within 45 days from the Effective date of the Contract
Plan for shop tests	2	Not less than 30 days before testing
Results of shop tests for approval	2	Upon completion of tests
Records of shop tests	2	Upon approval of results of shop tests
Plan for field-tests	2	Not less than 14 days before testing
Report for field tests	2	Within 14 days after completion of each test
As-built drawings	As Instructed	Within 30 days after completion of installation work
AutoCAD file of as-built drawings in USB flash drive	2	Within 30 days after completion of installation work
Instruction manuals and drawings with reproducible copies for installation	2	30 days after shipment of Equipment

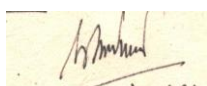



Table 0.2: For Civil Works

Item	No. of copies	Deadline&Remarks
Detail construction schedule & method	2	Within 30days from the Effective date of the Contract
Drawing for approval (principal drawings for construction)	2	Within 45 days from the Effective date of the Contract
Revised drawings for approval	2	Within 14 days after receiving drawings for revision
As-built drawings	2	Within 30 days after completion of construction works
AutoCAD files of as-built drawings in USB flash drive	2	Within 30 days after completion of construction works

Table 0.3: Others

Item	No. of copies	Deadline&Remarks
Drawing and Deliverable Schedule	1	Within 30days from the Effective date of the Contract
QA/QC Documentation	1	Within 30days from the Effective date of the Contract
Monthly Progress Reports with photographs	1	By 7th of following month
Packing list (copy)	1	At each shipment
Invoice (copy)	1	At each shipment
Bill of lading (copy)	1	At each shipment
Certificate of origin (copy)	1	At each shipment

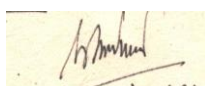
Drawings: Titles, scales and Sizes

The title of the drawing, Contract Number, the signature of the Contractor's engineer and the date shall appear in the bottom right-hand corner of each drawing in the following format:

Nepal Electricity Authority
(Government of Nepal Undertaking)
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations.

Contract No: Re-GOD/2079/080-03




In general the scales of the drawings shall be 1:200. The Contractor, however, can prepare and submit drawing in any other appropriate scales with the prior approval of the Employer. The Contractor shall use any one of the following sizes for the preparation of drawings as appropriate:

A0	841x1189mm	(33.11x46.81in)
A1	594x841mm	(33.39x33.11in)
A2	420x594mm	(16.54x23.39in)
A3	297x420mm	(11.69x16.54in)
A4	210x297mm	(8.27x11.69in)

Employer's Approval

The Employer will send comment/approval each drawing/design/document within twenty-one (21) days after receipt at his office. One print of each of the drawings submitted for approval will be returned by the Employer or Employer's Representative, marked either "APPROVED", "APPROVED EXCEPT AS NOTED", or "RETURNED FOR CORRECTION".

- a) The notations "APPROVED" or "APPROVED EXCEPT AS NOTED" will authorize the Contractor to proceed with the manufacturing drawings, subject to the corrections, if any indicated thereon. The notation "RETURNED FOR CORRECTION" shall require the Contractor to make the necessary revisions on the drawings and submit for approval within fourteen (14) days in the same manner as before.

Approval of the Contractor's drawings shall not in any way relieve the Contractor of any part of his obligation to meet all the requirements of the Contractor of the responsibility for the correction of the drawings.

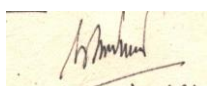
- b) Reproducible: Reproducible of all final approved drawings shall be made on USB flash drive.

Neither the review nor lack of review of any drawing, calculation or data shall waive any of the Specifications or Contract drawings, or responsibility for correctness of the drawings, calculations or data. Defective work, materials, and equipment may be rejected notwithstanding conformance with drawings, calculation and data reviewed by the Employer/the Employer's representative. The Employer shall have the right to require the Contractor to make any changes in the design which may be necessary, to make the apparatus/works conform to the requirements and intent of the Specifications, with no additional cost to the Employer.

Approval of the Contractor's drawings (including cases of un-noticed/un-known deviations) shall not in any way relieve the Contractor of any part of his obligation to meet all the requirements of the Contract or of the responsibility for the correction of the drawings. The ultimate responsibility of meeting all the requirements of the technical specifications and fulfill contractual obligations shall rest on the Contractor.

Any drawings changed by the Contractor during the development of his design after review by the Employer shall be submitted for approval.

Within 30 days from the effective date of the Contract, the Contractor shall prepare and furnish to the Employer a schedule for submission of all drawings and data. Each drawing to be submitted for the work of the Contract shall be listed in the Schedule, and the

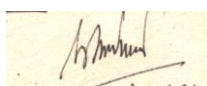


Schedule shall contain separate columns for scheduled submittal dates and actual submitted dates. The schedule will be reviewed by the Employer/ the Employer's representative and the Contractor shall correct any defects noted therein. The schedule shall at all times present a complete plan for orderly submission of such drawings and data and shall be updated and resubmitted monthly showing actual submittal dates and revised scheduling. The Contractor shall promptly notify the Employer of any occurrence requiring substantial revision of the schedule giving a detailed explanation of the cause of the revision. Revised schedules will be revised and corrected in the same manner as the original schedule.

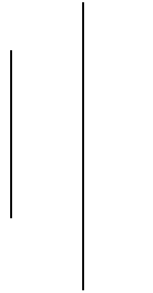
6.0 The Contractor shall provide Spare parts and Tools for the substation as specified in this Specification.

Furnish qualified supervision and construction personnel for the Installation, Testing, Commissioning and Final system testing and checking out of the equipment listed above and details in the Price Schedule. The testing and commissioning of the equipment should be in the supervision of the manufacturer's representative and should guarantee the test performed. The work shall be performed in close cooperation and collaboration with the Employer / Engineer.

Coordination of the substation work with the Installation of others shall be the responsibility of the Contractor. The Employer / Engineer will furnish the information needed to coordinate the substation work with the other work.



SECTION-I, PART-2



TECHNICAL SPECIFICATION (POWER TRANSFORMER)



SECTION-I, PART-2

POWER TRANSFORMER

1 GENERAL

This specification covers the design, engineering, manufacture, assembly, shop test, supply, delivery, installation works and field test of the power transformer complete with all accessories, fittings and auxiliary equipment for efficient and trouble-free operation as specified herein under.

The equipment specified in this Section of the Contract shall conform to the latest edition of the appropriate IEC specifications and / or other recognized international standards. In particular:

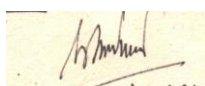
IEC 60076	Power transformer
IEC 60137	Insulating bushings for alternating voltages above 1kV
IEC 60156	Insulating liquids - Determination of the breakdown voltage at power frequency – Test method
IEC 60296	Specification for unused mineral insulating oils for transformers and switchgear
IEC 60551	Determination of transformer and reactor sound levels
IEC 60616	Terminal and tapping markings for power transformer
IEC 60722	Guide to the lightning impulse and switching impulse testing of power transformers and reactors

Equipment to be Furnished:

132/33kV, 100MVA Power Transformer - 2 Sets
132/66kV, 63 MVA Power Transformers - 2 Sets
132/33kV, 63 MVA Power Transformers - 3 Sets
132/66kV, 45MVA Power Transformers - 2 Sets
132/11kV, 45MVA Power Transformer - 6 Sets.
66/11kV, 30MVA Power Transformer - 2 Sets

2. DESIGN REQUIREMENT

- 2.1. The transformer shall be connected to three phase 50Hz system of 132kV and 33kV systems as specified for 132/33kV, 100MVA Power Transformers; 132kV and 66kV systems as specified for 132/66kV, 63MVA Power Transformers; 132kV and 33kV systems as specified for 132/33kV, 63MVA Power Transformers; 132kV and 66kV systems as specified for 132/66kV, 45MVA Power Transformers; 132kV and 11kV systems as specified for 132/11kV, 45MVA Power Transformers and 66kV and 11kV systems as specified for 66/11kV, 30MVA Power Transformers.
- 2.2. The transformer shall be installed outdoor in a hot, humid atmosphere. The transformer shall be oil immersed and designed for the cooling system as specified in Appendices.
- 2.3. The transformer shall be capable of operating continuously at its rated output without exceeding the temperature rise limits as specified in Appendices.
- 2.4. The transformer windings shall be designed to withstand short circuit stresses at its terminal with full voltage maintained behind it for a period as per IEC- 60076.

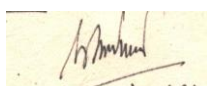


- 2.5. The transformer shall be capable of continuous operation at the rated output under the following conditions:
- a) The Voltage varying $\pm 10\%$ of rated voltage
 - b) Frequency varying $\pm 5\%$ of the rated frequency
- 2.6. The transformer shall be capable of delivering its rated output at any tap position.
- 2.7. The transformer shall be free from annoying hum and vibration when in operation even at 10% higher voltage over the rated voltage. The noise level shall be in accordance with respective IEC standards.
- 2.8. The transformer shall be designed and constructed so as not to cause any undesirable interference in radio or communication circuits.
- 2.9. The transformer shall be designed to take care of third harmonics not to exceed 2% of fundamental frequency. However, tertiary winding shall be provided on transformers with capacity of 100MVA and above.

3. CONSTRUCTION FEATURES

3.1 Tank

- 3.1.1 Tank shall preferably be of welded construction and fabricated from tested quality low carbon steel of adequate thickness.
- 3.1.2 All seams and those joints not required to be opened at site shall be factory welded, and wherever possible they shall be double welded. After completion of tank and before painting, dye penetration test shall be carried out on welded parts of jacking bosses, lifting lugs and all load bearing members. The requirement of post weld heat treatment of tank/stress relieving shall be based on recommendation of BS-5500 table 4.4.3.1.
- 3.1.3 Tank stiffeners shall be provided for general rigidity and these shall be designed to prevent retention of water.
- 3.1.4 The transformer shall have conventional type tank. In case the joint is welded it shall be provided with flanges suitable for repeated welding. The joint shall be provided with a suitable gasket to prevent weld splatter inside the tank. Proper tank shielding shall be done to prevent excessive temperature rise of the joint.
- 3.1.5 Each tank shall be provided with:
- (a) Lifting lugs suitable for lifting the equipment complete with oil.
 - (b) A minimum of four jacking pads in accessible position to enable the transformer complete with oil to be raised or lowered using hydraulic jacks. Each jacking pad shall be designed to support with an adequate factor of safety for at least half of the



total mass of the transformer filled with oil allowing in addition for maximum possible misalignment of the jacking force to the centre of the working surface.

(c) Suitable haulage holes shall be provided.

3.1.6 The tank shall be designed in such a way that it can be mounted on the rollers.

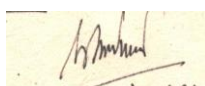
3.1.7 The base of each tank shall be so designed that it shall be possible to move the complete transformer unit by skidding in any direction without injury when using plates or rails.

3.1.8 Paint system and procedures

The painting details for transformer main tank, pipes, conservator tank, radiator, control cabinet/ marshalling box / oil storage tank etc. shall be as given below. The paint should not fade during drying process. The paint should be able to withstand temperature up to 120 deg. C .The detailed painting procedure shall also be submitted along with the bid which shall be finalized before award of the contract.

	Surface preparation	Primer coat	Intermediate undercoat	Finish coat	Total dry film thick-ness (DFT)	Colour shade
Main tank, pipes, conservator tank, oil storage tank etc. (external surfaces)	Shot Blast cleaning Sa 2 ½*	Epoxy base Zinc primer (30-40µm)	Epoxy high build Micaceous iron oxide (HB MIO) (75µm)	Aliphatic polyurethane (PU) (Minimum 50µm)	Minimum 155µm	RAL 7035
Main tank, pipes (above 80 NB), conservator tank, oil storage tank etc. (Internal surfaces)	Shot Blast cleaning Sa 2 ½*	Hot oil resistant, non-corrosive varnish or paint or epoxy	--	--	Minimum 30µm	Glossy white for paint
Radiator (external surfaces)**	Chemical / Shot Blast cleaning Sa 2 ½*	Epoxy base Zinc primer (30-40µm)	Epoxy base Zinc primer (30-40µm)	PU paint (Minimum 50µm)	Minimum 100µm	Matching shade of tank/ different shade aesthetically matching to tank
Radiator and pipes up to 80 NB (Internal surfaces)	Chemical cleaning, if required	Hot oil proof, low viscosity varnish	--	--	--	--
Control cabinet / marshalling box/RTCC	Seven tank process as per IEC	Zinc chromate primer (two coats)	--	EPOXY paint with PU top coat	Minimum 80µm	RAL 7035 shade for exterior and interior

Note: * Indicates Sa 2 ½ as per Swedish Standard SIS 055900 of ISO 8501 Part-1.



**** Radiator hot dip galvanized may also acceptable.**

3.1.9 Tank Cover

3.1.9.1 The tank cover shall be designed to prevent retention of rain water and shall not distort when lifted. The internal surface of the top cover shall be shaped to ensure efficient collection and direction of free gas to the buchholz relay.

3.1.9.2 At least one adequately sized inspection openings shall be provided in the transformers for easy access to bushings and earth connections. The inspection covers shall not weigh more than 25 kg. Handles shall be provided on the inspection cover to facilitate lifting.

3.1.9.3 The tank covers shall be fitted with pockets at the position of maximum oil temperature at maximum continuous rating for bulbs of oil and winding temperature indicators. It shall be possible to remove these bulbs without lowering the oil in the tank. The thermometer shall be fitted with a captive screw to prevent the ingress of water.

3.1.9.4 Bushing turrets, covers of inspection openings, thermometer pockets etc. shall be designed to prevent ingress of water into or leakage of oil from the tank.

3.1.9.5 All bolted connections shall be fitted with weather proof, hot oil resistant, resilient gasket in between for complete oil tightness. If gasket is compressible, metallic stops/other suitable means shall be provided to prevent over-compression. All gasketed joints shall be designed, manufactured and assembled to ensure long-term leak and maintenance free operation. Groove provided to accommodate round nitrile rubber cord for rectangular openings shall be milled.

3.1.9.6 Tank hotspot

The maximum temperature on any metal part shall be as per IEC standard.

3.1.9.7 Currents flowing in tank cover and bushing turrets

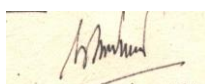
To allow for the effect of possible induced and capacitive surge current, good electrical connection shall be maintained between the tank and turrets.

3.1.9.8 The transformer shall be provided with pipe flange of suitable diameter with bolted blanking plate, gasket and shall be fitted at the highest point of the transformer tank for maintaining vacuum in the tank.

3.1.10 Axles and Wheels

3.1.10.1 The transformer shall be mounted on rollers, as per manufacturer's standard practice.

3.1.10.2 The roller mounted transformers are to be provided with flanged bi-directional wheels and axles. This set of wheels and axles shall be suitable for fixing to the under carriage of transformer to facilitate its movement on rail track. Suitable locking arrangement along with foundation bolts shall be provided for the wheels to prevent accidental movement of transformer.

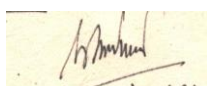


3.1.11 Foundation and Anti Earthquake Clamping Device

To prevent transformer movement during earthquake, suitable clamping devices shall be provided for fixing the transformer to the foundation.

3.2 Core & Coils

- a) The transformer shall be of core type. The core shall be built up with interleaved grade non-aging, low loss, high permeability, grain-oriented, cold rolled silicon steel lamination properly treated for core material.
- b) The design of the magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earthed clamping structure and production of flux component at right angles to the plane of laminations which may cause local heating. The temperature of any part of the core or its support structure in contact with oil shall not exceed 120 deg C under normal operating condition and 130 deg C under most extreme operating condition. Adequate temperature margin shall be provided to maintain longer life expectancy for this material.
- c) The insulation of core to bolts and core to clamp plates shall be able to withstand a voltage of 2 KV (rms) for 1 minute.
- d) All steel sections used for supporting the core shall be thoroughly sand blasted after cutting, drilling and welding.
- e) Each core lamination shall be insulated with a material that will not deteriorate due to pressure and hot oil.
- f) The supporting frame work of the core shall be so designed as to avoid presence of pockets which would prevent complete emptying of tank through drain valve or cause trapping of air during oil filling.
- g) Adequate lifting lugs will be provided to enable the core and windings to be lifted.
- h) The core shall be earthed to the core clamping structure at one point only, through a removable external link suitably located and protected to facilitate testing after installation of the transformer.
- i) In case core laminations are divided into sections by insulating barriers or cooling ducts parallel to the plane of the lamination, tinned copper bridging strips shall be inserted to maintain electrical continuity between sections.
- j) A drawing furnishing the details of the internal earthing design shall be included in the manual.
- k) The coils shall be manufactured from electrolytic copper of suitable grade. They should be properly insulated and stacked.
- l) All insulating material shall be of proven design. Coils shall be so insulated, that impulse and power frequency voltage-stresses are minimum.
- m) Coil assembly shall be suitably supported between adjacent sections by insulating spacers and barriers. Bracing and other insulation used in the assembly of the winding shall be arranged to ensure a free circulation of the oil and to reduce the hot spot of the winding.
- n) All leads from the windings to the terminal board and bushings shall be rigidly supported to prevent injury from vibration or short circuit stresses. Guide tube shall be used where practicable.



- o) The core and coil assembly shall be securely fixed in position so that no shifting or deformation occurs during movement of transformer or under short circuit stresses.

The bidder shall offer the CORE for inspection and approval by the purchaser during the manufacturing stage. Bidder's call notice for this purpose shall be accompanied with the following documents, as applicable, as a proof towards use of **PRIME CORE MATERIALS**.

- i. Invoice of the supplier
- ii. Mill's Test Certificates
- iii. Packing List
- iv. Bill of Lading
- v. Bill of Entry certificate by the Customs

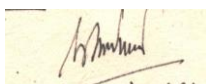
Core Materials shall be directly purchased either from the manufacturer or through their accredited marketing organization of repute and not through any agent. However, if the proof provided is considered sufficient by the Owner the core inspection can be waived.

3.3 Tapping

- 3.3.1 On-load taps as specified in Appendix shall be provided on the high voltage winding of the transformer.
- 3.3.2 The transformer shall be capable of operation at rated output at any tap position provided the primary voltage does not vary by more than $\pm 10\%$ of the rated voltage corresponding to the normal tap. Where the new transformer is required to operate in parallel with the existing one, the tap changer shall be similar to the one installed with the existing transformer.
- 3.3.3 The winding including the tapping arrangement shall be designed to maintain the electromagnetic balance between H.V., L.V. & Tertiary winding at all voltage ratios.

3.4 On-Load Tap Changer

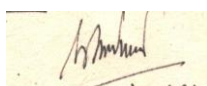
- 3.4.1 The on-load tap changer shall be of high speed resistor type principle. The on-load tap changer shall be vacuum technology without time-based maintenance criteria and made by MR Germany or ABB Sweden or equivalent. However, in case of equivalent make offer, the Bidder shall submit the type test report, performance certificate and any other documents substantiating the offered product compactible or at par with above specified make.
- 3.4.2 The transformers shall be supplied complete with an automatic control on load tap changer, three phase, and high speed resistor type. All tap ratings shall be full capacity. Built-in tank current transformer (s) for voltage regulating device shall be supplied if required.



- 3.4.3 The rated through current of the tap-changer, as defined in 4.17 of IEC 60214, shall not be less than 350 A. It shall be able to operate at the emergency and overload ratings of the transformer without damage.

In addition to the requirements of 8.3 of IEC 60214 for on-load tap-changers, tap-changing equipment shall be capable of carrying the same currents, due to external short-circuit, as the transformer windings with which they are associated.

- 3.4.4 The contact life of the moving and fixed contacts of the on-load tap changer switch at the rated through current shall be 600,000 operations minimum. The mechanical life shall be more than 800,000 operations. The number of operations between each maintenance period shall be 300,000 operations. The type test reports to support these figures shall be attached to the bid.
- 3.4.5 The on-load selector switch can be drained separately within a separate oil tight enclosure whose insulating oil can be drained separately from the insulating oil of the transformer through an internal suction pipe led to the ground of the on-load tap changer compartment. Removable bolted covers shall be provided for access to the arcing switch and selector contacts without having to open the main tank or lowering the oil in the main tank. The tap changer head shall be provided with an integrated pressure relief valve proposed by OLTC manufacturer.
- 3.4.6 The protective relay and valve mounted into the oil pipe between the tap changer and oil conservator responding to the oilflow from the on-load tap selector switch oil compartment toward the oil conservator shall be provided. Other designs of protective relays may be accepted subject to NEA's approval. The protective relay for tap changer shall be equipped with one contact for tripping the circuit. The OLTC conservator tank shall be fitted with a silica gel breather of the maintenance free type in a convenient floor height. Each silica gel breather shall be equipped with a condition based selflearning microprocessor control unit for optimal maximization controlled regeneration on the silica gel during phase when the transformer exhaling and LED status condition. The function shall be tested via a test button. A stainless steel filter at the bottom shall protect the silica gel chamber against external environment influences.
- 3.4.7 The tap changer shall be automatically driven by a motor drive assembly which shall be built onto the side of the transformer tank. All components of the motor drive shall be housed together in an IP54 protection class enclosure or which is electrically heated to prevent excessive moisture and which shall allow accommodation of specially made, supplementary equipment. The hand crank or hand wheel interlocked with the motor control shall also be furnished.
- 3.4.8 The power supply for load tap changer equipment shall be from a 400/230V, 3 phase, 4 wire grounded neutral, 50Hz or 230V single phase 50Hz source.
- 3.4.9 The tap position indicator shall be furnished at the tap changer head as well as at motor operating mechanism and identified by the numbers in sequence. The number "1" shall designate the highest tap voltage; consequently the number "17" indicated the lowest tap voltage. These identifications shall be in perfect correspondence to those indicated in the connection diagram on the nameplate.
- 3.4.10 The "raise" function shall move the tap changer to a higher number of tap position indicator and the "lower" function shall move the tap changer to the lower number of tap



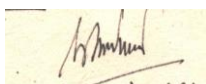
position indicator.

3.4.11 The following devices shall be provided in the motor drive enclosure:

- a) "Raise and lower" switch for manual control at the transformer.
- b) "Local-remote" switch.
- c) "Selsyn type" transmitter for remote tap position indication. Potentiometer types are also acceptable.
- d) Operation counter
- e) Circuit breaker for control and power supply circuits.
- f) Circuit breaker for motor protection circuit.
- g) Power "On" indicator.
- h) Local tap position indicator with drag hands to indicate maximum travel. Tap position shall be readable from outside without any obstruction.
- i) Limiting device to prevent travel beyond extreme tap positions.
- j) Contacts to operate remote light to indicate when tap changer is in operation.
- k) Convenient outlet for single phase, 230Vac and interior lamp.
- l) Terminal block having at least 10% spare terminals.
- m) Hand wheel for manual operation, interlocked with motor control.
- n) Interlock in control circuit to prevent operation in wrong direction of rotation.
- o) Additional contact assembly for sensing the position of the tap changer and suitable for use in conjunction with SCADA (Supervisory Control and Data Acquisition) equipment.
- p) Voltage monitoring circuit which shall sound an alarm signal in case voltage lower or higher than limit caused by the failure of automatic voltage regulating relay.
- q) Control circuit for preventing continuous operation of tap changer which shall block the operation of motor drive after an adjustable setting time.

3.4.12 The requirements to be met by the motor drive are summarized below:

- Mechanical indication of step position at the motor drive cabinet
- Transmission of step positions of the transformers to the load dispatch center and to the local control room



- Manual operation in the case of a failure in the electrical supply system
- Push button remote operation via the local control room and/or via the load dispatch center and remote tap position indication
- Step-by-step operation with automatic stop after each step
- No interference of the running tap changing procedure by permanent control switch /push button action
- Operation from local or remote control switch shall cause one tap movement only unless the control switch is returned to the “off” position between successful operations
- Automatic passage control for central taps
- Automatic restart of tap changing operation after a failure in the electrical supply system, interlocking to be provided against simultaneous raise/ lower operation
- Blocking of end positions by means of limit switches.
- Protection to prevent over-running of any tap position
- Provisions to be made for parallel running and automatic operation controlled by a voltage regulating device and parallel control unit. Motor operation via push buttons or lower/raise switch.
- Hand operation by means of a crank handle. It must not be possible to operate the electrical drive when the manual operating gear is in use.

All apparatus and instruments required for remote control as well as the connections and control cables running from the transformers towards the external and internal circuits of the substation are to be provided as specified in the Scope of Work / Scope of Supply.

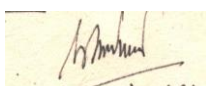
3.4.13 The OLTC Mechanism and Control cubicle including Voltage Regulator, Parallel Control Unit both remote and local shall be MR Germany or ABB Sweden.

3.5 Insulating Oil

The insulating oil shall be virgin high grade inhibited, conforming to IEC-60296 & all parameters specified below, while tested at supplier's premises.

The necessary first filling of oil shall be supplied for the transformer in non-returnable container suitable for outdoor storing ten percent (10%) excess oil shall also be provided to take wastage into account.

The contractor shall furnish test certificates from the supplier against the acceptance norms as mentioned below, prior to dispatch of oil from refinery to site. Under no circumstances, poor quality oil shall be filled into the transformer and only thereafter be brought up to the specified parameter by circulation within the transformer.



S. No.	Property	Test Method	Limits
A1.	Function		
1a.	Viscosity at 100degC	ISO 3104 or ASTM D445 or ASTM D7042	(Max.) 3 mm ² /s
1b.	Viscosity at 40degC	ISO 3104 or ASTM D445 or ASTM D7042	(Max.)12 mm ² /s
1c.	Viscosity at -30degC	ISO 3104 or ASTM D445 or ASTM D7042	(Max.)1800 mm ² /s
2.	Appearance	A representative sample of the oil shall be examined in a 100 mm thick layer, at ambient temperature	The oil shall be clear and bright, transparent and free from suspended matter or sediment
3.	Pour point	ISO 3016 or ASTM D97	(Max.)- 40degC
4.	Water content a) for bulk supply b) for delivery in drums	IEC 60814 or ASTM D1533	(Max.) 30 mg/kg 40 mg/kg
5.	Electric strength (breakdown voltage)	IEC 60156 or ASTM D1298	(Min.) 50 kV(new unfiltered oil) / 70 kV (after treatment)
6.	Density at 20 deg C	ISO 3675 or ISO 12185 or ASTM D 4052	0.820 - 0.895 g/ml
7.	Dielectric dissipation factor (tan delta) at 90 deg C	IEC 60247 or IEC 61620 Or ASTM D924	(Max) 0.0025
8.	Resistivity at 90 deg C	IEC 60247	150 X 10 ¹² Ohm –cm, (Min.) for records only.
9.	Negative impulse testing KVp @ 25 deg C	ASTM D-3300	145 (Min.)
10.	Carbon type composition (% of Aromatic, Paraffins and Naphthenic compounds.)	IEC 60590 or ASTM D 2140	Max.Aromatic : 4 to12 % Paraffins : <50% & balance shall be Naphthenic compounds.
B1.	Refining / Stability		
1.	Acidity	IEC 62021-1 or ASTM D974	(Max) 0.01 mg KOH/g
2.	Interfacial tension at 27degC	ISO 6295 or ASTM D971	(Min) 0.04 N/m
3.	Total sulfur content	BS 2000 part 373 or ISO 14596	0.15 % (Max.)
4.	Corrosive sulphur	IEC 62535	Non-Corrosive on copper and paper
		ASTM D1275B	Non-Corrosive
5.	Presence of oxidation inhibitor	IEC 60666 or ASTM D2668 or D4768	0.08% (Min.) to 0.4% (Max.) Oil should contain no other additives .Supplier should declare presence of additives, if any.
6.	2-Furfural content	IEC 61198 or ASTM D5837	25 Microgram/litre (Max.)
C1.	Performance		
1	Oxidation stability -Total acidity -Sludge - Dielectric dissipation factor (tan delta) at 90degC	IEC 61125 (method c) Test duration 500 hour IEC 60247	Max 0.3 mg KOH/g Max 0.05 % Max 0.05
2.	Gassing	IEC 60628A or ASTM D2300	No general requirement



3.	Oxidation stability (Rotating Bomb test)	IEC : 61125(Method B) / ASTM D2112 (e)	220 Minutes (Min.)
D1. Health, safety and environment (HSE)			
1.	Flash point	ISO 2719	(Min.)135degC
2.	PCA content	BS 2000 Part 346	Max 3%
3.	PCB content	IEC 61619 or ASTM D4059	Not detectable (Less than 2 mg/kg)

3.5.1 i) Prior to filling in main tank at site and shall be tested for

1. Break Down voltage (BDV) : 70kV (min.)
2. Moisture content : 5 ppm (max.)
3. Tan-delta at 90 °C : 0.0025 (max)
4. Interfacial tension : More than 0.004 N/m

ii) Prior to energisation at site oil shall be tested for following properties & acceptance norms as per below generally in line with IEC 60422:

1. Break Down voltage (BDV) : 70 kV (min.)
2. Moisture content : 10 ppm (max.)
3. Tan-delta at 90 °C : 0.01 (max.)
4. Resistivity at 90 °C : 6×10^{12} ohm-cm (min.)
5. Interfacial tension : 0.035 N/m (min.)
6. *Oxidation Stability (Test method as per IEC 61125 method C, Test duration: 500hour for inhibited oil)
 - a) Acidity : 0.3 (mg KOH /g) (max.)
 - b) Sludge : 0.05 % (max.)
 - c) Tan delta at 90 °C : 0.05 (max.)
7. * Total PCB content : Not detectable (2 mg/kg total)

* For Sr. No. 6 & 7 separate oil sample shall be taken and test results shall be submitted within 45 days after commissioning for approval of the Employer.

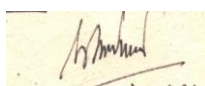
3.5.2 At manufacturer's works the quality of oil used for first filling, testing and impregnation of active parts shall meet at least parameters as mentioned in serial no. 1 to 5 of clause 3.5.1 (ii) above. The oil test results shall form part of equipment test report.

Oil sample shall be drawn before and after heat run test and shall be tested for dissolved gas analysis. Oil sampling to be done 2 hours prior to commencement of temperature rise test. For ONAN/ONAF cooled transformers, sample shall not be taken earlier than 2 hours after shutdown. The acceptance norms with reference to various gas generation rates shall be as per IEC 61181.

3.5.3 OIL SAMPLING BOTTLE

3.5.3.1 Oil sampling bottles shall be suitable for collecting oil samples from transformers and shunt reactors, for Dissolved Gas Analysis. Bottles shall be robust enough, so that no damage occurs during frequent transportation of samples from site to laboratory.

3.5.3.2 Oil sampling bottles shall be made of stainless steel having a capacity of one litre.




3.5.3.3 Oil Sampling bottles shall be capable of being sealed gas-tight and shall be fitted with cocks on both ends.

3.5.3.4 The design of bottle & seal shall be such that loss of hydrogen shall not exceed 5% per week.

3.5.3.5 An impermeable oil-proof, transparent plastic or rubber tube of about 5 mm diameter, and of sufficient length shall also be provided with each bottle along with suitable connectors to fit the tube on to the oil sampling valve of the equipment and the oil collecting bottles respectively.

3.6 Oil Preservation System

Oil preservation shall be by means of conservator tank system.

3.6.1 Conservator tank system

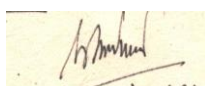
- 1) The conservator tank shall be mounted on a bracket fixed on the tank.
- 2) The conservator tank may be provided with two compartments, one for the main transformer tank while the other is for the OLTC compartment. The partition barrier shall be provided so that OLTC oil shall not be mixed up with transformer oil under any circumstances.
- 3) One compartment shall be connected with the main transformer tank by pipes through double float Buchholz Relay (gas operated relay) with valves at both ends.
- 4) The other compartment shall be connected with OLTC compartment by pipes through single float Buchholz Relay / oil surge relay with valves at both ends.
- 5) Using a flexible urethane air cell shall prohibit contact of the oil in the compartment for the main tank with atmosphere. The cell shall be vented into the atmosphere through a silica gel breather and shall inflate or deflate as oil volume changes.
- 6) Both compartments shall be provided with their own breather, filler cap and drain plug.
- 7) Each compartment of the conservator shall be provided with dial type level indicator visible from the ground level and fitted with low oil-level alarm contact. Plain oil level gauge shall also be provided to each compartment.

3.7 Online Dissolved Gas and Moisture Measuring Equipment

Online Dissolved Gas and Moisture Measuring Equipment along with all required accessories shall be provided for all 3-phase Power Transformers for measurement & analysis of dissolved gases and moisture in the oil. The detailed technical specification is as below:

3.7.1 Online Dissolved Gas and Moisture Analyser along with all required accessories shall be provided with each transformer for measurement & analysis of dissolved gases and moisture in the oil. Interpretations shall be as per IEC 60599- 1999.

3.7.2 The equipment shall detect, measure and analyses the following gases:



Gases & Moisture Parameters	Typical Detection Range
H ₂	5 – 5,000 ppm
CH ₄	5 – 5,000 ppm
C ₂ H ₆	5 – 5,000 ppm
C ₂ H ₄	3 – 5,000 ppm
C ₂ H ₂	1 – 3,000 ppm
CO	10 – 10,000 ppm
CO ₂	20 – 30,000 ppm
O ₂ (Optional)	500 – 25,000 ppm
H ₂ O	2 – 100 % RS should have facility for measurement of moisture in oil in ppm

3.7.3 The analyser should measure (not calculate) all above gases and should have 100% sensitivity. The equipment shall be capable of transferring data to sub-station automation system confirming to IEC 61850. Necessary interface arrangement shall be provided by the contractor for integration with automation system. The necessary type test report for such confirmation shall be submitted during detailed engineering.

3.7.4 Equipment shall have facility to give SMS alert to at least three users whenever any fault gas violates the predefined limit.

3.7.5 Equipment should work on station auxiliary supply. In case other supply is required for the equipment then suitable converter shall be included. All the necessary power and control cables, communication cables, cable accessories as required shall be provided by the supplier.

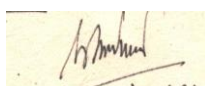
3.7.6 Online DGA shall be installed out door on transformer in harsh ambient and noisy condition (Electromagnetic induction, Corona, and capacitive coupling). Equipment shall be mounted separately to avoid effect of vibration. Suitable arrangement shall be provided to support and protect the inlet and outlet piping arrangement. The equipment shall be suitable for proper operation in EHV substation (800kV) environment where switching takes place in the EHV/HV System. The suitable indications for power On, Alarm, Caution, normal operation etc. shall be provided on the front panel of the equipment. The equipment shall have IP55 Stainless Steel enclosure, suitable for 55°C ambient temperature and EMI and EMC compatibility. The Equipment must carry a minimum of two (2) years manufacturer's Warranty.

3.7.7 The equipment shall connect to the transformer's main body in two locations. One Connection is for the supply of oil from the transformer. Second connection is for the return of the oil to the transformer. The connecting oil lines must be of Stainless Steel rigid pipes or flexible hoses.

3.7.8 The equipment shall be able to measure gas concentration and when downloaded should immediately compare it with user selected alarm & caution level for immediate display. The sampling rate shall be selectable as 2 or 4 or 6 or 12 hours etc. The equipment shall have inbuilt memory to store these results for complete one year even if sampling is done at the lowest interval.

3.7.9 The Equipment must have an automatic Calibration facility at fixed intervals. For calibration if anything required including cylinder must be mounted with the Equipment.

3.7.10 The technical feature of the equipment shall be as under:




Accuracy	± 10%
Repeatability	±3% to 10% depending upon gases
Oil temperature range	- 20 degree C to + 120 degree C
External Temp. Range	- 20 degree C to + 55 degree C (External temp range of 55 degree C is important and should not be compromise due to Nepal (Terai Region) ambient & operating conditions.)
Humind range	10 to 95 %
Operating voltage	230V ac, 50Hz (±20% variation)
Communications	USB & IEC 61850 compliant

3.7.11 Software for fault indication and fault diagnostics shall include following:

Fault indication:

- i) IEEE, IEC or user configurable levels of dissolved gases
- ii) Rate of change trending

Fault Diagnosis:

- i) Key gases
- ii) Ratios (Rogers, IEC. etc.)
- iii) Duval's Triangle

3.7.12 The equipment shall be supplied with all necessary accessories required for carrying out DGA of oil sample complete in all respect as per the technical specification. The following shall be also form a part of supply:

- i) Software
- ii) Operation Manual (2 set for every unit),
- iii) Software Manual and
- iv) Compact disc giving operation procedures of Maintenance Manual & Trouble shooting instructions.

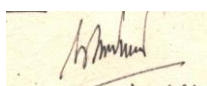
3.8 Temperature Indicators

3.8.1 One set of winding temperature indicator shall be supplied and fitted locally so as to be readable at a standing height from ground level. Necessary current transformer and heating coil for obtaining thermal images of winding temperatures and a detector element shall be furnished and wired.

3.8.2 The above winding temperature indicator shall be provided with necessary contacts to take care of the following.

- a. Starting of cooling units in stages, with rise of temperature
- b. Alarm on high temperature
- c. Trip on higher temperature

One set of oil temperature indicator with maximum reading pointer and electrically separate sets of contacts for alarm and trip shall be mounted locally so as to be readable at a standing height from ground level.



3.8.3 Make & Manufacturer:

The Temperature Indicators should be from the manufacturer: AB KHILSTROM Sweden or equivalent. However, in case of equivalent make offer, the Bidder shall submit the type test report, performance certificate and any other documents substantiating the offered product compactible or at par with above specified make.

3.9 Buchholz Relay (Gas Operated Relay - For Conservator Type of Oil Preservation)

- 3.9.1 The Buchholz Relay shall be provided with two floats and two pairs of electrically separate contacts - one pair for alarm and the other pair for tripping.
- 3.9.2 Buchholz Relay shall be provided with the facility for testing by injection of air by hand pump and with cock for draining and venting of air
- 3.9.3 Pressure relief device with a sudden gas pressure relay shall be furnished and mounted on top of the tank in the region of the gas space. The relay shall respond to sudden increase in internal gas pressure in the transformer due to internal arcing. The relay shall be provided with trip contact.

Above relay shall be stable during change in oil or gas pressure due to change in ambient temperature and / or loading.

3.10 Transformer Bushings

- 3.10.1 The electrical and mechanical characteristics of bushings shall be in accordance with IEC 60137/ DIN 42530.

- 3.10.2 Bushing for various voltage rating shall be as follows

52 kV and above: Hermetically sealed Oil filled condenser type/ RIP bushing with porcelain or composite insulator.

36 kV and below: Solid porcelain or oil communicating type. Dimensions of 36 kV bushing shall conform to IEC

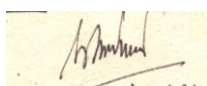
- 3.10.3 Oil Filled condenser type bushing shall be provided with at least the following fittings:

- (a) Oil level gauge.
- (b) Means for sampling and draining the liquid/oil.
- (c) Tap for capacitance and tan delta test. Test taps relying on pressure contacts against the outer earth layer of the bushing is not acceptable.

- 3.10.4 Where current transformers are specified, the bushings shall be removable without disturbing the current transformers.

- 3.10.5 Bushings of identical rating shall be interchangeable.

- 3.10.6 Porcelain used in bushing manufacture shall be homogenous, free from lamination, cavities and other flaws or imperfections that might affect the mechanical or



dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture.

3.10.7 Clamps and fittings shall be of hot dip galvanised steel.

3.10.8 Bushing turrets shall be provided with vent pipes, to route any gas collection through the Buchholz relay.

3.10.9 No arcing horns shall be provided on the bushings.

3.10.10 Suitable insulating cap (preferably of porcelain) shall be provided on the terminal of Bushing of tertiary winding to avoid accidental external short circuit.

3.10.11 Installation procedures for the various voltage class bushings shall be clearly brought out in the Instruction manual.

3.11 Breather

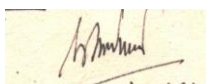
Each conservator vessel shall be fitted with a maintenance free breather in which only pure silica gel has been filled as a dehydrating agent. The silica gel filling capacity shall be minimum 1kg for the OLTC conservator and 2 kg for the main conservator. The maintenance free dehydrating breathers shall have a humidity and temperature sensor and must have 3 LED for status indication and a data logger to log all important events. The maintenance free breather shall be equipped with a self learning algorithm alpha control for the OLTC conservator and beta control for main tank conservator. Moving parts such as solenoid valves or fans are not accepted. Additionally an Anti-Condensation heater shall be installed in the control box and test button is required for auto-diagnosis and testing functions.

3.12 Marshaling Box

A sheet steel weatherproof marshaling box of IP-55W construction shall be provided. The box shall contain all auxiliary devices except those which must be located directly on the transformer. All terminal blocks for external cable connections shall be located in this box.

The marshaling box shall have the following but not limited to them

- a) Load disconnect switch for incoming power supply for auxiliaries
- b) Cooler fan motor starters and necessary protection
- c) FAN START-STOP control switch
- d) AUTO-MANUAL selector switch
- e) Wiring and termination individually of the following alarm contacts for remote pre-trip alarm
 - Buchholz relay alarm for main tank (for conservator type)
 - Buchholz / oil surge relay alarm for OLTC



- Winding temperature high alarm
- Oil temperature high alarm
- Tank oil level low alarm
- OLTC oil level low alarm
- Tap change incomplete alarm
- OLTC out of step
- f) Wiring and termination individually of the following trip contacts for remote trip and trip alarm
 - Winding temperature high trip
 - Oil temperature high trip
 - Buchholz relay trip or sudden gas and sudden oil pressure relay trip
 - Pressure relief device

Cubicle illumination lamp with door switch and space heater with thermostat and ON-OFF switch shall be provided.

Wiring shall be as specified in section under General Technical Specifications.

3.13 Cable Termination

Marshaling box shall be designed to facilitate cable entry from bottom. Removable plates shall be furnished with compression type cable glands to make entry dust tight and no weight is transferred on the terminal. The glands shall be suitable for terminating cable armour.

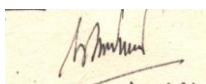
Sufficient space shall be provided to avoid sharp bending and for easy connection. A minimum space of 200mm from the gland plate to the nearest terminal block shall be provided.

3.14 Terminal Blocks

Terminal blocks shall be as specified in Technical Requirements under section in General Technical Specifications.

3.15 Painting

Painting works shall be as specified in Technical Requirements under section in General Technical Specifications.



3.16 Auxiliary supply

All indications, alarms and trip contacts provided shall be suitable for operation on a nominal 110V DC system.

Tap changing gear shall be suitable for operation of $400V \pm 10\%$, 3 phase, 4 wire, 50Hz, AC.

Cooling fans shall be rated at $400V \pm 10\%$ 3 Ph, 50Hz, AC.

The tap changing and cooler control supply voltage shall be 400/230V, 50Hz AC.

4 AUXILIARY EQUIPMENT TO BE FURNISHED

4.1 Bushing Current Transformer

Each transformer shall be provided with one (1) set of current transformer each on the HV and LV terminal bushings to be used for transformer differential relaying.

The transformer shall be provided with neutral bushing current transformer to be used for earth fault protection in High / Low Voltage sides.

Current transformer rating and accuracy class shall be as per Appendices and shall be designed to withstand the electromagnetic stresses developed during short circuit.

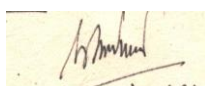
The current transformer secondary leads shall be wired up to a separate disconnecting type terminal block within the marshaling box. The terminal blocks shall be complete with shorting links.

NOTE:

- i) For TPS class CT's, Dimensioning parameter "K", Secondary VA shall be considered 1.5 and 20 respectively. Class (for the relevant protection and duties) as per IEC 60185.
- ii) Rated continuous thermal current rating shall be 200% of rated primary current.
- iii) Parameters of WTI CT for each winding shall be provided by the contractor.
- iv) For estimation of spares, one set of CTs shall mean one CT of each type used in transformer.
- v) The CT used for REF protection must have the identical parameters in order to limit the circulating current under normal condition for stability of protection.

4.2 Lightning Arresters

The lightning arrestor shall be mounted on tank for nominal Voltage level up to 33kV. The lightning arresters shall comply with the specifications in the chapter in Lightning Arrestor. The Contractor shall coordinate the insulation.



4.3 Cooling Equipment and its Control

4.3.1 Cooling Equipment

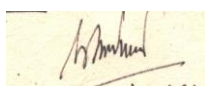
- 4.3.1.1 The cooler shall be designed using sufficient number of tank mounted radiators. Design of cooling system shall satisfy the performance requirements.
- 4.3.1.2 Tank mounted radiators shall have its cooling fans, shut off valves at the top and bottom of suitable size, lifting lugs, top and bottom oil filling valves, air release plug at the top, a drain and sampling valve and thermometer pocket fitted with captive screw cap on the inlet and outlet.
- 4.3.1.3 Required number of standby fans of approximately 20% capacity shall also be provided with radiators.
- 4.3.1.4 Cooling fans shall be directly mounted on radiator. Each fan shall be suitably protected by galvanised wire guard. The exhaust air flow from cooling fan shall not be directed towards the main tank in any case.
- 4.3.1.5 Cooling fans motors shall be suitable for operation from 400 volts, three phase 50 Hz power supply and shall conform to IEC. Each cooling fan motors shall be provided with starter thermal overload and short circuit protection. The motor winding insulation shall be conventional class 'B' type. Motors shall have hose proof enclosure equivalent to IP: 55.
- 4.3.1.6 The cooler and its accessories shall preferably be hot dip galvanised or corrosion resistant paint (as per clause 3.1.1.8) should be applied to it.
- 4.3.1.7 Air release device and oil plug shall be provided on oil pipe connections. Drain valves shall be provided in order that each section can be drained independently.

4.3.2 Cooling Equipment Control (ONAN/ONAF COOLING)

- 4.3.2.1 Automatic operation control of fans shall be provided (with temperature change) from contacts of winding temperature indicator. The Contractor shall recommend the setting of WTI for automatic changeover of cooler control from ONAN to ONAF. The setting shall be such that hunting i.e. frequent start-up operations for small temperature differential do not occur.
- 4.3.2.2 Suitable manual control facility for cooler fans shall be provided.
- 4.3.2.3 Selector switches and push buttons shall also be provided in the cooler control cabinet to disconnect the automatic control and start/stop the fans manually.
- 4.3.2.4 Indicating Devices

Following lamp indications shall be provided in cooler control cabinet:

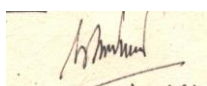
- a) Control Supply failure.



- b) Cooling fan failure.
- c) Common thermal overload trip

One potential free initiating contact for all the above conditions shall be wired independently to the terminal blocks of cooler control cabinet for further wiring to Common Marshalling Box (CMB).

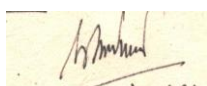
- 4.3.2.5 Two auxiliary power supplies, 400 volt, three phase four (4) wire shall be provided at common marshalling box. All loads shall be fed by one of the two sources through an electrically interlocked automatic transfer scheme housed in the CMB. Power supply to individual phase unit shall be extended from the CMB. Power supply to spare unit shall be extended from nearest CMB only. Suitably rated power contactors, separate MCBs/MCCBs shall be provided in the Common Marshalling Box for each circuit.
- 4.3.2.6 Control and power supplies are to be given for Cooler circuits after suitable selection at Common Marshalling Box. Necessary isolating switches and protective devices shall be provided at suitable points as per Purchaser's approved scheme. The Contractor shall derive AC power for Cooler Control Circuitry from the AC feeder as mentioned above. In case auxiliary power supply requirement for Cooler Control Mechanism is different than station auxiliary AC supply, then all necessary converters shall be provided by the Contractor.
- 4.3.2.7 For each circuit, suitably rated MCBs/MCCBs as required for further distribution of auxiliary power supply to DM boxes, Online Gases and moisture monitoring system, Online drying system and Fibre optic sensor Box etc. (as applicable), shall be provided by contractor, in individual marshalling boxes /cooler control boxes.
- 4.3.3 Auxiliary power supply distribution scheme shall be submitted for approval. Supply and laying of Power, Control and special cables from common marshalling box to individual MB/Cooler Control Cubicle (including spare unit) & further distribution from IMB/CCC to all accessories is in the scope of the contractor. Further any special cable (if required) from CMB to Owner's Control Panels/RTCC panels are also in the scope of the contractor.
- 4.3.4 The cooler control cabinet / Individual Marshalling box shall have all necessary devices meant for cooler control and local temperature indicators. All the contacts of various protective devices mounted on the transformer and all the secondary terminals of the bushing CTs shall also be wired upto the terminal board in the cooler control cabinet/Individual Marshalling box. All the CT secondary terminals in the cooler control cabinet shall have provision for shorting to avoid CT open circuit while it is not in use. All the necessary terminations for remote connection to Purchaser's panel shall be wired upto the Common Marshalling box.
- 4.3.5 Connection arrangement for spare unit shall be in such a way that spare unit of transformer can be connected in place of faulty unit without physically shifting and all the control, protection, indication signals of spare unit shall also be brought in common



marshalling box of all the banks. Necessary arrangement in schematic of Common marshalling box is required to facilitate change-over of all the signals of faulty units to spare unit of Transformer, to ensure flow of control, protection and indication signals between Purchaser's Control panels / Digital RTCC Panel / SCADA and individual units under operation (i.e. any designated unit for bank or spare unit, if it replace any designated unit). To facilitate change-over of spare unit signals with faulty unit in CMB, male-female plug-in connector or better arrangement shall be provided to reduce the outage time.

4.3.6 Valves

- 4.3.6.1 All valves shall be of gun metal or of cast steel/cast iron. They shall be of full way type with internal screw and shall open when turned counter clock wise when facing the hand wheel.
- 4.3.6.2 Suitable means shall be provided for locking the valves in the open and close positions. Provision is not required for locking individual radiator valves.
- 4.3.6.3 Each valve shall be provided with the indicator to show clearly the position of the valve.
- 4.3.6.4 All valves flanges shall have machined faces.
- 4.3.6.5 All valves in oil line shall be suitable for continuous operation with transformer oil at 115 deg C.
- 4.3.6.6 The oil sampling point for main tank shall have two identical valves to be put in series .Oil sampling valve shall have provision to fix rubber hose of 10 mm size to facilitate oil sampling.
- 4.3.6.7 A valve or other suitable means shall be provided to fix (in future) on line dissolved gas monitoring system to facilitate continuous dissolved gas analysis. The location & size of the same shall be finalised during detail engineering stage.
- 4.3.6.8 After testing, inside surface of all cast iron valves coming in contact with oil shall be applied with one coat of oil resisting paint/varnish with two coats of red oxide zinc chromate primer followed by two coats of fully glossy finishing paint conforming to international standards. Outside surface except gasket setting surface of butterfly valves shall be painted with two coats of red oxide zinc chromate conforming to International Standards followed by two coats of fully glossy finishing paint.
- 4.3.6.9 All hardware used shall be cadmium plated/electro galvanised steel.
- 4.3.6.10 For estimation purpose of spares one set of valves would mean one valve of each type used in Transformer.



4.4 QR Code

Manufacturer shall provide the QR code which shall be pasted on the transformer. Only by scanning this QR code, the authorized person may get the access of OEM's safe repository where the below documents are provided, related to the transformer supplied from works:

- a) Single line diagram
- b) Routine test certificates
- c) General arrangement drawings
- d) Manufacturer's catalogue
- e) Operation and maintenance manual.

This will help you to access all your above required documents any time without having hard copies available with you.

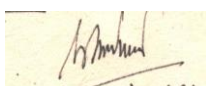
5 INSPECTION AND TESTING

The Contractor shall carry out a comprehensive inspection and testing programme during manufacture of the equipment. An indication of inspection envisaged by the Employer is given under Clause 5.1. This is however not intended to form a comprehensive programme as it is Contractor's responsibility to draw up and carry out such a programme in the form of detailed quality plan duly approved by Employer for necessary implementation.

5.1 Inspection

5.1.1 Tank and Conservator

- 5.1.1.1 Certification of chemical analysis and material tests of plates.
- 5.1.1.2 Check for flatness.
- 5.1.1.3 Electrical interconnection of top and bottom by braided tinned copper flexibles.
- 5.1.1.4 Welder's qualification and weld procedure.
- 5.1.1.5 Testing of electrodes for quality of base materials and coatings.
- 5.1.1.6 Inspection of major weld preparation.
- 5.1.1.7 Crack detection of major strength weld seams by dye penetration test.
- 5.1.1.8 Measurement of film thickness of :
 - i) Oil insoluble varnish.
 - ii) Zinc chromate paint.
 - iii) Finished coat.



- 5.1.1.9 Check correct dimensions between wheels, demonstrate turning of wheels through 90 deg C and further dimensional check.
- 5.1.1.10 Check for physical properties of materials for lifting lugs, jacking pads, etc. All load bearing welds including lifting lug welds shall be subjected to NDT.

5.1.1.11 Leakage test of the conservator.

5.1.1.12 Certification of all test results.

5.1.2 Core

5.1.2.1 Sample testing of core materials for checking specific loss, bend properties, nameledtion characteristics and thickness.

5.1.2.2 Check on the quality of varnish if used on the stampings :

i) Measurement of thickness and hardness of varnish on stampings.

ii) Solvent resistance test to check that varnish does not react in hot oil.

iii) Check over all quality of varnish by sampling to ensure uniform shining colour, no bare spots, no over burnt varnish layer and no bubbles on varnished surface.

5.1.2.3 Check on the amount of burrs.

5.1.2.4 Bow check on stampings.

5.1.2.5 Check for the overlapping of stampings. Corners of the sheet are to be part.

5.1.2.6 Visual and dimensional check during assembly stage.

5.1.2.7 Check for interlaminar insulation between core sectors before and after pressing.

5.1.2.8 Visual and dimensional checks for straightness and roundness of core, thickness of limbs and suitability of clamps.

5.1.2.9 High voltage test (2 kV for one minute) between core and clamps.

5.1.2.10 Certification of all test results.

5.1.3 Insulation Material

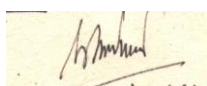
5.1.3.1. Sample check for physical properties of materials.

5.1.3.2 Check for dielectric strength.

5.1.3.3 Visual and dimensional checks.

5.1.3.4 Check for the reaction of hot oil on insulating materials.

5.1.3.5 Dimension stability test at high temperature for insulating material.



5.1.3.6 Tracking resistance test on insulating material

5.1.3.7 Certification of all test results.

5.1.4 Winding

5.1.4.1 Sample check on winding conductor for mechanical properties and electrical conductivity.

5.1.4.2 Visual and dimensional checks on conductor for scratches, dent marks etc.

5.1.4.3 Sample check on insulating paper for pH value, bursting strength and electric strength.

5.1.4.4 Check for the reaction of hot oil on insulating paper.

5.1.4.5 Check for the bonding of the insulating paper with conductor.

5.1.4.6 Check and ensure that physical condition of all materials taken for windings is satisfactory and free of dust.

5.1.4.7 Check for absence of short circuit between parallel strands.

5.1.4.8 Check for brazed joints wherever applicable.

5.1.4.9 Measurement of voltage ratio to be carried out when core/yoke is completely restacked and all connections are ready.

5.1.4.10 Conductor enamel test for checking of cracks, leakage and pin holes.

5.1.4.11 Conductor flexibility test

5.1.4.12 Heat shrink test for anameled wire.

5.1.4.13 Certification of all test results.

5.1.5 Checks Before Drying Process

5.1.5.1 Check condition of insulation on the conductor and between the windings.

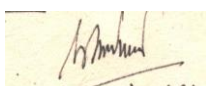
5.1.5.2 Check insulation distance between high voltage connections, cables and earth and other live parts.

5.1.5.3 Check insulating distances between low voltage connections and earth and other parts.

5.1.5.4 Insulation of core shall be tested at 2 kV/minute between core to bolts and core to clamp plates.

5.1.5.5 Check for proper cleanliness and absence of dust etc.

5.1.5.6 Certification of all test results.



5.1.6 Checks During Drying Process

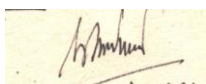
- 5.1.6.1 Measurement and recording of temperature, vacuum and drying time during vacuum treatment.
- 5.1.6.2 Check for completeness of drying by periodic monitoring of IR and Tan delta.
- 5.1.6.3 Certification of all test results.

5.1.7 Assembled Transformer

- 5.1.7.1 Check completed transformer against approved outline drawings, provision for all fittings, finish level etc.
- 5.1.7.2 Test to check effective shielding of the tank.
- 5.1.7.3 Jacking test with oil on all the assembled transformers.
- 5.1.7.4 Dye penetration test shall be carried out after the jacking test.

5.1.8 Bought Out Items

- 5.1.8.1 The makes of all major bought out items shall be subject to Employer's approval.
- 5.1.8.2 The Contractor shall also prepare a comprehensive inspection and testing programme for all bought out/sub-contracted items and shall submit the same to the Employer for approval. Such programme shall include the following components:
 - a) Buchholz Relay.
 - b) Axles and wheels.
 - c) Winding temperature indicators for local and remote mounting.
 - d) Oil temperature indicators.
 - e) Bushings.
 - f) Bushing current transformers.
 - g) Cooler cabinet.
 - h) ON Load / Off Load Tap change gear.
 - i) Oil pumps.
 - j) Terminal connectors.
 - k) Pressure relief device relay
 - l) Cables used for interconnecting Turret CT, equipment relays (exposed), with marshalling box.



The above list is not exhaustive and the Contractor shall also include other bought out items in his programme.

5.1.9 Pre-Shipment Checks at Manufacturer's Works

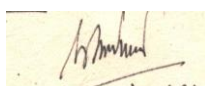
- 5.1.9.1 Check for interchangeability of components of similar transformers for mounting dimensions.
- 5.1.9.2 Check for proper packing and preservation of accessories like radiators, bushings, dehydrating breather, rollers, buchholz relay, fans, control cubicle, connecting pipes, conservator etc.
- 5.1.9.3 Check for proper provision for bracing to arrest the movement of core and winding assembly inside the tank.
- 5.1.9.4 Gas tightness test to confirm tightness and record of dew point of gas inside the tank.
- 5.1.9.5 Derivation of leakage rate and ensure the adequate reserve gas capacity.
- 5.1.9.6 Measure and record the dew point of dry air /Nitrogen at the time of filling and after 24 hours in the transformer tank. Dew point of dry air / nitrogen at the time of transformer dispatch should be better than (-) 30 deg C. Also the dew point of dry air / nitrogen cylinders attached for make up during transportation should of the order of (-) 50 deg C.
- 5.1.9.7 Functioning of impact recorder(s) at their works before installing on the tank.

5.2 Factory Tests

The manufacturer shall be fully equipped to perform all the required tests as specified. Bidder shall confirm the capabilities of the proposed manufacturing plant in this regard when submitting the bid. Any limitations shall be clearly stated in. The contractor shall bear all additional costs related to tests which are not possible to carry out at his own works.

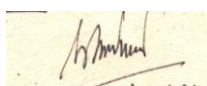
The contractor shall submit an Inspection and test plan (ITP) for approval. A typical test plan is indicated below.

No.	Item	Test Category
1.	Measurement of winding resistance	Routine
2.	Voltage ratio measurement	Routine
3.	Polarity & Vector group test	Routine
4.	No-load loss and current measurement	Routine
5.	Impedance voltage and load loss measurement	Routine
6.	Measurement of insulation resistance & Polarization Index	Routine



7.	Measurement of insulation power factor and capacitance between winding and earth	Routine
8.	Measurement of insulation power factor and capacitance of bushings	Routine
9.	Lightning impulse test	Routine
10.	Short duration induced AC withstand Test (ACSD) with PD measurement	Routine
11.	Separate source voltage withstand test	Routine
12.	On-load tap changer test (Ten complete cycle before LV test)	Routine
13.	Gas-in-oil analysis	Routine
14.	Core assembly dielectric and earthing continuity test	Routine
15.	Oil leakage test on transformer tank	Routine
16.	Appearance, construction and dimension check	Routine
17.	Magnetic balance test	Routine
18.	Measurement of no load current & Short circuit impedance with 400 V, 50 Hz AC.	Routine
19.	High voltage with stand test on auxiliary equipment and wiring after assembly	Routine
20.	Tank vacuum test	Routine
21.	Tank pressure test	Routine
22.	Frequency response analysis (Soft copy of test report in sfra format to be submitted to site along with O & M manual)	Routine
23.	Temperature rise test	*Type
24.	Measurement of harmonic level in no load current	*Type
25.	Measurement of acoustic noise level	*Type
26.	Measurement of Zero seq. reactance	*Type
27.	Measurement of power taken by fans and oil pumps	*Type

All tests shall be done in line with IEC: 60076 and as per “Annexure-A”. Complete test report shall be submitted to purchaser after proper scrutiny and signing on each page by the test engineer of the manufacturer. * Type test shall be carried out at first unit manufactured against the LOA at each manufacturing plant.




- 5.2.1** Measurement of capacitance and tan delta to determine capacitance between winding and earth. Tan delta value shall not be more than 0.5% at ambient temperature.
- 5.2.2** Measurement of capacitance and tan delta of OIP bushings. Tan delta value shall not be more than 0.4% at ambient temperature.

5.2.3 Type Tests on fittings:

All the following fittings shall conform to type tests in accordance with the latest revision of relevant standards listed in this specification and the type test reports shall be furnished by the contractor along with the drawings of equipment/ fittings as per the Clause no. 5.0 of Section I: General Technical Specification (General Requirements). Such test report shall be submitted during inspection or prior to dispatch for NEA approval. The list of fittings and the type test requirement is:

1. Bushing (Type Test as per IEC: 60137, including snap back/seismic test)
2. Buchholz relay (Type Test as per IEC and IP-55 Test on terminal box)
3. OLTC (Temperature Rise of contact, Short circuit current test, Mechanical test and Dielectric Test as per IEC: 60214 and IP-55 test on driving mechanism box).
4. Cooling fan and motor assembly – Free air delivery, Temperature rise, sound level, running at reduced voltage, IP-55 degree of protection for terminal box.
5. Air Cell (Flexible air separator) – Oil side coating, Air side under Coating, Air side outer coating and coated fabric as per BS: 903.
6. Cooler Control cabinet (IP-55 test)
7. Pressure Relief device Test

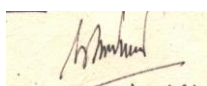
The pressure Relief Device of each size shall be subjected to increase in oil pressure. It shall operate before reaching the test pressure specified in transformer tank pressure test above.. The operating pressure shall be recorded. The device shall seal off after excess pressure has been released.

The terminal box / boxes of PRD should conform to degree of protection as per IP-55.

8. Magnetic Oil Level gauge & Terminal Box for IP-55 degree of protection.
9. OTI & WTI – Switch setting & operation, switch differential, switch rating.

5.3 Inspection and Testing at Site

The Contractor/Manufacturer shall carry out a detailed inspection and testing programme for field activities covering areas right from the receipt of material stage upto commissioning stage. An indicative programme of inspection as envisaged by the



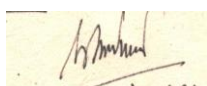
Employer is given below. Pre commissioning Procedures and Formats for equipments shall be contractor's responsibility to draw up and carry out such a programme.

5.3.1 Receipt and Storage Checks

- 5.3.1.1 Check and record condition of each package, visible parts of the transformer etc. for any damage.
- 5.3.1.2 Check and record the gas pressure in the transformer tank as well as in the gas cylinder. Measure and record the dew point of dry air /nitrogen in the transformer tank.
- 5.3.1.3 Visual check for wedging of core and coils before filling up with oil and also check conditions of core and winding in general.

5.3.2 Installation Checks

- 5.3.2.1 Inspection and performance testing of accessories like tap changers etc.
- 5.3.2.2 (i) Check the direction of rotation of fans .
(ii) Check the bearing lubrication.
- 5.3.2.3 Check whole assembly for tightness, general appearance etc.
- 5.3.2.4 Oil leakage test
- 5.3.2.5 Capacitance and tan delta measurement of bushing before fixing/connecting to the winding, contractor shall furnish these values for site reference.
- 5.3.2.6 Leakage test on bushing before erection.
- 5.3.2.7 Measure and record the dew point of nitrogen/dry air in the main tank before assembly. Manufacturer shall submit dew point acceptable limits along with temperature correction factor and shall form part of instruction manual. In case dew point values are not within permissible limit suitable drying out process shall be applied for dry out of active part in consultation with the Manufacturer.
- 5.3.2.8 Oil filling.**
 - 5.3.2.8.1 Oil impregnation or drying under vacuum at site shall be done with the transformer and oil at a temperature not exceeding 70 deg C.
 - 5.3.2.8.2 The duration of the vacuum treatment shall be demonstrated as adequate by means of water measurement with a cold trap or other suitable method. The vacuum shall be measured on the top of the transformer tank and should be less than 1mbar.
 - 5.3.2.8.3 Vacuum shall not be broken until the transformer is oil filled up to the Buchholz relay. Whenever the active insulation or any paper insulated HV connections, especially those from the windings to the bushings are exposed, these shall be re-impregnated under



vacuum along with the complete transformer. For this purpose the transformer shall first be drained to expose all insulation material.

5.3.2.8.4 The minimum safe level of oil filling (if different from the Buchholz level) to which the transformer shall be oil filled under vacuum, shall be indicated in the manual.

5.3.2.8.5 Procedures for site drying, oil purification, oil filling etc shall be submitted for approval and complete instructions shall form part of the manual.

5.3.3 Commissioning Checks

5.3.3.1 Check the colour of silicagel in silicagel breather.

5.3.3.2 Check the oil level in the breather housing, conservator tanks, cooling system, condenser bushing etc.

5.3.3.3 Check the bushing for conformity of connection to the lines etc,

5.3.3.4 Check for correct operation of all protection devices and alarms :

(i) Buchholz relay.

(ii) Excessive winding temperature.

(iii) Excessive oil temperature.

(iv) Low oil flow.

(v) Low oil level indication.

(vi) Fan and pump failure protection.

5.3.3.5 Check for the adequate protection on the electric circuit supplying the accessories.

5.3.3.6 Check resistance of all windings on all steps of the tap changer. Insulation resistance measurement for the following:

(i) Control wiring.

(ii) Main windings.

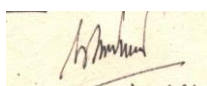
5.3.3.7 Check for cleanliness of the transformer and the surroundings.

5.3.3.8 Continuously observe the transformer operation at no load for 24 hours.

Gradually put the transformer on load, check and measure increase in temperature in relation to the load and check the operation with respect to temperature rise and noise level etc.

5.3.3.9 Phase out and vector group test.

5.3.3.10 Ratio test on all taps.



- 5.3.3.11 Magnetising current test.
- 5.3.3.12 Capacitance and Tan delta measurement of winding and bushing.
- 5.3.3.13 DGA of oil just before commissioning and after 24 hours energisation at site.
- 5.3.3.14 Frequency response analysis (FRA) at site by the equipment to be provided by the Bidder.
- 5.3.3.15 Contractor shall prepare a comprehensive commissioning report including all commissioning test results and forward to Employer for future record.

5.4 Design Test (Type Test)

Bidder/Manufacturer must have successfully carried out the complete type test including Dynamic Short Circuit (DSC) test as per IEC over last 10 years period as on the originally scheduled date of bid opening in Short-Circuit Testing Liaison (STL) - Accredited Laboratory OR must have successfully completed type test including DSC test conducted as per IEC over last 10 (ten) years period as on the originally scheduled date of Bid opening in any internationally accredited Laboratory in the presence of STL representative and certified the same by STL representative as indicated below :

Type test and DSC test on 100MVA or higher capacity, 132 kV or higher voltage class power transformer as specified in the Technical Data Sheet.

However, if the Bidder/Manufacturer has not conducted the complete type tests including the DSC in Short-Circuit Testing Liaison (STL) - Accredited Laboratory OR has not conducted completed type test including DSC test in the presence of STL representative in an internationally accredited Laboratory as mentioned above within last 10 (ten) years

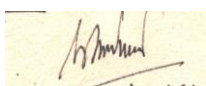
THEN the Bidder has to submit an undertaking letter along with the bid to carry out the complete type test on the above mentioned ratings of transformer including DSC in Short-Circuit Testing Liaison (STL) - Accredited Laboratory OR to carry out the complete type test including DSC in the presence of STL representative and NEA representative in any international accredited laboratory without any cost to the employer.

Further design review of offered 132 kV class transformers shall be carried out based on design of short circuit tested 132kV or above voltage class transformer.

The Bidder shall also submit the type test report of the OLTC from reputed testing agency accredited by ILAC or IAF.

5.5 Design review

The transformers shall be designed, manufactured and tested in accordance with the best international engineering practices under strict quality control to meet the requirement stipulated in the technical specification. Adequate safety margin with respect to thermal, mechanical, dielectric and electrical stress etc. shall be maintained during design, selection of raw material, manufacturing process etc so that the transformer provide long life with least maintenance.



Design reviews shall be conducted by Owner or an appointed Consultant at different stages of the procurement process for transformer, however the entire responsibility of design shall be with the manufacturer.

Employer may visit to the manufacturers works to inspect design, manufacturing and test facilities.

The design review will commence after placement of award with successful bidder and shall be finalised before commencement of manufacturing activity. These design reviews shall be carried out in detail to the specific design with reference of the transformer under scope of this specification.

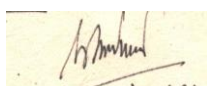
The design review shall be conducted generally following the “Guidelines for conducting design reviews for transformers 100 MVA and 132kV and above” prepared by Cigre SC 12 Working Group 12.22.

The manufacturer shall provide all necessary information and calculations during design review to demonstrate that the transformer meets the requirements for short circuit strength and durability. The latest recommendations of IEC and Cigre SC 12 shall be applied for short circuit withstand evaluation.

The manufacturer shall be required to demonstrate the use of adequate safety margin for thermal, mechanical, dielectric and vibration etc. design to take into the account the uncertainties of his design and manufacturing processes.

The scope of such a design review shall at least include the following:

SN	Design Review
1.	Core and magnetic design
2.	Winding and tapping design
3.	Short-circuit withstand capability
4.	Thermal design including review of localised potentially hot area.
5.	Cooling design
6.	Overload capability
7.	Eddy current losses
8.	Seismic design, as applicable
9.	Insulation co-ordination
10.	Tank and accessories
10.1	Bushings and barrier design
10.2	Tap changers
10.3	Protective devices
10.4	Radiators
10.5	Oil and oil preservation system



11.	Corrosion protection
12.	Electrical and physical Interfaces with substation
13.	Earthing
14.	Processing and assembly
15.	Testing capabilities
16.	Inspection and test plan
17.	Transport and storage
18.	Sensitivity of design to specified parameters
19.	Acoustic Noise
20.	Spares, inter-changeability and standardization
21.	Maintainability

6 TENDER EVALUATION AND THE GUARANTEED LOSSES

6.1 Capitalization of Transformer Losses:

When evaluating the individual bid received from various Bidders, the transformer shall be evaluated for the cost of losses based on the following relation.

$$P_E = P_b + K_L \times L_L + K_{NL} \times L_{NL} + K_{CL} \times L_{CL}$$

P_E = Evaluated Price

P_b = Bid Price

K_L = Value of Load Loss

L_L = Guaranteed Load losses at rated Current (Maximum MVA base)

K_{NL} = Value of no Load Loss

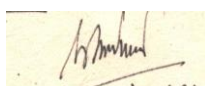
L_{NL} = Guaranteed no Load Loss

K_{CL} = Value of Cooler Loss

L_{CL} = Guaranteed Cooler Loss

The transformer losses shall be capitalized as follows:

- Value of No load losses: US\$ 4684.00 per kW
- Value of Load losses: US\$ 1180.00 per kW
- Loss associated with cooling fan load: US\$ 393.00 per kW




If the bidders quote unrealistic and unachievable guaranteed transformer loss values (no-load or load losses), then the Employer may ask the bidder to submit technical justifications to substantiate such guaranteed losses. If the justifications are not satisfactory, the proposed transformers shall be rejected and the bid shall be considered non-responsive.

6.2 Guaranteed Values Not Reached

If the individual losses of a power transformer as measured during test exceeds the values guaranteed in the Bid within the tolerances permitted by relevant standards, then for each kilowatt of losses in excess of the losses guaranteed, an amount at the rates of twice the rates of specified in clause 6.1 for no load losses, load losses and cooling (fan) losses shall be deducted from the Contract Price of the successful Bidder.

Any transformer shall be rejected if losses exceed the guaranteed value by an amount in excess of the following

Total losses: 10%

Component losses: 15% (unless the total loss exceeds 10 %)

In case of loss capitalization, no tolerance shall be permitted for the guaranteed value.

7 PERFORMANCE GUARANTEE

The performance figures quoted on Technical Data Sheet shall be guaranteed within the tolerances permitted by relevant standards listed under section of General Technical Specifications, and shall become a part of the successful Bidder's Contract. In case of loss capitalization, no tolerance shall be permitted for the guaranteed value. The transformer will be rejected, if the measured no-load and load losses (excluding fan loss) exceed the guaranteed value by over 15% provided that the total losses do not exceed 10% as specified.

8 DRAWINGS, DATA & MANUALS

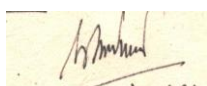
Submission of Drawings, Data & Manuals by the Bidder along with the Tender Document and that after the award of Contract for approval shall be as follows:

8.1 Typical general arrangement drawing of the proposed equipment shall be submitted along with the bid.

8.2 After Award of Contract

After award of Contract, the successful Bidder shall submit the required number of copies of following data for approval.

- 1) Outline dimensional drawing showing the general arrangement, indicating the space required for:
 - Cable termination arrangement
 - Wheel base dimension & detail
- 2) Head clearance required for de-tanking of core and coil assembly

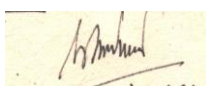


- 3) Foundation plan and loading
- 4) Transport / shipping dimension with net weight and weights of various parts
- 5) Final calculation of impedance for each transformer at normal, lowest and highest taps.
- 6) Schematic flow diagram of cooling system showing the number of cooling units
- 7) Technical details along with control schematic and wiring diagram for marshaling box, remote tap-changer control panel.
- 8.3 Any other relevant data, drawing and information necessary for review of the items under Clause No. 8.2 whether specifically mentioned or not, shall be furnished along with this information.

9 NAME PLATE

Each transformer shall be provided with a nameplate of weather resistant material fitted in a visible position showing but not limited to the following items:

- a) Kind of transformer
- b) Manufacturing standard
- c) Manufacturer's name
- d) Year of manufacture
- e) Manufacturer's serial number
- f) Number of phases and frequency
- g) Rated power
- h) Rated voltages and currents
- i) Connection symbol (Vector group)
- j) Percentage impedance at normal, highest and lowest taps at max. base MVA
- k) Type of cooling
- l) Total weight
- m) Weight of insulating oil
- n) Weight of transportation and un-tanking
- o) No-load and Full load losses values in kW



- p) Temperature rise
- q) Connection diagram
- r) Insulation levels
- s) Details regarding tappings.

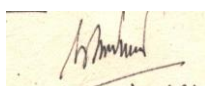
10 SPARE PARTS

The spare parts shall be provided in required quantities as listed in Price Schedule. Further, spare parts as recommended by the manufacturer shall also be included in the Price Schedule. If the spare parts are deemed not required by employer, it can be deleted during contract negotiation.

11 TRANSPORTATION

The Contractor shall dispatch the transformer filled with oil or in an atmosphere of nitrogen or dry air. In the former case the contractor shall take care of the weight limitation on transport and handling facility at site. In the latter case, necessary arrangement shall be ensured by the contractor to take care of pressure drop of nitrogen or dry air during transit and storage till completion of oil filling during erection. A gas pressure testing valve with necessary pressure gauge and adaptor valve shall be provided.

Transformer shall also be fitted with at least one Electronic impact recorder (on returnable basis) during transportation to measure the magnitude and duration of the impact in all three directions. The acceptance criteria and limits of impact in all three directions which can be withstood by the equipment during transportation and handling shall be submitted by the contractor during detailed engineering. The recording shall commence in the factory before dispatch and must continue till the unit is installed on its foundation. The data of electronic impact recorder(s) shall be down loaded at site and a soft copy of it shall be handed over to Engineer-in-charge. Further, within three weeks the contractor shall communicate the interpretation of the data. In the unlikely event of impact recorder output not available at site, the equipment shall be thoroughly internally inspected by the manufacturer's representative before erection at site to ensure healthiness of the equipment. Contractor shall mount Vehicle tracking system (GPRS/ GPS/ GSM based) to track the exact position of the vehicle on which the equipment is being loaded for transportation in order to ensure traceability and safety during transportation.



APPENDIX 2.1: TECHNICAL PARTICULARS OF 132/33kV, 100MVA POWER TRANSFORMERS

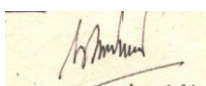
S. No.	Description	Required Data for 132/33kV 80/100MVA Transformer
1.	Rated capacity	80/100MVA
2.	Quantity required	Two (2) Nos.
3.	Type	Outdoor, Oil-immersed
4.	Type of cooling	ONAN / ONAF (80/100MVA)
5.	Temperature rise above 40 degree C ambient temperature	
	a) In oil by thermometer	50 degree C
	b) In winding by resistance	55 degree C
7.	Number of phases	3 (three)
8.	Maximum voltage (line to line)	
	a) Primary	145kV
	b) Secondary	36kV
	c) Tertiary (If Provided)	12kV
9.	Rated Voltage (line to line)	
	a) Primary	132kV
	b) Secondary	33kV
	c) Tertiary (If Provided)	11kV
10.	Insulation level of winding	
	a) Basic impulse level as per IEC 76	
	- Primary	650kV (crest)
	- Secondary	170kV (crest)
	- Tertiary (if provided)	75kV (crest)
	b) Power frequency induced over voltage (1 minute)	
	- Primary	275kV
	- Secondary	70kV
	- Tertiary (if provided)	28kV
11.	Connections	
	a) Primary	Star
	b) Secondary	Star
12.	Vector group reference	YNyn0d11
13.	Type of tap changer	On-load
14.	Range of taps	± 10%
15.	Number of taps	17
16.	Method of tap changer control	
	- Mechanical local	Yes
	- Electrical local	Yes
	- Electrical remote	Yes
	"MASTER-FOLLOWER-INDEPENDENT" and "AUTO - MANUAL" selection	Yes
17.	Percent impedance voltage at rated MVA and 75 °C On tap 1 On tap 9 On tap 17	12.50% (percentage impedance shall match with that of existing transformer)
18.	System grounding	Solidly grounded
19.	Neutral terminals & BCT	



	- Primary	yes, required
	- Secondary	yes, required
20.	Tank Mounted Lightning Arrester	
	HV	No
	LV	Yes
21.	Bushing Current Transformers	
	a. Number of core & current ratio (HV Phase & Neutral)	1 * 450/1A To be finalized during drawing approval
	b. Number of core & current ratio (LV Phase & Neutral)	1 * 1800/1A To be finalized during drawing approval
	c. Accuracy class	PS class

Notes:

1. For parallel operation with existing transformer, the impedance, OLTC connection & range and the winding configuration (if necessary) is to be matched.
2. No external or internal Transformers / Reactors are to be used to achieve the specified HV/IV, HV/LV and IV/LV impedances.
3. Tan delta of Winding & Bushing shall be measured at ambient temperature. No temperature correction factor shall be applied.
4. The criteria for Transformer losses shall be “**Copper Loss (Load Loss) > Iron Loss (No Load Loss) > Cooler Loss (Auxiliary Loss)**”.




APPENDIX 2.2: TECHNICAL PARTICULARS OF 132/33kV, 63MVA POWER TRANSFORMERS

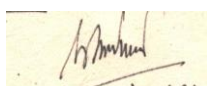
S. No.	Description	Required data for 132/33kV 40/51.5/63MVA Transformer
1.	Rated capacity	40/51.5/63MVA
2.	Quantity required	Three (3) Nos.
3.	Type	Outdoor, Oil-immersed
4.	Type of cooling	ONAN / ONAF1 / ONAF2 (40/51.5/63MVA)
5.	Temperature rise above 40 degree C ambient temperature	
	a) In oil by thermometer	50 degree C
	b) In winding by resistance	55 degree C
7.	Number of phases	3 (three)
8.	Maximum voltage (line to line)	
	a) Primary	145kV
	b) Secondary	36kV
9.	Rated Voltage (line to line)	
	a) Primary	132kV
	b) Secondary	33kV
10.	Insulation level of winding	
	a) Basic impulse level as per IEC 76	
	- Primary	650kV (crest)
	- Secondary	170kV (crest)
	b) Power frequency induced over voltage (1 minute)	
	- Primary	275kV
	- Secondary	70kV
11.	Connections	
	a) Primary	Star
	b) Secondary	Star
12.	Vector group reference	YNyn0
13.	Type of tap changer	On-load
14.	Range of taps	$\pm 10\%$
15.	Number of taps	17
16.	Method of tap changer control	
	- Mechanical local	Yes
	- Electrical local	Yes
	- Electrical remote	Yes
	"MASTER-FOLLOWER-INDEPENDENT" and "AUTO - MANUAL" selection	Yes
17.	Percent impedance voltage at rated MVA and 75 °C On tap 1 On tap 9 On tap 17	12.30-12.52% (percentage impedance shall match with that of existing transformer)
18.	System grounding	Solidly grounded
19.	Neutral terminals & BCT	
	- Primary	yes, required
	- Secondary	yes, required
20.	Tank Mounted Lightning Arrester	



	HV	No
	LV	Yes
21.	Bushing Current Transformers	
	a. Number of core & current ratio (HV Phase & Neutral)	1 * 300/1A To be finalized during drawing approval
	b. Number of core & current ratio (LV Phase & Neutral)	1 * 1200/1A To be finalized during drawing approval
	c. Accuracy class	PS class

Notes:

1. For parallel operation with existing transformer, the impedance, OLTC connection & range and the winding configuration (if necessary) is to be matched.
2. No external or internal Transformers / Reactors are to be used to achieve the specified HV/IV, HV/LV and IV/LV impedances.
3. Tan delta of Winding & Bushing shall be measured at ambient temperature. No temperature correction factor shall be applied.
4. The criteria for Transformer losses shall be “**Copper Loss (Load Loss) > Iron Loss (No Load Loss) > Cooler Loss (Auxiliary Loss)**”.




APPENDIX 2.3: TECHNICAL PARTICULARS OF 132/11kV, 45MVA POWER TRANSFORMERS

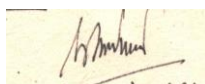
S. No.	Description	Required data for 132/11kV 45MVA Transformer
1.	Rated capacity	31.5/45MVA
2.	Quantity required	Six (6) Nos.
3.	Type	Outdoor, Oil-immersed
4.	Type of cooling	ONAN / ONAF
5.	Temperature rise above 40 degree C ambient temperature	
	a) In oil by thermometer	50 degree C
	b) In winding by resistance	55 degree C
7.	Number of phases	3 (three)
8.	Maximum voltage (line to line)	
	a) Primary	145kV
	b) Secondary	12kV
9.	Rated Voltage (line to line)	
	a) Primary	132kV
	b) Secondary	11kV
10.	Insulation level of winding	
	a) Basic impulse level as per IEC 76	
	- Primary	650kV (crest)
	- Secondary	75kV (crest)
	b) Power frequency induced over voltage (1 minute)	
	- Primary	275kV
	- Secondary	28kV
11.	Connections	
	a) Primary	Star
	b) Secondary	Star
12.	Vector group reference	YNyn0
13.	Type of tap changer	On-load
14.	Range of taps	± 10%
15.	Number of taps	17
16.	Method of tap changer control	
	- Mechanical local	Yes
	- Electrical local	Yes
	- Electrical remote	Yes
	"MASTER-FOLLOWER-INDEPENDENT" and "AUTO - MANUAL" selection	Yes
17.	Percent impedance voltage at rated MVA and 75 °C On tap 1 On tap 9 On tap 17	12.30% (percentage impedance shall match with that of existing transformer)
18.	System grounding	Solidly grounded
19.	Neutral terminals & BCT	
	- Primary	yes, required
	- Secondary	yes, required
20.	Tank Mounted Lightning Arrester	
	HV	No
	LV	Yes



21.	Bushing Current Transformers	
	b. Number of core & current ratio (HV Phase & Neutral)	1 * 200/1A To be finalized during drawing approval
	d. Number of core & current ratio (LV Phase & Neutral)	1 * 2400/1A To be finalized during drawing approval
	e. Accuracy class	PS class

Notes:

1. For parallel operation with existing transformer, the impedance, OLTC connection & range and the winding configuration (if necessary) is to be matched.
2. No external or internal Transformers / Reactors are to be used to achieve the specified HV/IV, HV/LV and IV/LV impedances.
3. Tan delta of Winding & Bushing shall be measured at ambient temperature. No temperature correction factor shall be applied.
4. The criteria for Transformer losses shall be “**Copper Loss (Load Loss) > Iron Loss (No Load Loss) > Cooler Loss (Auxiliary Loss)**”.




APPENDIX 2.4: TECHNICAL PARTICULARS OF 132/66kV, 63MVA POWER TRANSFORMER

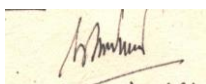
S. No.	Description	Required data for 132/66kV 40/51.5/63MVA Transformer
1.	Rated capacity	40/51.5/63MVA
2.	Quantity required	Two (2) Nos.
3.	Type	Outdoor, Oil-immersed
4.	Type of cooling	ONAN / ONAF1 / ONAF2 (40/51.5/63MVA)
5.	Temperature rise above 40 degree C ambient temperature	
	a) In oil by thermometer	50 degree C
	b) In winding by resistance	55 degree C
7.	Number of phases	3 (three)
8.	Maximum voltage (line to line)	
	a) Primary	145kV
	b) Secondary	72kV
9.	Rated Voltage (line to line)	
	a) Primary	132kV
	b) Secondary	66kV
10.	Insulation level of winding	
	a) Basic impulse level as per IEC 76	
	- Primary	650kV (crest)
	- Secondary	325kV (crest)
	b) Power frequency induced over voltage (1 minute)	
	- Primary	275kV
	- Secondary	140kV
11.	Connections	
	a) Primary	Star
	b) Secondary	Star
12.	Vector group reference	YNyn0
13.	Type of tap changer	On-load
14.	Range of taps	± 10%
15.	Number of taps	17
16.	Method of tap changer control	
	- Mechanical local	Yes
	- Electrical local	Yes
	- Electrical remote	Yes
	"MASTER-FOLLOWER-INDEPENDENT" and "AUTO -MANUAL" selection	Yes
17.	Percent impedance voltage at rated MVA and 75 °C On tap 1 On tap 9 On tap 17	12.30-12.5%
18.	System grounding	Solidly grounded
19.	Neutral terminals & BCT	
	- Primary	yes, required
	- Secondary	yes, required



20.	Tank Mounted Lightning Arrester	
	HV	No
	LV	Yes
21.	Bushing Current Transformers	
	b. Number of core & current ratio (HV Phase & Neutral)	1 * 300/1A To be finalized during drawing approval
	d. Number of core & current ratio (LV Phase & Neutral)	1 * 600/1A To be finalized during drawing approval
	e. Accuracy class	PS class

Notes:

1. For parallel operation with existing transformer, the impedance, OLTC connection & range and the winding configuration (if necessary) is to be matched.
2. No external or internal Transformers / Reactors are to be used to achieve the specified HV/IV, HV/LV and IV/LV impedances.
3. Tan delta of Winding & Bushing shall be measured at ambient temperature. No temperature correction factor shall be applied.
4. The criteria for Transformer losses shall be “**Copper Loss (Load Loss) > Iron Loss (No Load Loss) > Cooler Loss (Auxiliary Loss)**”.




APPENDIX 2.5: TECHNICAL PARTICULARS OF 132/66kV, 45MVA POWER TRANSFORMERS

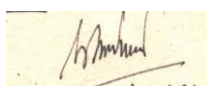
S. No.	Description	Required data for 132/66kV 45MVA Transformer
1.	Rated capacity	31.5/45MVA
2.	Quantity required	Two (2) Nos.
3.	Type	Outdoor, Oil-immersed
4.	Type of cooling	ONAN / ONAF1 (31.5/45MVA)
5.	Temperature rise above 40 degree C ambient temperature	
	a) In oil by thermometer	50 degree C
	b) In winding by resistance	55 degree C
7.	Number of phases	3 (three)
8.	Maximum voltage (line to line)	
	a) Primary	145kV
	b) Secondary	72kV
9.	Rated Voltage (line to line)	
	a) Primary	132kV
	b) Secondary	66kV
10.	Insulation level of winding	
	a) Basic impulse level as per IEC 76	
	- Primary	650kV (crest)
	- Secondary	325kV (crest)
	b) Power frequency induced over voltage (1 minute)	
	- Primary	275kV
	- Secondary	140kV
11.	Connections	
	a) Primary	Star
	b) Secondary	Star
12.	Vector group reference	YNyn0
13.	Type of tap changer	On-load
14.	Range of taps	± 10%
15.	Number of taps	17
16.	Method of tap changer control	
	- Mechanical local	Yes
	- Electrical local	Yes
	- Electrical remote	Yes
	"MASTER-FOLLOWER-INDEPENDENT" and "AUTO -MANUAL" selection	Yes
17.	Percent impedance voltage at rated MVA and 75 °C On tap 1 On tap 9 On tap 17	12.30-12.5%
18.	System grounding	Solidly grounded
19.	Neutral terminals & BCT	
	- Primary	yes, required
	- Secondary	yes, required



20.	Tank Mounted Lightning Arrester	
	HV	No
	LV	Yes
21.	Bushing Current Transformers	
	c. Number of core & current ratio (HV Phase & Neutral)	1 * 200/1A To be finalized during drawing approval
	f. Number of core & current ratio (LV Phase & Neutral)	1 * 400/1A To be finalized during drawing approval
	g. Accuracy class	PS class

Notes:

1. For parallel operation with existing transformer, the impedance, OLTC connection & range and the winding configuration (if necessary) is to be matched.
2. No external or internal Transformers / Reactors are to be used to achieve the specified HV/IV, HV/LV and IV/LV impedances.
3. Tan delta of Winding & Bushing shall be measured at ambient temperature. No temperature correction factor shall be applied.
4. The criteria for Transformer losses shall be “**Copper Loss (Load Loss) > Iron Loss (No Load Loss) > Cooler Loss (Auxiliary Loss)**”.




APPENDIX 2.6: TECHNICAL PARTICULARS OF 66/11kV, 24/27/30MVA POWER TRANSFORMER

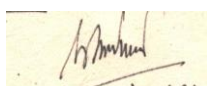
S. No.	Description	Required data for 66/11kV 24/27/30MVA Transformer
1.	Rated capacity	24/27/30MVA
2.	Quantity required	Two (2) Nos.
3.	Type	Outdoor, Oil-immersed
4.	Type of cooling	ONAN / ONAF1/ONAF2 (24/27/30MVA)
5.	Temperature rise above 40 degree C ambient temperature	
	a) In oil by thermometer	50 degree C
	b) In winding by resistance	55 degree C
7.	Number of phases	3 (three)
8.	Maximum voltage (line to line)	
	a) Primary	72.5kV
	b) Secondary	12kV
9.	Rated Voltage (line to line)	
	a) Primary	66kV
	b) Secondary	11kV
10.	Insulation level of winding	
	a) Basic impulse level as per IEC 76	
	- Primary	325kV (crest)
	- Secondary	75kV (crest)
	- Tertiary (if provided)	
	b) Power frequency induced over voltage (1 minute)	
	- Primary	140kV
	- Secondary	28kV
11.	Connections	
	a) Primary	Star
	b) Secondary	Star
12.	Vector group reference	YNyn0
13.	Type of tap changer	On-load
14.	Range of taps	$\pm 10\%$
15.	Number of taps	17
16.	Method of tap changer control	
	- Mechanical local	Yes
	- Electrical local	Yes
	- Electrical remote	Yes
	"MASTER-FOLLOWER-INDEPENDENT" and "AUTO -MANUAL" selection	Yes
17.	Percent impedance voltage at rated MVA and 75 °C On tap 1 On tap 9 On tap 17	$>10\%$
18.	System grounding	Solidly grounded
19.	Neutral terminals & BCT	
	- Primary	yes, required



	- Secondary	yes, required
20.	Tank Mounted Lightning Arrester	
	HV	No
	LV	Yes
21.	Bushing Current Transformers	
	a. Number of core & current ratio (HV Phase & Neutral)	3 Nos 5P20 for protection 0.5 for metering PS for diff 300/1A To be finalized during drawing approval
	b. Number of core & current ratio (LV Phase & Neutral)	3 Nos 5P20 for protection 0.5 for metering PS for diff 1600/1A To be finalized during drawing approval
	c. Accuracy Class	PS

Notes:

1. For parallel operation with existing transformer, the impedance, OLTC connection & range and the winding configuration (if necessary) is to be matched.
2. No external or internal Transformers / Reactors are to be used to achieve the specified HV/IV, HV/LV and IV/LV impedances.
3. Tan delta of Winding & Bushing shall be measured at ambient temperature. No temperature correction factor shall be applied.
4. The criteria for Transformer losses shall be “**Copper Loss (Load Loss) > Iron Loss (No Load Loss) > Cooler Loss (Auxiliary Loss)**”.




APPENDIX 2.5: REMOTE TAP CHANGER PANEL

Item	Legend	Description	Quantity per Panel
1.	ANN	Annunciator assembly, 12 active points, 110V DC, 6 rows high by 2 columns wide, flush mounted; with 3-separately mounted push buttons. Following minimum annunciations shall be provided: 1. Fan Bank Fail 2. OLTC Power supply Fail 3. Tap changer Out of step 4. Transformer Cooling system Fail 5. Tap changer Temperature High 6. AC Fail 7. DC Fail All the rest points are for spare	1 Lot
2	Relay 90	Only main instruments are listed here. All the auxiliary equipments required for satisfactory operation of the scheme shall be included by the Contractor. a. AVR as short listed, with future provision for parallel operation. b. Tap Position Indicator c. AC Relay & Under Voltage Protection Relay d. D.C. fail relay, if required	1 Lot 1 Lot 1 Lot 1 Lot
3		Interlocks, Switching & tripping Relay (where Required)	1 Lot
4.	V	<i>Indicating Voltmeter</i> <i>For specified PT ratios (For 1 Amp Secondary).</i>	1 Lot
5.		Indication lamps for status indications	1 Lot
6.		Other relays and equipments required as per specs and satisfactory operation of the transformer	

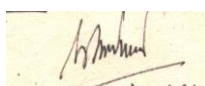
APPENDIX 2.6: TRANSFORMER ACCESSORIES

Each transformer furnished under this specification shall be equipped with the following:

1. Oil conservator with two compartments each with filler caps and drain plugs.
2. Two sets of Silica Gel breathers with connecting pipe and oil seal.
3. Air release plug.
4. Double float Buchholz Relay with electrically separate trip and alarm contacts for transformer tank.
5. Two Nos. of shut-off valves at both sides of each Buchholz Relay.
6. Mechanically operated self-resetting type pressure relief device with visible operation indicator and trip contact.
7. 150mm Dial Magnetic Oil Level Gauge with low level alarm contact.
8. Direct Reading Oil Level Gauge.
9. 150mm. Dial Oil Temperature Indicator with maximum reading pointer and individually adjustable electrically separate sets of contact for alarm and trip.
10. 150mm Dial Winding Temperature Indicator with individually adjustable electrically separate sets of contact for two stage cooler control, alarm and trip with detector element complete with heating coil, CT's etc.
11. Drain valve with threaded adapter.
12. Sample valve (top and bottom)
13. Filter valves with threaded adapter (top and bottom)

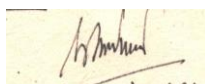


14. Cover lifting eyes
15. Jacking pads, hauling and lifting lugs.
16. Bi-directional flanged wheels.
17. Rails
18. Clamping device with nuts and bolts for clamping the transformer on foundation rails.
19. Ladder with safety device for access to the transformer top and Buchholz Relay.
20. Ground pads each with two (2) nos. tapped holes, bolts and washer for transformer tank, radiator bank.
21. Rating plate and terminal marking plate.
22. Marshaling box for housing control equipment and terminal connections.
23. Any other standard accessories including arcing horns.



SECTION I, PART 3

SWITCHGEAR EQUIPMENT



SECTION I, PART 3

SWITCHGEAR EQUIPMENT

1 OUTDOOR CIRCUIT BREAKER

1.1 GENERAL

This specification covers the design, manufacture, assembly, shop test, supply, delivery, installation works, field test and commissioning of outdoor circuit breaker complete with all accessories for efficient and trouble free operation as specified herein under.

The equipment specified in this Section shall conform to the latest edition of the appropriate IEC specifications and/or other recognized international standards. In particular:

- IEC 60056 High-voltage alternating switchgear
- IEC 62271 High-voltage alternating switchgear and control-gear
- IEC 60376 Specification and acceptance of new sulphur hexafluoride
- IEC 60529 Degree of protection provided by enclosures
- IEC 60694 Common specifications for high-voltage switchgear and controlgear standards

Bidder shall supply the Outdoor Circuit Breaker from the following short Listed Manufacturers:

SF6 Circuit Breakers shall be from: ABB, AREVA (Formerly ALSTOM), CGL, Hitachi, Siemens, Toshiba/Mitsubishi, LG, Fuji, GE, Schnieder Electric.

VCB shall be from ABB, AREVA, CGL, Hitachi, Siemens, Mitsubishi, LG, Fuji, GE, Jyoti, Schnieder Electric (except for two tires VCB).

1.2 DESIGN REQUIREMENTS

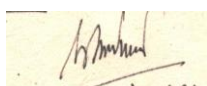
The circuit breakers shall be suitable for 3 phase, 50 Hz. and shall be installed outdoor in the vicinity of industries.

All equipment and accessories shall be provided with sub-tropical finish to prevent fungus growth.

The maximum temperature rise in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in relevant standards.

The rated peak short circuit current or the rated short time current carried by the equipment shall not cause:

- (a) mechanical damage to any part of the equipment
- (b) separation of contacts



(c) insulation damage of "Current Carrying Part"

Technical particulars of the circuit breaker shall be as specified in the appendix .

All auxiliary equipment shall be suitable for 3 phase-4 wires, 400V or single phase 230 V, 50 Hz system. All controls shall be suitable for 110V DC.

1.3 CONSTRUCTION FEATURES

The circuit breaker shall be outdoor, three-phase, (single-throw), spring charged motor operated, trip-free in any position, complete with operating mechanism and supporting structure.

The 145kV circuit breaker shall be SF6 gas type, whereas the 12kV circuit breaker shall be vacuum type.

Reclosing operation

The circuit breaker for outgoing / incoming line for voltage level 66 kV and above shall be capable of making reclosing operation.

Contacts

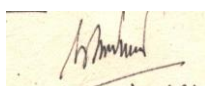
The contacts shall be designed to have adequate thermal and current carrying capacity for carrying full-rated current without exceeding the allowable temperature rise as specified by IEC standards. They shall be designed to have long life so that frequent replacement or maintenance will be unnecessary. The surfaces of either of both moving and stationary arcing-contacts that are exposed directly to the arc shall be faced with suitable arc resisting material.

Gas Density Detector for SF6 circuit breaker

The circuit breaker shall be provided with gas density detector, responding to the gas temperature and pressure, which shall have two different functions according to the gas condition: the first step gives alarm and the second step locks the operating mechanism. A gauge shall also be provided to indicate the gas-pressure.

Vacuum Interrupter for vacuum circuit breaker

Vacuum interrupter, which makes use of the excellent dielectric properties, should confirm to obtain a highly reliable extinguishing device such as to quench the arc as soon as possible without causing the visible formation of the arc. There should not be any deterioration of the quenching medium. The design and manufacturing technology of the interrupter should ensure the vacuum integrity. The recovery should be faster and hence the arc quenching should be accomplished within the adequate contact gap to support the required rating. The contact surface should be free of impurities and pollution layers. Materials of high conductivity should be used such that the contact resistance will be very low. During switching, the Breaker should be **re-strikes free**.



Local Test Switch

Each mechanism shall be equipped with a local test switch for electrically testing the closing and tripping operations of the circuit breaker. A separate manually operated cut-out device to disconnect the circuits from remote closing, reclosing and tripping devices shall be provided on each circuit breaker. A warning nameplate requiring operation of this device before operation of the local test switch shall be mounted adjacent to the local test switch.

Emergency Trip

Each circuit breaker shall be provided with an emergency hand trip device. This device shall be provided with mechanically interlocked contacts to disconnect circuits from remote closing and reclosing devices. The trip button shall be mounted in such a way that it can be operated from outside of the operating box.

Position Indicator

The circuit breaker shall be equipped with easily visible mechanical position indicator. The indicator shall be provided for each pole.

Tripping Circuit

Two (2) sets of tripping coils shall be provided in two separate current and magnetic circuits in order to make possible primary and backup tripping of circuit breaker. Provision for trip circuit supervision shall be provided.

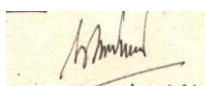
The tripping circuit mechanism and the closing control circuit mechanism shall each have a nominal voltage rating of 110 volts DC. The tripping circuit shall operate satisfactorily for a tripping operation over a voltage range of 70-110%. The closing control circuit shall operate satisfactorily over a voltage range of 85-110%.

Motor-operated Spring-Charged Mechanism

A complete and separate spring-operating system shall be furnished and installed to operate the circuit breaker. Closing action of breaker shall charge the opening spring for tripping.

Each operating mechanism shall be provided with a spring charging motor with a common control cabinet.

- The time required to charge the closing spring after the closing operation shall not exceed 30 seconds.
- Under voltage alarm relay suitable for operation on DC circuit to permit remote indication of loss of potential on the AC to the controlgear.



- Spring charged indicator shall indicate the state of energy store in the spring. Indication for fully charged spring shall be provided both at local and remote control panel.
- Means shall be provided to prevent the operation of the mechanism when maintenance work is being done. The mechanism shall be so arranged that emergency manual charging and release of the spring is possible without electrical means. One (1) CO-operation shall be possible after failure of supply.

Operating Cubicle

Circuit breaker operating mechanisms, auxiliary switches and associated relays, control switches, control cable terminations, and other ancillary equipment shall be housed in sheet steel vermin-proof and weatherproof cubicles. The enclosure protection of the cubicle shall be IP55W. Where appropriate, the cubicles may be free standing with front and rear access.

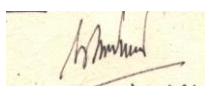
Cubicles shall be of rigid construction, preferably folded but alternatively formed on a framework of standard rolled steel sections and shall include any supporting steel work necessary for mounting on the circuit breaker or on concrete foundations. The thickness of the sheet steel shall be at least 2 mm. All fastenings shall be integral with the panel or door and provision made for locking. Doors shall be rigid and fitted with weatherproof sealing materials suitable for the climatic conditions specified.

Cubicles shall be well ventilated thorough vermin-proof louvers comprising a brass gauze-screen attached to a frame and secured to the inside of the cubicle. Divisions between compartments within the cubicle shall be perforated to assist air circulation. In addition, thermostat- controlled space heater with ON-OFF switches rated 230 V, 1 phase, 50 Hz shall be provided to prevent condensations within the cubicle.

A local control switch connected with a remote-local selector switch shall be furnished and wired in the control circuits of the breaker. The local control switch shall be operative from within the operating cubicle only when the selector switch is in local position.

SF6 Gas

- a) The SF6 gas shall comply with IEC 60376, 60376A and 60376B and shall be suitable in all respects for use in the switchgear under the operating conditions. It shall at least be sufficient for filling all breaker. The SF6 gas shall be supplied in non-returnable steel bottles
- b) The high pressure cylinders in which the SF6 gas is shipped and stored at site shall comply with requirements of the relevant standards and regulations.
- c) Test: SF6 gas shall be tested for purity, dew point, air, hydrolysable fluorides and water content as per IEC 60376, 60376A and 60376B and test certificates shall be furnished to Employer indicating all the tests as per IEC 60376 for each lot of SF6 gas in stipulated copies as indicated in Chapter-GTR. Gas bottles should be tested for leakage during receipt at site.



Bushings

The bushings shall be of the porcelain gas filled, designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used.

Accessories

The Contractor shall furnish following accessories as an integral part of each circuit breaker:

- (a) Padlocks and duplicate keys
- (b) Space heaters equipped with thermostatic controls
- (c) Local / remote control switch
- (d) Operation counter
- (e) Earthing pad (two)
- (f) Terminal boards with six spare terminals
- (g) Two earthing terminals
- (h) Auxiliary relays
- (i) Motor contactor with thermal release for spring charging motor
- (j) Nameplate
- (l) Other necessary accessories

Support Structure:

The structure design shall be such that during operation of circuit breaker vibrations are reduced to minimum.

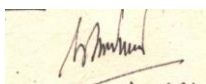
Spare Parts

For each type of circuit breaker, the spare parts shall be provided in required quantities as listed in Price Schedule. Further spare parts as recommended by the manufacturer shall also be included in the Price Schedule. The Spare parts, if any not required by NEA, shall be deducted from the Contract during Contract signing.

1.4 TESTS

Routine Tests

On completion each circuit breakers shall be subjected to following routine tests. As far as practical, the procedure of Routine tests as per IEC:62271-100 shall be performed on all circuit breakers as below:



- (a) Construction Inspection
- (b) Leakage Test (for SF6 circuit breaker)
- (c) Operating Speed Check
- (d) Dielectric test
- (e) Control and secondary wiring check test
- (f) Mechanical operation test
- (g) Operating mechanism system check
- (h) Voltage withstand test on auxiliary circuits
- (i) Measurement of resistance of main circuit of each pole
- (j) Power frequency voltage withstand test on main circuit of each pole and the combination of poles and breaker frame.

Design Tests

Following design tests shall be performed on the offered model.

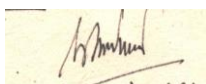
The circuit breaker design tests shall include following:

- (a) Dielectric withstand test
- (b) Temperature rise test
- (c) Radio interference voltage test
- (d) Short-time withstand current and peak withstand current tests
- (e) Verification of the protection
- (f) Electromagnetic compatibility tests

The Bidder shall submit copy of design test report from recognized testing laboratory for the circuit breaker of the offered model along with the bid.

PRE-COMMISSIONING TESTS

An indicative list of tests is given below. All routine tests except power frequency voltage dry withstand test on main circuit breaker shall be repeated on the completely assembled breaker at site. Contractor shall perform any additional test based on specialties of the items as per the field Q.P./instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests along with calibration certificates and shall furnish the list of instruments to the Employer for approval.



- (a) Insulation resistance of each pole.
- (b) Check adjustments, if any suggested by manufacturer.
- (c) Breaker closing and opening time.
- (d) Slow and Power closing operation and opening.
- (e) Trip free and anti pumping operation.
- (f) Minimum pick-up voltage of coils.
- (g) Dynamic Contact resistance measurement.
- (h) Functional checking of control circuits interlocks, tripping through protective relays and auto reclose operation.
- (i) Insulation resistance of control circuits, motor etc.
- (j) Resistance of closing and tripping coils.
- (k) SF6 gas leakage check.
- (l) Dew Point Measurement
- (m) Operation check of pressure switches and gas density monitor during gas filling.
- (n) Checking of mechanical 'CLOSE' interlock, wherever applicable.
- (o) Resistance measurement of main circuit.
- (p) Checking of operating mechanisms
- (q) Check for annunciations in control room.

The contractor shall ensure that erection, testing and commissioning of circuit breaker shall be carried out under the supervision of the circuit breaker manufacturer's representative. The commissioning report shall be signed by the manufacturers representative.

1.5 PERFORMANCE GUARANTEE

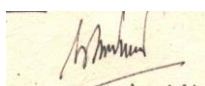
The performance guarantee figures quoted on the schedule of Technical Data shall be guaranteed within the tolerances permitted by relevant standard and will become a part of successful Bidder's Contract.

1.6 DRAWINGS, DATA AND MANUAL

The outline drawings of the breaker and control cubicle with accessories shall be furnished along with the Bid.

After award of Contract the successful Bidder shall submit the required number of copies of the following drawings and data for approval of the Employer.

- (a) General equipment layout

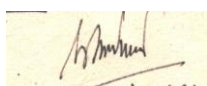


- (b) Outline drawings of the breaker and control cubicle with accessories
- (c) Loading data and foundation detail
- (d) Elementary control wiring diagrams
- (e) Internal wiring diagrams
- (f) External connection diagrams, showing terminal boards and other external Connection points for each assembly and the required interconnecting wiring
- (g) Drawings showing typical cross-sections of the operating mechanism and the breaker mechanism
- (h) Drawings showing typical cross-section and assembly of interrupting device
- (i) Drawings showing assembly of principal component parts and accessories
- (j) Drawings showing details of bushings or porcelain supporting columns, including dimension details of flanges and outline dimensions
- (k) Drawing to show details at all points where adjustments may be made to operating dimension mechanism, breaker mechanism and contact
- (l) Any other drawings and data required for design and installation of circuit breaker.
- (m) Instruction manual for storage, installation, operation and maintenance of circuit breaker and operating mechanism.

1.7 NAMEPLATE

Circuit breaker shall be provided with a nameplate of weather-resistant material fitted in a visible position. It shall show the following items as a minimum.

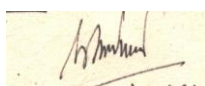
- (a) Circuit Breaker (Note: Circuit breaker and operating cubicle nameplates may be combined)
 - Manufacturer's name
 - Manufacturer's serial number and type designation
 - Year of manufacture
 - Rated voltage, kV
 - Rated insulation level, kV
 - Rated frequency, Hz



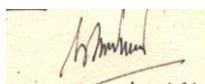
- Rated nominal current, A
 - Rated short-circuit breaking current, kA
 - Rated short circuit making current, kA
 - Rated operating cycle (duty cycles)
 - Rated short time current & duration, kA/s
 - Rated operating sequence (duty cycles)
 - Type of operating mechanism
 - First pole to clear factor
 - Rated interrupting time, cycles
 - Rated operating pressure (SF6), kg/cm²
 - Weight of circuit breaker, kg
 - Parts list number
- (b) Operating cubicle (Note: Operating cubicles and circuit breaker nameplates may be combined.)
- Manufacturer's name
 - Manufacturer's serial number and type designation
 - Year of manufacture
 - Rated supply-voltage of closing and opening devices, V
 - Rated supply-frequency of closing and opening devices, Hz
 - Closing current, A
 - Tripping current, A
 - Rated supply-voltage of auxiliary circuits, V
 - Rated supply-frequency of auxiliary circuits, Hz
 - Parts list number

1.8 SPECIAL TOOLS

In addition to the tools, which are regularly furnished with such breakers, the Contractor shall also supply all necessary special tools or equipment for assembling and



disassembling the breaker. The Contractor shall submit an itemised list of such equipment in the Price Schedule.



APPENDIX 3.1

TECHNICAL PARTICULARS OF 132KV SF6 CIRCUIT BREAKERS

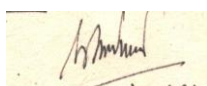
1.	Type	SF6, outdoor type
2.	Voltage rating: a) Nominal system voltage b) Rated maximum voltage	132 kV 145 kV
3.	Insulation level a) Impulse withstand voltage b) Power-frequency withstand voltage (1 min.)	650kV (crest) 275kV (crest)
4.	Frequency	50 Hz
5.	Current rating a) Rated continuous current at 40 degree C ambient b) Short circuit breaking current c) Short circuit making current	1250 A 25 kA 62.5 kA
6.	Creepage distance	3300 mm
7.	Auxiliary supply a) Control circuit b) Space heater and auxiliary equipment.	110 V DC AC, 230/400V, 50 Hz
8.	Operation	Three-pole operation type
9.	Number of possible operations without maintenance : For breaker contact with: - Rated short circuit breaking current (25 kA) - Rated normal current For mechanism	Not less than 10 Not less than 2,000 Not less than 2,000
10.	Reclosing duty cycle	O-0.3 sec-CO-3 min-CO
11.	Total maximum break time	60 ms
12.	First pole to clear factor	1.3
13.	Additional Auxiliary Contacts	8 NO, 8 NC
14.	Maximum make time	120 ms
15.	Spring charging motor	110 V DC



APPENDIX 3.2

TECHNICAL PARTICULARS OF 66KV SF6 CIRCUIT BREAKERS

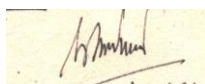
1.	Type	SF6, outdoor type
2.	Voltage rating: a) Nominal system voltage b) Rated maximum voltage	66kV 72.5kV
3.	Insulation level a) Impulse withstand voltage b) Power-frequency withstand voltage (1 min.)	325kV (crest) 140kV (crest)
4.	Frequency	50 Hz
5.	Current rating a) Rated continuous current at 40 degree C ambient b) Short circuit breaking current c) Short circuit making current	1250 A 25 kA 62.5 kA
6.	Creepage distance	1650 mm
7.	Auxiliary supply a) Control circuit b) Space heater and auxiliary equipment.	110 V DC AC, 230/400V, 50 Hz
8.	Operation	Three-pole operation type
9.	Number of possible operations without maintenance : For breaker contact with: - Rated short circuit breaking current (25 kA) - Rated normal current For mechanism	Not less than 10 Not less than 2,000 Not less than 2,000
10.	Reclosing duty cycle	O-0.3 sec-CO-3 min-CO
11.	Total maximum break time	60 ms
12.	First pole to clear factor	1.3
13.	Additional Auxiliary Contacts	8 NO, 8 NC
14.	Maximum make time	120 ms
15.	Spring charging motor	110 V DC




APPENDIX 3.3

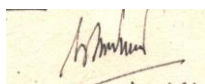
TECHNICAL PARTICULARS OF 33KV VACUUM CIRCUIT BREAKERS

1.	Type	Vacuum, outdoor type
2.	Voltage rating: a) Nominal system voltage b) Rated maximum voltage	33 kV 36 kV
3.	Insulation level a) Impulse withstand voltage b) Power-frequency withstand voltage (1 min.)	170 kV (crest) 70 kV (crest)
4.	Frequency	50 Hz
5.	Current rating a) Rated continuous current at 40 degree C ambient b) Short circuit breaking current c) Short circuit making current	2000 A 25 kA 62.5 kA
6.	Creepage distance	825 mm
7.	Auxiliary supply a) Control circuit b) Space heater and auxiliary equipment.	110 V DC AC, 230/400V, 50 Hz
8.	Operation	Three -pole operation type
9.	Number of possible operations without maintenance : For breaker contact with: - Rated short circuit breaking current (25 kA) - Rated normal current For mechanism	Not less than 10 Not less than 5,000 Not less than 5,000
10.	Reclosing duty cycle	O-0.3 sec-CO-3 min-CO
11.	Total maximum break time	60 ms
12.	First pole to clear factor	1.5
13.	Additional Auxiliary Contacts	8 NO, 8 NC
14.	Maximum make time	120 ms
15.	Spring charging motor	110 V DC




SECTION I, PART 4

SPECIFICATION OF INSTRUMENT TRANSFORMER



SECTION I, PART 4 SPECIFICATION OF INSTRUMENT TRANSFORMER

1 GENERAL

This specification covers the design, manufacture, assembly, shop test, supply, delivery, installation works, field test and commissioning of outdoor and indoor instrument transformers as specified hereunder.

1.1 The equipment specified in this Section shall conform to the latest edition of the appropriate IEC specifications and/or other recognized international standards. In particular:

IEC: 60044-1	Current Transformers
IEC:60044-5 / IEC-60358	Capacitive Voltage Transformers
IEC:60044-2	Inductive Voltage Transformers
IEC 60529	Degree of protection provided by enclosures

1.2 The instrument transformers shall be complete with its terminal box and a common marshalling box for a set of 3 instrument transformers.

1.3 The external surface of instrument transformer, if made of steel, shall be hot dip galvanized or painted as per Section I: General Requirement

1.4 The impregnation details alongwith tests/checks to ensure successful completion of impregnation cycle shall be furnished for approval.

1.5 The instrument transformers shall be designed for use in geographic and meteorological conditions as given in Section I: General Requirement.

2 DESIGN REQUIREMENTS

2.1 Instrument transformers shall be suitable for 50Hz, 3 phases with solidly grounded neutral system.

2.2 Instrument transformers shall be installed outdoor in a hot and humid climate. All equipment and accessories shall be provided with tropical finish to prevent fungus growth.

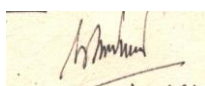
2.3 Capacitor voltage transformers shall be provided with accessories suitable for carrier equipment.

2.4 Technical particulars of instrument transformers shall be as per Appendices.

2.5 Burden of the instrument transformers stated herein is the minimum value required. Where higher burden is required to suit the designs, the Contractor shall supply the same without additional cost.

3 CONSTRUCTION FEATURES

3.1 The instrument transformers of 132 kV & 66kV shall be oil-filled construction and shall be designed for outdoor service and suitable for vertical mounting.



- 3.2 The core and coils of current transformer shall be mounted in a steel tank on the top of the unit with the primary coil leads extending through insulated bushings for series or multiple connections. A steel base shall support the high voltage bushing and tank. The high voltage bushing shall be sealed to the tank and the base with oil-tight joints.
- 3.3 The coupling capacitor voltage transformers shall be of high Capacitance (*minimum 8800 pF*) with three nominal voltage outputs of $110/\sqrt{3}$ volts each. They will be used for carrier service at the line terminations, must be suitable for revenue metering and shall be equipped with carrier accessories. Each of these CVTs shall be furnished with necessary length of lead-in type single-conductor cable suitable for connection to the associated line-tuning unit. Capacitor Voltage Transformers shall have a RF choke coil between the capacitor divider intermediate tap and the electromagnetic portion of the CVT to prevent leakage of carrier current. Bidders shall note that it is a compulsory requirement.
- 3.4 The primary terminals of instruments shall include provisions for externally connecting the primary winding. The secondary terminals shall be enclosed in a weatherproof terminal box.
- 3.5 Porcelain bushings shall have adequate mechanical and electrical strength. The color of porcelain shall be brown.
- 3.6 The Current Transformers & Voltage Transformers of 33 kV voltage level shall be Oil Insulated type suitable for outdoor mounting.
- 3.7 Junction Boxes

Junction boxes shall be rigid weatherproof type complete with terminal blocks suitable for cable size having the range up to $2 \times 6\text{mm}^2$ for termination of the secondary connections (such as delta or wye connection). They shall be made of metal, which will resist corrosion on both inside, and outside surfaces, otherwise galvanizing shall suitably protect them. Cover of the junction box shall be of hinge door type complete with door handle. Two drainage holes shall be provided at the bottom of the junction box. In case the junction boxes are steel sheet, the thickness of such steel sheet shall be at least 1.2 mm. Junction boxes shall be sized and arranged to provide easy access for external cables and adequate space for internal wiring and installed equipment. Enclosure protection class of the junction boxes shall be IP55W.

3.8 Terminations

(a) Current Transformers

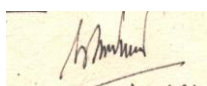
All current transformer secondary-winding terminals for each ratio shall be connected to terminals on terminal blocks located in the junction boxes.

(b) Capacitive Voltage Transformer / Voltage Transformer

All CVTs' secondary terminals (for each core) shall be connected to terminals for each ratio on terminal blocks located in the junction boxes.

3.9 Insulating Oil:

- a) Insulating oil to be used for instrument transformers shall be of EHV grade and shall conform to IEC - 60296 (required for first filling). Non-PCB based synthetic insulating



oil conforming to IEC 60867 can also be used in the capacitor units of CVT with specific approval from the owner, the proposal for which shall be submitted during detailed engineering stage.

- b) The SF6 gas shall comply with IEC-60376, 60376A and 60376B and shall be suitable in all respects for use in the switchgear under operating conditions.

3.10 Name Plate:

Name plate shall conform to the requirements of IEC incorporating the year of manufacture. The rated current, extended current rating in case of current transformers and rated voltage, voltage factor in case of voltage transformers shall be clearly indicated on the name plate. The rated thermal current in case of CT shall also be marked on the name plate. The intermediate voltage in case of capacitor voltage transformer shall be indicated on the name plate.

3.11 Accessories

The following items shall be provided for each instrument transformer:

- (a) Nameplate
- (b) Oil level gauge
- (c) Oil valves or plugs
- (d) Power factor test terminals
- (e) Necessary terminal connections
- (f) Grounding terminals
- (g) Other necessary accessories

4 TESTS

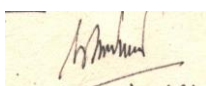
Tests shall be performed as specified hereunder.

4.1 Current transformer

- (a) Routine tests

Each current transformer shall be subjected to following routine tests. As far as practical, the procedure of IEC shall be followed:

- Verification of terminal markings
 - Power frequency withstand test (primary & secondary)
 - Partial discharge measurement
 - Power frequency withstand test between sections of primary & secondary windings
 - Inter turn over voltage test
 - Determination of errors
- (b) Design tests (Type Test)



The current transformer design tests shall include following:

- Short time current tests
- Temperature rise test
- Power frequency withstand voltage (wet) tests
- Lightning impulse withstand tests
- Switching impulse withstand tests
- Radio interference voltage measurement test

The Bidder shall submit copy of design test report from recognized testing laboratory for the instrument transformers of the offered model along with the bid.

4.2 (i) Capacitor Voltage Transformer (N/A)

(a) Routine Tests

Each capacitive voltage transformer shall be subjected to following routine tests. As far as practical, the procedure of IEC shall be followed:

- Capacitance and dissipation factor measurement of the capacitor divider before and after power frequency withstand voltage (dry) test
- Power frequency withstand voltage (dry) test for capacitor divider
- Dielectric tests for electromagnetic unit
- Accuracy tests
- Polarity check
- Applied and Induced over voltage test, etc.

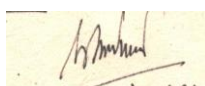
(b) Design Tests (Type Test)

The capacitive voltage transformer design tests shall include following:

- Impulse tests
- Ferro-resonance tests
- Temperature rise tests

(ii) Inductive Voltage Transformer

(a) Routine Tests



Each voltage transformer shall be subjected to following routine tests. As far as practical, the procedure of IEC shall be followed:

- Verification of terminal marking
- Power frequency withstand test on primary winding
- Partial discharge measurement
- Power frequency withstand test on secondary winding
- Power frequency withstand test on between sections
- Determination of error

(b) Design Tests (Type Test)

The inductive voltage transformer design tests shall include following:

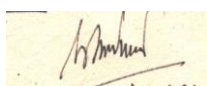
- Temperature rise test
- Short circuit withstand capability test
- Lightning impulse test
- Switching impulse test
- Measurement of the radio interference voltage

4.3 Pre-Commissioning Tests

4.3.1 An indicative list of tests is given below. Contractor shall perform any additional test based on specialties of the items as per the field Q.P./Instructions of the equipment Supplier or Purchaser without any extra cost to the Purchaser. The Contractor shall arrange all instruments required for conducting these tests along-with calibration certificates and shall furnish the list of instruments to the Purchaser for approval.

4.3.2 Current Transformers

- (a) Insulation Resistance Test for primary and secondary.
- (b) Polarity test
- (c) Ratio identification test - checking of all ratios on all cores by primary injection of current.
- (d) Dielectric test of oil (wherever applicable).
- (e) Magnetizing characteristics test.
- (f) Tan delta and capacitance measurement
- (g) Secondary winding resistance measurement
- (h) Contact resistance measurement (wherever possible/accessible).
- (i) Test for SF6 (for SF6 filled CTs) – Dew point measurement, SF6 alarm/ lockout check.
- (j) DGA test of oil.



Dissolved gas analysis to be carried out at the time of commissioning. CTs must have adequate provision for taking oil samples from the bottom of the CT without exposure to atmosphere. Bidder/Manufacturer shall recommend the frequency at which oil samples should be taken and norms for various gases in oil after being in operation for different durations. Bidder/Manufacturer should also indicate the total quantity of oil which can be withdrawn from CT for gas analysis before refill-ing or further treatment of CT becomes necessary.

4.3.3 Voltage Transformers/Capacitive Voltage Transformers

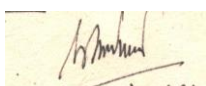
- (a) Insulation Resistance test for primary (if applicable) and secondary winding.
- (b) Polarity test
- (c) Ratio test
- (d) Dielectric test of oil (wherever applicable).
- (e) Tan delta and capacitance measurement of individual capacitor stacks.
- (f) Secondary winding resistance measurement.

5 DRAWINGS, DATA AND MANUALS

5.1 The outline dimensional drawings of the equipment shall be furnished with the Bid.

5.2 After award of Contract the required number of copies of the following drawings for approval of the Employer.

- (a) Outline dimensional drawings of the equipment
- (b) Transport/shipping dimensions with weights
- (c) Foundation and anchor bolt details
- (d) Characteristic and performance data including ratings, ratio and phase angle curves, accuracy for standard burdens, and thermal burden ratings
- (e) Instruction books including technical description and complete information for installation, testing, operation and maintenance with renewal parts data
- (f) Any other relevant drawings and data necessary for review of the items stated above.

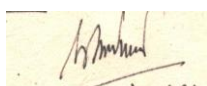


APPENDIX 4.1

TECHNICAL PARTICULARS OF 132 kV CURRENT TRANSFORMERS

1.	Type	Oil Insulated Type
2.	Rated primary voltage	132 kV
3.	Maximum system voltage	145 kV
4.	Impulse withstand voltage	650 (crest)
5.	Rated frequency	50Hz
6.	Number of core	5
7.	Short time thermal ratings	25 kA
8.	Current ratio Core 1: Metering Core 2: protection Core 3: Protection Core 4: differential core 5: differential	<i>300-600-900/1A</i> <i>300-600-900/1A</i> <i>300-600-900/1A</i> <i>600-800/1A</i> <i>600-800/1A</i>
9.	Rated burden for each core	30VA
10.	Accuracy class	5P20 for protection and 0.5 for metering and PS for differential
11.	Creepage distance	3300 mm
12.	Applicable standard	IEC 60044-1

*CT ratio and Burden will be decided during drawing approval

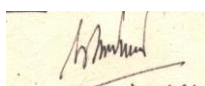



APPENDIX 4.2

TECHNICAL PARTICULARS OF 66 kV CURRENT TRANSFORMERS

1.	Type	Outdoor, Oil immersed
2.	Rated primary voltage	66 kV
3.	Maximum system voltage	72.5 kV
4.	Impulse withstand voltage	325 (peak)
5.	Rated frequency	50Hz
6.	Number of core	5
7.	Short time thermal ratings	62.5kA
8.	Current ratio Core 1: Metering Core 2: Protection Core 3: Differential Core 4: Bus Differential Core 5: Bus Differential	<i>600-800/1A</i> <i>600-800/1A</i> <i>600-800/1A</i> <i>600-800/1A</i> <i>600-800/1A</i>
9.	Rated burden for each core	30VA
10.	Accuracy class	5P20 for protection and 0.5 for metering and PS for differential
11.	Creepage distance	1650 mm
12.	Applicable standard	IEC

* CT ratio and Burden will be decided during drawing approval

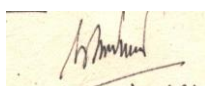



APPENDIX 4.3

TECHNICAL PARTICULARS OF 33 kV CURRENT TRANSFORMERS

1.	Type	Oil Insulated Type
2.	Rated primary voltage	33 kV
3.	Maximum system voltage	36 kV
4.	Impulse withstand voltage	170 (crest)
5.	Rated frequency	50Hz
6.	Number of core	3
7.	Short time thermal ratings	25 kA
8.	Current ratio Core 1: Metering Core 2: Protection Core 3: Differential	600-900-1200/1 600-900-1200/1 600-900-1200/1
9.	Rated burden for each core	30 VA
10.	Accuracy class	5P20 for protection and 0.5 for metering and PS for differential
11.	Creepage distance	850 mm
12.	Applicable standard	IEC 60044-1

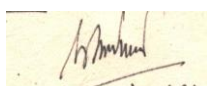
* CT ratio and Burden will be decided during drawing approval




APPENDIX 4.4

TECHNICAL PARTICULARS OF 33KV POTENTIAL TRANSFORMER

	DESCRIPTION	
1	Manufacturer and Country of Origin	
2	Years of manufacturing experience(Years)	5
3	Manufacturer's designation as per submitted catalogue / Model No.	To be furnished
4	Applicable standard	IEC
5	Type	<i>Outdoor Oil immersed</i>
6	Frequency,HZ	50
7	Rated Primary Voltage, KV	33
8	Insulation level	
	a) Impulse withstand voltage,KV(crest)	170
	b) Power frequency withstand voltage (1 min. rms),KV	75
9	Creepage distance,mm	850
10	Ratings	
	a)Voltage ratio kV	$33/ \sqrt{3}/0.11/ \sqrt{3}/0.11/\sqrt{3}$
	b)Rated Burden VA	50
	c)Accuracy class	3P&0.5 for metering
	d)Overvoltage factor	
	continuous	1.1
	30seconds	1.5
	e)Connection	
	f)Secondary fuse	
	Type	
	Manufacture	
	Amp rating, A	
	g)Power factor	0.85
	h)Number of secondary windings	2
13	Weight kg	

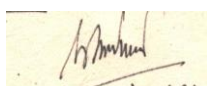



APPENDIX 4.5

TECHNICAL PARTICULARS OF 11 kV CURRENT TRANSFORMERS

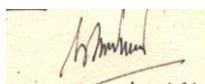
1.	Type	Indoor dry type/ cast-resin for protection and metering.
2.	Rated primary voltage	11 kV
3.	Maximum system voltage	12kV
4.	Impulse withstand voltage	75
5.	Power frequency withstand voltage	28
6.	Rated frequency	50Hz
7.	Number of core	3
8.	Current Ratio Core-1 (Backup Prot.) Core-2 (Metering) Core-3 (Trf. Diff. Prot.)	<i>1000-2000/1</i> <i>1000-2000/1</i> <i>1000-2000/1</i>
9.	Rated burden for each core	15 VA
10.	Accuracy class	5P20 for Protection 0.5 for Metering PS for differential
11.	Applicable standard	IEC

* CT ratio and Burden will be decided during drawing approval




SECTION I, PART 5

SPECIFICATION OF CONTROL & RELAY PANEL



SECTION I, PART 5 CONTROL & RELAY PANEL

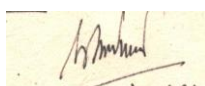
1 GENERAL

- 1.1 This specification covers study, design, manufacture, assembly, factory test, supply, delivery, installation, field test and commissioning of control and relay panels as specified herein under.
- 1.2 It is not the intent to specify completely herein all details of design and construction of equipment to be supplied. The major equipment to be supplied are specified in Appendix, Bill of Material. However, the equipment supplied shall conform, in all respects, to high standards of engineering, design and workmanship and be capable of performing in continuous commercial operation up to Manufacturers' guarantee.
- 1.3 The relays specified in the following articles is based on standard protection schemes generally adopted in 132 kV substations of Employer's Integrated Power System. However, the Contractor shall carry out detail system study of protection system of Integrated Power System with special regard to existing substations in the vicinity of the proposed works. Based on this study, the Contractor shall design a relaying scheme for the substations, prepare a detail relay schedule and recommend relay-setting values for relay co-ordination with existing ones and make all necessary adjustments in the relay settings of neighboring substations as well. *Suitable protection schemes shall be designed for parallel feeders.*
- 1.4 The indication and annunciation schemes intended for existing substations shall be compatible with the existing system as far as possible.
- 1.5 Manufacturers for Protection Equipment

All major protection relays shall be of static/numeric type. Relays shall be only from short listed manufacturers.

Following equipment shall be supplied from the manufacturers specified hereunder:

- a) The main protection relays shall be from ABB, AREVA, SIEMENS, Fuji, Reyrolle / Eusun Reyrolle, Toshiba, Mitsubishi, GE, Hitachi.
- b) Energy Meters: ELSTER (ABB), ACTARIS (Schlumberger), EDMI, SIEMENS, AMETEK, GE.
- c) OLTC and AVR shall be from MR or ABB.



2 CONSTRUCTION FEATURES

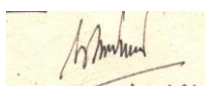
- 2.1 The 132/66kV, 132/33kV and 132/11kV control and relay panel shall be of duplex type. The duplex type shall be of walk-in tunnel type comprising two vertical front and rear panel sections connected back-to-back by formed sheet steel roof tie members and a central corridor in between. The corridor shall facilitate access to internal wiring and external cable connections. Both ends of the corridor shall be provided with double leaf doors with lift off hinges.

The door openings and corridor shall be a minimum of 0.7 meter wide with no equipment allowed within this width from top to bottom. Doors shall have handles with built-in locking facility. In case of number of duplex panels located in a row side by side, the central corridor shall be aligned to form a continuous passage with the sides of the two end panels provided with doors. Separate cable entries shall be provided for the front and rear panels. However, interconnection between front and back panels shall be by means of inter-panel wiring at the top of the panels.

The 33 kV control and relay panel shall be of simplex type.

However, the Control/Relay panels intended to be used in the existing system shall be compatible with the existing panels for aesthetic and space requirement points of view.

- 2.2 Panels shall be completely metal enclosed and shall be dust, moisture and vermin proof. Panel enclosures shall provide a degree of protection not less than IP 43 as per IEC.
- 2.3 Panels shall be free standing, floor mounting type and shall comprise rigid welded structural frames enclosed completely with specially selected smooth finished, cold rolled sheet steel of thickness not less than 3mm for front and rear portions and 2mm for sides, top and bottom portions. There shall be sufficient reinforcement to provide level surfaces, resistance to vibration and rigidity during transportation and installation.
- 2.4 All doors, removable covers and panels shall be gasketed all around. Ventilation louvres, if provided, shall have screens and filters. The screens shall be made of either brass or GI wire mesh.
- 2.5 Design, materials selection and workmanship shall be such as to result in neat appearance inside and outside with no welds, rivets or bolt heads apparent from outside, with all exterior surfaces true and smooth.
- 2.6 Panels shall be suitable for floor mounting. Metal sills in the form of steel channels properly drilled shall be furnished along with anchor bolts and necessary hardware for mounting to a concrete floor. Any irregularity between the sills and flooring shall be sealed to prevent entry of dust, moisture and vermin.
- 2.7 Cable entries to the panels shall be from the bottom unless otherwise specified. The bottom plates of the panels shall be fitted with removable plates of adequate size for holding the cables using cable connectors to seal from dust and moisture. All cable connectors required



shall be provided by the Contractor and shall be screwed type and shall be suitable for PVC armored cables.

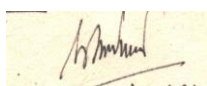
- 2.8 Control/Relay panels, if required to incorporate the provisions for SCADA as specified in the relevant chapter, shall be completely equipped and wired with necessary devices/equipment for control and other signals to be used for such systems. The detail requirements for SCADA systems have been furnished in the relevant chapters of these Specifications.

3 COMPONENT MOUNTING

- 3.1 All equipment on front/back of panel shall be mounted flush or semi-flush. In case of semi-flush mounting, only flange or bezel shall be visible from the front.
- 3.2 Equipment shall be mounted such that removal and replacement can be accomplished individually without interruption of service to adjacent equipment. Equipment mounted inside the panel shall be so located that terminals and adjacent devices are readily accessible without the use of special tools. Terminal markings shall be clearly visible.
- 3.3 Cutouts and wiring for free issue items, if any, shall be according to corresponding equipment-manufacturer's drawings. Cutouts, if any, provided for future mounting of equipment should include cover plates.
- 3.4 The centerline of switches, push buttons and indicating lamps shall be not at a height less than 750mm from the bottom of the panel. The centerline of relays with targets and/or requiring adjustment motors, test switches, and recorders shall be not less than 450mm from the bottom of the panel. No components shall extend below 200mm.
- 3.5 The centerline of switches, push buttons and indicating lamps shall be matched to give a neat and uniform appearance. Likewise, the top lines of all meters, relays and recorders, etc. shall be matched. Indicating lamps shall be of LED type.
- 3.6 No equipment shall be mounted on the doors without prior approval of the Employer.
- 3.7 The standard phase arrangement when facing the front of the switchboard shall be R-Y-B from left to right, from top to bottom and/or front to back. All relays, instruments, other devices, buses and equipment involving three-phase circuit shall be arranged and connected in accordance with the standard phase arrangement.

4 MIMIC DIAGRAMS

- 4.1 Mimic diagrams shall be provided on panels as required. Mimic diagrams shall be screwed on to panels and shall be made of anodized aluminum or plastic of approved fast color material, which can be easily cleaned. The width of the mimic bus shall be subject to approval of the Employer.



- 4.2 The colors for the various voltages in the mimic diagram shall be as follows:

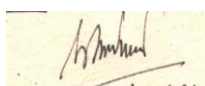
<u>System voltage</u>	<u>Mimic Color</u>
132 kV	Signal Red
66 kV	Light Orange
33 kV	Salmon pink
11 kV	White

If the existing mimic diagram differs from above color coding, the color and height shall match with the existing.

- 4.3 When semaphore indicators are used for disconnecting switch positions, they shall be so mounted in the mimic that the disconnecting switches' 'close' position shall complete the continuity of the mimic. When control switches of discrepancy type are mounted in the mimic, the 'close' position of the switch shall complete the mimic.

5 ANNUNCIATORS

- 5.1 Annunciators of the visual and audible type shall be provided on the panels. Annunciators shall be suitable for operation for the voltages specified.
- 5.2 Annunciators shall be of facia type translucent plastic window for each alarm point. Annunciator facia plates shall be engraved in block letter with respective alarm inscriptions, which will be furnished to Contractor by Employer. Alarm inscriptions shall be engraved on each window and the size of the lettering shall be not less than 5mm. The inscriptions shall be visible only when the respective light is lighted.
- 5.3 The annunciators shall be suitable for operation with normally open fault contacts which close on a fault. When specified in bill of materials, some of the annunciator points shall be suitable for operation with normally closed faults contacts which open on a fault. It shall be possible at site to change annunciators from "open to fault" to "close to fault" and vice versa. Annunciators shall be suitable for accepting fleeting faults of duration not less than 15 milliseconds.
- 5.4 Annunciators shall be compact self-contained units with associated relays and/or necessary cards mounted.
- 5.5 Annunciator facia units shall be suitable for flush/semi-flush mounting on panels. Replacement of individual facia inscription plates and lamps shall be possible from front of the panels.
- 5.6 One alarm buzzer common to annunciators on all the panels shall be provided. "Acknowledge", "Reset" and "Lamp Test" push buttons on all the panels shall be provided. These devices shall be located in the panels as determined by the Employer.
- 5.7 In case of static annunciator schemes, special precaution shall be taken by the Contractor to ensure that spurious alarm conditions do not appear due to false influence of external



magnetic fields on the annunciator wiring and switching disturbances from the neighboring circuits.

5.8 Each annunciation window shall be provided with two lamps to provide safety against lamp failure. Lamps shall operate in parallel such that failure of one will not affect operation of the other.

5.9 Sequence of Operation of the Annunciator shall be as follows :

<u>Alarm Condition</u>	<u>Fault Contact</u>	<u>Audible Alarm</u>	<u>Visual Alarm</u>
Normal	Open	Off	Off
Abnormal	Close	On	Flashing
Acknowledge	Close or Open	Off	Steady On
Reset	Open	Off	Off
Lamp Test	Open	Off	Steady On

In case 'RESET' push-button is pressed before abnormality is cleared, the lamps shall continue to glow-steady and shall go out only when 'Normal' condition is restored.

5.10 Provision of testing facilities for flasher and audible alarm circuits of annunciators shall be provided.

6. SPECIFIC PROTECTION REQUIREMENTS

In general, the major protection schemes to be employed are as follows:

a. For transmission lines

i) Main protection shall be with distance relay, which shall include:

- *transfer trip facility for each independent pole through PLC/optical link*
- Reclose facility with auto synchrocheck.

ii) Back-up protection shall be with directional IDMT overcurrent/earthfault (OC/EF) relays for parallel lines; and shall have additional definite time non-directional OC/EF for radial lines. Such directional OC/EF relays shall not be operated in case of potential loss. And, loss of potential shall lead to the alarm annunciator.

b. For power transformers

i) Main protection shall be with differential relay with inbuilt restricted earth fault.

ii) As back-up protection:

- a. non-directional OC/EF shall be adopted at HV side.
- b. directional OC/EF relays shall be used on LV side



If the existing scheme differs, the new scheme shall match the existing.

- c. For 132 kV bus-bar protection, current differential scheme with low impedance differential scheme shall be adopted. Where there are existing busbar scheme, additional equipments shall be provided to match the existing scheme.
- d. For 33 kV sub-transmission line protection

Static/numeric IDMT overcurrent / earthfault (OC/EF) relays with instantaneous feature shall be adopted.

- e. Other protective relays such as Circuit Breaker Failure, Trip Circuit Supervision, Synchro-Check etc shall be used as required.

The Contractor shall provide state-of-the art numeric type relays (BCU's and Protection Relays as required with necessary redundancy).(where specification does not call for specific type relay). The contractor shall furnish necessary probe and software, cable suitable for the relays supplied under this contract.

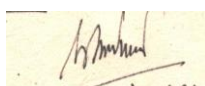
The auto reclose facility inbuilt in the relay shall provide delayed auto reclose and have a selector switch which can provide at least the following operating mode:

- i) single phase re-closing for single phase faults and three phase re-closing for multiphase faults
(to match Circuit Breaker specification)
- ii) three phase re closing for single phase or multiphase earth faults
- iii) no re-closing (for single phase faults or multiphase faults)

The auto recluse scheme shall have at least two blocking inputs and have single phase delay adjustable at least to three seconds and a three phase delay adjustable at least to five seconds and have a reclaim time adjustable at least to 60 seconds.

6.1 Differential Relay

The differential relays shall be used for transformer, parallel feeder lines, and bus bar protection.



a) Transformer Differential Protection:

The differential relays shall be three phases with six through-current restraint inputs. The relay shall have built-in trip relay, indicator and test switch. It shall have complete phase and earth-fault protection.

The harmonic restrained operate time of the relay shall be approximately 30 ms at 3 times pick-up current. Similarly unrestrained operate time 10-20 ms at 2 times pick-up current with minimum impulse time of 3 minutes.

For transformer protection the relay shall have variable percentage restraint for external fault security, even at use of on-load tap charger.

The relay shall have second harmonic restraint from all three phases for inrush security and fifth harmonic restraint for all three phases for over excitation security. The sensitivity shall be 20 to 50 percent of rated current.

Unrestrained operation set-able to 20 times of rated current.

The relay shall be provided with separate interposing CT's for ratio and phase angle matching and equalizing of zero sequence current, or by other programming method.

Restricted Earth Fault protection shall be provided with the help of neutral CT on the HV or LV of the transformer.

(b) Bus-bar differential scheme

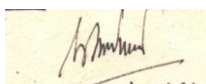
The 132 kV bus-bar shall be protected with low impedance differential relay. The numerical busbar protection shall have following features:

- fast operating time (<30 ms)
- stability against CT saturation
- suitable for 2 bus-bars sections and up to 20 feeders
- event and fault recorders

6.2 Transmission Line Distance Protection (N/A)

The directional distance relay shall be high speed numerical distance relay. The directional relays shall have following main features:

- Have three forward zones and one reverse zone.
- Have a maximum operating time of 50 milli secs for all types of faults within its Zone 1 reach.
- Have a maximum re-setting time of 50 milliseconds.



- Shall be capable to give single phase tripping and reclosing command
- Be able to operate with communication schemes : permissive or blocking or step acceleration
- Operate instantaneously when closing on the three phase Zero volt bolted fault.
- Capable to indicate distance to the faulty point
- Have inbuilt synchro check facility for auto recluse.
- Have self monitoring feature.
- Have event recording facility
- Have fault recording facility.
- Have a VT supply supervision facility
- Have power swing blocking facilities

6.3 Over-current and Earth-fault Protection

These protection schemes shall be used as back-up protection of transmission lines and power transformers.

(a) Non-directional phase over-current protection shall:

- have an inverse characteristic with a definite minimum time of 3 seconds at 10 times setting.
- have a variable setting range of 20-200% of rated current
- have a high set instantaneous unit with a continuously variable setting range of 5-20 times of rated current.

(b) Non-directional earth fault protection shall:

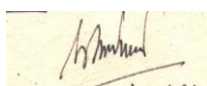
- have an inverse characteristic with a definite minimum time of 3 sec. at 10 times setting.
- have an adjustable setting of 10-80% of rated current.
- have a high set instantaneous unit with a continuously variable setting range of 5-20 times of rated current.

6.4.1 Directional Over current Protection

This protection scheme shall be used as a back-up protection for power transformers low-voltage side, as back-up protection for parallel transmission lines and as main protection for parallel sub- transmission lines.

(a) Phase over current relay shall:

- have an inverse characteristic with a definite minimum time of 3 secs. at 10 times setting.
- have a variable setting range of 20-200% of rated current.
- have a characteristic angle of 45 degree.
- have a directional controlled low transient over-reach high set instantaneous unit of continuously variable setting range 5-20 times of rated current.
- be of voltage polarized directional controlled type.



(b) Directional earth-fault over-current protection

Earth fault over current relay shall:

- be of zero-sequence voltage polarized directional controlled.
- have an inverse characteristic with a definite minimum time of 3 secs. at 10 times setting.
- have an adjustable setting range of 10-80% of rated current.
- have a directional controlled low transient over reach high set instantaneous unit with a continuously variable setting range of 5-20 times of rated current.
- have a characteristics angle of 45 degree.

6.5 Local Breaker Back Up Protection (Circuit Breaker Failure Protection)

Provide a **two-phase and ground breaker failure relay**. This relay shall:

- be able to give a re-trip delayed order to the circuit breaker after initiation when one circuit breaker fails to open
- remedy to the breaker failure by tripping the adjacent breakers
- be able to operate even during adverse CT saturation conditions

6.6 Synchro Check Relay

The synchro check relay shall be provided for each 132/66 kV transmission line. The static/numeric relay shall:

- measure difference in magnitude, phase angle and frequency between busbar and line voltage
- have a voltage check unit for closing order with a dead line and live busbar, or dead busbar and live line
- have an adjustable setting of at least :

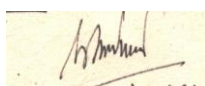
5% to 30% of rated voltage for voltage magnitude difference

5° to 60° for phase angle difference

0.05 to 0.5 Hz for frequency difference

6.7 Other Requirements

- (a) All auxiliary relays, if and when required for the completeness of the various protection schemes covered in this order, shall be deemed to be included in the scope of supply whether or not such items are specifically mentioned in the enclosed bill of material.



- (b) All terminal blocks for CT and PT circuits shall be of disconnecting line type. Suitable plastic covers for all terminal blocks shall be provided in order to prevent dust accumulation.
- (c) Panels shall be mounted to concrete foundation on galvanized steel channels with an intervening layer of anti-vibration strips made of shock absorbing materials, which shall be supplied by the Contractor.
- (d) Cable entries for all the panels shall be from bottom. The bottom plates of the panels shall be fitted with removable plates of adequate size for holding cables and sealing from dust and moisture.
- (e) A ground bus of bare copper strip of minimum size 25 x 6mm along the length of each panel shall be provided and shall be connected to the ground mat of the station.

7 ENERGY METERS

Energy meters shall be numeric type manufactured by internationally reputed manufacturer. Each feeder shall be equipped with one set of kWh and kVARh meters suitable for import and export measurements as specified in Bill of Materials (Appendix). The meters shall preferably be four quadrant type. In case of numeric type energy meters, the contractor shall furnish probe, copy-writed software and other necessary items for operational programming of the meters.

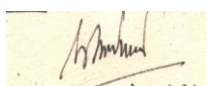
All kWh and kVARh meters shall be of 0.2 class accuracy. In addition to all the tests required to be performed at the manufacturing plant, each of these meters shall be tested at the Employer's laboratory also at the expense of the Contractor prior to installation and commissioning and as and when required by the Employer during the warranty period. Any meter, which fails the tests, will not be acceptable and the Contractor shall supply their replacements immediately. If the replacements too fail the tests, then the Employer reserves the right to replace the meters with new one at the expense of the Contractor. The test results from the Employer's laboratory shall be final and binding upon both parties.

SPECS of Energy meter:

For Secondary CT-1 Amp & PT-110V, programmable at site. 3P4W, CL 0.2, Current rating 1-10Amp, Voltage range 0-480 V.

8 MISCELLANEOUS ACCESSORIES

8.1 Space Heater



Each panel shall be provided with a thermostatically connected space heater rated for 230V, single phase, 50 Hz AC supply for the internal heating of the panel to prevent condensation of moisture. The fittings shall be complete with switch unit.

8.2 Plug Point

A 230 V, 1 phase, 50Hz AC plug point shall be provided in the interior of each cubicle with on-off switch for connection of hand lamps.

8.3 Panel Lighting

Each panel shall be provided with a fluorescent lighting fixture rated for 230 Volts, single phase, 50 Hz supply for the interior illumination of the panel controlled by the respective panel door switch. Adequate lighting shall also be provided for the corridor in Duplex panels.

8.4 DC Control supply:

Independent supply for main protection trip-circuit shall be provided and another separate supply shall be provided for back up protection, control and metering.

8.5 Name Plates and Markings

8.5.1 All equipment mounted on front and rear side as well as equipment mounted inside the panels shall be provided with individual name plates with equipment designation engraved. Also on the top of each panel on front as well as rear side, large and bold nameplates shall be provided for circuit/feeder designation.

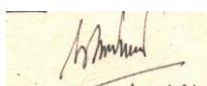
8.5.2 All front mounted equipment shall also be provided at the rear with individual name plates engraved with tag numbers corresponding to the one shown in the panel internal wiring to facilitate easy tracing of the wiring.

8.5.3 Each instrument and meter shall be prominently marked with the quantity measured e.g. KV, A, MW, etc. All relays and other devices shall be clearly marked with manufacturer's name, manufacturer's type, serial number and electrical rating data.

8.5.4 Name Plates shall be made of non-rusting metal or 3 ply lamicaid. Name plates shall be black with white engraving lettering.

8.5.5 Each switch shall bear clear inscription identifying its function e.g. 'BREAKER' '52A', "SYNCHRONISING" etc. Similar inscription shall also be provided on each device whose function is not otherwise identified. If any switch device does not bear this inscription separate name plate giving its function shall be provided for it. Switch shall also have clear inscription for each position indication e.g. "Trip- Neutral-Close", "ON-OFF", "R-Y-B-OFF" etc

8.5.6 All the panels shall be provided with name plate mounted inside the panel bearing LOA No & Date, Name of the Substation & feeder and reference drawing number.



8.6 Earthing

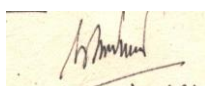
- 8.6.1 All panels shall be equipped with an earth bus securely fixed. Location of earth bus shall ensure no radiation interference from earth systems under various switching conditions of isolators and breakers. The material and the sizes of the bus bar shall be at least 25 X 6 sq.mm copper with threaded holes at a gap of 50 mm with provision of bolts and nuts for connection with cable armours and mounted equipment etc for effective earthing. When several panels are mounted adjoining each other, the earth bus shall be made continuous and necessary connectors and clamps for this purpose shall be included in the scope of supply of Contractor. Provision shall be made for extending the earth bus bars to future adjoining panels on either side.
- 8.6.2 Provision shall be made on each bus bar of the end panels for connecting Substation earthing grid. Necessary terminal clamps and connectors for this purpose shall be included in the scope of supply of Contractor.
- 8.6.3 All metallic cases of relays, instruments and other panel mounted equipment including gland plate, shall be connected to the earth bus by copper wires of size not less than 2.5 sq. mm. The colour code of earthing wires shall be green.
- 8.6.4 Looping of earth connections which would result in loss of earth connection to other devices when the loop is broken, shall not be permitted. However, looping of earth connections between equipment to provide alternative paths to earth bus shall be provided.
- 8.6.5 VT and CT secondary neutral or common lead shall be earthed at one place only at the terminal blocks where they enter the panel. Such earthing shall be made through links so that earthing may be removed from one group without disturbing continuity of earthing system for other groups.
- 8.6.6 An electrostatic discharge **arrangement** shall be provided in each panel **so as to discharge human body before he handles the equipments inside the panels.**

8.7 Indicating Instruments & Transducers for Control Panel:

All instruments, meters and transducers shall be enclosed in dust proof, moisture resistant, black finished cases and shall be suitable for tropical use. All megawatt , megavar, Bus voltage and frequency indicating instruments shall be provided with individual transducers and these shall be calibrated along with transducers to read directly the primary quantities. They shall be accurately adjusted and calibrated at works and shall have means of calibration check and adjustment at site. The supplier shall submit calibration certificates at the time of delivery. However no separate transducers are envisaged for digital bus voltmeters and digital frequency meters and the indicating meters provided in the synchronising equipment.

8.7.1 Indicating Instruments

- 8.7.1.1 Unless otherwise specified, all electrical indicating instruments shall be of digital type suitable for flush mounting.
- 8.7.1.2 Instruments shall have 4-digit display; display height being not less than 25 mm
- 8.7.1.3 Instrument shall conform to relevant IEC and shall have an accuracy class of 1.5 or better. Watt and Var meters shall have an indication of (+) and (-) to indicate EXPORT and IMPORT respectively.
- 8.7.1.4 Digital voltage and frequency meters shall be of class: 0.5 and shall have digital display



of 5 and 4 digits respectively, with display size, not less than 25mm (height).

8.7.2 Transducers

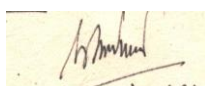
- 8.7.2.1 Transducers (for use with Indicating Instruments and Telemetry/Data Communication application) shall in general conform to IEC:688-1
- 8.7.2.2 The transducers shall be suitable for measurement of active power, reactive power, voltage, current and frequency in three phase four wire unbalanced system.
- 8.7.2.3 The input to the transducers will be from sub-station current & potential transformers. The output shall be in milli ampere D.C. proportional to the input & it shall be possible to feed the output current directly to the telemetry terminal or indicating instruments.
- 8.7.2.4 The transducer characteristic shall be linear throughout the measuring range.
- 8.7.2.5 The transducer output shall be load independent.
- 8.7.2.6 The input & output of the transducer shall be galvanically isolated.
- 8.7.2.7 Each transducer shall be housed in a separate compact case and have suitable terminals for inputs & outputs.
- 8.7.2.8 The transducers shall be suitably protected against transient high peaks of voltage & current.
- 8.7.2.9 The transducer shall withstand indefinitely without damage and work satisfactorily at 120% of the rated voltage and 120% of the rated input current as applicable.
- 8.7.2.10 All the transducers shall have an output of 4-20 mA.
- 8.7.2.11 The response time of the transducers shall be less than 1 second.
- 8.7.2.12 The accuracy class of transducers shall be 1.0 or better for voltage/current transducer, 0.5 or better for watt/VAR transducer and 0.2 or better for frequency transducer.
- 8.7.2.13 The transducers shall have a low AC ripple on output less than 1%.
- 8.7.2.14 The transducer shall have dual output.

8.8 Annunciation System for Control Panel

- 8.8.1 Alarm annunciation system shall be provided in the control board by means of visual and audible alarm in order to draw the attention of the operator to the abnormal operating conditions or the operation of some protective devices. The annunciation equipment shall be suitable for operation on the voltages specified in this specification.
- 8.8.2 The visual annunciation shall be provided by annunciation facia, mounted flush on the top of the control panels.
- 8.8.3 The annunciation facia shall be provided with translucent plastic window for alarm point with approximate size of 35mm x 50mm. The facia plates shall be engraved in black lettering with respective inscriptions. Alarm inscriptions shall be engraved on each window in not more than three lines and size of the lettering shall not be less than 5 mm.
- 8.8.4 Each annunciation window shall be provided with two white lamps in parallel to provide safety against lamp failure. Long life lamps shall be used. The transparency of cover plates and wattage of the lamps provided in the facia windows shall be adequate to ensure clear visibility of the inscriptions in the control room having high illumination intensity (350 Lux), from the location of the operator's desk.
- 8.8.5 All Trip facia shall have red colour and all Non-trip facia shall have white colour.
- 8.8.6 The audible alarm shall be provided by Buzzer/ Hooter /Bell having different sounds and shall be used as follows.

Hooter

Alarm Annunciation



Bell Annunciation DC failure

Buzzer AC supply failure

8.8.7 Sequence of operation of the annunciator shall be as follows :

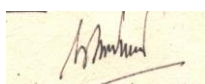
Sl. NO.	Alarm Condition	Fault Contact	Visual Annunciation	Audible Annunciation
1.	Normal	Open	OFF	OFF
2.	Abnormal	Close	Flashing	ON
3.	Accept Push Button Pressed	Close	Steady On	OFF
		Open	Steady On	OFF
4.	Reset Push Button Pressed	Close	On	OFF
		Open	Off	OFF
5.	Lamp Test Push Button Pressed	Open	Steady On	OFF

8.8.8 Audible annunciation for the failure of DC supply to the annunciation system shall be provided and this annunciation shall operate on 230 Volts AC supply. On failure of the DC to the annunciation system for more than 2 or 3 seconds (adjustable setting), a bell shall sound. A separate push button shall be provided for the cancellation of this audible alarm alone but the facia window shall remain steadily lighted till the supply to annunciation system is restored.

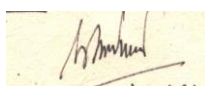
8.8.9 A separate voltage check relay shall be provided to monitor the failure of supply (230V AC) to the scheme mentioned in Clause above. If the failure of supply exists for more than 2 to 3 seconds, this relay shall initiate visual and audible annunciation. Visual and audible annunciation for the failure of AC supply to the annunciation system shall be provided and this annunciation shall operate on Annunciation DC and buzzer shall sound.

8.8.10 The annunciation system described above shall meet the following additional requirements :

- The annunciation system shall be capable of catering to at least 20 simultaneous signals at a time.
- One set of the following push buttons shall be provided on each control panel:
 - Reset push button for annunciation system
 - Accept push button for annunciation system
 - Lamp test push button for testing the facia windows
- One set of the following items shall be provided common for all the control panel (not applicable for extension of substation) :




- Flasher relay for annunciation system
 - Push button for Flasher test
 - Three Push buttons for test of all audible alarm systems
- d) These testing circuits shall be so connected that while testing is being done, it shall not prevent the registering of any new annunciation that may land during the test.
- e) The annunciation shall be repetitive type and shall be capable of registering the fleeting signal. Minimum duration of the fleeting signal registered by the system shall be 15 milli seconds.
- f) In case of static annunciator scheme, special precaution shall be taken to ensure that spurious alarm condition does not appear due to influence of external electromagnetic/ electrostatic interference on the annunciator wiring and switching disturbances from the neighbouring circuits within the panels and the static annunciator shall meet the high voltage susceptibility test , impulse voltage withstand test , high frequency disturbance test– class III and fast transient disturbance test –level III as per IEC 60255.
- 8.8.11 The annunciation system to be supplied for existing sub-stations shall be engineered as an extension to the existing scheme.
- 8.9 Switches
- 8.9.1 Control and instrument switches shall be rotary operated type with escutcheon plates clearly marked to show operating position and circuit designation plates and suitable for flush mounting with only switch front plate and operating handle projecting out.
- 8.9.2 The selection of operating handles for the different types of switches shall be as follows :
- | | |
|------------------------------------|---|
| Breaker, Isolator control switches | : Pistol grip, black |
| Synchronising switches | : Oval, Black, Keyed handle (one common removable handle for a group of switches or locking facility having common key) |
| synchronising Selector switches | : Oval or knob, black |
| Instrument switches | : Round, knurled, black |
| Protection Transfer switch | : Pistol grip, lockable and black. |
- 8.9.3 The control switch of breaker and isolator shall be of spring return to neutral type. The switch shall have spring return from close and trip positions to "after close" and "after trip" positions respectively.
- 8.9.4 Instrument selection switches shall be of maintained contact (stay put) type. Ammeter selection switches shall have make-before-break type contacts so as to prevent open circuiting of CT secondary when changing the position of the switch. Voltmeter transfer switches for AC shall be suitable for reading all line- to-line and line-to-neutral voltages for non- effectively earthed systems and for reading all line to line voltages for effectively earthed systems.
- 8.9.5 Synchronising switches shall be of maintained contact (stay put) type having a common



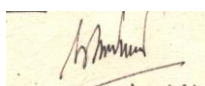
- removable handle for a group of switches. The handle shall be removable only in the OFF position and it shall be co-ordinated to fit into all the synchronising switches. These switches shall be arranged to connect the synchronising equipment when turned to the 'ON' position. One contact of each switch shall be connected in the closing circuit of the respective breaker so that the breaker cannot be closed until the switch is turned to the 'ON' position.
- 8.9.6 Lockable type of switches which can be locked in particular positions shall be provided when specified. The key locks shall be fitted on the operating handles.
- 8.9.7 The contacts of all switches shall preferably open and close with snap action to minimise arcing. Contacts of switches shall be spring assisted and contact faces shall be with rivets of pure silver or silver alloy. Springs shall not be used as current carrying parts
- 8.9.8 The contact combination and their operation shall be such as to give completeness to the interlock and function of the scheme.
- 8.9.9 The contact rating of the switches shall be as follows :

Description	Contact Rating in Amps		
	220V DC	50V DC	230V AC
Make and carry Continuously	10	10	10
Make and carry for 0.5 sec.	30	30	30
Break for Resistive load	3	20	7
Break for Inductive load with L/R = 40m sec.	0.2	-	-

9 TESTS

9.1 TYPE TESTS

- 9.1.1 The reports for following type tests shall be submitted during detailed engineering for the Protective relays, Fault Recorder, Fault locator and Disturbance recorder:
- Insulation tests as per IEC 60255-5
 - DC Voltage dips and interruptions/Variation as per IEC 6100-4-29.
 - High frequency disturbance test as per IEC 61000-4 16, Class IV (Not



applicable for electromechanical relays)

- d) Electrostatic discharges as per IEC 61000-4-2, level; 4 (not applicable for Electromechanical relays)
- e) Fast transient test as per IEC 61000, Level IV (Not applicable for electromechanical relays)
- f) Relay characteristics, performance and accuracy test as per IEC 60255
 - Steady state Characteristics and operating time
 - Dynamic Characteristics and operating time for distance protection relays and current differential protection relays
 - Conformance test as per IEC 61850-10.

For Fault recorder, Disturbance recorder; only performance tests are intended under this item.

- g) Tests for thermal and mechanical requirements as per IEC 60255-6
- h) Tests for rated burden as per IEC 60255-6
- i) Contact performance test as per IEC 60255-0-20 (not applicable for Distance to fault locator and Disturbance recorder)

In case there is a change either in version or in model (Except firmware) of the relay, the contractor has to submit the type test reports for the offered revision/model.

9.1.2 Steady state & Dynamic characteristics test reports on the distance protection relays, as type test, shall be based on test programme specified in Appendix A on simulator/network analyser/PTL. Alternatively, the files generated using Electromagnetic transient Programme (EMTP) can also be used for carrying out the above tests. Single source dynamic tests on transformer differential relay shall be/ should have been conducted based on general guidelines specified in CIGRE committee 34 report on Evaluation of characteristics and performance of Power system protection relays and protective systems.

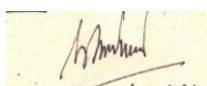
9.2 Relay and Control Panels shall be subjected the following tests:

- (a) Mechanical operation test
- (b) Calibration test for meters
- (c) Characteristic test for relays
- (d) High voltage test of insulation (2000 volts for 1 minute)
- (e) Electrical control, interlock and sequential operation tests
- (g) Verification of wiring as per approved schematic diagram, etc.

9.3 Routine test certificates of all the relays supplied under this contract shall be submitted for the Employer's approval before dispatching the control and relay panel.

9.4 After completion of the installation, panels shall be subjected the following field tests:

- (a) Electrical control, interlock and sequential operation tests
- (b) Calibration test for meters



- (c) Measurement of insulation resistance
- (d) Characteristic test for relays, etc.

10 SPARE PARTS

The spare parts shall be provided in required quantities as listed in Price Schedule. Further spare parts as recommended by the manufacturer shall also be included in the Price Schedule.

Please note, if any of the spare parts are considered not required by the NEA, it can be deleted during Contract negotiation.

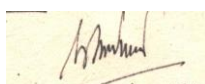
APPENDIX 5.1

BILL OF MATERIAL

The bill of materials shall cover only the major equipment, as will be required by the Tenderer for general information. The Tenderer shall offer his own design or type of equipment, which shall cover all the requirements of the Employer, for Employers' approval. It is to be understood that, all other associated auxiliary equipment and accessories, although not listed in the bill of materials, but necessary for the complete and sound functioning of the control and relay panels, as described in this specification, shall be furnished by the Contractor. Moreover, for the existing substations, the Bidder is required to investigate the existing CT ratios and propose the meters in compatibility with them accordingly.

A. TRANSFORMER CONTROL PANEL

Item	Legend	Description	Quantity per Panel
1.	ANN	Annunciator assembly, 24 active points, 110V DC, 4 rows high by 6 columns wide, flush mounted; with 3-separately mounted push buttons 2-separately mounted indicating lamps, one white lamp, and one red lamp. Following minimum annunciations shall be provided: 1. Transformer differential protection operated 2. Transformer H.V. backup protection operated 3. Transformer L.V back up protection operated 4. Transformer H.V CB failure trip 5. Transformer Buchholz alarm 6. Transformer Buchholz trip 7. Transformer low oil 8. Tap changer Buchholz trip	1 Lot



		9. Tap changer Buchholz alarm 10. Tap changer low oil level 11. Transformer winding and oil temperature high alarm 12. Transformer winding and oil temperature extremely high trip 13. Transformer cooling system fail 14. Bus selections incomplete 15. Pressure relief device operated 16. Trip coil 1 & 2 faulty 17. SF6 gas pressure low alarm 18. SF6 gas pressure low lockout 19. AC FAIL 20. DC Fail All the rest points are for spare	
2	Relay	Only main relays and instruments are listed here. All the trip relays and auxiliary relays required for satisfactory operation of the scheme shall be included by the Contractor. 87T a. Differential protection for transformer with inbuilt REF (main) 67/67N b. LV backup protection 51BF c. Breaker failure protection 51/51N d. H.V. backup protection of transformer e. Trip circuit supervision relay f. Interlock, switching & tripping relays g. D.C. fail relay	1 Lot 1 Lot 1 Lot 1 Lot 1 Lot 1 Lot 1 Lot
		Interlocks, Switching & tripping Relay (where Required) for existing Bus Differential system. If possible mount in the existing Panel.	1 Lot
3.	A	Indicating ammeter with selector switch For specified CT ratios (For 1 Amp Secondary).	1 Lot
4.	Energy meter	Kilowatt hour & KVARh with power import/export Facility and class 0.2, with impulse contact, for specified CT & PT Ratio (For Secondary CT-1 Amp & PT-110V) programmable at site. 3P4W, CL 0.2 Accuracy class, 1-10Amp, 0-480 V	1 Lot
5.	MVA	Var meter For specified CT & PT ratio (For Secondary CT-1 Amp & PT-110V)	1 Set
6.	MW	10(20) -0-10(20) MW For specified CT & PT ratio (For Secondary CT-1 Amp & PT-110V)	1 Set
7.	CS	Breaker control switch with 2-separately mounted indicating lamps for status indication	1 Lot
8.	CS	Disconnecting control switch with 2-separately mounted indicating lamps for status indication	1 Lot
9.		Electrically operated mimic disconnect device, 110V DC, to indicate the position of disconnecting switch	1 Lot



10.		Electrically operated mimic connected to position of line ground switch	1 Lot

APPENDIX 5.2

33 kV LINE CONTROL PANEL

Item	Legend	Description	Quantity per Panel
1.	ANN	Annunciator assembly, 18 active points, 110V DC, 3 rows high by 6 columns wide, flush mounted, and with: 3-separately mounted push buttons 2-separately mounted indicating lamps, one white lamp, and one red lamp. Following minimum annunciations shall be provided: 1. Main protection trip 2. Back up protection trip 3. Trip circuit faulty 4. V.T. Fuse fail 5. Breaker failure protection trip 6. Pole discrepancy 7. C.B. in trouble 8. Auto-reclose operated 9. SF6 gas pressure low alarm 10. SF6 gas pressure low lockout 11. spare 12. spare 13. A.C. supply failure Alarm 14. D.C. supply failure Alarm 15. C.B trip	1

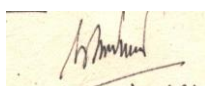


		16. spare 17. spare 18. spare	
2.	Relay	Only main relays and instruments are listed here. All the trip relays and auxiliary relays required for satisfactory operation of the scheme shall be included by the Contractor.	
	51/51N	a. Over-current and earth fault protection	1
	50BF	b. Breaker failure protection	1
		c. Trip circuit supervision relay	1
3.	A	Indicating ammeter with selector switch for specified CT ratios (For 1 Amp Secondary).	1
4.	Energy meter	Kilowatt hour & KVARh with power import/export Facility and class 0.2, with impulse contact, for specified CT & PT Ratio (For Secondary CT-1 Amp & PT-110V) programmable at site. 3P4W, CL 0.2 Accuracy class, 1-10Amp , 0-480 V	1
5.	MVAr	Zero centre MVAr meter	1
6.	MW	Center zero Megawattmeter, 10-0-10; 20-0-20 MW for specified CT & PT ratio(For Secondary CT-1 Amp & PT-110V)	1
7.	CS	Breaker control switch, with 2-separately mounted indicating lamps for status indication.	1
8.		Electrically operated mimic disconnect device, 110V DC, to indicate the position of disconnecting switch	2
9.		Electrically operated mimic connected to position of line ground switch	1

NOTE 1: A separate terminal named “SCADA” shall be provided. All indications, alarm and control wiring shall be brought to this terminal for connection with SCADA equipment, when required.

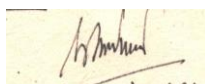
NOTE 2: The Panel is to connected with the existing busbar & breaker failure protection system, therefore necessary relays & aux relay shall be included in the panel

NOTE 3: Please provide necessary AVR, and Control & Indication circuit for Remote Tap Changing and Control in the existing Panel. The scheme shall be suitable for parallel operation with the existing transformer.




SECTION I, PART 6

DISCONNECTING SWITCH



SECTION I, PART 6

DISCONNECTING SWITCH

1 GENERAL

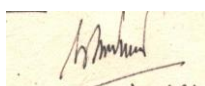
This specification covers the design, manufacture, assembly, shop test, supply, delivery, installation works, field test and commissioning of outdoor type disconnecting switches complete with all accessories for efficient and trouble-free operation as specified hereunder.

The equipment specified in this Section shall conform to the latest edition of the appropriate IEC specifications and/or other recognized international standards. In particular:

- IEC 60129 High-voltage alternating current disconnectors and earthing switches
- IEC 60529 Degree of protection provided by enclosures

2 DESIGN REQUIREMENTS

- 2.1 The disconnecting switches shall be used for the 50Hz, 3 phase system.
- 2.2 The equipment shall be installed outdoor. All equipment, accessories and wiring shall be provided with sub-tropical finish to prevent fungus growth.
- 2.3 The maximum temperature rise in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in relevant standards.
- 2.4 The rated peak short circuit current or the rated short time current carried by the equipment shall not cause;
 - (a) mechanical damage to any part of the equipment
 - (b) separation of Contacts
 - (c) Insulation damage of "Current Carrying Part".
- 2.5 The disconnecting switches shall be (*center rotating for 36 kV, and for 66kV and above centre break*) with contact blades moving through *horizontal/vertical* plane.
- 2.6 The rating, the accessories to be furnished and the schedule of equipment are detailed in Appendix.
- 2.7 The disconnecting switches shall be able to carry the rated current continuously and rated short time current for one seconds without exceeding the temperature limit specified in the relevant standard.
- 2.8 The disconnecting switches shall be capable of withstanding the dynamic and thermal effects of maximum possible short circuit current.



- 2.9 In case of disconnecting switch with grounding switch, the grounding switch shall be capable of making to a dead short circuit without damage of the equipment or endangering operator. It shall be provided with and interlocking with the corresponding disconnecting switch.

3 CONSTRUCTION FEATURES

- 3.1 The 3-pole disconnecting switches shall be gang-operated type so that all the poles make and break simultaneously.
- 3.2 The disconnecting switches shall be designed for *upright/vertical* mounting on steel structure. Disconnecting switches to be mounted on gantry structure shall include necessary steel channels, bolts, nuts, etc.
- 3.3 The disconnecting switches shall have padlocking arrangement in both "open" and "closed" positions.
- 3.4 All current carrying parts shall be of non-ferrous metal or alloy. All live parts shall be designed to avoid sharp points and edges.
- 3.5 All metal parts shall be of such material and treated in such a way as to avoid rust, corrosion and deterioration due to atmospheric conditions. Ferrous parts shall be hot-dip galvanized.
- 3.6 Bolts, nuts, pins, etc. shall be provided with appropriate locking arrangement such as lock nuts, spring washers, key, etc.
- 3.7 Bearing housing shall be weatherproof with provision for lubrication. The design, however, shall be such as not to require frequent lubrication.
- 3.8 All bearings in the current path shall be shorted by flexible copper conductor of adequate size (minimum – 150 mm²) to allow the specified fault current through it without injury.
- 3.9 Main contacts

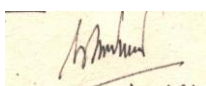
The main contacts shall be of silver-plated copper alloy and controlled by powerful springs designed for floating and pressure point contact.

The contacts shall have sufficient area and pressure to withstand the electromagnetic stresses developed during short circuit without excessive heating liable to pitting or welding.

Contacts shall be adjustable to allow for wear, shall be easily replaceable and shall have minimum movable parts and adjustments.

The moving blade shall be made of electrolytic-copper / aluminum tube for centre rotating type disconnecting switch. Rotating feature of the blade at the end of tube travel for contact wiping shall be provided.

Arcing horns shall be provided to divert the arc from main contacts to the separating horns after the main contacts have opened. Arcing horns shall be renewable type.



3.10 Base :

Each single pole of the isolator shall be provided with a complete galvanised steel base provided with holes and designed for mounting on a supporting structure.

3.11 Blades :

- a) All metal parts shall be of non-rusting and non-corroding material. All current carrying parts shall be made from high conductivity electrolytic copper/aluminium. Bolts, screws and pins shall be provided with lock washers. Keys or equivalent locking facilities if provided on current carrying parts, shall be made of copper silicon alloy or stainless steel or equivalent. The bolts or pins used in current carrying parts shall be made of non-corroding material. Ferrous parts, other than stainless steel shall not be used in close proximity of main current path. All ferrous castings, if used elsewhere shall be made of malleable cast iron or cast-steel. No grey iron shall be used in the manufacture of any part of the isolator.
- b) The live parts shall be designed to eliminate sharp joints, edges and other corona producing surfaces, where this is impracticable adequate corona rings shall be provided. Corona shields are not acceptable. Corona rings shall be made up of aluminum/aluminum alloy.
- c) Isolators and earthing switches including their operating parts shall be such that they cannot be dislodged from their open or closed positions by short circuit forces, gravity, wind pressure, vibrations, shocks, or accidental touching of the connecting rods of the operating mechanism.
- d) The switch shall be designed such that no lubrication of any part is required except at very infrequent intervals. i.e. after every 1000 operations or after 5 years whichever is earlier.

3.10 Insulators and Terminals

Insulators shall be post type, brown glazed and solid core single stage type.

The porcelain used for insulators shall be manufactured by wet process and shall be homogenous and free from cavities and other flaws.

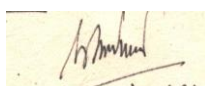
Caps and pins shall be of the highest quality malleable iron or forged steel and smoothly galvanized.

Arcing horns as required shall be furnished.

All insulators of identical ratings shall be interchangeable.

The terminals of the disconnecting switch shall be provided with terminal connectors.

- a) The insulator shall conform to or IEC-60168. The porcelain of the insulator shall conform to the requirements stipulated under Chapter 2-GTR and shall have a minimum cantilever strength of **1000/600** Kgs. for 245/145 kV insulators respectively.



- b) Pressure due to the contact shall not be transferred to the insulators after the main blades are fully closed.
- c) The parameters of the insulators shall meet the requirements specified under Chapter 2-GTR.
- d) Insulator shall be type and routine tested as per IEC-60168.
- e) For 245 kV Insulator: (For Isolator)

Top PCD	=	127 mm
No. of holes	=	4 x M16
Bottom PCD	=	275 mm
No. of holes	=	8 x 18 dia

- f) For 145 kV Insulator: (For Isolator)

Top PCD	=	127 mm
No. of holes	=	4 x M16
Bottom PCD	=	254 mm
No. of holes	=	8 x 18 dia

3.11 Name Plate :

The name plate shall conform to the requirements of IEC incorporating year of manufacture.

4 OPERATING MECHANISM

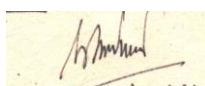
4.1 Disconnecting Switches

The operating mechanism for 66 kV and above, disconnecting switches shall be motor operated. [The driving motor of the motor operated disconnecting switch shall be suitable for operating on 400/230 V AC supply.](#) The mechanism shall also be equipped with dependable manual operating device for emergency operation when the power operating mechanism is inoperative.

The operating mechanism for 36 kV disconnecting switch shall be manual. The operating handle shall be such that it can be operated easily from standing height from ground level. Grounding of handle through copper flexible conductor of adequate size shall be provided.

The control shall be such that the disconnecting switch can be opened or closed from local as well as remote. LOCAL / REMOTE selector switch and OPEN / STOP / CLOSE push buttons shall be provided at the local "Mechanism Box" for local electrical operation. The LOCAL / REMOTE selector switch shall be lockable type.

Starters, relays and limit switches shall be provided as required for operation, indication and interlocks. All electrical controls shall be suitable for 110V DC.



The disconnecting switch shall be provided with a minimum number of eight (8) normally closed and eight (8) normally open electrically separated (Voltage free) auxiliary contacts for system interlock in addition to the auxiliary contacts required for its own indication and operational requirements so as to have a trouble free operation of the system. The contacts shall be convertible type so that normally open contact may be converted to normally closed contact and vice-versa at site.

All auxiliary contacts shall be wired up to terminal block in local mechanism box. All auxiliary contacts shall be silver plated and shall have positive wiping action when closing.

The auxiliary contacts shall be adjustable type to suit the following requirements.

- (a) Signaling of "closed position" shall not take place unless main power contacts have reached a position so that rated normal and short time current can be carried safely.
- (b) Signaling of "open position" shall not take place unless the main power contacts are at a safe isolating distance.

The operating device, auxiliary switches and all other devices shall be housed in a weatherproof box of sheet steel / aluminum alloy construction. The enclosure protection of the mechanism box shall be IP-55W as per IEC. The thickness of the sheet steel shall be at least 2mm. In the case of aluminum alloy, the operating box shall be of robust design. The box shall have gasket-hinged door with lock and key. The box shall be suitable for fixing on disconnecting switch steel structure. A 4mm thick removable gland plate shall be provided at the bottom of the box for cable entry. The box shall be mounted at a safe working clearance from the live parts of switches. Thermostat-controlled space heater with ON-OFF switches rated 230V, 1 phase, 50Hz shall be provided to prevent condensation within the mechanism box.

4.2 Earthing Switches

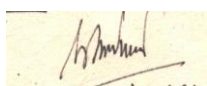
The grounding switch shall be triple pole manually and gang operated. The mechanism shall be such that one operator alone shall be able to operate without undue effort. Electrical and mechanical interlocking shall be provided for the safe operation of grounding switch.

The grounding switch shall be capable of withstanding the electrical and mechanical stresses developed by a short circuit current specified in Appendix. The cross-section of the flexible copper connection between rotating shaft and structure shall be capable to allow specified fault through it without injury but of minimum size 150 mm².

Arrangement shall be provided to padlock the grounding switch in open and closed positions.

The operating handle shall be such that it can be operated easily from standing height from ground level. Grounding of handle through copper flexible conductor of adequate size shall be provided.

Each grounding switch shall be provided with four (4) normally closed and four (4) normally open contacts for remote indication and interlocking purpose.



All the auxiliary contacts and interlocking coils shall be housed in a mechanism box. The box shall be suitable for fixing on grounding switch steel structure. A 4mm thick removable gland plate shall be provided at the bottom of the box for cable entry.

Auxiliary contacts shall be suitable for 0.5A, 110V DC inductive breaking duty.

The auxiliary coils shall be suitable for 110V DC supply.

5 TESTS

a) The test reports of the type tests and the following additional type tests (additional type tests are required for isolators rated above 72.5 kV only) shall also be submitted for the Purchaser's review.

- (i) Radio interference voltage test.
- (ii) Seismic withstand test on isolator mounted on Support structure. The test shall be performed in the following position :

Isolator open	E/S Closed
Isolator open	E/S Open
Isolator Closed	E/S Open

b) Routine Tests

On completion each disconnecting switch shall be subjected to following routine tests. As far as practical, the procedure of IEC shall be followed:

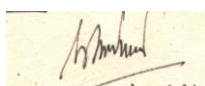
- Power frequency voltage dry test
- Measurement of resistance of main circuit
- Control and secondary wiring check tests
- Mechanical operation test

c) Design Tests

The disconnecting switch design tests shall include following:

- Dielectric tests, including impulse withstand tests
- Radio interference tests
- Temperature rise tests
- Short-time withstand current tests
- Operating and mechanism endurance test
- Voltage drop test.

The voltage drop across one complete phase of a switch shall be measured when carrying rated current.



The Bidder shall submit copy of design test report from recognized testing laboratory for the disconnecting switch of the offered model along with the bid.

d) Field Tests

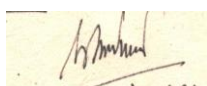
An indicative list of tests on isolator and earthswitch is given below. Contractor shall perform any additional test based on specialties of the items as per the field Q.P./instructions of the equipment Supplier or Purchaser without any extra cost to the Purchaser. The Contractor shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Purchaser for approval.

- (a) Insulation resistance of each pole.
- (b) Manual and electrical operation and interlocks.
- (c) Insulation resistance of control circuits and motors.
- (d) Ground connections.
- (e) Contact resistance.
- (f) Proper alignment so as to minimize vibration during operation.
- (g) Measurement of operating Torque for isolator and Earth switch.
- (h) Resistance of operating and interlocks coils.
- (i) Functional check of the control schematic and electrical & mechanical interlocks.
- (j) 50 operations test on isolator and earth switch.

The contractor shall ensure that erection, testing and commissioning of Isolators above 72.5 kV class shall be carried out under the supervision of the Isolator manufacturer's representative. The commissioning report shall be signed by the manufacturer's representative.

6 DRAWINGS, DATA AND MANUALS

- 6.1 The General arrangement drawing with Technical leaflets shall be furnished with the Bid.
- 6.2 After award of Contract the successful Bidder shall submit the required number of copies of the following drawings and data for approval of the Employer.
 - (a) Outline dimensional drawings of the equipment showing general arrangement and location of fittings.
 - (b) Transport / shipping dimensions with weights.
 - (c) Foundation and anchor bolt details including loading condition.

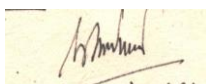


- (d) Assembly drawings for erection at site with part numbers and schedule of materials.
- (e) Electrical schematic and wiring diagram.
- (f) Any other relevant drawings and data necessary for erection, operation and maintenance.
- (g) Instruction manual and data sheets.
- (h) Any other relevant data, drawing and information necessary for review of the items stated above.

7 SPARE PARTS

For each type of disconnecting switch, the spare parts shall be provided in required quantities as listed in Price Schedule. Further spare parts as recommended by the manufacturer shall also be included in the Price Schedule.

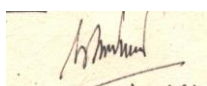
Please note, if any of the spare parts are considered not required by the NEA, it can be deleted during Contract negotiation.



APPENDIX 6.1

TECHNICAL PARTICULARS OF 132kV DISCONNECTING SWITCH WITH & WITHOUT GROUNDING SWITCH

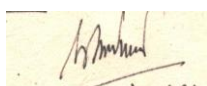
S. No	Description	Disconnecting switch 132 kV
1.	Type	3-poles, center break
2.	Rated Voltage	145 kV
3.	Frequency	50 Hz
4.	Insulation levels	
	a) Basic impulse level (BIL)	650 kV (crest)
	b) Power frequency withstand voltage (For 1 minute)	275 kV
5.	Current ratings	
	a) Continuous current	1250A
	b) Rated Short Time current (1 sec.)	25 kA
6.	Operating mechanism of disconnecting switch	Motor operated (both local and remote operation) and manual
7.	Auxiliary power supply	
	a) Space heater and cubicle	230V, 1-phase, 50Hz
	b) Control circuit	110 V DC
	c) Operating motor	230/400 V, 50 Hz
8.	Grounding Switch	Not applicable
9.	Applicable standard	IEC




APPENDIX 6.2

TECHNICAL PARTICULARS OF 66 kV DISCONNECTING SWITCH WITH & WITHOUT GROUNDING SWITCH

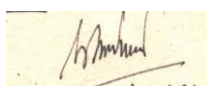
S. No	Description	Disconnecting switch 66 kV
1.	Type	3-poles, center rotate, horizontal type
2.	Rated Voltage	72 kV
3.	Frequency	50 Hz
4.	Insulation levels	
	a) Basic impulse level (BIL)	325 kV (crest)
	b) Power frequency withstand voltage (For 1 minute)	150 kV
5.	Current ratings	
	a) Continuous current	1250A
	b) Rated Short Time current (1 sec.)	25 kA
6.	Operating mechanism of disconnecting switch	Motor operated (both local and remote operation) and manual
7.	Auxiliary power supply	
	a) Space heater and cubicle	230V, 1-phase, 50Hz
	b) Control circuit	110 V DC
	c) Operating motor	230/400 V, 50 Hz
8.	Grounding Switch	Not applicable
9.	Applicable standard	IEC




APPENDIX 6.3

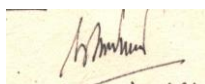
TECHNICAL PARTICULARS OF 33kV DISCONNECTING SWITCH WITH & WITHOUT GROUNDING SWITCH

S. No	Description	Disconnecting switch 33 kV
1.	Type	3-poles, center break
2.	Rated Voltage	33 kV
3.	Frequency	50 Hz
4.	Insulation levels	
	a) Basic impulse level (BIL)	
	b) Power frequency withstand voltage (For 1 minute)	325 kV
5.	Current ratings	
	a) Continuous current	2000A
	b) Rated Short Time current (1 sec.)	25 kA
6.	Operating mechanism of disconnecting switch	Motor operated (both local and remote operation) and manual
7.	Auxiliary power supply	
	a) Space heater and cubicle	230V, 1-phase, 50Hz
	b) Control circuit	110 V DC
	c) Operating motor	230/400 V, 50 Hz
8.	Grounding Switch	As per BOQ
9.	Applicable standard	IEC




SECTION I, PART 7

SPECIFICATION OF LIGHTNING ARRESTOR



SECTION I, PART 7

LIGHTNING ARRESTER

1 GENERAL

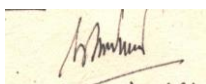
This specification covers the design, manufacture, factory test, delivery, installation, field test and commissioning of lightning arresters, complete with all accessories.

The equipment specified in this Section shall conform to the latest edition of the appropriate IEC specifications and/or other recognized international standards. In particular:

- IEC 60099-4 Metal-oxide Surge arrester without gap for a.c. system
- IEC 60099-5 Surge arrester - Selection and application recommendations
- IEC 60529 Degree of protection provided by enclosures

2 DESIGN REQUIREMENTS

- 2.1 The lightning arresters shall be suitable for a nominal system of 3 phase, 50Hz solidly grounded system. Lightning arresters shall be provided at entry points of the overhead transmission lines and both HV & LV sides of the transformers.
- 2.2 The lightning arresters shall be station type / transformer-tank-mounted, gap less metal oxide type of rated voltage of 120 kV for 132 kV system, 60 kV for 66 kV system, 30 kV for 33 kV system & 9 kV for 11 kV system. The nominal discharge current shall not be less than 10 kA.
- 2.3 The active part of the lightning arresters shall be accommodated in single stacked porcelain insulators, which are suitably reinforced to prevent explosion of an arrester.
- 2.4 Pressure relief device shall be provided for the safe discharge of internal pressure.
- 2.5 The lightning arresters shall be preferably mounted on galvanized steel structure. Terminal connectors for both line and ground terminals shall be furnished.
- 2.6 Surge monitoring device consisting of surge counter, leakage current measuring instrument etc., along with insulating bases for mounting at the bottom of the arrester, shall be furnished.
- 2.7 The technical features of the lightning arresters are given in Appendix.
- 2.8 Duty Requirements:
 - a. The surge arresters shall be of heavy duty station class and gapless type without any series or shunt gaps.
 - b. The surge arresters shall be capable of discharging over-voltages occurring during switching of unloaded transformers, reactors and long lines.



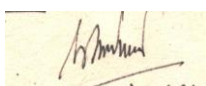
- c. 245/145/36 kV class arrester shall be capable for discharging energy equivalent to class 3 of IEC for 245/145/36 kV system on two successive operations.
- d. The surge arresters shall be suitable for withstanding forces as defined in Chapter 2-GTR.
- e. The reference current of the arresters shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage.
- f. The surge arresters are being provided to protect the following equipment whose insulation levels are indicated in the table given below:-

Equipment to be protected	Lightning impulse(kVp) for 245 kV system	Lightning Surge for 145 kV system
Power transformer	± 950	± 550
Instrument Transformer	± 1050	± 650
Reactor	--	--
CB/Isolator Phase to ground	± 1050	± 650
CB/Isolator Across open contacts	± 1050 (for CB) ± 1200 (for Isolator)	± 750

- g. The duty cycle of CB installed in 245/145 kV System of the Purchaser shall be O-0.3 sec-CO-3 min-CO. The Surge Arrester shall be suitable for such circuit breaker duties in the system.

2.9 Fittings and Accessories:

- a) 216/120/30 kV Arresters shall be complete with insulating base and Surge monitor having provision for bolting to flat surface of structure.
- b) Self contained discharge counters, suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit alongwith necessary connection. Suitable leakage current meters should also be provided. The reading of milliammeter and counters shall be visible through an inspection glass panel. The terminals shall be robust and of adequate size and shall



be so located that incoming and outgoing connections are made with minimum possible bends.

- c) Surge monitor consisting of discharge counters and milliammeters should be suitable to be mounted on support structure of the arrester and should be tested for IP66 degree of protection. The standard supporting structure for surge arrester should be provided with a mounting pad, for fixing the surge monitor. The surge monitor should be suitable for mounting on this standard mounting pad. Also all nuts, bolts, washers etc. required for fixing the surge monitor shall have to be supplied by the Contractor.

The arrangement for Surge Monitor enclosure fixing to the structure shall be at its rear/bottom. Connection between the Surge Arrester base and Surge Monitor shall be through a 2.0 m(minimum) long insulated copper rod/strip of at least 75 sq.mm cross sectional area. The cable shall be terminated at rear/bottom side of the Surge Monitor. The gaskets of the surge monitors shall be of Neoprene, Butyl or equivalent material.

- d) Grading/corona rings shall be provided on each complete arrester unit as required. Suitable terminal connectors shall be supplied by the Contractor.

3 TEST

- 3.1 The test reports of the type tests and the following additional type tests(additional type tests are required for Surge Arresters above 72.5 kV class only) shall also be submitted for the Purchaser's review.

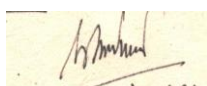
- i) Radio interference voltage test as per IEC 60099-4.
- ii) Seismic withstand test.
- iii) Contamination test.
- iv) Test to verify the Power frequency versus time characteristics. Temporary over voltage profile for arresters are to be mutually agreed.

Each metal oxide block of surge arresters shall be tested for the guaranteed specific energy capability in addition to the routine/acceptance test as per IEC: 60099-4.

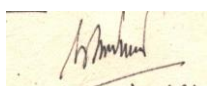
- 3.2 (a) Acceptance Tests:

- 1. Measurement of power frequency reference voltage of the arrester units.
- 2. Lightning Impulse Residual voltage on arrester units. (IEC clause 6.3.2).
- 3. Internal Ionisation or partial Discharge test.

- (b) Special Acceptance Test:



1. Thermal stability test on three sections. (IEC Clause 7.2.2).
 2. Aging & Energy Capability test on blocks (procedure to be mutually agreed).
 3. Wattloss test.
- (c) Routine Tests:
1. Sealing test: Water dip test at 1.5m depth from top of Surge Arrestor for 30 minutes shall be performed during assembly of Surge Arrestor stacks (followed by other routine tests, i.e. P.D. Measurement, Reference Voltage, Residual Voltage & IR measurement).
 2. Measurement of reference voltage.
 3. Residual voltage test of arrester unit.
 4. Internal Ionisation test or partial discharge test.
 5. Verticality check on completely assembled Surge arresters as a sample test on each lot.
- (d) Test on Surge Monitors:
- The Surge monitors shall also be connected in series with the test specimens during residual voltage and current impulse withstand tests to verify efficacy of the same. Additional routine/ functional tests with one 100A and 10kA current impulse(8/20 micro sec.) shall also be performed on the Surge monitor.
- Surge monitors shall be routinely tested for water dip test at 1.5m for 30 minutes. No water vapors shall be visible on the monitor glass.
- (e) Test on insulators
- All routine tests shall be conducted on the hollow column insulators as per IEC 62155. Polymer housing shall be tested in accordance to IEC-61462.
- (f) Field Tests
- An indicative list of tests is given below.
- (a) operation check of LA counter.
 - (b) Insulation resistance measurement
 - (c) Capacitance and Tan delta measurement of individual stacks.
 - (d) Third harmonic resistive current measurement (to be conducted after energisation.)



Contractor shall perform any additional test based on specialties of the items as per the field Q.P./Instructions of the equipment Supplier or Purchaser without any extra cost to the Purchaser. The Contractor shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Purchaser for approval.

4 DRAWINGS AND DATA

4.1 The following documents shall be furnished along with the bid:

- (a) Standard catalogue identifying the models and ratings being furnished
- (b) Outline drawings including dimensions

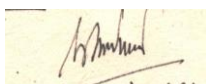
4.2 The following drawings and data shall be furnished in required number of copies after award of Contract for approval of Employer:

- (a) Outline drawings including dimensions
- (b) Foundation and anchor details including dead load
- (c) Transport/shipping dimensions with weight
- (e) Any other relevant data, drawings and information

5 NAMEPLATE

Each lightning arrester shall be provided with a nameplate of weather resistant material fitted in a visible position showing the following items as a minimum:

- (a) Manufacturer's name
- (b) Manufacturer's serial number and type designation
- (c) Year of manufacture
- (d) Rated voltage
- (e) Nominal discharge current



APPENDIX 7.1

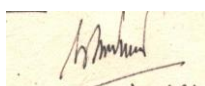
TECHNICAL PARTICULARS OF 120kV LIGHTNING ARRESTERS

S.N.	DESCRIPTION	120kV LA
1.	Manufacturer and Country of origin	
2.	Years of manufacturing service	10
3.	Manufacturer's designation as per submitted catalogue / Model No.	To be furnished
4.	Applicable standard	IEC
5.	Type	Gap less metal – oxide / Outdoor
6.	Rated voltage rating of L.A.	120
7.	Impulse withstand voltage, (crest)	650
8.	Power frequency withstand voltage	275
9.	Rated frequency	50
10.	Nominal discharge current	10
11.	Surge counter with insulating base furnished?	Yes
12.	Leakage current measuring instrument furnished?	Yes
13.	Porcelain creepage distance	3300
14.	Line terminal with accessories provided	Yes
15.	Earth terminal with accessories provided	Yes
16.	Has manufacturer exported such units?	Yes

APPENDIX 7.2

TECHNICAL PARTICULARS OF 60kV LIGHTNING ARRESTERS

S. No.	Description	60 kV LA
1.	Type	Gap less, Metal –oxide, Outdoor
2.	Mounting	Pedestal mounted
3.	Rated frequency	50Hz
4.	System voltage	66 kV
5.	Rated voltage	72.5 kV
6.	Impulse withstand voltage (BIL)	325 kV (peak)
7.	Power frequency withstand voltage	140 kV (rms)
8.	Nominal discharge current of 8/20 micro second wave shape	10 kA
9.	Applicable Standard	IEC 60099-4




APPENDIX 7.3

TECHNICAL PARTICULARS OF 30kV LIGHTNING ARRESTERS

S. No.	Description	30 kV LA
1.	Type	Gap less, Metal –oxide, Outdoor
2.	Mounting	Pedestal and Tank mounted
3.	Rated frequency	50Hz
4.	System Voltage	33 kV
5.	Rated Highest Voltage	36 kV
6.	Impulse withstand Voltage (BIL)	170 kV (crest)
7.	Power frequency withstand Voltage	70 kV
8.	Nominal discharge current of 8/20 micro second wave shape	10 kA
9.	Applicable Standard	IEC 60099-4

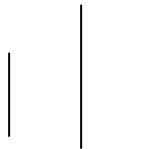
APPENDIX 7.4

TECHNICAL PARTICULARS OF 9kV LIGHTNING ARRESTERS

S. No.	Description	9 kV LA
1.	Type	Gap less, Metal –oxide, Outdoor
2.	Mounting	Tank mounted
3.	Rated frequency	50Hz
4.	System Voltage	11 kV
5.	Rated Voltage	12 kV
6.	Impulse withstand voltage (BIL)	75 kV (peak)
7.	Power frequency withstand voltage	28 kV (rms)
8.	Nominal discharge current of 8/20 micro second wave shape	10 kA
9.	Applicable Standard	IEC 60099-4



SECTION-I, PART-8



SPECIFICATION OF 12KV SWITCHGEAR PANEL

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SECTION I, PART-8

12kV SWITCHGEAR

1.1 GENERAL

This specification covers the Design, Manufacture, Assembly, Shop test, Supply, Delivery, Installation works and Field test of 11kV Indoor VCB Switchgear Panels complete with all accessories for efficient and trouble free operation as specified herein under.

1.2 EQUIPMENT TO BE FURNISHED

The following equipment shall be supplied:

- a. For Parwanipur Substation: 11 kV Indoor Switchgears with Triple Pole Operating, spring Charging Mechanism with motor for 11kV including spares.

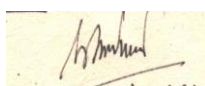
2000A, Incomer VCB	- 3 Sets
1250A, Outgoing VCB	- 12 Sets
2000A Buscoupler VCB	- 2 Set
- b. For New Bharatpur Substation: 11 kV Indoor Switchgears with Triple Pole Operating, spring Charging Mechanism with motor for 11kV including spares.

2000A, Two Tier Incomer VCB	- 2 Sets
1250A, Two Tier Outgoing VCB	- 6 Sets
2000A, Two Tier Buscoupler VCB	- 2 Set
Trunking Chamber	- 2 Set
- c. For Simara Substation: 11 kV Indoor Switchgears with Triple Pole Operating, spring Charging Mechanism with motor for 11kV including spares.

2000A, Incomer VCB	- 1 Sets
1250A, Outgoing VCB	- 3 Sets
2000A Buscoupler VCB	- 1 Set
Trunking Chamber	- 1 Set
- d. For Birgunj Substation: 11 kV Indoor Switchgears with Triple Pole Operating, spring Charging Mechanism with motor for 11kV including spares.

2000A, Two Tier Incomer VCB	- 1 Sets
1250A, Two Tier Outgoing VCB	- 3 Sets
2000A Two Tier Buscoupler VCB	- 1 Set
Trunking Chamber	- 1 Set
- e. For Pokhara Substation: 11 kV Indoor Switchgears with Triple Pole Operating, spring Charging Mechanism with motor for 11kV including spares.

2000A, Incomer VCB	- 1 Sets
1250A, Outgoing VCB	- 3 Sets
2000A Buscoupler VCB	- 1 Set
Trunking Chamber	- 1 Set
- f. All accessories and auxiliary equipment required for the successful operation.



- g. Special tools and tackle required for operation and maintenance of equipment as specified.

Adaption works for existing SAS: The bidder shall provide all necessary compatible equipments and instrumentation including but not limited to BCU's, Switches Relays and other instrumentation as required for the full Integration with the existing SAS system in above mentioned substations

All necessary signals from the new panels shall be integrated with existing SAS software. The signal list shall be provided during detail engineering. The system used in the existing panel shall be restored completely for the successful completion of the work in above mention substations.

Following equipment shall be supplied only from the manufacturers specified hereunder (except for two tier VCB):

- i. VCB shall be from ABB, CGL, Hitachi, Siemens, Mitsubishi, LG, Fuji, GE, or Schnieder Electric.
- ii. The main protection relays shall be form ABB, AREVA, SIEMENS, Fuji and Reyrolle / Eusun Reyrolle, Toshiba or Mitsubishi.
- iii. Energy Meters: ELSTER (ABB), ACTARIS (Schlumberger), EDM I or SIEMENS.
- iv. The VCB and Switchgear Panel shall be from the same manufacturer.

1.3 DESIGN REQUIREMENTS

The circuit breakers shall be suitable for 3 phases, 50 Hz.

Circuit breakers shall be installed Indoor for switching Transformer and Line.

All equipment and accessories shall be provided with sub-tropical finish to prevent fungus growth.

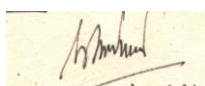
The maximum temperature rise in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in relevant standards. The de-rating of the equipment shall be made taking 50 degree C as an ambient temperature of the site, if it is designed for any lower ambient temperature.

The rated peak short circuit current or the rated short time current carried by the equipment shall not cause;

- a. Mechanical damage to any part of the equipment
- b. Separation of contacts.
- c. Insulation damage of "Current Carrying Part"

Technical particulars of the circuit breaker shall be as per **specified**.

All auxiliary equipment shall be suitable for 3 phase-4 wire, 50 Hz, 400V AC or 1Phase, 230V AC



All controls shall be suitable for 110V DC.

The VCB should be Indoor type with minimal maintenance, high reliability and completely free from menace of vermin. It should be designed with adequate clearances; sufficient creepage to suit polluted atmosphere and the communication between the inside of pole unit and the atmosphere is not desirable. Each breaker should have three porcelain enclosed vacuum type interrupters, which is required to provide a high insulation and an excellent breaking capability.

1.4 DESIGN REQUIREMENTS

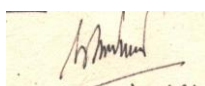
11 kV, Indoor Metal Clad VCB Switchgear with Triple Pole operating, spring charging Mechanism with motor for 11kV, Incomer and Outgoing feeders.

1.4.1 General Requirement

11kV cubicle type Indoor Switchgear Panel shall be an air insulated metal clad switchgear with withdraw able vacuum circuit breaker with the fault interrupting capacity of 25 kA at 11kV solidly grounded system. The switchgear shall be arranged in connection with the existing 11kV Bus Bar System. The cubicle shall be of modular design provided with space heaters, with the following modules integrated neatly to form dead front type switchgear capable of extension on the both side, forming a single row, single bus bar switchgear panels.

- Breaker compartment.
- Busbar Compartment
- Cable, C.T. Compartment
- Instrument and Relay Compartment (LV Compartment)
- 11kV P.T. Compartment (For Incomer).

- 1.1 All Switchgear operation shall be performed behind a close door. Additionally it shall even be possible to perform all preparations for work inside the cubicle with full degree of protection.
- 1.2 The use of insulation material shall be reduced to minimum; only ripped insulators with high-anti-tracking characteristics shall be used for necessary conductor supports.
- 1.3 Cubicle front shall be covered by a door with inspection windows for mechanical indication for CB ON/OFF position, spring charged and counter indication of CB operation.
- 1.4 The cubicle shall be of modular design consisting of separate modules for busbar, circuit breaker, cable and low voltage compartment, and instrument component. Each compartment shall have its own pressure relief flap. High voltage cable termination compartment shall have a steel wire grid mesh fitted inside the back cover so as to prevent accidental contact with the live parts during the routine inspection of the panels. The fixed contact shall be mounted in bushing moved by circuit breaker carriage.
- 1.5 Earthing to cable feeder and Busbar shall be done via earthing switch manually operated from panel front.



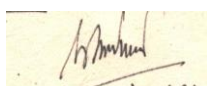
- 1.6 Fixed contacts shall have flat silver plating and contact pressure of male and female contacts during connected position according to the International Standard.
- 1.7 Busbars and Jumpers shall have made of flat electrolytic bare copper contact with special heat shrinkable sleeves which provide effective insulation between phases or phase to earth, even if bridged by vermin or other conducting body and suitable for rated **current as per the Appendix**. Busbar shall be latched per panel and easy to replace by standard normal material. Flexible insulation shrouds shall cover the Busbar to Jumper Joints and jumper to stationary contact joints.
- 1.8 Bottom of the cubicle shall be covered with a bottom mica plate through which cables are passed into the panel.
- 1.9 The proposed switchgear panel shall be extendible on both sides.
- 1.10 The proposed switchgear panel shall be suitable for mounting of standard Current and Voltage Transformer according to IEC standard.
- 1.11 The circuit breaker cubicle shall be designed as to be vermin proof to prevent the entry of the vermin, reptiles, mouse etc. inside the compartments of the cubicles

1.5. WITHDRAWABLE PART (CARRIAGE)

- 1.1 The chassis shall be made of sheet-steel section and shall carry the switching device, moving mechanism, 4 rolling contact bearings for movement and interlocking mechanism. Movement for carriage shall be done manually and shall be independent from switch room floor.
- 1.2 Moving contacts shall be double flat contact with silver plated contact pieces. The flexible fixing shall allow high tolerance and avoiding overheating.
- 1.3 Connection of auxiliary supply to the fixed part shall be verified via multi-pole plug, which shall be included in the interlocking system. For the easy and assured insert of the plug the hose should come from the fixed part and the plug shall be on with-draw able part.
- 1.4 CB and Isolating Switch Carriage shall have the provision to operate mechanically behind the closed door in Operating and Test Position.
- 1.5 Carriage of the same rating shall be exchangeable. It shall be possible to insert CB with higher current in lower rated cubicle but not vice versa.

Other Requirements for removable parts:

Removable parts are intended to be used as a disconnecter or intended to be removed and replaced more often than only for maintenance purposes, mechanical operation tests shall also be possible as per IEC 62271-102.



The requirement that it shall be possible to know the operating position of the disconnector or earthing switch by applying following conditions:

- The isolating distance is visible.
- The position of the withdrawable part, in relation to the fixed part, is clearly visible and the positions corresponding to full connection and full isolation are clearly identified.
- The position of the withdrawable part is indicated by a reliable indicating device.

Any removable part shall be so attached to the fixed part that its contacts will not open inadvertently due to forces which may occur in service, in particular those due to a short circuit.

1.6 11 KV METALCLAD SWITCHGEAR:

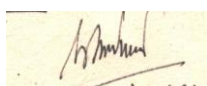
1.1 Main Equipment Characteristics

1.1.1 Insulation:

- i 11kV primary equipment shall be insulated to meet or exceed the following criteria:
 - Rated Lightning Impulse Withstand Voltage (kVp): 75
 - Rated Power Frequency Withstand Voltage (kVrms): 28
- ii 11kV cubicles shall be designed to provide phase segregation within the enclosures.

1.1.2 Clearances:

- i 11kV Primary Equipment clearances between phases and phase to earth shall not be less than as per IEC, whichever is greater.
- ii The layout of the equipment shall provide for safe access for operation and maintenance whilst the remaining sections equipment are alive.
- iii Minimum clearances in air for the 11kV 'Indoor' Primary Equipment shall not be less than as per IEC:
- iv The busbars shall be insulated by High Grade Phase Insulation. Busbars partitioning shall be done by means of a bushing plate with Cast-Resin Insulators and Cubicles shall be partitioning with earthed sheet metal barriers.
- v When it is not practicable to disconnect the cable for the dielectric tests from the metal-enclosed switchgear and control gear, those parts which remain connected to the cable shall be capable of withstanding the cable test voltages as stated by the relevant cable standard.
- vi The dimension (specially height) of one termination point of the Trunking Chamber should be matching with the Bus Bar Height of the existing VCB and the height of other termination point of Trunking Chamber should be matching with Bus Bar height of New VCB.



1.1.3 Current Carrying Capacity:

- i Switchgear 11kV Busbars and Connections thereto shall be designed to carry current corresponding to Maximum Permissible Overload of the connected equipment without exceeding temperature rise specified in the Relevant Standards.
- ii Switchgear 11kV Busbar shall be designed to safely withstand with an appropriate margin of the Mechanical and Thermal Effects corresponding to the following short circuit currents:
Symmetrical three-phase
 - (Is) (kA)_{rms}: 25
 - Peak making Current (kA)_p : 62.5

1.7 Vacuum Circuit Breakers:

1.7.1 General

The 11 kV Circuit Breakers shall be Vacuum type, easily withdraw-able and housed in a cubicle. It shall consist of three Vacuum Interrupter, three Supports and the Operating Mechanism. The Operating Mechanism shall have either Motor Charged Spring Operated or Solenoid Operated, with provision of hand operated mechanism. With the breaker in close state, spring energy shall be for a "Trip/Close/Trip" Cycle.

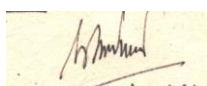
1.7.2 Main Data:

Type: Metal enclosed Indoor switchgear cubicle type with vacuum interrupters.

- Nominal Service Voltage (kV) : 11
- Rated Voltage (kV) : 12
- Rated Frequency (Hz) : 50
- Rated Nominal Current for Incomer : 3000A, 2000A
- Rated Nominal Current for Buscoupler : 3000A, 2000A
- Rated Nominal Current for Outgoing feeder : 1250A
- Rated Short-Time Breaking Current (asymmetrical) at Rated Voltage, : 25 KA (rms)
- Rated Short-Time Making Current at Rated Voltage (KA)_p : 62.5 (KA)_p
- Rated Operating Mechanism: Motor-spring operated or solenoid operated. : Suitable for Trip/close /Trip cycle.
- Provision for Manual Operation also.

1.7.3 Technical Requirements:

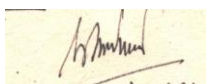
- i The Circuit Breakers shall meet requirements of IEC 56 & IEC 62271.
- ii **Vacuum Interrupter:** The Arcing chamber with the two stem connected contacts shall be located between two ceramic insulators. One contact shall be fixed to the housing and the moving contact shall be connected to the housing via vacuum tight bellows. The metal bellows shall enable the moving contact to carry out its strokes. The metal bellows must be able to withstand the movement corresponding to 10,000 make/break operations without failing. The insulators shall be made of metallized



aluminium oxide ceramic, which permits them to be brazed to metal so that there is no need to use conventional seals. The Vacuum Interrupter shall remain vacuum tight through out its working life.

The Contact surfaces should be free of impurities and pollution layers. Materials of high conductivity should be used such that the contact resistance will be very low.

- iv The Operating Mechanism shall have single Trip Coil and be electrically Trip-Free and Anti-pumping.
- v The Spring Charging Motor, the Closing Coil, the Tripping Coils and all other control devices of all circuit Breakers shall be suitable for 110V DC Operation.
- vi A Manually Operated Mechanism for closing and tripping shall be provided in the breaker cubicle for Maintenance and Emergency Operation. This device shall be so interlocked that while it is operative, the breaker cannot be operated remotely.
- vii Each Circuit Breakers shall be equipped with an Operation Counter (to register tripping operations) and position indicator, on the cubicle front.
- viii Provision shall be made for Remote alarm/indication of the following status through a pair of NC+NO contacts:
 - Circuit Breaker "Open".
 - Circuit Breaker "Closed".
 - Circuit Breaker "Trip".
 - Trip Circuit Healthy.
 - Circuit Breaker "Failure"
- ix The circuit breaker shall be equipped with a local control switch and local remote selector switch auxiliary contacts for remote indication. All contacts shall be wired to terminal block in the breaker cubicle. Control cable and the indicator box shall have at least three numbers of spare cables and the indicators for future use. CT terminal shall be disconnecting type.
- x Each of the circuit breakers shall be housed in a freestanding indoor type cubicle. This cubicle (and others comprised in the 11KV metal clad switchgear) shall be of standard construction and shall be suitable for attachment of cable connection as described in relevant cubicles.
- xi Plugging contact apertures shall be fitted with fully automatic metal safety shutters to close the apertures and prevent access to live part when truck partition is withdrawn and to open when the truck partition is being plugged in. The shutters shall form reasonable dust, drip, fire and insect proof enclosures over the apertures.
- xii Auxiliary Switches shall be provided as required for Indication, Control, Protection and Interlocking. In addition, a minimum of two Normally Open and two Normally Closed Auxiliary Contacts shall be provided as spare contacts. All available contacts of Auxiliary Switch Assembly shall be wired to the Terminal Blocks on the fixed

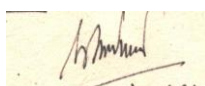


- portion of the equipment of the switches and terminals shall be such as to facilitate future extension.
- xiii All auxiliary switches shall have contacts with strong wiping action. The switches shall be located in an accessible position and adequate physical protection shall be provided.
- xiv The Circuit Breakers shall be tested in accordance with IEC56 and IEC60 and shall include the following routine tests:
- * Mechanical operating tests
 - * Power Frequency Voltage withstand tests.
 - * Tests on auxiliary and control circuits
- xv The quality assurance of the equipments and their auxiliary shall be of ISO 9001 Standard. An updated copy of its certificate shall be submitted.
- xvi The Minimum Operating Cycle (without maintenance) of Interrupters and Operating Mechanisms shall be suitable for operation over 10Years or 10,000 operations with rated current or 100 operation with rated short circuit current and overall life shall be more than 30,000 operating cycles for bellows.
- xvii The Vacuum Circuit Breaker installed in the Switchgear shall move into following position in the Circuit Breaker Components:
- ⇒ Running Position (Run)
Main Circuit and Control Circuit connected to all circuits.
 - ⇒ Test Position (Test)
Main circuit separated from the circuit and only Control Circuits are Connected.
 - ⇒ Disconnected Position

As a Control Circuit Connector that would be plugged by hand during the test position both Main and Control circuit are disconnected from the Circuit.

EARTHING

- i To ensure personnel protection during maintenance work, all parts of the main circuit to which access is required or provided shall be capable of being earthed prior becoming accessible.
- ii Factory built transport units shall be interconnected during final installation through an earthing conductor. This interconnection between the adjacent transport units shall be capable of carrying the rated short time and peak withstand current for the earthing circuit.
- iii. These cubicles shall be equipped with copper earthing bus bars of not less than 200Sq.mm.
- iv The enclosure of each functional unit shall be connected to this earthing conductor. All the metallic parts intended to be earthed and not belonging to a main or auxiliary



circuit shall also be connected to the earthing conductor directly or through metallic structural parts.

1.7.4. EARTHING SWITCHES

1.7.4.1 The 11KV metal clad switchgear shall include earthing switches to facilitate earthing of each cubicle as specified.

The Earthing Switch is operated by means of detachable lever from outside the cable compartment. It shall be mechanically interlocked with the CB so that the earthing switch in close position in section of CB truck into the service position is not possible. The operation of the Earthing Switch shall not be possible as long as the CB is not in isolated position.

1.7.4.2 Main Data

Rated Voltage KV	: 12 kV
Rated Short-Time Breaking Current (asymmetrical) at Rated Voltage,	: 25 kA (rms)
Rated Short-Time Making Current at Rated Voltage (KA)p	: 62.5 (kA)p

1.7.4.3 Technical Requirements:

- i. The Earthing Switches shall meet the requirements of IEC129.
- ii. Auxiliary Switches shall be provided as specified for the Circuit Breakers.
- iii. Provision shall be made for padlocking in the Open and Closed position.
- iv. Manual control of the switches and Position indicator external to the cubicle shall be provided.
- v. The Earthing Switch shall be interlocked manually with circuit breaker.

1.7.5 INTERLOCKING

The following operation shall be taken place only when the under stated interlocking conditions are fulfilled to ensure Personnel and Operational Safety.

1.2.5.1 Transferring the withdrawable part from the Disconnecting Position to the Service Position:

- i. Control Circuit Plug Inserted
- ii. High Voltage Compartment Door closed.
- iii. Circuit Breaker in OPEN Position.
- iv. Earthing Switch in OPEN Position

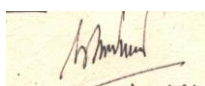
1.7.5.2 Transferring the Withdrawable part from the Service Position to the Disconnected Position.

Circuit Breaker in OPEN Position.

1.7.5.3 Operating the Circuit breaker

- i. Withdrawal part in the Interlocked Final Position (Service or Disconnecting position)

1.7.5.4 Operating the Earth Switch



- i. Withdrawal part in the interlocked disconnected position. Windows shall be provided to allow visual inspection.

The Switches shall be tested in accordance with IEC129 and IEC265 and shall include the following routine tests:

- Operating and Mechanical tests
- Measurements of the resistance of the main circuit.

1.8 LOW VOLTAGE COMPARTMENT:

The Low Voltage Compartment of the Switchgear shall be located on the front and on the top front of the Panel and shall be accessible with a separate door and partitioned against high voltage part. Connection of control and Metering cable is by means of a Multi pole plug to the withdrawable part possibly at front face of the breaker. Low voltage devices metering and protection equipment shall be mounted flush in the door or on the mounting plate inside.

Wiring inside the cubicle shall be done by 2.5 Sq. mm insulated stranded copper wires for current circuits and 2.5 Sq. mm for voltage circuits. All power circuit shall be wired with 4 Sq.mm cables.

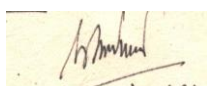
The following equipments shall be mounted in the low voltage compartment.

- 1 No Ammeter Digital Type of 0.5 class with A/S Switch.
- 1 No. Voltmeter, Digital Type of 0.5 class, with Voltage Selector switch for Incomer.
- 1 No. MW / MVA Meter, Digital type of 0.5 class
- For Incomer and outgoing feeders - 1 No Energy meter 3Phase 4 wire, Digital, programmable via Optical Port, 3P4W, class 0.5 designation, Current rating 1-10Amp, Voltage range 0-480 V. The energy meter should have test pulse and calibrating facility. The Energy meters should be from the list of manufacturer.
- **Directional Over current and Earth fault Protection for Incomer**

This protection scheme shall be used as a back-up protection for power transformers low-voltage side and as main protection for parallel sub- transmission lines.

(a) Phase over current relay shall:

- have an inverse characteristic with a definite minimum time of 3 secs. at 10 times setting.
- have a variable setting range of 20-200% of rated current.
- have a characteristic angle of 45 degree.
- have a directional controlled low transient over-reach high set instantaneous unit of continuously variable setting range 5-20 times of rated current.
- be of voltage polarized directional controlled type.



(b) Directional earth-fault protection

Earth fault over current relay shall:

- be of zero-sequence voltage polarized directional controlled.
- have an inverse characteristic with a definite minimum time of 3 secs. at 10 times setting.
- have an adjustable setting range of 10-80% of rated current.
- have a directional controlled low transient over reach high set instantaneous unit with a continuously variable setting range of 5-20 times of rated current.
- have a characteristics angle of 45 degree.

Non directional Over current and Earth fault protection for Outgoing feeders and Busoupler.

- Over current Relay, Numerical Type with Instantaneous tripping for 1A (Secondary Current) and built in Earth fault Relay with Instantaneous Tripping for 1A rating.
Accuracy Limit $\rightarrow \pm 5.0\%$

Over Current Relay:

Setting range 5%-250% in steps of 5% (for Over current element)
Setting range 50% to 2500% in steps of 50% (for High Set Element)
Time Multiplier Setting range 0.025 Sec to 1.00 Sec in steps of 0.025 Sec
Reset Delay 0 to 60 Sec in steps of 1 Sec

Earth fault Relay:

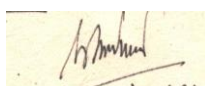
Setting range 5%-250% in steps of 5% (For Earth fault)
Setting range 50% to 2500% in steps of 50% (for High Set Element)
Time Multiplier Setting range 0.025 Sec to 1.00 Sec in steps of 0.025 Sec
Reset Delay 0 to 60 Sec in steps of 1 Sec

Characteristics Selection: SI, EI, VI, LTI, DTL

1.9 CURRENT TRANSFORMERS:

- 1.9.1. The 11kV Metal clad Switchgear shall include protection and metering Current Transformers as specified. The Current Transformers shall be Epoxy Resin insulated block type. Current Transformers as follows:

For Incomer Panel:	Ratio	Accuracy Class	Burden
-Core 1 (for Metering)	*	0.5	15VA
-Core 2 (for Protection)	*	5P20	15VA
-Core 3 (Differential for Incomer only)	*	PS	15VA



For Outgoing Feeder Panel:	Ratio	Accuracy Class	Burden
-Core 1 (for Metering)	*	0.5	15VA
-Core 2 (for Protection)	*	5P20	15VA

For Bus Coupler Panel:	Ratio	Accuracy Class	Burden
-Core1(for Metering)	*	0.5	15VA
-Core 2 (for Protection)	*	5P20	15VA

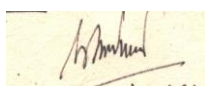
- *Note: CT Ratio to be finalized during drawing Approval*

The current transformer shall comply with the requirements of IEC 185 shall confirm to the specified insulation requirements and shall withstand without damage the applicable short-circuit current specified. Primary ratio taps shall not be accepted.
Maximum temperature rise at rated primary current shall not exceed 50 degree centigrade.

- 1.9.2 Each set of secondary windings shall be wired to suitable terminal blocks and earthed at the first control or relay panel to which they are connected.
- 1.9.3 The continuous thermal current rating shall be 150% of normal current rating.
- 1.9.4 The Current Transformers shall be tested in accordance with IEC 185 and shall include the following Routine Tests:
 - i. Verification of terminal markings polarity etc.
 - ii. Power frequency tests on primary windings.
 - iii. Partial Discharge Measurement
 - iv. Power frequency withstand tests on secondary windings.
 - v. Power Frequency withstand test between sections
 - vi. Over voltage inter-turn tests.
 - vii. Determination of ratio error and phase displacement.

1.10. VOLTAGE TRANSFORMERS

- 1.10.1 The 11kV Metal clad Switchgear shall include Voltage Transformers in incomer as required by the Single Line Diagram as follows:
 - i. Type : Epoxy-resin insulated, single pole with 7.3A Primary side fuses
 - ii. Basic Impulse Level : 75kV
 - iii. Rated Power Frequency Withstand Voltage: 28kV
 - iv. Primary Voltage : $11/\sqrt{3}$ kV
 - v. Secondary Circuit : $110/\sqrt{3}$ V
 - vi. Rated burden : 50 VA
 - vii. Accuracy classification : 0.5 / 3P Class
- 1.10.2 The voltage transformers shall comply with the requirements of IEC 186. Accuracy class and burden shall be adequate to ensure the correct operation.
- 1.10.3 The voltage transformers and their fuses shall meet the specified insulation requirements and have a rated primary voltage of 11kV with knee of saturation curve not lower than 12kV and ratios per single line diagram.

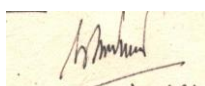



- 1.10.4 The voltage transformer shall be provided with high rupturing capacity (HRC) fuses for primary and secondary circuits. The fuses shall be rated for the short circuit levels specified.
- 1.10.5 Each set of secondary windings shall be wired to suitable terminal blocks and earthed at the first control or relay panel to which they are connected.
- 1.10.6 Earth Fault Factor should not exceed 1.4 for effectively earthed system.
- 1.10.7 Continuous Rated Voltage Factor should be 1.2 and for 8h should be 1.5.
- 1.10.8 For hermitically sealed Potential Transformer the temperature rise of the oil at the top of the tank or housing shall not exceed 55K.
- 1.10.9 Power Frequency withstand voltage for the earthed terminal : The terminal of the primary winding intended to be earthed shall, when insulated from the case or frame, be capable of withstanding the rated power frequency short-duration withstand voltage of 3kV (r.m.s.)
- 1.10.10 The dielectric Dissipation Factor at $U_m/\sqrt{3}$ and ambient should not exceed 0.005.
- 1.10.11 The rated power frequency-withstand voltage for secondary winding insulation shall be 3kV (r.m.s.).
- 1.10.12 The Voltage Transformer shall be designed and constructed to withstand without damage, when energized at rated voltage, the mechanical and thermal effects of an external short-circuit for the duration of 1 Sec.
- 1.10.13 The voltage transformers shall be tested in accordance with IEC 186, and shall include the following routine tests:
- Verification of terminal markings.
 - High voltage power frequency withstand test on primary windings.
 - High voltage power frequency withstand test on secondary windings.
 - Partial Discharge Measurement.
 - Power Frequency Tests between sections
 - Determination of Errors

Repeated Power Frequency Tests on Primary windings shall be performed at 80% of the specified test voltage.

1.11. SURGE ARRESTERS FOR INCOMER :

- 1.11.1 The surge Arresters shall be 9kV, 10 kA of the gapless Zinc oxide type and suitable for operation under the service conditions specified and be suitable for the protection of Transformer and other substation equipments. The Arresters shall comply with IEC 99-1, IEC99-4.
- 1.11.2 The surge diverters shall be tested in accordance with IEC 99-4.
- 1.11.3 The manufacturer of Surge Arrester must be Valid ISO 9001:2000 holder.

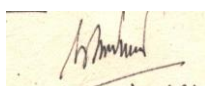


1.12 CONTROL PROTECTION AND INSTRUMENTATION:

- 1.12.1 This covers the detailed requirements for design, manufacture, transport, installation and commissioning of 11kV Metal clad VCB switchgear.
- 1.12.2 The substation will normally be attended and operation will be semi-automatic. Normally closing of circuit breakers shall be manual operation and operation of earthing switches will be manual if it is not mentioned.
- 1.12.3 Local control facilities adjacent to the equipment shall be provided for maintenance, inspection and emergency operation.
- 1.12.4 The control system shall be designed to permit the following operating modes:
- 1.12.4.1 Automatic start/stop operation refers to spring-charged motor for operating mechanism of 11kV VCB.
- 1.12.4.2 Automatic tripping of 11kV VCB, LV MCB if faults occur in protected lines equipments or circuits.
- 1.12.4.3 The control system shall be arranged in such way that it is possible to change between local automatic and local manual control any time.
- 1.12.4.4 The designs shall be in general conformity with the single line diagrams and layout drawings accompanying this specification.
- 1.12.4.5 Under manual control the individual operations shall each be subject to safety interlocks being satisfied.
- 1.12.4.6 The control scheme shall be operationally simple, safe, easy to maintain and functionally consistent.
- 1.12.4.7 Each module shall have sufficient test points to facilitate faultfinding. Control circuits shall be brought out to isolating terminals to permit efficient trouble shooting.
- 1.12.4.8 Each cubicle shall be provided with a sufficient point Annunciation Block to identify an alarm condition, including audible alarm, test, acknowledge and reset push buttons.
- 1.12.4.9 Control switches for circuit breakers shall be of the discrepancy type. Two independent movements shall be required to initiate an operation.
- 1.12.4.10 The design shall be such that as to avoid nuisance alarms and shall block those devices, which assume alarm conditions when the equipment is under shutdown. Annunciation Block windows shall be engraved with identification of the alarm condition.

1.12.5 Annunciators shall have the following sequence:

Condition	Lamp	Alarm
Normal	Off	Off
Alarm Flashing	On	On
Acknowledge	On	Off



Reset after return:

Normal	Off	Off
Lamp test	On	Off

1.12.6 Required signals or alarm systems:

- CB Off / On position by green / red lamp
- Flag or lamp indication of faults for:
Over current Protection, E/F Protection, DC Supply Failure, CB Failure, MCB tripped, AC supply failure

1.7.7 The Annunciation Block shall be of solid-state type and suitable for operation at 110 V dc and shall be able to withstand IEC 255 class 3 tests without malfunctioning.

Applicable for Switchgear Panels

1.8 11kV Switchgear Panel (Incomer and Feeder) shall consist of metal-clad cubical fitted with:

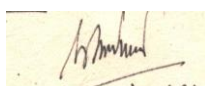
- Copper Busbar, 3000A & 2500 A as required 1 Set
- Fault making earth switch for cable earthing, hand operated with auxiliary switch 1 set
- Epoxy Resin insulated block type Current Transformer of ratio mentioned above in the clause 1.4.1. 1 set

Withdraw-able module with :

- Hand operated drive mechanism 1 Set
- Auxiliary block with 4NO+ 4NC contacts for position indication 1 No.
- Multiple Pole lug for control signals 1 No.
- Vacuum circuit breaker with motor operated spring charged mechanism or solenoid operated mechanism 1 No.
- Close/trip buttons 1 No.
- Trip coil 1 No.
- Closing coil 1 No.
- Counter indicating number of switching operation 1 No.
- Auxiliary block with 11NO + 11NC 1Wi (alarm contact) 1 No.
- Auxiliary switch for spring charged indication 1 No.

In the low voltage compartment the following equipment shall be mounted:

- 2 pole miniature circuit breaker fitted with auxiliary switch 1NO+1NC 2 Nos.
- Single Ammeter Cl. 0.5 with A/S switch 1 Nos.
(Range: 2500-3000/1A for Incomer)
(Range: 500-1000/1A for Feeder Panel)
(Range: 2500-3000/1A for Bus coupler Panel)
- Voltmeter, Digital Type of 0.5 Accuracy class with voltage selector Switch for **Incomer** only 1 No.
- MW Meter, Digital Type of 0.5 Accuracy Class 1 No.
- kWh meter for 3Phase 4Wire , accuracy class as specified with Test Pulse & Programming Facility 1 No.
- Local/remote selector switch 1 No.
- Numerical Over current relay with Built in Earth fault Relay as specified in 1.8 above 1 No.



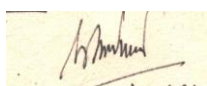
- Annunciation Block 2x3 Matrix in Incomer Panel 1 No.
- Auxiliary relay and coupling relay 1 No.
- Anti condensation heater in cable compartment 1 No.

Accessories shall consist of:

- Emergency hand crank for the switch 1No.
- Operation handle for withdrawable module 1No.
- Operation handle for the earthing switch 1No.
- High voltage compartment keys 1No.
- Service Track for removing of withdrawal module 1No.
- Breaker Carriage 1No.

Additional Requirement for Buscoupler Panel

- Voltage switching arrangements with necessary interlocks in the buscoupler panel, such that the voltage from both incomers, new and existing, can be switched incase the voltage is not available from the any one Incomer. The voltage shall be available to all panels, new and existing. Please provide necessary drawings and indicate any wiring modification required for the existing Incomer panels

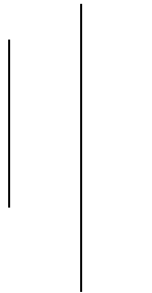


APPENDIX-8.1
TECHNICAL PARTICULARS OF 11 KV METAL CLAD VCB SWITCHGEAR

S.N.	Descriptions	Incomer/Buscoupler	Outgoing feeder
1.	Type	Indoor	Indoor
2.	Operating Mechanism	3 Pole Spring Operated Mechanism	
2.	Voltage rating:		
	a) Nominal system voltage	11 kV	
	b) Rated maximum voltage	12 kV	
3.	Insulation level		
	a) Impulse withstand voltage (Peak) Common Value----- Across the Isolating Distance----	75 kV 85kV	
	b) Power frequency withstand voltage (1 min.) Common Value----- Across the Isolating Distance-----	28 kV 32kV	
4.	Frequency	50 Hz	
5.	Current rating		
	a) Rated continuous current at ambient	3000A/3000 A, 2500A/2500 A	1250 A
	b) Short Circuit Breaker Current	25 kA	25 kA
	c) Short Circuit making current (1 sec)	62.5kA	62.5kA
6.	Rated duration of Short Circuit (tk)	1Sec	1Sec
7.	Rated Capacitive Switching Currents		
7.1	Rated Line Charging Breaking Current	≥10A	
7.2	Rated Cable Charging Breaking Current	≥25A	
8.	Auxiliary supply		
	a) Control circuit	110 V DC	
	b) Space heater and auxiliary equipment.	AC, 3 ph-4W, 400V, 50 Hz	
	c) Spring Charging motor & circuit	110V DC	
9.	Re-closing duty cycle	0-15s-CO	
10.	Total break time	≤ 60 mS	
11.	Additional Auxiliary Contacts	6 NO, 6 NC	
12.	Make time	≤ 100 mS	
13.	First Pole to Clear actor	1.5	
14.	Degree of Protection	IP54	
15.	Applicable standard	IEC	
16.	Valid ISO9001:2000 Certificate	Yes	



SECTION-I, PART-9



TECHNICAL SPECIFICATION (SPECIFICATION OF CABLES)

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SECTION I, PART 9

SPECIFICATION OF CABLES

1 GENERAL

This specification covers the design, manufacture, factory test, supply, delivery, installation, field-testing and commissioning of all Power, Control, Communication and Instrumentation cables required for the entire project.

2 DESIGN REQUIREMENTS

33 kV Power Cable

a) General

The rated voltage of the power cables shall be 19/33(36) kV.

The power cable shall be cross-linked polyethylene insulated, screened and steel tape armoured.

b) Conductor

Conductor for power cable shall consist of stranded annealed copper wires. They shall comply with IEC Publication.

c) Cable Rating

The minimum current rating for the cable and conditions of installation shall be as follows:

The fault current for 1 sec. shall not be less than 15 kA.

The cable shall be single core 800sq. mm. per Phase.

d) Anti-Termite Covering

Anti-termite protection shall be applied to the cable and shall be black PVC suitable for the operating temperature of cable and shall meet the requirements of IEC standard.

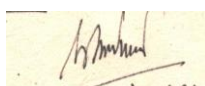
e) Outer Covering

The outer covering of the cable shall be extruded, continuous black PVC suitable for the operating temperature of cable and shall meet the requirements of IEC standard.

f) Cable Drum

Cable drum shall be non- returnable and made of steel suitably protected against corrosion.

g) Outdoor and Indoor Termination



33 kV cable terminations shall be of the heat-shrinkable type / pre-moulded push on type. Terminations for cable shall be provided in sufficient quantities for complete installations of all feeders of the substations. The cost of all necessary termination kits shall be included in the price of the cables.

h) Jointing Accessories

Cables shall be installed in maximum possible lengths and straight-through jointing shall not be permitted without the prior written approval of the Employer.

i) Voltage Identification

The plastic covering shall be embossed with the name of the manufacturer, number of conductors, the cross sections, type of insulation followed by:

Electric cable - (Corresponding) volts

j) Phase Identification

Phase identification for either triplex or multi-core conductor cable shall be in accordance with the following:

Phase A (R) : Red

Phase B (Y) : Yellow

Phase C (B) : Blue

11 kV Power Cable

a) General

The rated voltage of the power cables shall be 12 kV.

The power cable shall be cross-linked polyethylene insulated, screened and steel tape armoured.

b) Conductor

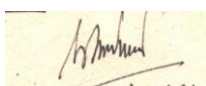
Conductor for power cable shall consist of stranded annealed copper/Aluminium wires. They shall comply with IEC Publication.

c) Cable Rating

The minimum current rating for the cable and conditions of installation shall be as follows:

The fault current for 1 sec. shall not be less than 15 kA.

The cable shall be copper single core 800sq.mm. per Phase.



d) Anti-Termite Covering

Anti-termite protection shall be applied to the cable and shall be black PVC suitable for the operating temperature of cable and shall meet the requirements of IEC standard.

e) Outer Covering

The outer covering of the cable shall be extruded, continuous black PVC suitable for the operating temperature of cable and shall meet the requirements of IEC standard.

f) Cable Drum

Cable drum shall be non- returnable and made of steel suitably protected against corrosion.

g) Outdoor and Indoor Termination

11 kV cable terminations shall be of the heat-shrinkable type / pre-moulded push on type. Terminations for cable shall be provided in sufficient quantities for complete installations of all feeders of the substations. The cost of all necessary termination kits shall be included in the price of the cables.

h) Jointing Accessories

Cables shall be installed in maximum possible lengths and straight-through jointing shall not be permitted without the prior written approval of the Employer.

i) Voltage Identification

The plastic covering shall be embossed with the name of the manufacturer, number of conductors, the cross sections, type of insulation followed by:

Electric cable - (Corresponding) volts

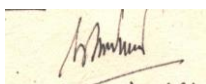
j) Phase Identification

Phase identification for either triplex or multi-core conductor cable shall be in accordance with the following:

Phase A (R) : Red

Phase B (Y) : Yellow

Phase C (B) : Blue



600 Volt Power Cable

a) General

The low voltage cables shall be 600 V grade polyethylene insulated and PVC sheathed. Low voltage AC power systems will be solidly grounded neutral with phase to phase voltage level of 400 V and phase to neutral voltage of 230V AC system and the DC system with 110V. The size of the single core conductor shall not be less than 2.5 sq. mm for lighting and 4 sq. mm for power. **The main (incomer) cable to AC distribution panel shall be three & half (3.5) core and not less than 120 sq. mm.**

b) Conductor

Conductor shall consist of stranded annealed copper wires. They shall comply with IEC publication. The cable is intended for use at normal conductor operating temperatures not exceeding 75 degree C.

c) Insulation

The electrically and thermally stable polyethylene insulation shall be extruded onto the conductor so as to prevent contamination and voids in the insulation.

d) Current Rating

The Contractor shall state the maximum continuous current rating and conditions of installation for low voltage power cables.

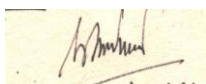
e) Jacket

The cable core assembly shall be covered with a flame-retardative and moisture resistant PVC jacket, which is free stripping from the insulation. The overall jacket shall be clean, dry, and free of grease and shall be suitable for ink or paint application.

f) Anti-termite protection shall be applied to the cable and shall consist of either a non-magnetic metallic barrier or layer of nylon sheathing.

g) Identification

- 1) Each cable shall have a printed legend on the overall jacket with the manufacturer's name, voltage class, the number and size of conductors, type of insulation.
- 2) The colors for core identification and color sequence shall be in accordance with follows
 - Single-core : Black
 - Twin : Red and black
 - Three-core : Red, yellow and blue
 - Four-core : Red, yellow, blue and black



Control and Instrumentation Cable

a) General

All control and instrumentation cable shall be 600 V grade as per IEC standard, multi conductor, color-coded, PVC insulated armored cable. Each multicore cable shall have not less than 20 percent or 2 spare cores, whichever is the greater.

b) Conductor

Copper conductor shall be stranded circular non-compacted cross-section of minimum 2.5 sq.mm. The Contractor shall calculate the load of CT core considering all connected loads and submit to the employer for approval. In case of CT burden constrain, CT circuit cable cross sectional area shall be increased. In this case the Contractor shall supply and install the cable required cross-section area without any additional cost to the Employer.

c) Insulation

The electrically and thermally stable PVC insulation shall be extruded onto the conductor so as to prevent contamination and voids in the insulation.

d) Assembly

- 1) Multicore conductor cables shall be assembled in accordance with applicable IEC standards.
- 2) A flame-retardative binder tape may be used underneath the overall jacket of multi-conductor cables, if required, to achieve the desired flame retardative characteristics. Tapes, if used, shall be non-hygroscopic.

e) Jacket

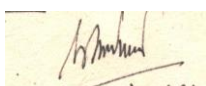
- 1) The cable core assembly shall be covered with a flame retardative and resistant jacket, which is free stripping from the insulation.
- 2) The overall jacket shall be clean, dry, and free of grease and shall be suitable for ink or paint application.
- 3) Cable jacketing and the interstices within the jacket shall be free of water. Evidence of water shall be the ground for rejection of the cable.

f) Anti- Termite Covering

Anti-termite protection shall be applied to the cable and shall consist of either a non-magnetic metallic barrier or layer of nylon sheathing.

g) Identification

Each cable shall have a printed legend on the overall jacket, with the manufacturer's name, voltage class, the number and size of conductors, and a unique number or code indicating the production run or batch. The identification shall remain legible for the life of the cable.



2.4. SPECIAL REQUIREMENTS

Small cut piece lengths of cables will not be accepted. Cables up to 500 meters in length or as approved by Employer shall be of one length shipped in a drum of adequate size. For higher quantities, multiple lengths/drums may be shipped subject to the approval of Employer.

2.5. DRAWINGS, DATA & MANUALS

The following information shall be furnished along with the bid.

- a) Manufacturer's leaflets giving constructional details, dimensions and characteristics of different cables.
- b) Current rating of cables including derating factor due to grouping, ambient temperature and type of various installation.

2.6. TESTS

2.6.1 Routine and Design Tests

Power cables shall be subjected to following routine tests. As far as practical, the procedure of IEC shall be followed:

- a) Measurement of the electrical resistance of conductor
- b) Partial discharge test
- c) Voltage test

The power cable design tests shall include following:

- a) Partial discharge test
- b) Bending test, followed by a partial discharge test
- c) Tan delta measurement
- d) Heating cycle test, followed by a partial discharge test
- e) Impulse test, followed by voltage test
- f) Voltage test for 4 hours.

The Bidder shall submit copy of design test report from recognized testing laboratory for the offered power cable along with the bid.

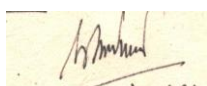
2.6.2 Field Tests

After installation at Site, cables shall be subjected but not limited to the following tests:

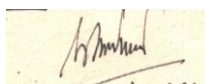
- a) Measurement of insulation resistance
- b) *DC dielectric test*

2.7. PERFORMANCE GUARANTEE

The performance figures quoted on schedule of Technical Data shall be guaranteed within the tolerance permitted by relevant standards and shall become part of the Contract. In case of failure of

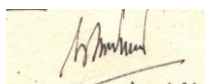


the cables to meet the guarantees, the Employer reserves the right to reject the item. The Contractor shall have to rectify/replace the defect/defective part at no extra cost to the Employer and without delaying the commissioning schedule.



SECTION I, PART 10

SPECIFICATION OF GROUNDING SYSTEM



SECTION I, PART 10

GROUNDING SYSTEM

1. GENERAL

This specification covers the design, supply, delivery, installation and testing of the complete grounding system as described below.

The complete station grounding work shall be in accordance with the recommendation in the "Guide for Safety in Substation Grounding" IEEE No. 80 and the requirements of this section.

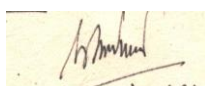
2. GROUNDING INSTALLATION FEATURES

The installation shall be complete in all respects for efficient and trouble free service. All work shall be carried out in a first class neat workman like manner. Grounding conductors shall be handled carefully to avoid kinking and cutting of the conductors during laying and installation. All exposed ground conductors runs shall be taken in a neat manner, horizontal, vertical and parallel to building walls or columns and shall not be laid haphazardly.

- 2.2 For all connections made to equipment or to the structures, the grounding conductor, connectors and equipment enclosures shall have good clean contact surfaces. Grounding conductor connection to all electrical equipment, switchgear, transformers, motors, panels, conduit system, equipment enclosures, cable trays, distribution boards, equipment frames, bases, steel structure, etc. shall be by pressure type or bolting type connectors.
- 2.3 All lap, cross and tee connections between two grounding conductors shall be made by thermo-welding process or compression type connector. The various joints shall have adequate mechanical strength as well as necessary electrical conductivity not less than that of the parent conductors of the joints. All accessories for grounding installation shall be of quality and design approved by the Employer.
- 2.4 Ground conductors, when crossing underground trenches, directly laid underground pipe and equipment foundation, if any, shall be at least 300mm below the bottom elevation of such trenches/pipes.
- 2.5 The maximum size of each grid of grounding mat shall not exceed 4X4 meters. The terminals for connecting ground mat and equipment shall be terminated whenever necessary. *(The new grounding shall be bonded with existing grounding network.)*

3 GROUNDING CONDUCTOR

3.1 Main Ground Grid



The main ground system shall consist of a grounding grid buried minimum 0.6 meter below grade level. The grounding grid shall consist of minimum 25 x 4 mm copper flat conductor cable or minimum 100 sq. mm stranded copper wire.

3.2 Ground Electrodes

The ground electrodes shall be 16mm diameter and 3.0 meter long (min.) copper clad steel. These shall be driven into ground and connected to the main ground grid.

3.3 Risers

The risers shall consist of copper conductor of adequate size (but not less than 100 sq. mm.) connected at one end to the main ground mat and at the other end to the equipment.

4 DESIGN REQUIREMENTS

4.1 *The Contractor shall measure the soil resistivity in presence of the Employer. Based on the resistivity the contractor shall calculate the total length of buried ground conductor, number of grounding electrode and their depth and spacing to achieve a grounding system resistance of less than 1.0 (One) Ohm.*

4.2 The Contractor shall calculate the cross-section considering the maximum fault level of 25 kA.

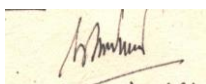
4.3 The Contractor shall submit the details of calculations of the grounding system for the Employer's approval.

5 TESTS

On completion of the installation, either wholly or in sections, it shall be tested in compliance with relevant Code by the Contractor in presence of the Employer. The cost of any test including labor, material and equipment charges shall be borne by the Contractor. If the ground grid resistance can not be obtained as per his design, then additional grounding conductors shall be buried in the earth, or if necessary, buried in treated soil to obtain the required low ground resistance without any additional cost.

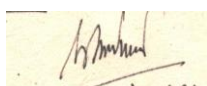
6 LIGHTNING PROTECTION

The outdoor equipment of the substation and the substation building shall be protected against lightning. The lightning protection shall be achieved by an overhead lightning shield system of galvanized steel wire of 7/3.35 mm, which shall be connected to the main grounding grid by steel conductor of 7/3.35 mm. The design of the lightning protection system shall be subject to the approval of the Employer.



7 DRAWINGS

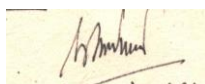
After award of the Contract, the Contractor shall furnish the grounding layout drawing with dimensions showing the location of grounding grids, electrodes, test link chambers and risers, backed up by necessary calculations for Employer's approval. The work shall have to be started at site only after getting approval from the Employer. If alteration is required for any work done before getting Employer's approval, the same shall have to be done by the Contractor at no extra cost to the Employer.



APPENDIX 10

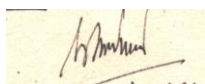
STATION GROUNDING SYSTEM

DESCRIPTION	UNIT	REQD.
1. Main ground grid conductor material		Copper
2. Main ground grid conductor size	Sq.mm	≥ 100
3. Cross section of riser conductors	sq mm	≥ 100
4. Ground electrodes		
- Material		Copper clad steel
- Diameter	mm	16
- Length	meter	3
5. Material of risers		Copper
6. Earthing system designed for	ohm	≤ 1




SECTION I, PART 11

SPECIFICATION OF STRUCTURE



SECTION I, PART 11 SPECIFICATION OF STRUCTURE

1.0 GENERAL

The scope of specification covers design, fabrication, trial assembly, supply and erection of galvanized steel structures for towers, girders, lightning masts and equipment support structures. Structures shall be lattice or Pipe type structure fabricated from structural steel conforming to relevant British standard Codes (BS Codes)/ equivalent International Standards.

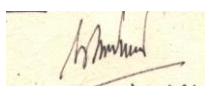
Line diagrams of Towers, girders, Lightning mast, equipment support structures for 220kV structures enclosed with the tender document are for information only. However, The line diagram of all structures of 220 kV, 132kV, 66kV and 33 kV for new switch yards shall be prepared by the contractor based on their design during detailed engineering stage. The fabrication drawing/line diagram of structures for extension of existing switch yards shall be furnished by NEA/Consultant to the successful bidder progressively during detailed engineering stage. The bidder shall mention in their bid for the type of proposed structure i.e. Pipe or lattice type structure. The fabrication drawings, proto corrected drawings along with Bill of Material (BOM) for all the structures (Both Gantry and Equipment support structures) shall be prepared by the contractor during detailed engineering for submission to NEA/Consultant for their approval. Support structure for circuit breaker shall also be designed by the Manufacturer/Contractor.

It is the intent of the NEA/Consultant to provide structures which allow interchangeability of equipments at a later stage. Accordingly, Contractor is expected to design the equipment support structures with the provision of stool. Stools shall be provided by the Contractor between the equipment and its support structure to match the bus bar height. The top of stool shall be connected to the equipment and the bottom of the stool shall be connected to the Base support structure.

The scope shall include supply and erection of all types of structures including bolts, nuts, washers, step bolts, inserts in concrete, gusset plates, equipment mounting bolts, structure earthing bolts, foundation bolts, spring washers, fixing plates, ground mounted marshalling boxes (AC/DC Marshalling box & equipment control cabinets), structure mounted marshalling boxes and any other items as required to complete the job.

The connection of all structures to their foundations shall be with base plates and embedded anchor/foundation bolts. All steel structures and anchor/foundation bolts, fasteners (Nuts,bolts,washers) shall be fully galvanized as per relevant British standard Codes (BS Codes) / equivalent International Standards. The weight of the zinc coating shall be at least 610 grammes /sq. m for anchor bolts/foundation bolts and for structural members. One additional nut shall be provided below the base plate which may be used for the purpose of leveling.

Contractor shall provide suitable arrangement on the equipment support structures wherever required to suit fixation of accessories such as marshalling boxes, MOM boxes, Control Cabinets, Junction box, surge counter, etc. in the equipment structure fabrication drawings.



2.0 DESIGN REQUIREMENTS FOR STRUCTURES

- 2.1 For design of steel structures loads such as dead loads, live loads, wind loads etc. shall be based on relevant British standard Codes (BS Codes) / equivalent International Standards.
- 2.2 For materials and permissible stresses, relevant British standard Codes (BS Codes) / equivalent International Standards. Shall be followed in general. However, additional requirements given in following paragraphs shall be also considered.
- 2.3 Minimum thickness of galvanized lattice structure member shall be as follows:

Members Min Thickness	(mm)
Leg members, Ground wire	5
Peak members\Main members	5
Other members	4
Redundant members	4

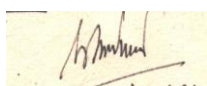
- 2.4 Maximum slenderness ratios for leg members, other stressed members and redundant members for compression force shall be as per relevant British standard Codes (BS Codes) / equivalent International Standards.
- 2.5 Minimum distance from hole center to edge shall be $1.5 \times$ bolt diameter. Minimum distance between center to center of holes shall be $2.5 \times$ bolt diameter.
- 2.6 All bolts shall be M16 or higher as per design requirement.

2.7 Step Bolts

In order to facilitate inspection and maintenance, the tower structures shall be provided with climbing devices. Each tower shall be provided with M16 step bolts 175mm long spaced not more than 450mm apart, staggered on faces on diagonally opposite legs extending from about 0.5 meters above plinth level to the top of the tower. The step bolt shall conform to relevant British standard Codes (BS Codes) / equivalent International Standards. Ladders along with safety guard shall be provided for the Lightning Mast Tower.

2.8 Design Criteria

- a) All gantry structures shall be designed for the worst combination of dead loads, live loads, wind loads and Seismic forces as per relevant British standard Codes (BS Codes) / equivalent International Standards. (latest), loads due to deviation of conductor, load due to unbalanced tension in conductor, torsional load due to unbalanced vertical and horizontal forces, erection loads, short circuit forces including “snatch” in the case of bundled conductors etc. Short circuit forces shall be calculated considering a fault level of 40.0 kA for 220kV, 31.5KA for 132kV and 25KA for 33kV or as applicable. Relevant British standard Codes (BS Codes) / equivalent International Standards. May be followed for evaluation of short circuit forces.
- b) Switchyard gantry structures shall be designed for the two conditions i.e. normal



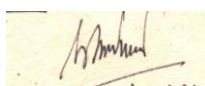
condition and short circuit condition. In both conditions the design of all structures shall be based on the assumption that stringing is done only on one side i.e. all the three (phase) conductors broken on the other side.

Factor of safety of 2.0 under normal conditions and 1.5 under short circuit condition shall be considered on all external loads for the design of switchyard structures.

- c) Vertical load of half the span of conductors/string and the earth wires on either side of the beam shall be taken into account for the purpose of design. Weight of man with tools shall be considered as 150 kgs. for the design of structures.
- d) Terminal/line take off gantries shall be designed for a minimum conductor tension of 2 metric tonnes per phase for 220 kv, 1 Metric tonne per phase for 132 kV and 0.50 Metric Tonne for 33 kV or as per requirements whichever is higher. The distance between terminal gantry and dead end tower shall be taken as 200 meters for 220kV, 150m for 132kV and 80 m for 33 kV switch yard. The design of these terminal gantries shall also be checked considering +/- 30 deg deviation of conductor in both vertical and horizontal planes. For other gantries the structural layout requirements shall be adopted in design.
- e) The girders / beams shall be connected with lattice/Tower columns by bolted joints.
- f) All equipment support structures shall be designed for the worst combination of dead loads, erection load. Wind load/seismic forces, short circuit forces and operating forces acting on the equipment and associated bus bars as per relevant British standard Codes (BS Codes) / equivalent International Standards.
- g) If luminaries are proposed to be fixed on gantries/towers, then the proper loading for the same shall be considered while designing. Also holes for fixing the brackets for luminaries should be provided wherever required.
- h) Foundation bolts shall be designed for the loads for which the structures are designed.
- i) The height of Lightning Mast shall be as per approved structural layout and designed for diagonal wind condition. . The lightning mast shall be provided with platform for mounting of lighting fixtures and a structural steel ladder within its base up to the level of platform. The ladder shall be provided with protection rings The platforms shall also have protection railing. The details of lighting fixtures would be as per approved drawings of electrical fixtures.

3.0 DESIGN, DRAWINGS, BILL OF MATETRIALS AND DOCUMENTS

- 3.1 The Contractor shall submit design and line diagram of each structure for approval of NEA/Consultant. Fabrication drawing based on approved line diagram shall be prepared by the contractor for approval of NEA/Consultant. The BOM (Bill Of Material) shall be prepared by the contractor based on approved fabrication drawing. The Line diagram should indicate not only profile, but section, numbers and sizes of bolts and details of typical joints. In case NEA/Consultant feels that any design or drawings are to be modified even after its approval, Contractor shall modify the designs & drawings and resubmit the same for approval.
- 3.2 The fabrication drawings shall indicate complete details of fabrication and erection including all erection splicing details and typical fabrication splicing details, lacing

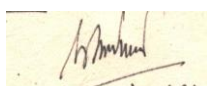


details, weld sizes and lengths. Bolt details and all customary details in accordance with standard structural engineering practice. The fabrication drawing and bill of material based on design/line diagram shall be submitted to NEA/Consultant for approval. Approved bill of materials prepared on the basis of fabrication drawing shall be the basis for payment.

- 3.3 Such approvals shall, however, not relieve the contractor of his responsibility for safety and durability of the structure and good connection and any loss occurring due to defective fabrication, design or workmanship shall be borne by the contractor.
- 3.4 The contractor shall submit editable soft copy of all designs preferably in Staad / excel form and drawings in AutoCAD to NEA/Consultant. The list of British standard codes relevant to steel structures have been given in Chapter-14-Civil section of technical specification This list is illustrative but not exhaustive. The contractor shall submit the copy of relevant portion of BS codes/equivalent International standard referred to NEA/Consultant for reference if necessary during detailed engineering stage.

4.0 FABRICATION AND ERECTION

- 4.1 The fabrication and erection works shall be carried out generally in accordance with relevant British standard Codes (BS Codes) / equivalent International Standards. All materials shall be completely shop fabricated and finished with proper connection material and erection marks for ready assembly in the field.
- 4.2 The component parts shall be assembled in such a manner that they are neither twisted nor otherwise damaged and shall be so prepared that the specified camber, if any, is provided. In order to minimize distortion in member the component parts shall be positioned by using the clamps, clips, dogs, jigs and other suitable means and fasteners (bolts and welds) shall be placed in a balanced pattern. If the individual components are to be bolted, paralleled and tapered drifts shall be used to align the part so that the bolts can be accurately positioned.
- 4.3 Sample towers, beams and lightning masts and equipment support structures may be trial assembled in the fabrication shop to ensure fitment of various members and to avoid problems during erection.
- 4.4 For all structures, BOM along with fabrication drawings in hard and editable soft copies shall be submitted to NEA/Consultant as document for information. The responsibility of correctness of such fabrication drawing and BOM shall be fully with the contractor.
- 4.5 Approval of fabrication drawings and BOM shall, however, not relieve the Contractor of his responsibility for the safety and durability of the structure and good connections and any loss or damage occurring due to defective fabrication, design or workmanship shall be borne by the Contractor.
- 4.6 The Contractor should arrange on his own all plant and equipment, welding set, tools and tackles, scaffolding, trestles equipments and all other accessories and ancillaries required for carrying out erection without causing any stresses in the members which may cause deformation and permanent damage. Minor modification if any, required



during erection shall be done at site with the approval of NEA/Consultant.

5.0 BOLTING

- i) Every bolt shall be provided with a washer under the nut so that no part of the threaded portion of the bolt is within the thickness of the parts bolted together.
- ii) In case of fasteners, the galvanizing shall conform to relevant British standard Codes (BS Codes) / equivalent International Standards. The spring washer shall be electro galvanized as per relevant British standard Codes (BS Codes) / equivalent International Standards.

6.0 WELDING

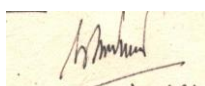
The work shall be done as per approved fabrication drawings which shall clearly indicate various details of joints to be welded, type of weld, length and size of weld, Symbols for welding on erection and shop drawings shall be according to relevant British standard Codes (BS Codes) / equivalent International Standards. Welding shall be carried out in accordance to relevant British standard Codes (BS Codes) / equivalent International Standards.

7.0 FOUNDATION BOLTS

- 7.1 Foundation bolts for the towers and equipment supporting structures and elsewhere shall be embedded in first stage concrete while the foundation is cast. The Contractor shall ensure the proper alignment of these bolts to match the holes in the base plate.
- 7.2 The Contractor shall be responsible for the correct alignment and leveling of all steel work on site to ensure that the towers/structures are plumb.
- 7.3 All foundation bolts for lattice structure, pipe structure are to be supplied by the Contractor.
- 7.4 All foundation bolts shall be fully galvanised so as to achieve minimum 610 grammes Per Sq.m. of Zinc Coating as per relevant British standard Codes (BS Codes) / equivalent International Standards.
- 7.5 All foundation bolts and its material shall conform to relevant British standard Codes (BS Codes) / equivalent International Standards. All foundation bolts shall be provided with two number standard nuts, one check nut, one plain washer and MS plate at the bottom of foundation bolt.

8.0 STABILITY OF STRUCTURE

The Supplier shall be responsible for the stability of the structure at all stages of its erection at site and shall take all necessary measures by the additions of temporary bracings and guying to ensure adequate resistance to wind and also to loads due to erection equipment and their operations.



9.0 GROUTING

The method of grouting the column bases shall be subject to approval of NEA/Consultant and shall be such as to ensure a complete uniformity of contact over the whole area of the steel base. No additional payment for grouting shall be admissible.

10.0 GALVANISING

10.1 All structural steel works (Gantry structures, Equipment support structures) and foundation bolts shall be galvanized after fabrication. The galvanization shall be done as per requirement relevant British standard Codes (BS Codes) / equivalent International Standards.

10.2 Zinc required for galvanizing shall have to be arranged by the Contractor/manufacturer. Purity of zinc to be used shall be 99.95% as per relevant British standard Codes (BS Codes) / equivalent International Standards.

10.3 The Contractor shall be required to make arrangement for frequent inspection by the owner as well as continuous inspection by a resident representative of the owner, if so desired for fabrication work.

11.0 TOUCH-UP PAINTING

Minor defects in hot dip galvanized members shall be repaired by applying zinc rich primer and two coats of enamel paint to the satisfaction of NEA/Consultant before erection.

12.0 INSPECTION BEFORE DISPATCH

Each part of the fabricated steel work shall be inspected as per approved quality plans and certified by NEA/Consultant or his authorized representative as satisfactory before it is dispatched to the erection site. Such certification shall not relieve the Contractor of his responsibility regarding adequacy and completeness of fabrication.

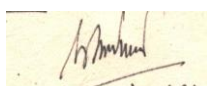
13.0 TEST CERTIFICATE

Copies of all test certificates relating to material procured by the Contractor for the works shall be submitted to NEA/Consultant.

14.0 MODE OF MEASUREMENT

The measurement of the structure, fasteners (Nuts, Bolts, and Washers) and foundation bolts including its nuts washers and MS Plate at bottom shall be done as per Bid price schedule (BPS). The weight of all structural members and foundation bolts (Bolt, Nuts, washer and MS steel plates welded at bottom of bolt) shall be measured under one head in Metric Tonne. The weight of fasteners and step bolts (Nuts, bolts and washers) used to erect/complete structures shall be measured under another head in Metric tons.

15.0 SAFETY PRECAUTIONS



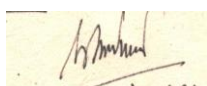
The Contractor shall strictly follow all precautions at all stages of fabrication, transportation and erection of steel structures. The stipulations contained in relevant

British standard Codes (BS Codes) / equivalent International Standards. for Safety during erection of structural steel work shall also be adhered to.

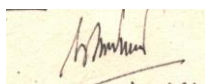
16.0 MANUFACTURING QUALITY PLAN

The material specification shall also be as per relevant British standard Codes (BS Codes) / equivalent International Standards.

The Contractor shall prepare the manufacturing quality plan to accept/check the material, galvanization and welding as per relevant international standards/BS codes within 1 month after award of work and submit the same to NEA/ Consultant for approval.



PART 12 MISCELLANEOUS MATERIAL



PART 12 MISCELLANEOUS MATERIAL

1 GENERAL

This specification covers the design, fabrication, properly packing for transportation, delivery, installation, testing and putting into efficient and trouble-free operation of the bus materials, insulators and miscellaneous items complete with all accessories.

2 TECHNICAL REQUIREMENTS

2.1 Insulators

a) General

All types of insulators shall satisfactorily withstand the specified climatic and service conditions. The strength of insulators as given by the electro-mechanical tests shall be such that the factor of safety when supporting their maximum working loads shall be not less than two and a half.

Design shall be such that stresses due to expansion and contraction in any part of the insulators and fittings do not lead to development of defects.

All insulators, whether cylindrical post or string shall have plain shed profiles.

Damaged insulators shall be replaced at no costs to the Employer.

b) Materials

Porcelain insulators shall be in accordance with IEC standards, where applicable. Porcelain shall be sound, free from defects and thoroughly vitrified and the glazed.

Porcelain glaze shall be smooth, hard, of uniform shade of brown and shall completely cover all exposed parts of the insulators. Outdoor insulator fittings shall remain unaffected by atmospheric conditions producing weathering, acids, alkalis, dust and rapid changes in temperature that may be experienced under working conditions.

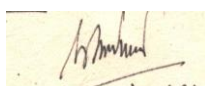
Suspension and tension insulators shall comprise porcelain units with ball and socket fittings.

Retaining pins or locking devices for insulating units shall be of phosphor bronze or other approved material, and shall effectively prevent accidental separation of the units.

Unless otherwise approved, the individual units of both the suspension and tension insulator sets shall be identical and interchangeable.

c) Number of discs

-	132 kV :	11 Nos (minimum)	per set
-	66kV :	6 Nos (minimum)	per set
-	33 kV:	3 Nos (minimum)	per set



d) Marking

Each insulator shall have marked on it the manufacturer's name or trademark, the year of manufacture and the manufacturer's reference mark. Tension and suspension insulators shall also be marked with the guaranteed electromechanical strength. Marks shall be legible and indelible.

e) Post insulator

Post insulator shall be cylindrical type, solid core porcelain, single stacked, provided in accordance with following requirements:

	<u>Type A</u>	<u>Type B</u>	<u>Type C</u>
- Rated voltage	145 kV	72.5 kV	36 kV
- Nominal voltage	132 kV	66 kV	33 kV
- Impulse withstand voltage	650 kV	325 kV	170 kV
- Color	Brown	Brown	Brown

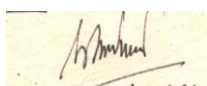
Test shall be divided into three groups in accordance with IEC 168.

f) Standard particulars of insulator units

Insulator units shall comply with the following requirements. (IEC 305)

1)	Porcelain disc diameter	254 mm
2)	Unit spacing	146 mm
3)	Creepage distance	292 mm
4)	Electro mechanical failing load	12,000 kg
5)	Dry power frequency withstand Voltage	70 kV
6)	Wet power frequency withstand Voltage	40 kV
7)	Dry impulse withstand voltage	120 kV
8)	Puncture voltage	120 kV

Dimension and tolerances of ball and socket coupling shall comply with IEC Publications 120, and the internal height of the socket shall also comply with the requirements of IEC Publication 372-1 (1977)



2.2 Bus Conductor and Fittings

The bus-bar system to be adopted shall be as follows:

- For 132 kV it shall be of double bus-bar type with single breaker connecting system.
- For 33 kV it shall be of single bus-bar type with single breaker connecting system. The bus-bar system shall be designed in such a way that at least one bay in each end can be extended in future without major construction.

a) General

Busbars and electrical connections in outdoor substations shall be in accordance with IEC, BS, ASTM or equivalent national standards in respect of current rating and material analysis.

Bus conductor to be supplied shall be aluminum tube for 132 kV, 66kV and 33 kV. For connection purpose aluminum conductor steel reinforced may be used, if required. Minimum size and material of each bus shall be as following:

<u>Bus</u>	<u>Material</u>	<u>Min. Size</u>
- 33 kV Main	Al-Tube	100mm
- 33 kV Branch	Al-Tube	75mm

The 33 kV bus-bars shall be designed for the following conditions:

	<u>Current Carrying Capacity</u>	<u>Fault Level</u>
Main bus-bar -	1600 A	25 kA
Branch bus-bar -	800 A	25kA

The Contractor shall submit detailed calculation for approval.

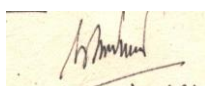
Materials used for busbars and connections shall be stressed not to more than two-fifths of their elastic limit. Provision shall be made for expansion and contraction with variation in conductor temperature and busbars shall be arranged so that they may be readily extended in length with a minimum of disturbance to existing equipment.

Busbars shall be in continuous lengths between supports. Connectors shall be of approved type, and if necessary type tested. Connections dependent upon site welding techniques will not be permitted.

Busbars and connections shall be so arranged and supported that under no circumstances, including short circuit conditions, the clearances between live metal and earth, or between other conductors, cross the safe limit.

b) Strain Bus and Fittings

The conductor shall be of suitable size to withstand the full load current.



The direction of lay of the outer layer shall be right-hand. The direction of lay shall be reversed in successive layers; continuous layer shall in all cases have opposite lay.

The external form and surface of the finished conductor shall be uniformly cylindrical upon completion of manufacture and shall remain so when erected in place on the line.

The surface of the conductor shall be free from points, sharp edges, abrasions or other departures from smoothness or uniformity that would tend to increase radio interference and corona loss. When the conductor is subjected to tensions up to 50 percent of its rated ultimate strength, the conductor surface shall not depart from its general cylindrical form, nor shall any of the strands move relative to each other in such a way as to get squeezed out of place and disturb the longitudinal smoothness of the conductor. Strands of a section of "popped" cable shall not protrude more than 1/2 of their diameter of a strand. The conductor shall be capable of withstanding the normal handling necessary for manufacture and erection, such as, reeling, unreeling, and pulling through stringing sheaves under sufficient tension to keep the conductor off the ground, etc., without being deformed from the cylindrical form that causes to increase radio interference and corona loss.

The make-up and lay of wires shall be such as to produce a conductor essentially free from a tendency to untwist or spring when cut. The steel wires shall be preformed or post-formed so that when the conductor is cut and the aluminum wires are stripped away from the core as required for splicing, the steel wires can be readily regrouped and easily held in place with one hand to allow a splicing sleeve to be slipped over the steel core wire at the cut end of the conductor.

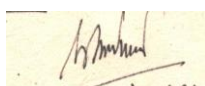
This forming of the core is required and shall be done in a manner which will not in any way scratch, scrape, remove or otherwise damage the zinc coating of the steel core wires, individually or collectively.

The conductor shall be free from excessive amounts of die grease, metal particles and dirt. The Bidder shall describe in complete detail the method, which he proposes to use to clean the conductor in normal production. The effectiveness of the cleaning process shall be subject to verification.

Where dissimilar metals are in contact, approved means shall be provided to prevent electro-chemical action and corrosion. Unless otherwise approved, joints and surfaces of copper or copper alloy fittings shall be tinned.

Suspension and tension conductor clamps shall be of approved types and shall be as light as possible. Those for aluminum conductor shall preferably be compression type. Suspension and tension clamps shall be designed to avoid any possibility of deforming the stranded conductor and separating the individual strands.

Tension conductor clamps shall not permit slipping of or damage to, or failure of the complete conductor or any part thereof, at a load less than 95 per cent of the ultimate strength of the conductor.



Clamps and fittings made of steel or malleable iron shall be galvanized. All bolts and nuts shall be as specified and shall be locked in an approved manner.

c) Tubular Bus and Fittings

Tubular bus shall be made of first melting aluminum alloy, cold rolled or hard-drawn and assembled using corona free fittings. The bus-bar shall be designed and manufactured in such a way to dampen any vibration.

The tubular bus conductor shall be designed to withstand mechanical forces due to short circuit currents; and its temperature when carrying full load current shall not exceed 75 degree C. A safety factor of 2 for normal working loads and 1.5 with short circuit currents shall be used. Vibration of bus shall be checked for the design wind conditions.

The tubular bus shall include a small drain hole in any low section. Where joints are required they shall be of the thin leaf type. They are required at all potheads and as required on bus bars. Bus supports for main tubular buses shall include rigid fixed conductor clamp with slide fit on adjacent supports.

All bus support clamps shall be cast of first melting aluminum alloy. Each clamp shall be adjustable for alignment with insulator and furnished with four galvanized steel mounting bolts.

- Bolted type clamps shall be furnished with first melting alloy and, bolts, nuts and washers shall be finished with an anodic coating and lubricated. The clamps for tubing shall have dimensions and sections suitable for splicing two pieces of tubing in the clamp.
- Flexible elements of expansion bus support clamps shall be laminated aluminum strap, which has current capacity equivalent to the tube.

Terminal connectors for aluminum shall be of first melting cast aluminum alloy. All terminal pads shall be furnished with stainless steel bolts, nuts and Bellville washers.

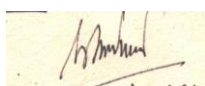
The bolted type terminal connectors shall be a multigrip type terminal and furnished with first melting aluminum alloy with bolts, nuts and washers finished with anionic coating and lubricated.

Bolted type connectors shall be furnished with first melting aluminum alloy with bolts, nuts and washers finished with anionic coating and lubricated.

Angle-connectors:

All angle connectors shall be of streamlined, bolted type and made of first melting cast aluminum alloy. Tap element sockets shall be deep enough to allow for error in cut-off.

- Couplers: All couplers shall be of bolted type and made of first melting cast aluminum alloy.



- Corona Bells: All corona bells shall be streamline internal type and cast of first melting aluminum alloy.

The Contractor shall submit calculations regarding selection of the size of the bus material for approval.

d) Overhead ground wire

Overhead shield wire shall be galvanized steel wire, stranded with a minimum cross sectional area of 61.7 sq mm and shall comply with BS 183.

Earthwires shall be greased as for conductors and the outer strands shall have a right hand lay.

Each completed shield wire shall be bare and shall be composed of the specified number of strands.

The nominal diameter of individual wires shall have a variation of not more than plus or minus one and one-half (1.5) percent.

Joints or splices may be made in the individual wires prior to drawings to final size or in the finished wire composing the strand. Such joints shall have protection to corrosion equivalent to that of the finished wire itself and shall not decrease the strength of the finished strand below the specified minimum breaking strength. Joints in the individual wires in the finished strand shall be separated by at least 15.2 meters.

All strands in the wire shall lay naturally in their true position in the completed cable, shall tend to remain in position when the cable is cut at any point, and shall permit restraining by hand after being forcibly raveled at the end of the cable. The strand shall be free from imperfections and consistent with good commercial practice with a carefully controlled finish completely free from any dirt, loose metal particles, nicks, scratches, abrasions or deformities of any nature.

Each item of material to be furnished by the Contractor shall be accompanied by the manufacturer's routine factory test certificates/reports.

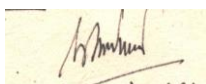
3 TESTS

3.1 Insulators

The insulators shall be tested in accordance with IEC standards. Certified copies of the tests shall be submitted for approval to the Employer.

a) Design tests

- Power frequency wet withstand voltage test
- Critical - impulse flashover test
- Impulse withstand test
- Radio-interference voltage test
- Compression strength test
- Thermal shock test



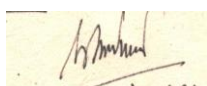
- b) Quality conformance tests
 - Visual and dimensional test
 - Porosity test
 - Galvanizing test
 - Cantilever strength test
 - Torsional strength test
 - Tensile strength test

- c) Routine tests
 - Flashover test
 - Tension tests

3.2 Bus Materials

Following shop tests shall be performed by the manufacturer on the bus material. The Contractor shall submit such test reports to the Employer for approval before dispatch.

- a) Aluminum Tube
 - General inspection
 - Chemical composition of aluminum alloy
 - Conductivity measurement of aluminum tube
 - Dimension and weight measurement
 - Certified report of aluminum alloy from the original manufacturer
- b) Bus Support Clamp and Connector
 - General inspection
 - Dimension measurement
 - Chemical composition of aluminum alloy
 - Certified report of aluminum alloy from the original manufacturer
- c) Connectors for Stranded Conductor
 - General inspection
 - Measurement of dimensions
 - Compression tests
 - Certified report of aluminum alloy from the original manufacturer
- d) Miscellaneous Hardware
 - General inspection
 - Measurement of dimensions
 - Tension test
 - Galvanizing test



4 PACKAGING AND MARKING

4.1 Insulator

a) Packaging

The insulators shall be packed in strong wooden boxes with a waterproof lining. These boxes shall provide adequate protection against salt spray, chemical attack and damage that might be encountered in transportation and rough handling during loading, transportation to job site, unloading to temporary storage, ocean transportation, etc.

b) Marking

In addition to marks required for shipping purposes, each crate and pallet shall be marked with shipper's identity, Employer's name and address and quantity and type of contents etc. Also, the gross, tare and net weights in kilograms shall be stenciled on each pallet.

4.2 Bus Materials

a) Packing

The conductor shall be furnished on non-returnable wooden reels, and shall be properly protected to prevent displacement, chafing, distortion, damage from corrosive atmosphere or other damage to the conductor, which might be encountered in shipping, storage for handling, etc. Each layer of conductor shall be separated from the adjacent layer in such a manner as to prevent abrasion or other damage during handling and shipping.

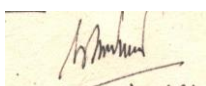
The non-returnable reels shall be made of strong materials suitably strengthened for ocean transport and treated to withstand rotting or any type of damages due to ocean atmosphere. The reels shall be capable of withstanding all stresses due to braking and string operations. The Employer will accept the use of returnable reels, but any additional costs in disposing such reels shall be the responsibility of the Contractor.

b) Marking

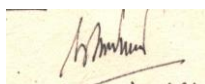
In addition to marks required for shipping purposes, each reel-head shall be stenciled to show serial number, type of conductor, length of conductor in meters, the gross, tare, and net weights in kilograms. Each reel shall also be plainly marked to indicate the direction in which it should be rolled to prevent loosening of the conductor on the reel. Those reels from which test samples were taken shall be marked "TESTED" with length of sample conductor removed and removal included in the markings.

5 GUARANTEE

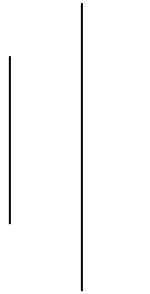
- 5.1 Any defects in materials or workmanship or other failure to meet requirements of these specifications, which are disclosed prior to the Operational Acceptance Certificate by the Employer, be corrected entirely (including removal and replacement) at the expense of the Contractor.



- 5.2.1 Any latent defects not disclosed before date of the Operational Acceptance Certificate but disclosed within Defects Liability Period shall be corrected promptly by and at the expense of the Contractor.



SECTION-I, PART-13



TECHNICAL SPECIFICATION (CIVIL WORKS)

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SECTION I, PART-13

CIVIL WORKS

1. GENERAL

This specification covers the general requirements for Design, Manufacture, Test, Supply and Construction of Civil works necessary for the erection of Equipments at the various substations.

The Contractor shall perform the works to meet the requirements of this Specification, the attached drawings and the relevant Articles in these Contract Documents.

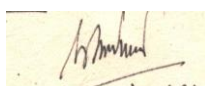
2. STANDARD AND REFERENCES.

All equipment, materials, fabrication and tests under these Specifications shall conform to the latest applicable standards, manuals and Specifications contained in the following list or to equivalent applicable standards, manuals and Specifications established and approved in the country of manufacturer, and approved as equal by Employer.

ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standard Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing Materials
AWS	American Welding Society
JIS	Japanese Industrial Standards
DIN	Dueches Industries Norms

Alternatively, Standard Specifications for this Contract shall be the “Standard Specifications for Road and Bridge Works” issued under the authority of Government of Nepal, Ministry of Physical Planning and Works, Department of Roads.

Any details not specifically covered by these standards and Specifications shall be subject to approval of Employer. In the event of contradictory requirements between the standards and these Specification requirements, the terms of the Specifications shall apply.



3. SCOPE OF WORKS.

Civil Works under these contracts consist of:

1. Dismantling of structures
2. Excavation
3. Filling
4. Soling
5. PCC
6. RCC and Formwork
7. Reinforcement (Rebars) Works
8. Anchoring
9. Foundation Rail Installation
10. Gantry Structure
11. Retaining Structure
12. Gravel Laying Work
13. Building Extension Work, etc.

This contract includes above mentioned civil works for extension and upgradation of substation bay in different districts. Payment for extra head/lift/haulage, transportation of construction material shall not be made separately. The work must start independently in every location so that work can be completed in time. Bidders are advised to visit the construction site before submission of bid so that knowledge of site condition will facilitate in bidding.

4. DESIGN OF CIVIL WORK.

The Contractor shall perform detailed design for each structure and on the basis of the design criteria and codes or regulations of international standards.

Prior to proceeding with the design work, design conditions or design values that shall include other allowable stress safety factor, load conditions, and applicable standards shall be approved by Employer.

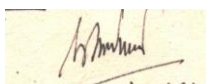
The Contractor shall submit to Employer for approval the Contractor's drawing, structural and other calculation sheets, bill of materials, construction method and schedule for the construction of civil works.

In case modification of detailed design of civil work is required, the Contractor shall promptly inform Employer and shall submit modified drawings to Employer for approval.

No separate or direct payment will be made to the Contractor for design works. All costs incurred in connections therewith shall be included in the unit/lump sum bid prices for the construction of various structures, foundations, etc.

5 FOUNDATIONS AND CONCRETE WORK.

5.1 Foundation Works



5.1.1 General Requirement.

The design of the foundation for all the substation steel structures, electro-mechanical equipment's, control building to be constructed shall be the responsibility of the Contractor. All designs and details shall be subject to approval of Employer. Approval of designs by Employer in no way relieves the Contractor of responsibility for an inadequate foundation design.

Where new transformers are to replace existing transformers, the Contractor shall investigate the technical feasibility of using the existing foundations for the new transformers. In case, the existing foundations are not suitable, the Contractor shall remove them from site.

Design loads

Foundations shall be actual working loads applied to the foundations by the equipment and structures. The foundations shall be designed to resist all vertical and lateral forces, uplift forces and overturning moments with a minimum factor of safety of 1.5.

Bearing loads

The Contractor shall use an allowable soil bearing pressure of 1.0kg/sq.cm for the design of the foundation for the purpose of bidding, but this is only reference value. After award of Contract, the Contractor shall carry out detail soil test and detail design of foundation based on the soil test result. There may be variation in the volume of work in final design compared to the bidding design, for which the Contractor will not get any extra payment.

Uplift and overturning loads

The uplift and overturning resistance of concrete spread footings shall be assumed as the weight of a volume of earth in the form of an inverted frustum of a cone or pyramid. The cone or pyramid height shall be 30 cm less than the depth from finish grade to the top of the concrete mat, the base area shall be the top area of the mat and the top area shall be determined by the intersection of planes starting at the mat edges and sloping outward at a 20 degree cone angle from the vertical and the horizontal plane 30 cm below finish grade.

Unit weights for overturning resistance

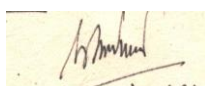
The following unit weights shall be used for design:

- a) Soil 1,200kg/m³
- b) Concrete 1,600kg/m³

5.1.2 Details.

Detail Calculation. Detail calculations for each type of foundation shall be submitted for approval of Employer. Such details shall show the following requirements:

1. Calculation of loads acting on foundation under different conditions.
2. Calculated safety factor for each type of stability and condition.



3. Maximum stresses in concrete and in steel reinforcement at any critical section.

Line and Grade.

The Contractor shall provide all lines and grades or elevation of the ground at each footing and set the necessary stakes that are required for the work and will be held responsible for their accuracy. Employer may check lines and levels set by the Contractor from time to time, but the responsibility for their accuracy shall rest entirely with the Contractor.

Detail Drawings.

Details of each type of foundation submitted for Employer's approval shall be as shown on the approved design drawings and shall conform to the requirements described hereafter. No change shall be made without the written approval of Employer. The detail drawings shall at least include:

1. Detail dimensions of foundation.
2. Detail of setting dimensions of foundation.
3. Details of placing of all reinforcing steel which shall conform to the Building Code Requirements for Reinforced Concrete (ACI 318) and the Manual of Standard Practice of Detailing Reinforced Concrete Structure (ACI 315) unless otherwise as specified herein.
4. Details of type, size and length of each reinforcing steel including details of bar bending.

6 EARTH WORK

Excavation

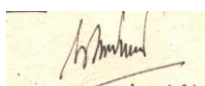
Excavation shall conform to the dimensions and elevations as shown on the approved drawings. The general cut slope shall not be steeper than 1: 1.5; however, where the Contractor shall not excavate the slope to satisfy the condition above, temporary supports to the sides of excavations shall be required by means of timbering, sheet piling or shoring.

When foundations rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation. When subsoil for foundations become mucky on top due to construction operation or any other reason, such subsoil shall be removed and replaced by one or more layers of compacted sand or compacted crushed rock, as directed by Employer.

Excavated materials suitable for use as backfill shall be deposited by the Contractor in storage piles at the area approved by Employer. However, surplus excavated materials shall also be hauled and transported to the disposal area designated by Employer.

Backfill.

The Contractor shall place and compact the backfill materials to the lines, grades and dimensions to be shown on the approved drawings. The materials to be used for backfill, the amount thereof and the manner of depositing the materials shall be approved by Employer.



Payment

No separate or direct payment will be made to the Contractor for earth work in foundations. All costs incurred in connections therewith shall be included in the unit/lump sum bid prices for the construction of various foundations, etc.

7 CONCRETE WORKS

Concrete work shall mean and include all and every concrete work for the civil work. The Contractor shall perform the concrete work in strict conformity to the Specification and as directed by Employer and shall inform Employer at least 24 hours in advance, of the times and places at which he intends to place concrete.

7.1 Composition of Concrete.

General Mix Composition.

The concrete shall be composed of cement, fine aggregate, coarse aggregate, water and admixtures as specified. All materials shall be well mixed and brought to the proper consistency.

The mix proportions shall be as follows:

Minimum compressive strength (28 days)	210 kg/cm ²
Minimum cement content	300 kg/cm ³
Maximum water cement ratio	0.6
Maximum slump	10 cm.

The detailed mix proportion shall be submitted to Employer for approval on the basis of producing concrete having suitable workability, consistency, density, impermeability, durability, and required strength, with concrete compressive strength test records. If 210kg/sq.cm. Strength of 28 days concrete cannot be achieved with the above cement content, more cement shall be used for which the Contractor will not receive any extra payment.

Consistency.

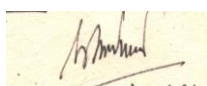
The detailed mix proportions shall be submitted to Employer for approval to secure concrete of the proper consistency and to adjust for any variation in the moisture content or grading of the aggregate as they enter the mixer. Addition of water to compensate for stiffening of the concrete before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

Lean Concrete.

Lean concrete of minimum 5 cm. thickness shall be used under all foundations with the ratio of cement: fine aggregate: coarse aggregate equal to 1:3:5 (by volume)

7.2 Cement

Quality. The Contractor shall furnish normal Portland cement in fifty (50) kg net weight sacks.



The cement for the civil work shall conform to the requirements of "Portland cement, Type I" designated in ASTM C150. Where conditions require the use of high sulphate resistance cement, cement conforming to the requirements of ASTM C150 Type V shall be used without any cost to Employer.

7.3 Coarse Aggregate

Quantity.

Coarse aggregate shall conform to the requirements of ASTM C 33 and shall be either natural gravel or manufactured coarse aggregate. Coarse aggregate shall consist of well-shaped clean, hard, dense, durable rock fragments and shall not contain wood chips and any other impurities.

Grading.

Coarse aggregate shall be graded for each maximum size within the standard limits specified as follows:

Percentage passing by weight

Designation of size in inch (Sieves with square openings)	<u>inch</u>	<u>inch</u>	<u>inch</u>	<u>inch</u>	<u>inch</u>	<u>inch</u>	No.4
40 mm	100	90to	20to	0to	0to		
(1-1/2 to 3/4 inch)			100	55	15	5	
20 mm	-	-	100	90to	20to	0to	
(3/4 inch to No.4)					100	55	10

7.4 Fine Aggregate.

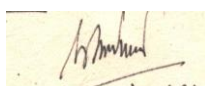
Quality.

Fine aggregate shall conform to the requirements of ASTM C33 and shall be natural sand or manufactured sand. It shall consist of clean, hard, dense and durable rock particles, free from injurious amounts of dust, silt, stone powder, pieces of thin stone, alkali, organic matter and other impurities.

Grading.

The fine aggregate as batched shall be well graded, and when tested shall conform to the following limits:

<u>Sieve size</u>	<u>Percentage passing by weight</u>
9.51mm (3/8 inch)	100
4.76 mm (No.4)	95 to 100
2.38 mm (No.8)	80 to 100
1.19 mm (No.16)	50 to 85
595 micron (No.30)	25 to 60
297 micron (No.50)	10 to 30
149 micron (No.100)	2 to 10




7.5 Admixture.

The Contractor shall use admixture, if required, listed below in order to improve the quality of concrete or mortar such as workability and finishability and water tightness.

Air-entraining agent	- ASTM C260
Water-reducing and set retarding agent	- ASTM C494
Plasticizer	

The cost of the material and all costs incidental to their use shall be included in the unit price bid in the Price Schedule for concrete in which the materials are used.

7.6 Batching and Mixing.

The Contractor shall provide equipment and shall maintain and operate the equipment to produce the required quality of concrete.

When any mixer produces unsatisfactory results, Employer may direct the Contractor to increase the mixing time or repair the mixing blades, and the Contractor shall promptly carry out the directions of Employer.

The order of feeding the materials into the mixer shall be subject to approval of Employer. If concrete is to be mixed by hand, it shall be subject to approval of Employer.

7.7 Placing of Concrete.

General Conditions.

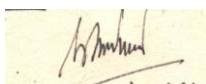
Prior to placing concrete, the Contractor shall submit to Employer for approval the mixed proportion, the characteristics of each materials of concrete, the concrete placing schedule, placing equipment, and method of execution of work. No concrete shall be placed until all formwork, treatment of surface, placing of reinforcement and other parts to be embedded have been inspected and approved by Employer.

Placing of concrete shall not be permitted under the following conditions, unless specifically approved by Employer.

1. When it rains.
2. When illumination is imperfect for night work.
3. When Employer orders to stop.

Preparation for Placing.

Treatment of foundation surfaces. All surfaces of foundation upon or against which the concrete is to be placed shall be cleaned and moistened thoroughly before the placing. When concrete is placed upon or against earth foundations, the Contractor shall, in accordance with the direction of Employer, remove all objectionable substances such as standing water, flowing water, fragments of wood.



Treatment of surfaces of construction joints. Prior to placing the concrete upon or against the hardened concrete, the surface of the construction joints shall be cleaned, moistened and removed of all laitance, defectable or loose concrete, and unsound foreign materials.

Transporting and Conveying.

The concrete which has elapsed more than 60 minutes after being discharged from the mixer and/or in which slump loss exceeds 3.0 cm as it is delivered to the site for placing shall be disposed of at the place designated by Employer. All such wasted concrete shall be borne to the Contractor's account. Concrete shall be placed with a vertical drop not greater than 1.0 m except where suitable equipment is provided to prevent segregation or where specifically authorized.

Concrete which has segregated during transportation shall be remixed. Retempering of concrete shall not be permitted.

Placing.

After the surface of unformed construction joint has been cleaned and the placing of concrete has been approved by Employer in accordance with the provisions of the preceding sub-Articles, surface of unformed construction joint shall be covered with a layer of mortar approximately 1.5 cm thick. The Contractor shall place concrete upon the fresh mortar before it begins to set. The mortar shall be of richer cement content than concrete without coarse aggregate. The cost of the mortar shall be included in the bid unit price for the foundation lot.

Concrete shall be deposited in all cases, as nearly as practicable, directly in its final position and shall not be caused to flow such that will permit lateral movement or cause segregation of the coarse aggregate, mortar or water from the concrete mass.

Consolidation.

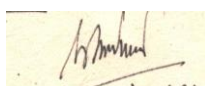
Immediately after placing, every layer of concrete shall be consolidated to the maximum practicable density so that it closes snugly against all surfaces of reinforcement bars and embedded fixtures and against all corners of the forms. Consolidation of concrete shall be by electric or pneumatic power-driven, immersion-type vibrators or other approved means.

7.8 Concrete Construction Tolerance.

Variation in alignment, grade and dimension of the structures from the established alignment, grade and dimensions shall be remedied or removed and replaced by the Contractor at his own expense.

7.9 Repair of Concrete.

The Contractor shall repair at his own expense the imperfections of concrete surfaces and the irregularities which do not meet the specified dimensions. Repairing work shall be performed and completed within 24 hours after the removal of forms, in accordance with the direction of Employer.



7.10 **Curing.**

Prior to placing concrete, the Contractor shall obtain Employer's approval in respect of the method to protect and cure concrete and the facilities he proposes to use. After concrete has been placed, it shall be protected and cured strictly in accordance with the method approved by Employer.

All costs for the curing of concrete shall be included in the unit price bid for foundation lot.

7.11 **Forms.**

General Conditions.

Forms shall be used, wherever necessary, to confine and shape the concrete to the required lines, and as directed by Employer. Forms shall have sufficient strength to withstand the pressure resulting from placing and vibrating of the concrete, and shall be maintained rigidly in positions. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Each form shall be so prepared that each section may be removed individually without injuring the concrete.

The costs of all labor and materials for forms and for any necessary treatment of coating of forms shall be included in the unit price bid for foundation lot, for which the forms are to be used. No separate payment will be made for form.

Removal of Forms.

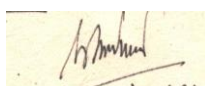
Forms shall not be removed without the approval of Employer. As a rule, the forms shall be removed at the following minimum times after concrete has been placed.

Side form of column and wall	2 days
Supporting form of floors and beam	28 days

7.12 **Grouting**

Grouting for seating structural steel members and equipment on foundations shall be non-shrink (not-setting) Portland cement mortar grout, or a suitable commercially available grout, at the Contractor's option. Grouting shall be done under pressure by means of an expanding agent or by means of a static head. Proportioning and mixing of grout shall conform to the following:

- (a) Mortar grout containing aluminum powder as an expansive agent mixture of 1 part cement and 2 parts sand, by weight, with a water-cement ratio not exceeding 0.55. The quantity of aluminum powder used shall be approximately 0.005 percent of the weight of cement, the actual quantity to be determined from tests with materials to be used, and at the temperature and under the conditions of placement. Aluminum powder shall be blended with cement in proportions of one part powder to 50 parts cement, by weight, and the blend shall be sprinkled over the dry batch. After all ingredients are added, the batch shall be mixed for 3 minutes. Grout which has not been placed within 45 minutes shall be wasted.



- (b) In lieu of use of an expansive agent, settlement shall be reduced by extending the mixing period or by delaying final mixture to minimize the interval between time of placement and initial set and placement the understatic header pressure. The mortar grout shall be a mixture of one part cement and 2.5 parts sand, with a minimum necessary to enable placement.

Payment:

No separate or direct payment will be made to the Contractor for Grouting. All cost incurred in connection therewith shall be included in the unit sum bid price for the construction of the various foundation types.

7.13 Tests.

The Contractor shall make all necessary tests for determining the mixed proportions of each type of concrete, including tests of aggregates, so as to produce the concrete specified in Item 14.7.1.

In order to control the quality of concrete to be placed, the Contractor shall perform the following field tests:

Slump Test.

A slump test will be made from each of the first three batches mixed each day. An additional slump test will be made for each additional 40 cubic meters of concrete placed in any one day. Slump will be determined in accordance with ASTM C 143.

Compression Test.

Three sets of three concrete compression test cylinders will be made each day when concrete is placed or as directed by Employer. One set of each group will be tested at an age of 7 days and the other set will be tested at an age of 28 days. The third set will be an extra set to be tested only if needed. If the compressive strength indicates a compressive strength of less than 210 kg/sq.cm. Employer will determine what remedial measures are necessary and the Contractor shall perform the remedial measures at his own expense.

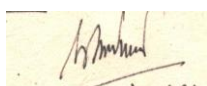
Concrete test cubes/cylinders will be made, cured, and stored in accordance with ASTM C31. Concrete cubes/cylinders will be tested in accordance with ASTM C39.

No separate or direct payment will be made to the Contractor for tests. All costs for the tests shall be included in the unit bid price for the construction of various foundation types.

7.14 Measurement for payment.

Measurement for payment for the Contract item, "Concrete Foundation" shall be on the basis of the actual unit/lump sum of each type of foundation constructed by the Contractor.

- a) Performing detail foundation designs and preparation of construction drawing including bar-bending schedule.
- b) Supplying and transporting all foundation materials to job site.



- c) Excavating, dewatering, form works, providing 10cm thick soiling layer providing 5cm thick (1M3M6) lean concrete layer, form works and backfilling for the foundations and all other related operations.

8 STEEL REINFORCEMENT.

The Contractor shall place all the reinforcement bars in the concrete structures as shown on the approved drawings and as directed by Employer. The reinforcement bars shall be furnished by the Contractor.

Quality.

The reinforcement bars used for the concrete structure shall be torsteel reinforcing bars and dimensions, shapes, tensile strength, yield point, elongation and other properties, shall conform to BS 1144 or equivalent.

Placing.

Reinforcement bars shall be accurately placed and special care shall be exercised to prevent the reinforcement bars from being displaced during the placement of concrete. Intersecting points and splices of the reinforcement bars shall be fixed by using suitable clips or annealed wires, the diameter of which shall be no less than No.16 gauge. The reinforcement bars in structures shall be placed and supported by use of concrete blocks, metal spacers, metal hangers or other satisfactory devices to ensure required coverage between the reinforcement bars and the surface of concrete. Drawings of bar lists shall be submitted for approval. The cost of binding wires, cutting and placing of steel bars shall be included in the unit price bid for foundation lot.

Payment

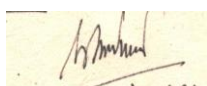
No separate or direct payment will be made to the Contractor for Concrete Reinforcing Steel in foundations. All costs incurred in connection therewith shall be included in the unit bid price for the construction of the various foundation types.

9. SUBSTATION STEEL STRUCTURES

9.1 General Requirements.

The Contractor shall assume full responsibility for design and details of the steel structures and for their satisfactory performance. All designs and details shall be subject to approval of Employer. Employer shall have the right to instruct the Contractor to make any changes to conform to the Contract Document. Elevations of all structures shall be compatible with the existing structures.

No omissions or ambiguities on the drawings or in these Specification will relieve the Contractor from furnishing first class materials and workmanship. Should any inaccuracies be found the Contractor shall notify Employer and any further work done before these discrepancies are corrected will be at the Contractor's risk.



9.2 Materials.

The materials shall conform to the following requirements:

Item	Description	Unit	Minimum Value
1.	Tensile and Yield strength The quality of steel used for support members and bolts.		
1.1	Mild steel		
	(a) Tensile strength	kg/mm ²	24
	(b) Yield strength	kg/mm ²	14
1.2	High strength steel		
	(a) Tensile strength	kg/mm ²	36
	(b) Yield strength	kg/mm ²	20

9.3 Design of Steel Structures.

Design Methods.

The stress analysis shall be conducted by the force diagram method for all type of steel structures. Any computer programs to be employed, shall be prepared or approved by a recognized institute and be submitted to Employer.

Loading Conditions.

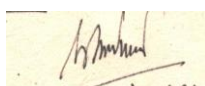
In additions to dynamic loads imposed by equipment, steelwork shall be design to withstand simultaneously wind and other loads as follows:

Design Load.

a. Wind Load.

On flat steel surface	121 kg/m ²
For lattice structures	121 kg/m ² of 1.71 times the projected area of the members of one face of the structure
On line trap, disconnecting switch	50 kg/m ²
On overhead ground wire, Conductor	75 kg/m ²
On porcelain insulator Strings and all other section	50 kg/m ²

b. Human Load. 240 kg at the center of the beam.




c. Load due to conductor and weight of equipment and accessories.

Loads due to the ACSR conductor shall be wind load, dead weight and short circuit forces.

Weight of equipment including insulator string shall be according to actual installation.

Normal Working Condition.

The normal working condition for various loads shall be deemed to work simultaneously. The take-off structure shall be subjected to a vertical uplift of 500 kg. at each supporting point of overhead ground wire and conductor. The tension for conductor and ground wire will be 750 and 350 kg respectively and angle of deviation will be 15^0 .

Combination of loads.

The Contractor shall calculate the maximum and minimum stresses at any combinations of loading conditions.

Safety Factors.

The safety factors shall be not less than two (2) times for normal working conditions and 1.5 in combination with short circuit forces.

Design and Ultimate Stress Allowed in Design.

For tensile members of steel structure the design stress shall not exceed the yield point of materials even under test loading condition. For compressive members the design stress shall not exceed the value of the ultimate buckling stress.

Ultimate stress allowed in design shall be as follows :

Members:

Buckling	As per ASCE Manuals and Reports on Engineering Practice-No. 52.
Tension	less than 1.00 F_y
Bearing	less than 1.80 F_y

Bolts:

Shear	less than 0.60 F_u
Bearing	less than 1.00 F_u

Where : F_y : Yield point of steel member materials
 F_u : Ultimate tensile stress of bolt materials

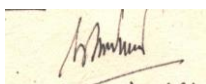
Limit of Effective Slenderness Ratio.

The effective slenderness ratio (L/r) of members shall meet the following limits:

Leg member, main compression member and ground wire peaks = 120

Other members having computed compressive stresses= 200

Secondary members without computed compressive stresses = 250



Tension member = 350

Where : L : Length of the unsupported panel of member
 r : Radius of gyration of members.

In determining the slenderness ratio for various member, suitable provisions shall be taken into consideration for various types of end connections, eccentricity of load transfer in the members etc. The unsupported length "L" shall be considered from centre to centre of intersections or working lines at both ends of members. A single bolt connection shall not be considered as offering restraint against rotation. A multiple bolt connection with minimum two (2) bolts; properly detailed to minimize eccentricities shall be considered to offer partial restraint, if such connection is to a member having adequate strength to resist rotation of joint. Points of intermediate supports shall not be considered as offering full restraint to rotation, if the same is provided only on one flange of the member. For members of double-diagonal web system which are bolted at their point of intersection, max L/r shall be determined from the following criteria:

'L' is the greatest distance from the point of the intersection to either of the end connections and 'r' is the minimum radius of gyration of the member.

'L' is equal to 0.75 times the distance between the end connections and 'r' is the radius of gyration of the member for its axis parallel to the plane of connected leg.

Minimum Thickness and Size of Steel Members.

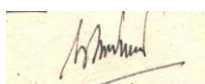
Minimum thickness and size of steel members of structures shall be as follows:

Calculated members	40x5 mm
All other stressed members and secondary members	not less than L40x4 mm
Gusset plates	not less than 5 mm
Bolts and nuts	M-12 mm

In computing the net section of tension members, the diameter of the bolt holes shall be taken as 3.0 mm greater than the nominal diameter of the bolts. Net section on both straight and zigzag sections across the members shall be as specified in ASCE or BS.

Connections.

- Bolts.** All connections shall be bolted and all stressed members shall be connected by at least one(1) bolt. For structural connections, a maximum of two bolt sizes may be used for each tower type provided the quantity of each size is not less than 20 per cent of the total requirement for the tower and the bolts in any one connection are uniform in size.
- Splices.** The number of splices shall be practically minimum. Splices shall develop the maximum stress in member or seventy (70%) percent of compressive strength of gross section or tensile stress of net section. No credit shall be allowed for bearing on abutting areas.



Design Drawings and Calculation.

The design drawings shall show the following data and information

Scaled line diagram of the steel structures showing all redundant bracing members and their sizes completely dimensioned and proving compliance with all clearance requirements.

All loadings and their manners of application including the determination of wind load (wind load on structure shall be applied at each panel point along the height of the steel structure.)

Calculations showing:

- a. Total stresses in each member for each loading case and the critical case.
- b. The effective slenderness ratio, calculated stress ratio of maximum total stress to calculated stress for each member and strength of connection.
- c. The estimated weight of the complete galvanized steel structures.
- d. Size and type of steel for each member and number of bolts required for its connection.
- e. The compression and uplift reactions and corresponding horizontal shears at each leg of all steel structures (column and equipment supports) for all loading cases.

9.4 Detailing

Detailing shall be as follows:

General. Steel structure dimensions, framing, member sizes and length, number, size and length of bolts, thickness of each filler, and other necessary details to fabricate each piece shall be shown on the approved detail drawings. No change shall be made without the written approval of Employer.

All web members shall be in one piece where practicable. All double diagonal web system members shall be connected at their point of intersection by at least one bolt.

Step Bolts. Step bolts shall be of 16 mm diameter and shall have round or hexagonal head. Each step bolt shall be provided with two hexagonal nuts. The minimum bolt length and length of unthreaded portion shall be 180 and 125 mm respectively. Step bolts shall not be used as connection bolts.

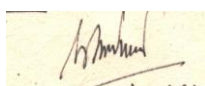
The step bolts shall be spaced alternately on the inner gauge line on each face of the angle about 40 cm centers. They shall be furnished for one leg of each steel tower from the base elevation of the steel tower.

Step bolts for lattice single pole or H-frames are not required.

U-Bolts.

U-bolts shall be suitably furnished on steel structures to suspend or terminate insulator strings or ground wire assemblies. Size of U-bolt shall withstand all loads acting on it.

Detail Drawings.



Detail drawings shall be complete with sizes and detail dimensions of all steel structure members. At each joint, there shall be the number, size and length of bolts, number and size of fillers and detail dimensions of gusset plate, if any.

Bill of Material.

Bill of materials shall give the size length and galvanized weight of each member and the total weights of steel structures. It shall also include the number of bolts, nuts and washer per structure.

9.5 Fabrications.

Workmanship.

Workmanship shall be first class throughout. All pieces must be straight, true to detail drawings and free from lamination flaws and other defects. All clipping, backcuts, grindings, bends, holes and etc. must be true to detail drawings and free of burrs.

All identical pieces bearing the same erection number must be exactly interchangeable with each other and interchangeable in their relative position in all towers or structures of which they form a part.

Threads of bolts and nuts shall be cleanly rolled or cut and the face and head of nut shall be truly at right angle to the axis of the bolt.

Cleaning and Galvanizing.

- a. Cleaning. After fabrication has been completed and accepted, all materials shall be clear of rust, loose scale, dirt, oil, grease and other foreign substances.
- b. Galvanizing. All materials shall be hot-dip galvanized after fabrication and cleaning. Retapping of nuts after galvanizing is not required.

Galvanizing for structural mild steel products shall meet the requirements of ASTM A123. All holes in materials shall be free of excess splinter after galvanizing.

Galvanizing for bolts, nuts, washers, lock nuts, step bolts and similar hardware shall meet requirements of ASTM A153. Excess spelter on bolts, nuts, washers, lockouts, step bolts and similar hardware shall be removed by appropriate means acceptable to Employer.

Finished materials shall be dipped into the solution of dichromate after galvanizing for white rust protection during sea transportation.

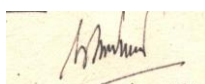
- c. Uniformity of Coating. The uniformity of coating test shall be made in accordance with ASTM A239. The minimum repetition times for one minute dip in uniformity test shall be as follows :

Steel shapes and plates..... 6
Bolts, nuts and similar hardware.....4

Galvanizing Coating Weight

Coating Weight (g/sq.m)

Uniformity Test



Description	Thickness	Average Value	Minimum Value	Time (1 min./1 time)
Shaped steel	Over 6mm	more than 700	more than 610	more than 6
Steel plates	Under 6mm	more than 610	more than 550	more than 6
Bolts, Nuts & washers etc		more than 470	more than 400	more than 4

- d. Straightening after Galvanizing. All plates and shapes which have been warped by the galvanizing process shall be straightened by being rerolled or pressed. The materials shall not be hammered or otherwise straightened in a manner that will injure the protective coating. If, in the opinion of Employer, the material has been hardfully bent or warped in the process of galvanizing or fabrication, such defects shall be cause for rejection.
- e. Repair of Galvanizing. Materials on which galvanizing has been damaged shall be acid stripped and regalvanized, unless, in the opinion of Employer, the damage is local and can be repaired by zinc spraying or by applying a coating of galvanizing repair compound. Where regalvanizing is required, any member which becomes damaged after having been dipped twice shall be rejected.
- f. Shop Assembly. One of each type of steel structure shall be assembled in the shop to such an extent as to insure proper field erection. Reaming of untrue holes will not be permitted. A reasonable amount of drifting will be allowed in assembling. Shop assembled parts shall be dismantled for shipment.

9.6 Shop Test.

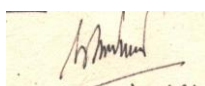
The following shop test shall be performed with relevant provisions of the ASTM.

- General inspection
- Material tests
- Assembly test
- Galvanizing test

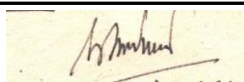
The Contractor shall furnish four certified copies of report of all tests to Employer. The cost of all tests and reports shall be borne by the Contractor.

9.7 Payment

Payment for the Contract item, "Steel Structures" will be made at the unit / lump sum price per steel structures type bid therefor in the Price Schedule, which unit/lump sum price shall include full compensation for all costs incurred in furnishing all materials, equipment and labor and all other operations related to steel structure design, fabrication, installation etc.




SECTION - II TECHNICAL DATA SHEET



ITEM No. 1: 132/33kV, 100MVA POWER TRANSFORMER

ITEM No.1: POWER TRANSFORMER				Sheet 1 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/33kV, 80/100MVA
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC 60076	
5	Type		Outdoor, oil immersed, Core Type	
6	Winding / Phase		Three	
7	Cooling		ONAN / ONAF	
8	Ratings			
8.1	Rated MVA			
8.1.1	ONAN	MVA	80	
8.1.2	ONAF	MVA	100	
8.2	Rated Voltage			
8.2.1	Primary	kV	132	
8.2.2	Secondary	kV	33	
8.2.3	Tertiary	kV	11	
8.3	Maximum Voltage			
8.3.1	Primary	kV	145	
8.3.2	Secondary	kV	36	
8.3.3	Tertiary	kV	12	
8.4	Number of Phases		Three	
8.5	Rated Frequency	Hz	50	
9	Noise Level			
	On ONAN Rating	dB	<73	
	On ONAF Rating Rated Voltage	dB	<75	
10	Temperature Rise			
10.1	Temperature Rise above 45°C ambient			
	- In Oil by Thermometer	°C	50	
	- In Winding By Resistance	°C	55	
10.2	Hottest Spot Temperature in Winding Limited to	°C	As per IEC	
10.3	Temperature Indicators Make		KHILSTROM, Sweden or Equi.	
11	Connection			
11.1	High Voltage		Star	
11.2	Low Voltage		Star	
11.3	Tertiary		Delta	



ITEM No.1: POWER TRANSFORMER			Sheet 2 of 6	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/33kV, 80/100MVA
11.4	Vector Group Ref in accordance with IEC		YNyn0d11	
12	Taps			
12.1	Type of Tap changer		OLTC	
12.2	Tap Step		1.25%	
12.3	Tap Range		± 10%	
12.4	Nos. of Tap		17	
13	Cooling Equipment (For ONAF)			
13.1	Manufacturer/ Type			
13.2	Number of Fans Connected	Nos		
13.3	Rated Operating Voltage, Vac	Vac	230/400, 50Hz	
13.4	Rated Control Voltage, V	Vdc	110	
13.5	Rated Power	kW		
14	OLTC Gear			
14.1	Manufacturer / Type	MR Germany, ABB Sweden or equivalent/ Vacuum Type		
14.2	Rating - Rated Voltage - Rated Current - Step Voltage - Numbers of Steps	kV A V Nos	Suitable for 132kV Class 17	
14.3	Control Suitable For - Remote / Local Operation - Auto / Manual Operation - Parallel Operation - Master Slave Operation	Yes/No Yes/No	Remote / Local Auto / Manual Yes Yes	
14.4	Rated voltage of Drive Motor	Vac	230/400 50Hz	
15	Transformer Bushing			
15.1	Manufacturer and country of origin			
15.2	Year of manufacturing experience			
15.3	Applied standard		IEC 60137/ DIN 42530	
15.4	Bushing type a) HV b) MV c) LV		As per technical specifications for various voltage rating	
16	Online Dissolved Gas & Moisture Measuring Equipment			
16.1	Manufacturer and country of origin			
16.2	Year of manufacturing experience			
16.3	Applied standard		IEC 60599- 1999	
17	Guaranteed losses			



ITEM No.1: POWER TRANSFORMER (132/33kV, 80/100MVA)				Sheet 3 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
17.1	No Load Losses at Rated Voltage and Frequency on Max. MVA Base.	kW		
17.2	Load Losses at rated Current and at 75°C on max. MVA base	kW		
17.3	Cooler Losses for full load operation on max. MVA base	kW		
18	Impedance at Rated Current and Frequency at 75°C Winding Temperatures on ONAF, MVA Base. (Tolerance $\pm 7.5\%$ of the Declared Value)	%	(percentage impedance shall be matched with that of existing transformer for parallel operation)	
18.1	Positive Sequence Impedance at nameplate Normal tap	%	12.50%	
18.2	Positive Sequence at Maximum Voltage Tap (Tap 17)	%		
18.3	Positive Sequence at Minimum Voltage Tap (Tap 1)	%		
18.4	Zero Sequence at Nameplate Tap			
19	Reactance at rated current and Frequency at 75°C on Maximum MVA base at a nameplate tap			
20	Efficiency at 75°C Winding Temperature at PF=0.9			
20.1	At 100% Load	%		
20.2	At 75% Load	%		
20.3	At 50% Load	%	Above 99%	
21	Load in Percentage of Full Load and Power Factor at which maximum efficiency occurs.			
22	Regulation at full Load and at 75C			
22.1	At Unity Power Factor			
22.2	At 0.85 Power Factor Lagging			
23	No Load Current in Percentage of rated Current referred to HV and 50Hz.			
23.1	At 90% Rated Voltage	%		
23.2	At 100% Rated Voltage	%	<1	
23.3	At 110% Rated Voltage	%		
24	Clearances			
24.1	Minimum Clearances in air-HV/LV	mm		
24.2	Between Phases Between Phase and Earth	mm		
25	Insulation Level			



ITEM No.1: POWER TRANSFORMER (132/33kV, 80/100MVA)				Sheet 4 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
25.1	Power Frequency Withstand Voltage (1 Min rms)			
25.1.1	Primary	kV	275	
25.1.2	Secondary	kV	70	
25.1.3	Tertiary (if Provided)	kV	28	
25.2	Impulse Withstand Voltage			
25.2.1	Primary	kV	650 (Crest)	
25.2.2	Secondary	kV	170 (Crest)	
25.2.2	Tertiary(if Provided)	kV	75 (Crest)	
26	Details of Oil Preservation System			
26.1	Type		Conservator Type	
26.2	Details of Oil Preservation System			
26.3	If Conservator Type, Urethane Air Cell provided	Yes/No	Yes	
26.4	Volume of Conservator	Cu.m		
26.5	Volume of Oil Between the highest and Lowest Levels	Ltrs		
26.6	Breather			
i.	Manufacturer and Country of origin			
ii.	Manufacturer's Type designation			
iii.	Type		Maintenance Free	
27	Pressure Relief Device Min. pressure setting	kg/cm2		
28	Details of Bushings HV / LV / Neutral			
28.1	Manufacturer / Type			
28.2	Voltage class	kV	145/36/12	
28.2	Creepage Distance	mm	25mm/kV	
28.3	Weight of Bushing	kg		
28.4	Standard Reference		IEC	
28.5	Dry Flash over Voltage	kV	275/70/28	
28.6	Wet Flash Over Voltage	kV	275/70/28	
28.7	Impulse Withstand Voltage	kV	650/170/75	
29	Insulating Oil			
i	Manufacturer and Country of Origin			
ii	Manufacturer's type designation			
iii	Type		Insulating Oil	
iv	Applicable standard		IEC	
v	Technical Specifications: As per General Technical Specifications			
vi.	PCB Content		Not Detectable	
vii.	Approx. volume of Oil, ltrs			



ITEM No.1: POWER TRANSFORMER (132/33kV, 80/100MVA)				Sheet 5 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
viii	Whether First filled of Oil with 5% excess provided	Yes/No	Yes	
30	Core Material			
30.1	Maximum flux density at rated voltage on principal tapping and rated frequency:			
	Transformer legs	T		
	Transformer yokes	T		
30.2	Maximum flux density at 110% voltage			
	Transformer legs	T	< 1.9	
	Transformer yokes	T	< 1.9	
30.3	Grade of core used	Prime core		
31	Type of Core	CRGO		
31.1	Maximum current density in windings at rated output:			
	Primary (HV)	A/mm ²		
	Secondary (LV)	A/mm ²		
	Weight of copper in windings:			
	Primary (HV)			
	Secondary (LV)			
32	Bushing Current Transformers			
32.1	Numbers of Cores - HV - LV - Neutral	Nos Nos Nos	1 / phase 1 / phase 1	
32.2	Accuracy class / Burden/Ratio - HV / HV Neutral - LV / LV Neutral		PS / 20VA/450/1 PS / 20VA/1800/1	
33	Lightning Arrestor mounted on - HV - LV	Yes/No Yes/No	No Yes	
34	RTCC Panel Details			
34.1	AVR make / Model	MR Germany, ABB Sweden		
34.2	Annunciator 12 Windows provided	Yes/No	Yes	
34.3	Indicating Voltmeter	Yes/No	Yes	
34.4	Facilities and Provision as per specification provided?	Yes/No	Yes	
35	Approximate Overall Dimension (L x W x H)	m		
36	Approximate Weights	Metric Ton	140 (Approx.)	
36.1	Core and Coil	kg		
36.2	Tank and fittings	kg		
36.3	Oil	kg		
36.4	Total Weight	kg		



37	Delivery of Equipment in Months, following the Award of Contract (Allowing the time for Drawing Approval)		Months	
38	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
39	Type test certificate submitted?	Yes/No	Yes	
40	Has manufacturer exported units?	Yes/No	Yes	
41	User's certificate submitted?	Yes/No	Yes	
42	Technical literature / drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....

As representative for.....

Address.....

Date.....

[Handwritten signature]



ITEM No. 2: 132/33kV, 63MVA, 3-phase POWER TRANSFORMER

ITEM No.1: POWER TRANSFORMER				Sheet 1 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/33kV, 40/51.5/63MVA
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, oil immersed, Core Type	
6	Cooling		ONAN / ONAF1 / ONAF2	
7	Ratings			
7.1	Rated MVA			
7.1.1	ONAN	MVA	40	
7.1.2	ONAF	MVA	51.5/63	
7.2	Rated Voltage			
7.2.1	Primary	kV	132	
7.2.2	Secondary	kV	33	
7.3	Maximum Voltage			
7.3.1	Primary	kV	145	
7.3.2	Secondary	kV	36	
7.4	Number of Phases		Three	
7.5	Rated Frequency	Hz	50	
8	Noise Level			
	On ONAN Rating	dB	<73	
	On ONAF Rating Rated Voltage	dB	<75	
9	Temperature Rise			
9.1	Temperature Rise above 45°C ambient			
	- In Oil by Thermometer	°C	50	
	- In Winding By Resistance	°C	55	
9.2	Hottest Spot Temperature in Winding Limited to	°C	As per IEC	
9.3	Temperature Indicators Make		KHILSTROM, Sweden or Equi.	
10	Connection			
10.1	High Voltage		Star	
10.2	Low Voltage		Star	



ITEM No.2: POWER TRANSFORMER				Sheet 2 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/33kV,40/51.5/63MVA
10.3	Vector Group Ref in accordance with IEC 76		YNyn0	
11	Taps			
11.1	Type of Tap changer		OLTC	
11.2	Tap Step		1.25%	
11.3	Tap Range		± 10%	
11.4	Nos. of Tap		17	
12	Cooling Equipment (For ONAF)			
12.1	Manufacturer/ Type			
12.2	Number of Fans Connected	Nos		
12.3	Rated Operating Voltage, Vac	Vac	230/400, 50Hz	
12.4	Rated Control Voltage, V	Vdc	110	
12.5	Rated Power	kW		
13	OLTC Gear			
13.1	Manufacturer / Type	MR Germany, ABB Sweden or equivalent/ Vacuum Type		
13.2	Rating - Rated Voltage - Rated Current - Step Voltage - Numbers of Steps	kV A V Nos	Suitable for 132kV Class 17	
13.3	Control Suitable For - Remote / Local Operation - Auto / Manual Operation - Parallel Operation - Master Slave Operation	Yes/No Yes/No	Remote / Local Auto / Manual Yes Yes	
13.4	Rated voltage of Drive Motor	Vac	230/400 50Hz	
14	Transformer Bushing			
14.1	Manufacturer and country of origin			
14.2	Year of manufacturing experience			
14.3	Applied standard		IEC 60137/ DIN 42530	
14.4	Bushing type a) HV b) MV c) LV		As per technical specifications for various voltage rating	
15	Online Dissolved Gas & Moisture Measuring Equipment			
15.1	Manufacturer and country of origin			
15.2	Year of manufacturing experience			
15.3	Applied standard		IEC 60599- 1999	
16	Guaranteed losses			



ITEM No.2: POWER TRANSFORMER 132/33kV, 40/51.5/63MVA				Sheet 3 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
16.1	No Load Losses at Rated Voltage and Frequency on Max. MVA Base.	kW		
16.2	Load Losses at rated Current and at 75°C on max. MVA base	kW		
16.3	Cooler Losses for full load operation on max. MVA base	kW		
17	Impedance at Rated Current and Frequency at 75°C Winding Temperatures on ONAF, MVA Base. (Tolerance $\pm 7.5\%$ of the Declared Value)	%	(percentage impedance shall match with that of existing transformer for parallel operation)	
17.1	Positive Sequence Impedance at nameplate Normal tap	%	12.30-12.52%	
17.2	Positive Sequence at Maximum Voltage Tap (Tap 17)	%		
17.3	Positive Sequence at Minimum Voltage Tap (Tap 1)	%		
17.4	Zero Sequence at Nameplate Tap			
18	Reactance at rated current and Frequency at 75°C on Maximum MVA base at a nameplate tap			
19	Efficiency at 75°C Winding Temperature at PF=0.9			
19.1	At 100% Load	%		
19.2	At 75% Load	%		
19.3	At 50% Load	%	Above 99%	
20	Load in Percentage of Full Load and Power Factor at which maximum efficiency occurs.			
21	Regulation at full Load and at 75C			
21.1	At Unity Power Factor			
21.2	At 0.85 Power Factor Lagging			
22	No Load Current in Percentage of rated Current referred to HV and 50Hz.			
22.1	At 90% Rated Voltage	%		
22.2	At 100% Rated Voltage	%	<1	
22.3	At 110% Rated Voltage	%		
23	Clearances			
23.1	Minimum Clearances in air-HV/LV	mm		



ITEM No.2: POWER TRANSFORMER 132/33kV, 40/51.5/63MVA				Sheet 4 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
23.2	Between Phases and Between Phase and Earth	mm		
24	Insulation Level			
24.1	Power Frequency Withstand Voltage (1Min rms)			
24.1.1	Primary	kV	275	
24.1.2	Secondary	kV	70	
24.2	Impulse Withstand Voltage			
24.2.1	Primary	kV	650 (Crest)	
24.2.2	Secondary	kV	170 (Crest)	
25	Details of Oil Preservation System			
25.1	Type		Conservator Type	
25.2	Details of Oil Preservation System			
25.3	If Conservator Type, Urethane Air Cell provided	Yes/No	Yes	
25.4	Volume of Conservator	Cu.m		
25.5	Volume of Oil Between the highest and Lowest Levels	Ltrs		
25.6	Breather			
i.	Manufacturer and Country of origin			
ii.	Manufacturer's Type designation			
iii.	Type		Maintenance Free	
26	Pressure Relief Device Min. pressure setting	kg/cm2		
27	Details of Bushings HV / LV / Neutral			
27.1	Manufacturer / Type			
27.2	Voltage class	kV	145/36	
27.2	Creepage Distance	mm	25mm/kV	
27.3	Weight of Bushing	kg		
27.4	Standard Reference		IEC	
27.5	Dry Flash over Voltage	kV	275/70	
27.6	Wet Flash Over Voltage	kV	275/70	
27.7	Impulse Withstand Voltage	kV	650/170	
28	Insulating Oil			
i	Manufacturer and Country of Origin			
ii	Manufacturer's type designation			
iii	Type		Insulating Oil	
iv	Applicable standard		IEC	



ITEM No.2: POWER TRANSFORMER 132/33kV, 40/51.5/63MVA				Sheet 5 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
v	Technical Specifications: As per General Technical Specifications			
vi.	PCB Content		Not Detectable	
vii.	Approx. volume of Oil, ltrs			
viii	Whether First filled of Oil with 5% excess provided	Yes/No	Yes	
29	Core Material			
29.1	Maximum flux density at rated voltage on principal tapping and rated frequency:			
	Transformer legs	T		
	Transformer yokes	T		
29.2	Maximum flux density at 110% voltage			
	Transformer legs	T	< 1.9	
	Transformer yokes	T	< 1.9	
29.3	Grade of core used	Prime core		
30	Type of Core	CRGO		
	Thickness of core lamination			
	Rated Loss per kg			
30.1	Maximum current density in windings at rated output:			
	Primary (HV)	A/mm ²		
	Secondary (LV)	A/mm ²		
	Weight of copper in windings:			
	Primary (HV)			
	Secondary (LV)			
31	Bushing Current Transformers			
31.1	Numbers of Cores - HV - LV - Neutral	Nos Nos Nos	1 / phase 1 / phase 1	
31.2	Accuracy class / Burden/Ratio - HV / HV Neutral - LV / LV Neutral		PS / 20VA/300/1 PS / 20VA/1200/1	
32	Lightning Arrestor mounted on - HV - LV	Yes/No Yes/No	No Yes	
33	RTCC Panel Details			
33.1	AVR make / Model	MR Germany, ABB Sweden		
33.2	Annunciator 12 Windows provided	Yes/No	Yes	
33.3	Indicating Voltmeter	Yes/No	Yes	
33.4	Facilities and Provision as per	Yes/No	Yes	



	specification provided?			
34	Approximate Overall Dimension (L x W x H)			
35	Approximate Weights			
35.1	Core and Coil	kg		
35.2	Tank and fittings	kg		
35.3	Oil	kg		
35.4	Total Weight	kg		
36	Delivery of Equipment in Months, following the Award of Contract (Allowing the time for Drawing Approval)		Months	
37	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
38	Type test certificate submitted?	Yes/No	Yes	
39	Has manufacturer exported units?	Yes/No	Yes	
40	User's certificate submitted?	Yes/No	Yes	
41	Technical literature / drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....

As representative for.....

Address.....

Date.....

Handwritten signature



ITEM No. 3: 132/11kV, 31.5/45MVA POWER TRANSFORMER

ITEM No.3: 132/11kV, 45MVA POWER TRANSFORMER				Sheet 1 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/11kV, 31.5/45 MVA
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, oil immersed, Core Type	
6	Cooling		ONAN / ONAF	
7	Ratings			
7.1	Rated MVA			
7.1.1	ONAN	MVA	31.5	
7.1.2	ONAF	MVA	45	
7.2	Rated Voltage			
7.2.1	Primary	kV	132	
7.2.2	Secondary	kV	11	
7.3	Maximum Voltage			
7.3.1	Primary	kV	145	
7.3.2	Secondary	kV	12	
7.4	Number of Phases		Three	
7.5	Rated Frequency	Hz	50	
8	Noise Level			
	On ONAN Rating	dB	<73	
	On ONAF Rating Rated Voltage	dB	<75	
9	Temperature Rise			
9.1	Temperature Rise above 45°C ambient			
	- In Oil by Thermometer	°C	50	
	- In Winding By Resistance	°C	55	
9.2	Hottest Spot Temperature in Winding Limited to	°C	As per IEC	
9.3	Temperature Indicators Make		KHILSTROM, Sweden or Equi.	
10	Connection			
10.1	High Voltage		Star	
10.2	Low Voltage		Star	
10.3	Vector Group Ref in accordance with IEC 76		YNyn0	
ITEM No.3: 132/11kV, 31.5/45MVA POWER TRANSFORMER				Sheet 2 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/11kV, 31.5/45 MVA



11	Taps			
11.1	Type of Tap changer		OLTC	
11.2	Tap Step		1.25%	
11.3	Tap Range		± 10%	
11.4	Nos. of Tap		17	
12	Cooling Equipment (For ONAF)			
12.1	Manufacturer/ Type			
12.2	Number of Fans Connected	Nos		
12.3	Rated Operating Voltage, Vac	Vac	230/400, 50Hz	
12.4	Rated Control Voltage, V	Vdc	110	
12.5	Rated Power	kW		
13	OLTC Gear			
13.1	Manufacturer / Type	MR Germany, ABB Sweden or equivalent/ Vacuum Type		
13.2	Rating - Rated Voltage - Rated Current - Step Voltage - Numbers of Steps	kV A V Nos	Suitable for 132kV class 17	
13.3	Control Suitable For - Remote / Local Operation - Auto / Manual Operation - Parallel Operation - Master Slave Operation	Yes/No Yes/No	Remote / Local Auto / Manual Yes Yes	
13.4	Rated voltage of Drive Motor	Vac	230/400 50Hz	
14	Transformer Bushing			
14.1	Manufacturer and country of origin			
14.2	Year of manufacturing experience			
14.3	Applied standard		IEC 60137/ DIN 42530	
14.4	Bushing type a) HV b) MV c) LV		As per technical specifications for various voltage rating	
15	Online Dissolved Gas & Moisture Measuring Equipment			
15.1	Manufacturer and country of origin			
15.2	Year of manufacturing experience			
15.3	Applied standard		IEC 60599- 1999	
16	Guaranteed losses			
16.1	No Load Losses at Rated Voltage and Frequency on Max. MVA Base.	kW		
ITEM No.3: 132/11kV, 31.5/45MVA POWER TRANSFORMER				
				Sheet 3 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
16.2	Load Losses at rated Current and at 75°C on max. MVA base	kW		



16.3	Cooler Losses for full load operation on max. MVA base	kW		
17	Impedance at Rated Current and Frequency at 75°C Winding Temperatures on ONAF, MVA Base. (Tolerance $\pm$ 7.5% of the Declared Value), percentage impedance shall match with that of existing Transformer.	%	(percentage impedance shall match with that of existing transformer for parallel operation)	
17.1	Positive Sequence Impedance at nameplate Normal tap	%	10.65%	
17.2	Positive Sequence at Maximum Voltage Tap (Tap 17)	%	10.60%	
17.3	Positive Sequence at Minimum Voltage Tap (Tap 1)	%	11.17%	
17.4	Zero Sequence at Nameplate Tap			
18	Reactance at rated current and Frequency at 75°C on Maximum MVA base at a nameplate tap			
19	Efficiency at 75°C Winding Temperature at PF=0.9			
19.1	At 100% Load	%	Above 99%	
19.2	At 75% Load	%		
19.3	At 50% Load	%		
20	Load in Percentage of Full Load and Power Factor at which maximum efficiency occurs.			
21	Regulation at full Load and at 75C			
21.1	At Unity Power Factor			
21.2	At 0.85 Power Factor Lagging			
22	No Load Current in Percentage of rated Current referred to HV and 50Hz.			
22.1	At 90% Rated Voltage	%		
22.2	At 100% Rated Voltage	%	<1	
22.3	At 110% Rated Voltage	%		
23	Clearances			
23.1	Minimum Clearances in air-HV/LV	mm		
23.2	Between Phases Between Phase and Earth	mm		
24	Insulation Level			
24.1	Power Frequency Withstand Voltage (1Min rms)			
ITEM No.3: 132/11kV, 31.5/45MVA POWER TRANSFORMER				Sheet 4 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
24.1.1	Primary	kV	275	
24.1.2	Secondary	kV	28	



24.2	Impulse Withstand Voltage			
24.2.1	Primary	kV	650(Crest)	
24.2.2	Secondary	kV	75(Crest)	
25	Details of Oil Preservation System			
25.1	Type		Conservator Type	
25.2	Details of Oil Preservation System			
25.3	If Conservator Type, Urethane Air Cell provided	Yes/No	Yes	
25.4	Volume of Conservator	Cu.m		
25.5	Volume of Oil Between the highest and Lowest Levels	Ltrs		
25.6	Breather			
i.	Manufacturer and Country of origin			
ii.	Manufacturer's Type designation			
iii.	Type		Maintenance Free	
26	Pressure Relief Device	kg/cm2		
	Min. pressure setting			
27	Details of Bushings HV / LV / Neutral			
27.1	Manufacturer / Type			
27.2	Voltage class	kV	145/12	
27.2	Creepage Distance	mm	25mm/kV	
27.3	Weight of Bushing	kg		
27.4	Standard Reference		IEC	
27.5	Dry Flash over Voltage	kV	275/28	
27.6	Wet Flash Over Voltage	kV	275/28	
27.7	Impulse Withstand Voltage	kV	650/75	
28	Insulating Oil			
i	Manufacturer and Country of Origin			
ii	Manufacturer's type designation			
iii	Type		Insulating Oil	
iv	Applicable standard		IEC	
v	Technical Specifications: As per General Technical Specifications			
vi.	PCB Content		Not Detectable	
vii.	Approx. volume of Oil, ltrs			
viii	Whether First filled of Oil with 5% excess provided	Yes/No	Yes	
29	Core Material			
29.1	Maximum flux density at rated voltage on principal tapping and rated frequency:			
ITEM No.3: 132/11kV, 31.5/45MVA POWER TRANSFORMER				Sheet 5 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
	Transformer legs	T		
	Transformer yokes	T		

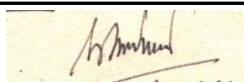


29.2	Maximum flux density at 110% voltage			
	Transformer legs	T	< 1.9	
	Transformer yokes	T	< 1.9	
30	Type of Core	CRGO		
	Thickness of core lamination			
	Rated Loss per kg			
30.1	Maximum current density in windings at rated output:			
	Primary (HV)	A/mm ²		
	Secondary (LV)	A/mm ²		
	Weight of copper in windings:			
	Primary (HV)			
	Secondary (LV)			
31	Bushing Current Transformers			
31.1	Numbers of Cores - HV - LV - Neutral	Nos Nos Nos	1 / phase 1 / phase 1	
31.2	Accuracy class / Burden/Ratio - HV / HV Neutral - LV / LV Neutral		PS / 20VA/200/1 PS/ 20VA/2400/1	
32	Lightning Arrestor mounted on - HV - LV	Yes/No Yes/No	No Yes	
33	RTCC Panel Details			
33.1	AVR make / Model	MR, Germany, ABB, Sweden		
33.2	Annunciator 12 Windows provided	Yes/No	Yes	
33.3	Indicating Voltmeter	Yes/No	Yes	
33.4	Facilities and Provision as per specification provided?	Yes/No	Yes	
34	Approximate Overall Dimension (L x W x H)			
35	Approximate Weights			
35.1	Core and Coil	kg		
35.2	Tank and fittings	kg		
35.3	Oil	kg		
35.4	Total Weight	kg		
36	Delivery of Equipment in Months, following the Award of Contract (Allowing the time for Drawing Approval)		Months	
37	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
38	Type test certificate submitted?	Yes/No	Yes	
39	Has manufacturer exported units?	Yes/No	Yes	
40	User's certificate submitted?	Yes/No	Yes	
41	Technical literature / drawings submitted?	Yes/No	Yes	



Deviations from technical requirements:

Signed.....
As representative for.....
Address.....
Date.....



ITEM No. 4: 132/66kV, 63MVA, 3-PHASE POWER TRANSFORMER

ITEM No.4: POWER TRANSFORMER				Sheet 1 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/66kV, 40/51.5/63MVA
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, oil immersed, Core Type	
6	Winding / Phase		Three	
7	Cooling		ONAN / ONAF / ONAF	
8	Ratings			
8.1	Rated MVA			
8.1.1	ONAN	MVA	40	
8.1.2	ONAF	MVA	51.5/63	
8.2	Rated Voltage			
8.2.1	Primary	kV	132	
8.2.2	Secondary	kV	66	
8.3	Maximum Voltage			
8.3.1	Primary	kV	145	
8.3.2	Secondary	kV	72	
8.4	Number of Phases		Three	
8.5	Rated Frequency	Hz	50	
9	Noise Level			
	On ONAN Rating	dB	<73	
	On ONAF Rating Rated Voltage	dB	<75	
10	Temperature Rise			
10.1	Temperature Rise above 45°C ambient			
	- In Oil by Thermometer	°C	50	
	- In Winding By Resistance	°C	55	
10.2	Hottest Spot Temperature in Winding Limited to	°C	As per IEC	
10.3	Temperature Indicators Make		KHILSTROM, Sweden or Equi.	
11	Connection			
11.1	High Voltage		Star	
11.2	Low Voltage		Star	



ITEM No.4: POWER TRANSFORMER				Sheet 2 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/66kV, 40/51.5/63MVA
11.4	Vector Group Ref in accordance with IEC 76		YNyn0	
12	Taps			
12.1	Type of Tap changer		OLTC	
12.2	Tap Step		1.25%	
12.3	Tap Range		± 10%	
12.4	Nos. of Tap		17	
13	Cooling Equipment (For ONAF)			
13.1	Manufacturer/ Type			
13.2	Number of Fans Connected	Nos		
13.3	Rated Operating Voltage, Vac	Vac	230/400, 50Hz	
13.4	Rated Control Voltage, V	Vdc	110	
13.5	Rated Power	kW		
14	OLTC Gear			
14.1	Manufacturer / Type	MR Germany, ABB Sweden or equivalent/ Vacuum Type		
14.2	Rating - Rated Voltage - Rated Current - Step Voltage - Numbers of Steps	kV A V Nos	Suitable for 132kV Class 17	
14.3	Control Suitable For - Remote / Local Operation - Auto / Manual Operation - Parallel Operation - Master Slave Operation	Yes/No Yes/No	Remote / Local Auto / Manual Yes Yes	
14.4	Rated voltage of Drive Motor	Vac	230/400 50Hz	
15	Transformer Bushing			
15.1	Manufacturer and country of origin			
15.2	Year of manufacturing experience			
15.3	Applied standard		IEC 60137/ DIN 42530	
15.4	Bushing type a) HV b) MV c) LV		As per technical specifications for various voltage rating	
16	Online Dissolved Gas & Moisture Measuring Equipment			
16.1	Manufacturer and country of origin			
16.2	Year of manufacturing experience			
16.3	Applied standard		IEC 60599- 1999	



ITEM No.4: POWER TRANSFORMER 132/66kV,40/51.5/63MVA				Sheet 3 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
17	Guaranteed losses			
17.1	No Load Losses at Rated Voltage and Frequency on Max. MVA Base.	kW		
17.2	Load Losses at rated Current and at 75°C on max. MVA base	kW		
17.3	Cooler Losses for full load operation on max. MVA base	kW		
18	Impedance at Rated Current and Frequency at 75°C Winding Temperatures on ONAF, MVA Base. (Tolerance $\pm 7.5\%$ of the Declared Value)	%	(percentage impedance shall match with that of existing transformer for parallel operation)	
18.1	Positive Sequence Impedance at nameplate Normal tap	%	12.30-12.52%	
86.2	Positive Sequence at Maximum Voltage Tap (Tap 17)	%		
18.3	Positive Sequence at Minimum Voltage Tap (Tap 1)	%		
18.4	Zero Sequence at Nameplate Tap			
19	Reactance at rated current and Frequency at 75°C on Maximum MVA base at a nameplate tap			
20	Efficiency at 75°C Winding Temperature at PF=0.9			
20.1	At 100% Load	%		
20.2	At 75% Load	%		
20.3	At 50% Load	%	Above 99%	
21	Load in Percentage of Full Load and Power Factor at which maximum efficiency occurs.			
22	Regulation at full Load and at 75C			
22.1	At Unity Power Factor			
22.2	At 0.85 Power Factor Lagging			
23	No Load Current in Percentage of rated Current referred to HV and 50Hz.			
23.1	At 90% Rated Voltage	%		
23.2	At 100% Rated Voltage	%	<1	
23.3	At 110% Rated Voltage	%		



24	Clearances			
ITEM No.4: POWER TRANSFORMER 132/66kV,40/51.5/63MVA				Sheet 4 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
24.1	Minimum Clearances in air-HV/LV	mm		
24.2	Between Phases Between Phase and Earth	mm		
25	Insulation Level			
25.1	Power Frequency Withstand Voltage (1Min rms)			
25.1.1	Primary	kV	275	
25.1.2	Secondary	kV	140	
25.2	Impulse Withstand Voltage			
25.2.1	Primary	kV	650 (Crest)	
25.2.2	Secondary	kV	325 (Crest)	
26	Details of Oil Preservation System			
26.1	Type		Conservator Type	
26.2	Details of Oil Preservation System			
26.3	If Conservator Type, Urethane Air Cell provided	Yes/No	Yes	
26.4	Volume of Conservator	Cu.m		
26.5	Volume of Oil Between the highest and Lowest Levels	Ltrs		
26.6	Breather			
i.	Manufacturer and Country of origin			
ii.	Manufacturer's Type designation			
iii.	Type		Maintenance Free	
27	Pressure Relief Device Min. pressure setting	kg/cm2		
28	Details of Bushings HV / LV / Neutral			
28.1	Manufacturer / Type			
28.2	Voltage class	kV	145/72	
28.2	Creepage Distance	mm	25mm/kV	
28.3	Weight of Bushing	kg		
28.4	Standard Reference		IEC	
28.5	Dry Flash over Voltage	kV	275/140	
28.6	Wet Flash Over Voltage	kV	275/140	
28.7	Impulse Withstand Voltage	kV	650/325	
29	Insulating Oil			
i	Manufacturer and Country of			



	Origin			
ITEM No.4: POWER TRANSFORMER 132/66kV,40/51.5/63MVA				Sheet 5 of 6
	DESCRIPTION	UNIT	NEA REQ	
ii	Manufacturer's type designation			
iii	Type		Insulating Oil	
iv	Applicable standard		IEC	
v	Technical Specifications: As per General Technical Specifications			
vi.	PCB Content		Not Detectable	
vii.	Approx. volume of Oil, ltrs			
viii	Whether First filled of Oil with 5% excess provided	Yes/No	Yes	
30	Core Material			
30.1	Maximum flux density at rated voltage on principal tapping and rated frequency:			
	Transformer legs	T		
	Transformer yokes	T		
30.2	Maximum flux density at 110% voltage			
	Transformer legs	T	< 1.9	
	Transformer yokes	T	< 1.9	
30.3	Grade of core used	Prime core		
31	Type of Core	CRGO		
	Thickness of core lamination			
	Rated Loss per kg			
31.1	Maximum current density in windings at rated output:			
	Primary (HV)	A/mm ²		
	Secondary (LV)	A/mm ²		
	Weight of copper in windings:			
	Primary (HV)			
	Secondary (LV)			
32	Bushing Current Transformers			
32.1	Numbers of Cores - HV - LV - Neutral	Nos Nos Nos	1 / phase 1 / phase 1	
32.2	Accuracy class / Burden/Ratio - HV / HV Neutral - LV / LV Neutral		PS / 20VA/300/1 PS / 20VA/600/1	
33	Lightning Arrestor mounted on - HV - LV	Yes/No Yes/No	No Yes	
34	RTCC Panel Details			
34.1	AVR make / Model	MR Germany, ABB		



		Sweden		
34.2	Annunciator 12 Windows provided	Yes/No	Yes	
34.3	Indicating Voltmeter	Yes/No	Yes	
34.4	Facilities and Provision as per specification provided?	Yes/No	Yes	
35	Approximate Overall Dimension (L x W x H)			
36	Approximate Weights			
36.1	Core and Coil	kg		
36.2	Tank and fittings	kg		
36.3	Oil	kg		
36.4	Total Weight	kg		
37	Delivery of Equipment in Months, following the Award of Contract (Allowing the time for Drawing Approval)		Months	
38	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
39	Type test certificate submitted?	Yes/No	Yes	
40	Has manufacturer exported units?	Yes/No	Yes	
41	User's certificate submitted?	Yes/No	Yes	
42	Technical literature / drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....

As representative for.....

Address.....

Date.....

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ITEM No. 5: 132/66kV, 45MVA POWER TRANSFORMER

ITEM No.5: POWER TRANSFORMER				Sheet 1 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/66kV, 31.5/45MVA
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, oil immersed, Core Type	
6	Winding / Phase		Three	
7	Cooling		ONAN / ONAF	
8	Ratings			
8.1	Rated MVA			
8.1.1	ONAN	MVA	31.5	
8.1.2	ONAF	MVA	45	
8.2	Rated Voltage			
8.2.1	Primary	kV	132	
8.2.2	Secondary	kV	66	
8.3	Maximum Voltage			
8.3.1	Primary	kV	145	
8.3.2	Secondary	kV	72	
8.4	Number of Phases		Three	
8.5	Rated Frequency	Hz	50	
9	Noise Level			
	On ONAN Rating	dB	<73	
	On ONAF Rating Rated Voltage	dB	<75	
10	Temperature Rise			
10.1	Temperature Rise above 45°C ambient			
	- In Oil by Thermometer	°C	50	
	- In Winding By Resistance	°C	55	
10.2	Hottest Spot Temperature in Winding Limited to	°C	As per IEC	
10.3	Temperature Indicators Make		KHILSTROM, Sweden or Equi.	
11	Connection			
11.1	High Voltage		Star	
11.2	Low Voltage		Star	



ITEM No.5: POWER TRANSFORMER				Sheet 2 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132/66kV, 31.5/45MVA
11.4	Vector Group Ref in accordance with IEC 76		YNyn0	
12	Taps			
12.1	Type of Tap changer		OLTC	
12.2	Tap Step		1.25%	
12.3	Tap Range		± 10%	
12.4	Nos. of Tap		17	
13	Cooling Equipment (For ONAF)			
13.1	Manufacturer/ Type			
13.2	Number of Fans Connected	Nos		
13.3	Rated Operating Voltage, Vac	Vac	230/400, 50Hz	
13.4	Rated Control Voltage, V	Vdc	110	
13.5	Rated Power	kW		
14	OLTC Gear			
14.1	Manufacturer / Type	MR Germany, ABB Sweden or equivalent/ Vacuum Type		
14.2	Rating - Rated Voltage - Rated Current - Step Voltage - Numbers of Steps	kV A V Nos	Suitable for 132kV Class 17	
14.3	Control Suitable For - Remote / Local Operation - Auto / Manual Operation - Parallel Operation - Master Slave Operation	Yes/No Yes/No	Remote / Local Auto / Manual Yes Yes	
14.4	Rated voltage of Drive Motor	Vac	230/400 50Hz	
15	Transformer Bushing			
15.1	Manufacturer and country of origin			
15.2	Year of manufacturing experience			
15.3	Applied standard		IEC 60137/ DIN 42530	
15.4	Bushing type a) HV b) MV c) LV		As per technical specifications for various voltage rating	
16	Online Dissolved Gas & Moisture Measuring Equipment			
16.1	Manufacturer and country of origin			
16.2	Year of manufacturing experience			
16.3	Applied standard		IEC 60599- 1999	



ITEM No.5: POWER TRANSFORMER, 132/66kV,31.5/45MVA				Sheet 3 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
17	Guaranteed losses			
17.1	No Load Losses at Rated Voltage and Frequency on Max. MVA Base.	kW		
17.2	Load Losses at rated Current and at 75°C on max. MVA base	kW		
17.3	Cooler Losses for full load operation on max. MVA base	kW		
18	Impedance at Rated Current and Frequency at 75°C Winding Temperatures on ONAF, MVA Base. (Tolerance $\pm 7.5\%$ of the Declared Value)	%	(percentage impedance shall match with that of existing transformer for parallel operation)	
18.1	Positive Sequence Impedance at nameplate Normal tap	%	12.30-12.52%	
86.2	Positive Sequence at Maximum Voltage Tap (Tap 17)	%		
18.3	Positive Sequence at Minimum Voltage Tap (Tap 1)	%		
18.4	Zero Sequence at Nameplate Tap			
19	Reactance at rated current and Frequency at 75°C on Maximum MVA base at a nameplate tap			
20	Efficiency at 75°C Winding Temperature at PF=0.9			
20.1	At 100% Load	%		
20.2	At 75% Load	%		
20.3	At 50% Load	%	Above 99%	
21	Load in Percentage of Full Load and Power Factor at which maximum efficiency occurs.			
22	Regulation at full Load and at 75C			
22.1	At Unity Power Factor			
22.2	At 0.85 Power Factor Lagging			
23	No Load Current in Percentage of rated Current referred to HV and 50Hz.			
23.1	At 90% Rated Voltage	%		
23.2	At 100% Rated Voltage	%	<1	
23.3	At 110% Rated Voltage	%		
24	Clearances			



ITEM No.5: POWER TRANSFORMER, 132/66kV,31.5/45MVA				Sheet 4 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
24.1	Minimum Clearances in air-HV/LV	mm		
24.2	Between Phases Between Phase and Earth	mm		
25	Insulation Level			
25.1	Power Frequency Withstand Voltage (1Min rms)			
25.1.1	Primary	kV	275	
25.1.2	Secondary	kV	140	
25.2	Impulse Withstand Voltage			
25.2.1	Primary	kV	650 (Crest)	
25.2.2	Secondary	kV	325 (Crest)	
26	Details of Oil Preservation System			
64.1	Type		Conservator Type	
26.2	Details of Oil Preservation System			
26.3	If Conservator Type, Urethane Air Cell provided	Yes/No	Yes	
26.4	Volume of Conservator	Cu.m		
26.5	Volume of Oil Between the highest and Lowest Levels	Ltrs		
26.6	Breather			
i.	Manufacturer and Country of origin			
ii.	Manufacturer's Type designation			
iii.	Type		Maintenance Free	
27	Pressure Relief Device Min. pressure setting	kg/cm2		
28	Details of Bushings HV / LV / Neutral			
28.1	Manufacturer / Type			
28.2	Voltage class	kV	145/72	
28.2	Creepage Distance	mm	25mm/kV	
28.3	Weight of Bushing	kg		
28.4	Standard Reference		IEC	
28.5	Dry Flash over Voltage	kV	275/140	
28.6	Wet Flash Over Voltage	kV	275/140	
28.7	Impulse Withstand Voltage	kV	650/325	
29	Insulating Oil			
i	Manufacturer and Country of Origin			
ii	Manufacturer's type designation			
iii	Type		Insulating Oil	
iv	Applicable standard		IEC	



ITEM No.5: POWER TRANSFORMER, 132/66kV,31.5/45MVA				Sheet 5 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
v	Technical Specifications: As per General Technical Specifications			
vi.	PCB Content		Not Detectable	
vii.	Approx. volume of Oil, ltrs			
viii	Whether First filled of Oil with 5% excess provided	Yes/No	Yes	
30	Core Material			
30.1	Maximum flux density at rated voltage on principal tapping and rated frequency:			
	Transformer legs	T		
	Transformer yokes	T		
30.2	Maximum flux density at 110% voltage			
	Transformer legs	T	< 1.9	
	Transformer yokes	T	< 1.9	
30.3	Grade of core used	Prime core		
31	Type of Core	CRGO		
	Thickness of core lamination			
	Rated Loss per kg			
31.1	Maximum current density in windings at rated output:			
	Primary (HV)	A/mm ²		
	Secondary (LV)	A/mm ²		
	Weight of copper in windings:			
	Primary (HV)			
	Secondary (LV)			
32	Bushing Current Transformers			
32.1	Numbers of Cores - HV - LV - Neutral	Nos Nos Nos	1 / phase 1 / phase 1	
32.2	Accuracy class / Burden/Ratio - HV / HV Neutral - LV / LV Neutral		PS / 20VA/200/1 PS / 20VA/400/1	
33	Lightning Arrestor mounted on - HV - LV	Yes/No Yes/No	No Yes	
34	RTCC Panel Details			
34.1	AVR make / Model	MR Germany, ABB Sweden		
34.2	Annunciator 12 Windows provided	Yes/No	Yes	
34.3	Indicating Voltmeter	Yes/No	Yes	
34.4	Facilities and Provision as per	Yes/No	Yes	



	specification provided?			
35	Approximate Overall Dimension (L x W x H)			
36	Approximate Weights			
36.1	Core and Coil	kg		
36.2	Tank and fittings	kg		
36.3	Oil	kg		
36.4	Total Weight	kg		
37	Delivery of Equipment in Months, following the Award of Contract (Allowing the time for Drawing Approval)		Months	
38	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
39	Type test certificate submitted?	Yes/No	Yes	
40	Has manufacturer exported units?	Yes/No	Yes	
41	User's certificate submitted?	Yes/No	Yes	
42	Technical literature / drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....

As representative for.....

Address.....

Date.....

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ITEM No. 6: 66/11kV, 24/27/30MVA POWER TRANSFORMER

ITEM No.6: 66/11kV, 30MVA POWER TRANSFORMER				Sheet 1 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				66/11kV, 24/27/30MVA
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, oil immersed, Core Type	
6	Winding / Phase		Three	
7	Cooling		ONAN / ONAF	
8	Ratings			
8.1	Rated MVA			
8.1.1	ONAN	MVA	24	
8.1.2	ONAF1	MVA	27	
8.1.3	ONAF2	MVA	30	
8.2	Rated Voltage			
8.2.1	Primary	kV	66	
8.2.2	Secondary	kV	11	
8.3	Maximum Voltage			
8.3.1	Primary	kV	72.5	
8.3.2	Secondary	kV	12	
8.4	Number of Phases		Three	
8.5	Rated Frequency	Hz	50	
9	Noise Level			
	On ONAN Rating	dB	<73	
	On ONAF Rating Rated Voltage	dB	<75	
10	Temperature Rise			
10.1	Temperature Rise above 45°C ambient	°C	50	
	- In Oil by Thermometer	°C	55	
	- In Winding By Resistance			
10.2	Hottest Spot Temperature in Winding Limited to	°C	As per IEC	
10.3	Temperature Indicators Make		KHILSTROM, Sweden or Equi.	
11	Connection			
11.1	High Voltage		Star	
11.2	Low Voltage		Star	
11.3	Vector Group Ref in accordance with IEC 76		YNyn0	
ITEM No.6: 66/11kV, 24/27/30MVA POWER TRANSFORMER				Sheet 2 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				66/11kV, 24/27/30MVA



12	Taps			
12.1	Type of Tap changer		OLTC	
12.2	Tap Step		1.25%	
12.3	Tap Range		± 10%	
12.4	Nos. of Tap		17	
13	Cooling Equipment (For ONAF)			
13.1	Manufacturer/ Type			
13.2	Number of Fans Connected	Nos		
13.3	Rated Operating Voltage, Vac	Vac	230/400 50Hz	
13.4	Rated Control Voltage, V	Vdc	110	
13.5	Rated Power	KW		
14	OLTC Gear			
14.1	Manufacturer / Type	MR Germany, ABB Sweden		
14.2	Rating - Rated Voltage - Rated Current - Step Voltage - Numbers of Steps	KV A V Nos	Suitable for 66kV Class 17	
14.3	Control Suitable For - Remote / Local Operation - Auto / Manual Operation - Parallel Operation - Master Slave Operation	Yes/No Yes/No	Remote / Local Auto / Manual Yes Yes	
14.4	Rated voltage of Drive Motor	Vac	230/400 50Hz	
15	Transformer Bushing			
15.1	Manufacturer and country of origin			
15.2	Year of manufacturing experience			
15.3	Applied standard		IEC 60137/ DIN 42530	
15.4	Bushing type a) HV b) MV c) LV		As per technical specifications for various voltage rating	
16	Online Dissolved Gas & Moisture Measuring Equipment			
16.1	Manufacturer and country of origin			
16.2	Year of manufacturing experience			
16.3	Applied standard		IEC 60599- 1999	
17	Guaranteed losses			
17.1	No Load Losses at Rated Voltage and Frequency on Max. MVA Base.	kW		
17.2	Load Losses at rated Current and at 75°C on max. MVA base	kW		
ITEM No.6: 66/11kV, 24/27/30MVA POWER TRANSFORMER				Sheet 3 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
17.3	Cooler Losses for full load operation on max. MVA base	kW		



18	Impedance at Rated Current and Frequency at 75°C Winding Temperatures on ONAF, MVA Base. (Tolerance $\pm$ 7.5% of the Declared Value), percentage impedance shall match with that of existing Transformer.	%	(percentage impedance shall match with that of existing transformer for parallel operation)	
18.1	Positive Sequence Impedance at nameplate Normal tap	%	>10 %	
18.2	Positive Sequence at Maximum Voltage Tap (Tap 17)	%		
18.3	Positive Sequence at Minimum Voltage Tap (Tap 1)	%		
18.4	Zero Sequence at Nameplate Tap			
19	Reactance at rated current and Frequency at 75°C on Maximum MVA base at a nameplate tap			
20	Efficiency at 75°C Winding Temperature at PF=0.9			
20.1	At 100% Load	%		
20.2	At 75% Load	%	Above 99%	
20.3	At 50% Load	%		
21	Load in Percentage of Full Load and Power Factor at which maximum efficiency occurs.			
22	Regulation at full Load and at 75C			
22.1	At Unity Power Factor			
22.2	At 0.85 Power Factor Lagging			
23	No Load Current in Percentage of rated Current referred to HV and 50Hz.			
23.1	At 90% Rated Voltage	%		
23.2	At 100% Rated Voltage	%	<1	
23.3	At 110% Rated Voltage	%		
24	Clearances			
24.1	Minimum Clearances in air-HV/LV	mm		
24.2	Between Phases Between Phase and Earth	mm		
25	Insulation Level			
25.1	Power Frequency Withstand Voltage (1Min rms)			
25.1.1	Primary	kV	140	
25.1.2	Secondary	kV	28	
25.1.3	Tertiary (if Provided)	kV	...	
25.2	Impulse Withstand Voltage			
ITEM No.6: 66/11kV, 24/27/30MVA POWER TRANSFORMER				Sheet 4 of 6
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
25.2.1	Primary	kV	325 (Crest)	
25.2.2	Secondary	kV	75 (Crest)	



26	Details of Oil Preservation System			
26.1	Type		Conservator Type	
26.2	Details of Oil Preservation System			
26.3	If Conservator Type, Urethane Air Cell provided	Yes/No	Yes	
26.4	Volume of Conservator	Cu.m		
26.5	Volume of Oil Between the highest and Lowest Levels	Ltrs		
26.6	Breather			
i.	Manufacturer and Country of origin			
ii.	Manufacturer's Type designation			
iii.	Type		Maintenance Free	
27	Pressure Relief Device	kg/cm2		
	Min. pressure setting			
28	Details of Bushings HV / LV / Neutral			
28.1	Manufacturer / Type			
28.2	Voltage class	kV	72.5/12	
28.2	Creepage Distance	mm	25mm/kV	
28.3	Weight of Bushing	kg		
28.4	Standard Reference		IEC	
28.5	Dry Flash over Voltage	kV	140/28	
28.6	Wet Flash Over Voltage	kV	140/28	
28.7	Impulse Withstand Voltage	kV	325/75	
29	Insulating Oil			
i	Manufacturer and Country of Origin			
ii	Manufacturer's type designation			
iii	Type		Insulating Oil	
iv	Applicable standard		IEC	
v	Technical Specifications: As per General Technical Specifications			
vi.	PCB Content		Not Detectable	
vii.	Approx. volume of Oil, ltrs			
viii	Whether First filled of Oil with 5% excess provided	Yes/No	Yes	
30	Core Material			
30.1	Maximum flux density at rated voltage on principal tapping and rated frequency:			
	Transformer legs	T		
ITEM No.6: 66/11kV, 24/27/30MVA POWER TRANSFORMER				
DESCRIPTION			UNIT	NEA REQ
Transformer yokes			T	

Sheet 5 of 6

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30.2	Maximum flux density at 110% voltage			
	Transformer legs	T	< 1.9	
	Transformer yokes	T	< 1.9	
30.3	Grade of core used	Prime core		
31	Type of Core	CRGO		
	Thickness of core lamination			
	Rated Loss per kg			
	Primary (HV)	A/mm ²		
	Secondary (LV)	A/mm ²		
	Weight of copper in windings:			
	Primary (HV)			
	Secondary (LV)			
32	Bushing Current Transformers			
32.1	Accuracy class		5P20 for protection 0.5 for metering PS for Tr. Diff. Prot.	
32.2	Numbers of Cores - HV - LV - Neutral	Nos Nos Nos	3 / phase 3/ phase 1	
32.3	Accuracy class / Burden/Ratio - HV / HV Neutral - LV / LV Neutral		PS / 20VA/300/1 PS / 20VA/1600/1	
33	Lightning Arrestor mounted on - HV - LV	Yes/No Yes/No	No Yes	
34	RTCC Panel Details			
32.1	AVR make / Model	MR Germany or ABB Sweden		
34.2	Annunciator 12 Windows provided	Yes/No	Yes	
34.3	Indicating Voltmeter	Yes/No	Yes	
34.4	Facilities and Provision as per specification provided?	Yes/No	Yes	
35	Approximate Overall Dimension (L x W x H)			
36	Approximate Weights			
36.1	Core and Coil	Kg		
36.2	Tank and fittings	Kg		
36.3	Oil	Kg		
36.4	Total Weight	Kg		
37	Delivery of Equipment in Months, following the Award of Contract (Allowing the time for Drawing Approval)		Months	
38	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
39	Type test certificate submitted?	Yes/No	Yes	
40	Has manufacturer exported units?	Yes/No	Yes	



41	User's certificate submitted?	Yes/No	Yes	
42	Technical literature / drawings submitted?	Yes/No	Yes	

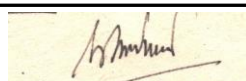
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TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.7: 132kV CIRCUIT BREAKER				Sheet 1 of 2
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132kV
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		SF6 Outdoor	
6	Poles		Three pole	
7	Local and remote operations		Both Required	
8	Rated Voltage	kV	132	
9	Rated current			
9.1	Continuous at 45 degree ambient	A	1250	
9.2	Short time for 1 sec at max. kV	kA	25	
10	Frequency	Hz	50	
11	Temperature rise above 45 degree C ambient		As per IEC	
11.1	Contacts	°C	65	
11.2	Terminals	°C	65	
12	Rated short circuit breaking current	kA	25	
13	Rated short circuit making current			
13.1	Peak	kA	62.5	
14	Interrupting time at 100% capacity			
14.1	Maximum opening time	mS	40	
14.2	Total interrupting time	mS	≤ 60	
15	Closing time	mS	100	
16	Make time	mS	≤ 120	
17	Maximum capacitive current breaking capacity (rms)	A	50	
18	Insulation level			
18.1	Impulse withstand voltage (crest)	kV	650	
18.2	Power frequency withstand voltage	kV	275	
19	Operating mechanism			
19.1	Type		Spring operated	
19.2	Number of mechanism per breaker		1	
19.3	Single/three phase auto-reclosure		3	
19.4	Operating voltage of closing and tripping coil	V DC	110	
19.5	Operating voltage range -Closing -Tripping	% of rated voltage	85-110% 70-110%	
19.6	Closing and tripping current	A		

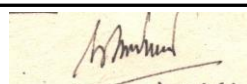


TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.7: 132kV CIRCUIT BREAKER			Sheet 2 of 2	
19.7	Spring charging motor rating -Capacity -Rated voltage	kW V	110V DC	
19.8	Time required by motor to charge the spring completely	Sec	<30	
19.9	Push button for local operation	Yes/No	Yes	
19.10	Selection switch for local/remote control	Yes/No	Yes	
20	Anti pumping device provided	Yes/No	Yes	
21	Trip-free feature provided	Yes/No	Yes	
22	Gas density detector provided	Yes/No	Yes	
23	Operation counter provided	Yes/No	Yes	
24	Space heater provided for cubicle	Yes/No	Yes	
25	Thickness of sheet steel of cubicle	mm	Min 2	
26	Operating duty cycle		O - 0.3sec – CO - 3min – CO	
27	Number of auxiliary contacts	No.	8NO, 8NC	
28	Enclosure Protection		IP55W	
29	Number of possible operations without maintenance under: Rated short circuit breaking current Rated normal current	No No	10 2000	
30	Porcelain insulator			
30.1	Manufacturer			
30.2	Creepage distance	mm	3300	
31	Rated SF6 pressure	kgf/cm2		
32	Guaranteed SF6 losses/year	kg	1% per Annum	
33	Padlocking provision for local cubicle	Yes/No	Yes	
34	Total weight of the circuit breaker	Kg		
35	Mechanical dimension(LXWXH)	mm x mm x mm		
36	Delivery of equipment in months following award of contract	(Allowing time for approval of drawing)		
37	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
39	Has manufacturer exported units?	Yes/No	Yes	
40	Technical literature / drawings submitted?	Yes/No	Yes	

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TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.8: 66kV CIRCUIT BREAKER			Sheet 1 of 2	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
				132kV
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		SF6 Outdoor	
6	Poles		Three pole	
7	Local and remote operations		Both Required	
8	Rated Voltage	kV	66	
9	Rated current			
9.1	Continuous at 45 degree ambient	A	1250	
9.2	Short time for 1 sec at max. kV	kA	25	
10	Frequency	Hz	50	
11	Temperature rise above 45 degree C ambient		As per IEC	
11.1	Contacts	°C	65	
11.2	Terminals	°C	65	
12	Rated short circuit breaking current	kA	25	
13	Rated short circuit making current			
13.1	Peak	kA	62.5	
14	Interrupting time at 100% capacity			
14.1	Maximum opening time	mS	40	
14.2	Total interrupting time	mS	≤ 60	
15	Closing time	mS	100	
16	Make time	mS	≤ 120	
17	Maximum capacitive current breaking capacity (rms)	A	50	
18	Insulation level			
18.1	Impulse withstand voltage (crest)	kV	325	
18.2	Power frequency withstand voltage	kV	140	
19	Operating mechanism			
19.1	Type		Spring operated	
19.2	Number of mechanism per breaker		1	
19.3	Single/three phase auto-reclosure		3	
19.4	Operating voltage of closing and tripping coil	V DC	110	
19.5	Operating voltage range -Closing -Tripping	% of rated voltage	85-110% 70-110%	
19.6	Closing and tripping current	A		



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.8: 66kV CIRCUIT BREAKER			Sheet 2 of 2	
19.7	Spring charging motor rating -Capacity -Rated voltage	kW V	110V DC	
19.8	Time required by motor to charge the spring completely	Sec	<30	
19.9	Push button for local operation	Yes/No	Yes	
19.10	Selection switch for local/remote control	Yes/No	Yes	
20	Anti pumping device provided	Yes/No	Yes	
21	Trip-free feature provided	Yes/No	Yes	
22	<i>Gas density detector provided</i>	Yes/No	Yes	
23	Operation counter provided	Yes/No	Yes	
24	Space heater provided for cubicle	Yes/No	Yes	
25	Thickness of sheet steel of cubicle	mm	Min 2	
26	Operating duty cycle		O - 0.3sec – CO - 3min – CO	
27	Number of auxiliary contacts	No.	8NO, 8NC	
28	Enclosure Protection		IP55W	
29	A. Number of possible operations without maintenance under: Rated short circuit breaking current Rated normal current	No No	10 2000	
30	<i>Porcelain insulator</i>			
30.1	Manufacturer			
30.2	Creepage distance	mm	1650	
31	Rated SF6 pressure	kgf/cm2		
32	Guaranteed SF6 losses/year	kg	1% per Annum	
33	Padlocking provision for local cubicle	Yes/No	Yes	
34	Total weight of the circuit breaker	Kg		
35	Mechanical dimension(LXWXH)	mm x mm x mm		
36	Delivery of equipment in months following award of contract	(Allowing time for approval of drawing)		
37	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
39	Has manufacturer exported units?	Yes/No	Yes	
40	Technical literature / drawings submitted?	Yes/No	Yes	

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ITEM No.9: 33kV VACUUM CIRCUIT BREAKER				Sheet 1 of 2
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Vacuum CB Outdoor	
6	Poles		Three pole	
7	Local and remote operations		Both Required	
8	Rated Voltage	kV	33	
9	Rated current			
9.1	Continuous at 45 degree ambient	A	2000	
9.2	Short time for 1 sec at max. kV	kA	25	
10	Frequency	Hz	50	
11	Temperature rise above 45 degree C ambient		As per IEC	
11.1	Contacts	°C	65	
11.2	Terminals	°C	65	
12	Rated short circuit breaking current	kA	25	
13	Rated short circuit making current			
13.1	Peak	kA	62.5	
14	Interrupting time at 100% capacity			
14.1	Maximum opening time	mS	40	
14.2	Total interrupting time	mS	60	
15	Closing time	mS	100	
16	Make time	mS	120	
17	Maximum capacitive current breaking capacity (rms)	A	10	
18	Insulation level			
18.1	Impulse withstand voltage(crest)	kV	170	
18.2	Power frequency withstand voltage	kV	70	
19	<i>Vacuum Chamber</i> Make Rating	A	2000	
20	Operating mechanism			
20.1	Type		Spring operated	
20.2	Operating voltage of closing and tripping coil	V DC	110	
20.3	Operating voltage range -Closing -Tripping	% of rated voltage	85-110% 70-110%	
20.4	Closing and tripping current	A		



ITEM No.9: 33kV VACUUM CIRCUIT BREAKER				Sheet 2 of 2
20.5	Spring charging motor rating -Capacity -Rated voltage / Frequency	kW V / Hz	400 / 50 or 230V	
20.6	Time required by motor to charge the spring completely	Sec	<30	
20.7	Push button for local operation	Yes/No	Yes	
20.8	Selection switch for local/remote control	Yes/No	Yes	
21	Anti pumping device provided	Yes/No	Yes	
22	Trip-free feature provided	Yes/No	Yes	
23	Operation counter provided	Yes/No	Yes	
24	Space heater provided for cubicle	Yes/No	Yes	
25	Thickness of sheet steel of cubicle	mm	Min 2	
26	Operating duty cycle		O - 15 – CO	
27	Number of auxiliary contacts	No.	8NO, 8NC	
28	Enclosure Protection		IP55W	
29	Number of possible operations without maintenance under: Rated short circuit breaking current Rated normal current	No. No	10 5000	
30	<i>Porcelain insulator</i>			
30.1	Manufacturer			
30.2	Creepage distance	mm	825	
31	Padlocking provision for cubicle	Yes/No	Yes	
32	Total weight of the circuit breaker	Kg		
33	Mechanical dimension(LXWXH)	mm x mm x mm		
34	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)			
35	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
36	ISO 9001 certificate submitted?	Yes/No	Yes	
37	Has manufacturer exported units?	Yes/No	Yes	

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TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.10: 132kV CURRENT TRANSFORMER			Sheet 1 of 1	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			132kV	132kV
1.	Manufacturer and Country of Origin			
2.	Year of manufacturing experience	Years	10	
3.	Manufacturing's Designation as per submitted catalogue			
4.	Applicable standard		IEC	
5.	<i>Type</i>		Outdoor, Oil immersed	
6.	Number of phases	No.	1	
7.	Number of cores in each CT	NO.	5	
8.	Frequency	Hz	50	
9.	Rated Primary Voltage			
9.1	Nominal	kV	132	
9.2	Maximum	kV	145	
10.	Temperature rise above 45 degree C ambient at normal rated current	°C		
11.	Insulation level			
11.1	Impulse withstand voltage(peak)	kV	650	
11.2.	Power frequency withstand voltage (1min, rms)	kV	275	
12.	Creepage distance	mm	3300	
13.	Short time thermal rating	kA	25	
14.	Rated Peak Shortcircuit Current	kA	62.5	
15.	Rated VA burden for each core	VA	30	
16.	Accuracy class		5P20 for protection 0.5 for metering PS for diff / Bus	
17.	Current Ratio Core-1, Transformer Diff. Prot. / Distance Core-2, Backup Prot. Core-3, Metering Core-4, 5, Bus Diff. Prot.	A	As per Technical Data in specification	
19.	Overvoltage factor		1.1	
20.	Dimension(LXWXH)	mm ³		
21.	Weight	kg		
22.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
24.	Has manufacturer exported units?	Yes/No	Yes	
25.	Technical literature/drawings submitted?	Yes/No	Yes	

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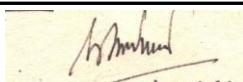


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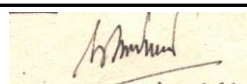
ITEM No. 11: 66kV CURRENT TRANSFORMER

ITEM No.11: 66kV CURRENT TRANSFORMER				Sheet 1 of 1
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			66kV	66kV
1.	Manufacturer and Country of Origin			
2.	Year of manufacturing experience	Years	10	
3.	Manufacturing's Designation as per submitted catalogue			
4.	Applicable standard		IEC	
5.	Type		Outdoor, Oil immersed	
6.	Number of phases	No.	1	
7.	Number of cores in each CT	No.	5	
8.	Frequency	Hz	50	
9.	Rated Primary Voltage			
9.1	Nominal	kV	66	
9.2	Maximum	kV	72.5	
10.	Temperature rise above 45 degree C ambient at normal rated current	°C		
11.	Insulation level			
11.1	Impulse withstand voltage(peak)	kV	325	
11.2	Power frequency withstand voltage (1min, rms)	kV	140	
12.	Creepage distance	mm	1650	
13.	Short time thermal rating	kA	25	
14.	Rated Peak Shortcircuit Current	kA	62.5	
15.	Rated VA burden for each core	VA	30	
16.	Accuracy class		5P20 for protection 0.5 for metering PS for diff / Bus	
17.	Current Ratio Core-1, Metering Core-2, Backup Prot. Core-3, Transformer Diff. Prot. / Distance Core-4, 5, Bus Differential	A	As per Technical Data in specification	
18.	Rated thermal VA burden	VA	30	
19.	Overvoltage factor		1.1	
20.	Dimension(LXWXH)	mm ³		
21.	Weight	kg		
22.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
23.	Has manufacturer exported units?	Yes/No	Yes	
24.	Technical literature/drawings submitted?	Yes/No	Yes	

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ITEM No. 12: 33kV CURRENT TRANSFORMER

DESCRIPTION	UNIT	REQUIREMENT	OFFERED DATA
1. Manufacturer and Country of Origin			
2. Years of manufacturing experience	Years	10	
3. Manufacturer's designation as per submitted catalogue / Model No.		To be furnished	
4. Applicable standard		IEC	
5. Type		Oil Insulated Type	
6. Number of phases	No.	single	
7. Number of cores in each CT	No.	3	
8. Frequency	Hz	50	
9. Rated Primary Voltage	kV	33	
10. Temperature rise above 40 degree C ambient	°C		
11. Insulation level			
a) Impulse withstand voltage	kV,(crest)	170	
b) Power frequency withstand voltage (1 min. rms)	kV	75	
12. Rated peak withstand current	kA	62.5	
13. Creepage distance	mm	825	
14. Short time thermal rating (1 Sec)	kA	25	
15. Ratings			
16. Current ratio	A	As per Technical Data in specification	
17. Rated VA burden for each core	VA	30	
18. Accuracy class		5P20 for protection, 0.5 for metering PS for Differential	
19. Dimension (L x W x H)	mm		
20. Weight	kg		
24. Delivery of equipment in months following award of contract (Allowing time for approval of drawings.)	month		

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Date.....

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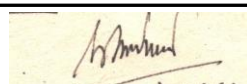
TECHNICAL DATA SHEET (To Be Completed By the Bidder)			
ITEM No.13: 33KV POTENTIAL TRANSFORMER			Sheet 1 of 1
	DESCRIPTION	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin		
2	Years of manufacturing experience(Years)	10	
3	Manufacturer's designation as per submitted catalogue / Model No.	To be furnished	
4	Applicable standard	IEC	
5	Type	Outdoor Oil immersed	
6	Frequency,HZ	50	
7	Rated Primary Voltage, KV	33	
8	Insulation level		
	a) Impulse withstand voltage,KV(crest)	170	
	b) Power frequency withstand voltage (1 min. rms),KV	75	
9	Creepage distance,mm	825	
10	Ratings		
	a)Voltage ratio kV	$33/\sqrt{3}/0.11/\sqrt{3}/0.11/\sqrt{3}$	
	b)Rated Burden VA	50	
	c)Accuracy class	3P&0.5 for metering	
	d)Overvoltage factor		
	continuous	1.1	
	30seconds	1.5	
	e)Connection		
	f)Secondary fuse		
	Type		
	Manufacture		
	Amp rating, A		
	g)Power factor	0.85	
	h)Number of secondary windings	2	
11	Knife switch and fuse on secondary provided	Yes/No	
12	Dimension(LxWxH) mm		
13	Weight kg		
14	Delivery of equipment in months following award of contract(allowing time forapproval of drawing)month	6	

Deviations from technical requirements

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As representative for.....

Date.....





ITEM No.14: 11KV CURRENT TRANSFORMER				Sheet 1 of 1
	DESCRIPTION	UNIT	NEA REQ.	DATA to be Filled
1	Manufacturer			
2	Type		Cubicle mounted, epoxy resin	
3	Manufacturing's Designation as per submitted catalogue /Model No.		To be furnished	
4	Rated Voltage	kV	12	
5	Frequency	Hz	50	
6	Reference standard		IEC	
7.1	- For Incomer, Buscoupler - Nos. of Core - Ratio / Class / Burden - Metering - Protection - Differential		3 1000-2000/1A 0.5,30VA 5P20, 30VA PS,30VA	
8	Insulation level			
	a. Impulse Withstand Voltage	kV	75	
	b. Power frequency withstand Voltage	kV	28	

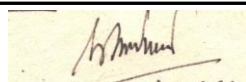
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TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.15: 132kV DISCONNECTING SWITCH			Sheet 1 of 3	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			132kV	132kV
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturer's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		3 pole, Single throw, Outdoor, Center break	
6	Frequency	Hz	50	
7	Rated Voltage			
7.1	Nominal	kV	132	
7.2	Maximum	kV	145	
8	Rated current			
8.1	Continuous at 45°C ambient	A	1250	
8.2	Short time for 1 sec at max. kV	kA	25	
8.3	Peak short time current	kA		
9	Temperature rise above 45 degree C ambient at normal rated current		As per IEC	
9.1	Contacts	°C		
9.2	Current carrying parts	°C		
10	Maximum current the switch can safely interrupt			
10.1	Bus/line charging current	A	0.5 min	
10.2	Potential transformer magnetizing current	A	0.5 min	
11	Clearance			
11.1	Between live part and ground	mm		
11.2	Between fixed contact and blade in open position	mm	3300	
12	Insulation level			
12.1	Impulse withstand voltage(peak)	kV	650	
12.2	Power frequency withstand voltage (1min, rms)	kV	275	
13	Main contacts			
	- Material of fixed contacts		copper alloy	
	- Coating of fixed contacts		Silver plated	
	- Material of moving contacts		copper alloy	
	- Coating of moving contacts		Silver plated	
	- Material of the contacts of the earthing switch		copper alloy	
	- Coating of the contacts of the earthing switch		Silver Alloy	



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.15: 132kV DISCONNECTING SWITCH			Sheet 2 of 3	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			132kV	132kV
14	Material of terminals			
14.1	Coating of terminals			
15	Operating mechanism		Motor and manual operated	
16	Auxiliary contacts			
16.1	Type	Convertible or fixed	Convertible	
16.2	Continuous current at 110V DC	A	10	
16.3	Material		Copper	
16.4	Contacts silver plated	Yes/No	Yes	
17	No. of operations switch can withstand without deterioration of contacts	No.	1000	
19	Auxiliary power supply			
19.1	Space heater and cubicle	V/phase	230V/phase	
19.2	Control circuit	V, DC	110V DC	
19.3	Operating motor	V, phase	400/230V AC	
20	Local operator provided	Yes/No	Yes	
21	Insulator			
21.1	Manufacturer			
21.2	Type		Single stack post type	
21.3	Creepage Distance in Air	mm	3300	
21.4	Tensile Strength			
21.5	Cantilever Strength			
22	Number of N.C. contacts	No.	8 min	
23	Number of N.O. contacts	No.	8 min	
24	Enclosure protection Material / Thickness of sheet	mm	IP-55w Steel / 2 Aluminum / > 3	
25	Operating mechanism		Motor & Manual Operated	
26	Types of interlocks furnished		Electrical and manual	
27	Earthing Switch			
27.1	Operating Mechanism		Manual Operated	
27.2	Type of Interlocks		Electrical and manual	
22	Number of N.C. contacts	No.	8	
23	Number of N.O. contacts	No.	8	
27	Weight of Isolator	Kg		
28	Dimension (L x B x H)			
29	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	Month		



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.15: 132kV DISCONNECTING SWITCH				Sheet 3 of 3
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			132kV	132kV
30	ISO 9001 certificate submitted?	Yes/No	Yes	
31	Has manufacturer exported units?	Yes/No	Yes	
32.	Technical literature / drawings submitted?	Yes/No	Yes	

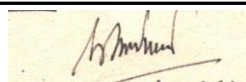
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TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

ITEM No.16: 66kV DISCONNECTING SWITCH

Sheet 1 of 3

	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			66kV	66kV
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	5	
3	Manufacturer's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		3 pole, Single throw, Outdoor, Center rotate, horizontal	
6	Frequency	Hz	50	
7	Rated Voltage			
7.1	Nominal	kV	66	
7.2	Maximum	kV	72	
8	Rated current			
8.1	Continuous at 45°C ambient	A	1250	
8.2	Short time for 1 sec at max. kV	kA	25	
8.3	Peak short time current	kA		
9	Temperature rise above 45 degree C ambient at normal rated current		As per IEC	
9.1	Contacts	°C		
9.2	Current carrying parts	°C		
10	Maximum current the switch can safely interrupt			
10.1	Bus/line charging current	A	0.5 min	
10.2	Potential transformer magnetizing current	A	0.5 min	
11	Clearance			
11.1	Between live part and ground	mm		
11.2	Between fixed contact and blade in open position	mm	1800	
12	Insulation level			
12.1	Impulse withstand voltage(peak)	kV	380	
12.2	Power frequency withstand voltage (1min, rms)	kV	150	
13	Main contacts			
	- Material of fixed contacts		copper alloy	
	- Coating of fixed contacts		Silver plated	



	- Material of moving contacts		copper alloy	
	- Coating of moving contacts		Silver plated	
	- Material of the contacts of the earthing switch		copper alloy	
	- Coating of the contacts of the earthing switch		Silver Alloy	
14	Material of terminals			
14.1	Coating of terminals			
15	Operating mechanism		Motor and manual operated	
16	Auxiliary contacts			
16.1	Type	Convertible or fixed	Convertible	
16.2	Continuous current at 110V DC	A	10	
16.3	Material		Copper	
16.4	Contacts silver plated	Yes/No	Yes	
17	No. of operations switch can withstand without deterioration of contacts	No.	1000	
19	Auxiliary power supply			
19.1	Space heater and cubicle	V/phase	230V/phase	
19.2	Control circuit	V, DC	110V DC	
19.3	Operating motor	V, phase	400/230V AC	
20	Local operator provided	Yes/No	Yes	
21	Insulator			
21.1	Manufacturer			
21.2	Type		Single stack post type	
21.3	Creepage Distance in Air	mm	1800	
21.4	Tensile Strength			
21.5	Cantilever Strength			
22	Number of N.C. contacts	No.	8 min	
23	Number of N.O. contacts	No.	8 min	
24	Enclosure protection Material / Thickness of sheet	mm	IP-55w Steel / 2 Aluminum / > 3	
25	Operating mechanism		Motor & Manual Operated	
26	Types of interlocks furnished		Electrical and manual	
27	Earthing Switch			
27.1	Operating Mechanism		Manual Operated	
27.2	Type of Interlocks		Electrical and manual	
22	Number of N.C. contacts	No.	8	
23	Number of N.O. contacts	No.	8	
27	Weight of Isolator	Kg		
28	Dimension (L x B x H			



29	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	Month		
30	ISO 9001 certificate submitted?	Yes/No	Yes	
31	Has manufacturer exported units?	Yes/No	Yes	
32.	Technical literature/drawings submitted?	Yes/No	Yes	

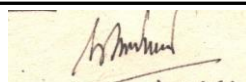
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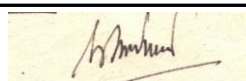
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TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.17: 33 kV DISCONNECTING SWITCH			Sheet 1 of 4	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturer's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		3 pole, Outdoor, Center break	
6	Frequency	Hz	50	
7	Rated Voltage			
7.1	Nominal	kV	33	
7.2	Maximum	kV	36	
8	Rated current			
8.1	Continuous at 45°C ambient	A	2000	
8.2	Short time for 1 sec at max. kV	kA	25	
8.3	Peak short time current	kA		
9	Temperature rise above 45 degree C ambient at normal rated current		As per IEC	
9.1	Contacts	°C		
9.2	Current carrying parts	°C		
10	Maximum current the switch can safely interrupt			
10.1	Bus/line charging current	A	0.5 min	
10.2	Potential transformer magnetizing current	A	0.5 min	




TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.17: 33 kV DISCONNECTING SWITCH			Sheet 2 of 4	
11	Clearance			
11.1	Between live part and ground	mm		
11.2	Between fixed contact and blade in open position	mm	1650	
12	Insulation level			
12.1	Impulse withstand voltage(peak)	kV	325	
12.2	Power frequency withstand voltage (1min, rms)	kV	140	
13	Main contacts			
	- Material of fixed contacts		copper alloy	
	- Coating of fixed contacts		Silver plated	
	- Material of moving contacts		copper alloy	
	- Coating of moving contacts		Silver plated	
	- Material of the contacts of the earthing switch		copper alloy	
	- Coating of the contacts of the earthing switch		Silver Alloy	
14	Material of terminals			
14.1	Coating of terminals			
15	Operating mechanism		Motor and manual operated	
16	Auxiliary contacts			
16.1	Type	Convertible or fixed	Convertible	
16.2	Continuous current at 110V DC	A	10	
16.3	Material		Copper	
16.4	Contacts silver plated	Yes/No	Yes	



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.17: 33 kV DISCONNECTING SWITCH			Sheet 3 of 4	
19	Auxiliary power supply			
19.1	Space heater and cubicle	V/phase	230v/phase	
19.2	Control circuit	V, DC	110V DC	
19.3	Operating motor	V, phase	230/400 V, 50 Hz	
20	Local operator provided	Yes/No	Yes	
21.1	Manufacturer			
21.2	Type		Single stack post type	
21.3	Creepage Distance in Air	mm	1650	
21.4	Tensile Strength			
21.5	Cantilever Strength			
22	Number of N.C. contacts	No.	8 min	
23	Number of N.O. contacts	No.	8 min	
24	Enclosure protection		IP-55w	
	Material / Thickness of sheet	mm	Steel / 2 Aluminum / > 3	
25	Operating mechanism		Motor & Manual Operated	
26	Types of interlocks furnished		Electrical and manual	
27	Earthing Switch		As per BOQ	
27.1	Operating Mechanism		Manual Operated	
27.2	Type of Interlocks		Electrical and manual	
22	Number of N.C. contacts	No.	8	
23	Number of N.O. contacts	No.	8	
27	Weight of Isolator	Kg		
28	Dimension (L x B x H			



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.17: 33 kV DISCONNECTING SWITCH			Sheet 4 of 4	
29	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	Month		
30	ISO 9001 certificate submitted?	Yes/No	Yes	
31	Has manufacturer exported units?	Yes/No	Yes	
32.	Technical literature/drawings submitted?	Yes/No	Yes	

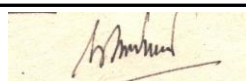
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TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.18: 132/33 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 1 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	CONTROL AND RELAY PANEL TYPE Duplex			
1.1	Manufacturer and Country of Origin			
1.2	Year of manufacturing experience	Years	10	
1.3	Manufacturing's Designation as per submitted catalogue			
2	CONTROL DISCREPANCY SWITCHES			
2.1	Manufacturer and Country of Origin			
2.2	Type		Discrepancy	
2.3	Current Rating	A		
2.3	Catalogue furnished	Yes/No	Yes	
3	PUSH BUTTON			
3.1	Manufacturer and Country of Origin			
3.2	Type			
3.3	Contact Rating, continuous Making Current Breaking Current	Amp Amp Amp		
3.3	Catalogue furnished	Yes/No	Yes	
4	INDICATING LAMPS			
4.1	Manufacturer			
4.2	Voltage Rating	V		
4.3	Wattage	W		
5	INDICATING INSTRUMENTS			
5.1	Ammeter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iv.	Accuracy class		0.5	
v.	Scale			
	-Type of scale		Center zero	
	-Range of indication (...../1 Amp CT operated)	A	100-50-0-50- 100	
	-Overload range	%	1.5	
vi.	VA Burden			
vi.	Transducer operated	Yes/No	Yes	
5.2	Apparent Power Meter (VAr)			
i.	Manufacturer and Country of Origin			
ii	Type		Digital	
iii	Rated voltage	kV	132/√3 : 0.11/√3	
iv	Rated current	A	/1	
vi	Accuracy class		0.5	
vii	Scale		Centre zero	



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.18 :132/33kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 2 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
	-Range of indication	MVA	100-50-0-50-100	
viii.	VA Burden Current Coil Voltage Coil			
x	Transducer operated	Yes/No	Yes	
5.3	KWh Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital, 3-phase, 4 wire	
iii.	Applicable standard	IEC	IEC	
iv.	Accuracy class		0.2	
v.	Import and Export meter provided	Yes/No	Yes	
vi.	Rated voltage	kV	132/√3 : 0.11/√3	
vii.	Rated current	A	/1	
viii.	Operating current range	A	1-10A	
ix.	Operating Voltage range	A	0-480V	
x.	VA Burden Current Coil Voltage Coil	VA		
xi.	Impulse contact provided	Yes/No	Yes	
xii.	Programmable at Site		Yes	
xiii.	Software and optical probe provided as per Price schedule & BOQ		Yes	
5.4	Wattmeter, MW Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iii.	Accuracy class		0.5	
iii	Rated voltage	kV	132/√3 : 0.11/√3	
iv	Rated current	A	/1	
	-Range of indication	MW	20-10-0-10-20	
5.5	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
viii.	Number of column	No.	6	
ix.	Type of mounting		Flush	



TECHNICAL DATA SHEET
(To Be Completed By the Bidder)

ITEM No.18:132/33 kV CONTROL AND RELAY PANEL FOR TRANSFORMER

Sheet 3 of 7

	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
x.	Replacement of individual inscription plates and lamps from front panel possible	Yes/No	Yes	
xi.	Sequence of operation as per specification	Yes/No	Yes	
5.6	RTCC Facility			
i.	RTCC Facility in the Panel Provided	Yes/No	Yes	
ii.	Manufacturer and Country of Origin of AVR		Shortlisted	
iii.	Type			
iv.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
5.5	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
6	PROTECTIVE RELAYS			
6.1	PHASE OVERCURRENT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Non Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple Pole	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xiv.	Technical literature submitted	Yes/No	Yes	

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TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

ITEM No.18:132/33 kV CONTROL AND RELAY PANEL FOR TRANSFORMER

Sheet 4 of 7

	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
6.2	EARTH FAULT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical, Non-Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	x In		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts, Nos	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xvi.	Technical literature submitted	Yes/No	Yes	
6.3	Directional Over current Relay			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics Characteristic Angle		IDMT(standard inverse), 45°	
x.	Instantaneous unit provided -Current setting range -Operating range	Yes/No % of rated current, mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		



TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.18: 132/33kV CONTROL AND RELAY PANEL FOR TRANSFORMER				
			Sheet 5 of 7	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
xiii.	Auxiliary DC Supply	V _{dc}	110	
6.4	Directional Earth fault Relay			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	xIn		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics Characteristic Angle		IDMT(standard inverse), 45°	
x.	Instantaneous unit provided -Current setting range -Operating range	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Technical literature submitted	Yes/No	Yes	
6.5	Transformer Differential relay			
i.	Manufacturer / Country of Origin			
ii.	Standard Reference	IEC	IEC	
iii.	Type of Construction			
iv.	Type		Numerical	
v.	Voltage Rating	V	110	
vi.	Type of Mounting		Flush	
vii.	Operating Time Setting, Sec	mS	<30	
viii.	Sensitivity Setting		20-50% x In	
ix.	Bias Setting			
x.	CT Ratio Compensating Range			
xi.	Burden for Current Circuit	VA		
xii.	DC Burden	VA		
xiii.	Tripping	A		
xiv.	Making current	A		
xv.	Closing Load (At 110V DC)	A		
6.6	AUXILIARY TRIPPING & LOCKOUT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type			



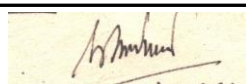
TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.18:132/33 kV CONTROL AND RELAY PANEL FOR TRANSFORMER					Sheet 6 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled	
iii.	Manufacturer's type designation				
iv.	Applicable standard	IEC	IEC		
v.	Operating time	mS	<15		
vi.	Does the lockout relay reset by the manually operated or electrically operated reset device				
vii.	Is the cut-off contact provided to interrupt the operating coil ?	Yes/No			
viii.	Contact rating at 125V DC	A			
xi.	Technical literature submitted	Yes/No	Yes		
6.7	Breaker Fail Lockout Relay, 86K				
i.	DC Voltage Rating, V	V	110		
ii.	Nos. of Electrically separate NO & NC Contacts				
6.8	Breaker Failure Lockout Relay, 86BF & LBB Protection				
i.	DC Voltage Rating, V	V	110		
ii.	Nos of Electrically separate NO & NC Contacts				
v.	Technical literature submitted	Yes/No	Yes		
6.9	BREAKER FAILURE PROTECTION RELAYS				
i.	Manufacturer and Country of Origin				
ii.	Manufacturer's type designation				
iii.	Applicable standard	IEC	IEC		
iv.	Triple pole or single pole		Triple Pole		
v.	Current setting range	% of rated current	20-200%		
vi.	Time setting range	sec			
vii.	Reset time	mS			
viii.	Insulating test according to IEC	Yes/No			
ix.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No			
x.	Auxiliary DC Supply	V _{dc}	110		
xi.	Is manufacturer ISO 9001 holder?	Yes/No	Yes		
xii.	ISO certificate submitted	Yes/No	Yes		
xiii.	Technical literature submitted	Yes/No	Yes		
7	CONSTRUCTION OF CONTROL & RELAY PANEL				
i.	Type(Simplex/Duplex)		Duplex		
ii.	Manufacturer's type designation				
iii.	Applicable standard	IEC	IEC		
iv.	Control panels furnished as per specifications	Yes/No	Yes		
v.	Enclosure protection class	IP	IP 4X		
vi.	Thickness of sheet metal used -Front and rear portion -Side, top and bottom covers -Doors	mm mm mm	>=3 >=2 >=3		



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.18:132/33 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 7 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
vii.	All instruments, meters, relays and control switches flush or semi-flush type		Flush	
viii.	Ground bus -Material -Size	mm x mm	Copper 25 X 6	
ix.	Internal Wiring - Type of Insulation - Voltage Grade of Wires - Cross Section of wire Current circuit Voltage & auxiliary Circuit	V Sq.mm	600	
x.	Overall dimension of control boards (LxWxH)	mm		
xi.	Shipping data -Size of large package -Weight of the heaviest package	mm Kg		
xii.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
xiii.	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
xiv.	ISO 9001 certificate submitted?	Yes/No	Yes	
xv.	Has manufacturer exported units?	Yes/No	Yes	
xvi.	User's certificate submitted?	Yes/No	Yes	
xvii.	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....
As representative for.....
Address.....
Date.....





TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.19: 132/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 1 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	CONTROL AND RELAY PANEL TYPE	Duplex		
1.1	Manufacturer and Country of Origin			
1.2	Year of manufacturing experience	Years	10	
1.3	Manufacturing's Designation as per submitted catalogue			
2	CONTROL DISCREPANCY SWITCHES			
2.1	Manufacturer and Country of Origin			
2.2	Type		Discrepancy	
2.3	Current Rating	A		
2.3	Catalogue furnished	Yes/No	Yes	
3	PUSH BUTTON			
3.1	Manufacturer and Country of Origin			
3.2	Type			
3.3	Contact Rating, continuous Making Current Breaking Current	Amp Amp Amp		
3.3	Catalogue furnished	Yes/No	Yes	
4	INDICATING LAMPS			
4.1	Manufacturer			
4.2	Voltage Rating	V		
4.3	Wattage	W		
5	INDICATING INSTRUMENTS			
5.1	Ammeter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iv.	Accuracy class		0.5	
v.	Scale			
	-Type of scale		Center zero	
	-Range of indication (...../1 Amp CT operated)	A	100-50-0-50- 100	
	-Overload range	%	1.5	
vi.	VA Burden			
vi.	Transducer operated	Yes/No	Yes	
5.2	Apparent Power Meter (VAr)			
i.	Manufacturer and Country of Origin			
ii	Type		Digital	
iii	Rated voltage	kV	132/√3 : 0.11/√3	
iv	Rated current	A	/1	
vi	Accuracy class		0.5	
vii	Scale		Centre zero	



TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.19:132/11kV CONTROL AND RELAY PANEL FOR TRANSFORMER				
			Sheet 2 of 7	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
	-Range of indication	MVA	100-50-0-50-100	
viii.	VA Burden Current Coil Voltage Coil			
x	Transducer operated	Yes/No	Yes	
5.3	KWh Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital, 3-phase, 4 wire	
iii.	Applicable standard	IEC	IEC	
iv.	Accuracy class		0.2	
v.	Import and Export meter provided	Yes/No	Yes	
vi.	Rated voltage	kV	132/√3 : 0.11/√3	
vii.	Rated current	A	/1	
viii.	Operating current range	A	1-10A	
ix.	Operating Voltage range	A	0-480V	
x.	VA Burden Current Coil Voltage Coil	VA		
xi.	Impulse contact provided	Yes/No	Yes	
xii.	Programmable at Site		Yes	
xiii.	Software and optical probe provided as per Price schedule & BOQ		Yes	
5.4	Wattmeter, MW Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iii.	Accuracy class		0.5	
iii	Rated voltage	kV	132/√3 : 0.11/√3	
iv	Rated current	A	/1	
	-Range of indication	MW	20-10-0-10-20	
5.5	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
viii.	Number of column	No.	6	
ix.	Type of mounting		Flush	



TECHNICAL DATA SHEET
(To Be Completed By the Bidder)

ITEM No.19:132/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER

Sheet 3 of 7

	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
x.	Replacement of individual inscription plates and lamps from front panel possible	Yes/No	Yes	
xi.	Sequence of operation as per specification	Yes/No	Yes	
5.6	RTCC Facility			
i.	RTCC Facility in the Panel Provided	Yes/No	Yes	
ii.	Manufacturer and Country of Origin of AVR		Shortlisted	
iii.	Type			
iv.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
5.5	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
6	PROTECTIVE RELAYS			
6.1	PHASE OVERCURRENT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Non Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple Pole	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xiv.	Technical literature submitted	Yes/No	Yes	



TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

ITEM No.19:132/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER

Sheet 4 of 7

	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
6.2	EARTH FAULT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical, Non-Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	x In		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts, Nos	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xvi.	Technical literature submitted	Yes/No	Yes	
6.3	Directional Overcurrent Relay			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics Characteristic Angle		IDMT(standard inverse), 45°	
x.	Instantaneous unit provided -Current setting range -Operating range	Yes/No % of rated current, mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		



TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.19: 132/11kV CONTROL AND RELAY PANEL FOR TRANSFORMER				
DESCRIPTION			UNIT	NEA REQ
DATA to be Filled				
xiii.	Auxiliary DC Supply	V _{dc}	110	
6.4	Directional Earthfault Relay			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	xIn		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics Characteristic Angle		IDMT(standard inverse), 45°	
x.	Instantaneous unit provided -Current setting range -Operating range	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Technical literature submitted	Yes/No	Yes	
6.5	Transformer Differential relay			
i.	Manufacturer / Country of Origin			
ii.	Standard Reference	IEC	IEC	
iii.	Type of Construction			
iv.	Type		Numerical	
v.	Voltage Rating	V	110	
vi.	Type of Mounting		Flush	
vii.	Operating Time Setting, Sec	mS	<30	
viii.	Sensitivity Setting		20-50% x In	
ix.	Bias Setting			
x.	CT Ratio Compensating Range			
xi.	Burden for Current Circuit	VA		
xii.	DC Burden	VA		
xiii.	Tripping	A		
xiv.	Making current	A		
xv.	Closing Load (At 110V DC)	A		
6.6	AUXILIARY TRIPPING & LOCKOUT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type			



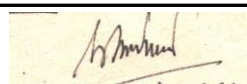
TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.19:132/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER					Sheet 6 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled	
iii.	Manufacturer's type designation				
iv.	Applicable standard	IEC	IEC		
v.	Operating time	mS	<15		
vi.	Does the lockout relay reset by the manually operated or electrically operated reset device				
vii.	Is the cut-off contact provided to interrupt the operating coil ?	Yes/No			
viii.	Contact rating at 125V DC	A			
xi.	Technical literature submitted	Yes/No	Yes		
6.7	Breaker Fail Lockout Relay, 86K				
i.	DC Voltage Rating, V	V	110		
ii.	Nos. of Electrically separate NO & NC Contacts				
6.8	Breaker Failure Lockout Relay, 86BF & LBB Protection				
i.	DC Voltage Rating, V	V	110		
ii.	Nos of Electrically separate NO & NC Contacts				
v.	Technical literature submitted	Yes/No	Yes		
6.9	BREAKER FAILURE PROTECTION RELAYS				
i.	Manufacturer and Country of Origin				
ii.	Manufacturer's type designation				
iii.	Applicable standard	IEC	IEC		
iv.	Triple pole or single pole		Triple Pole		
v.	Current setting range	% of rated current	20-200%		
vi.	Time setting range	sec			
vii.	Reset time	mS			
viii.	Insulating test according to IEC	Yes/No			
ix.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No			
x.	Auxiliary DC Supply	V _{dc}	110		
xi.	Is manufacturer ISO 9001 holder?	Yes/No	Yes		
xii.	ISO certificate submitted	Yes/No	Yes		
xiii.	Technical literature submitted	Yes/No	Yes		
7	CONSTRUCTION OF CONTROL & RELAY PANEL				
i.	Type(Simplex/Duplex)		Duplex		
ii.	Manufacturer's type designation				
iii.	Applicable standard	IEC	IEC		
iv.	Control panels furnished as per specifications	Yes/No	Yes		
v.	Enclosure protection class	IP	IP 4X		
vi.	Thickness of sheet metal used -Front and rear portion -Side, top and bottom covers -Doors	mm mm mm	>=3 >=2 >=3		



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.19:132/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 7 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
vii.	All instruments, meters, relays and control switches flush or semi-flush type		Flush	
viii.	Ground bus -Material -Size	mm x mm	Copper 25 X 6	
ix.	Internal Wiring - Type of Insulation - Voltage Grade of Wires - Cross Section of wire Current circuit Voltage & auxiliary Circuit	V Sq.mm	600	
x.	Overall dimension of control boards (LxWxH)	mm		
xi.	Shipping data -Size of large package -Weight of the heaviest package	mm Kg		
xii.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
xiii.	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
xiv.	ISO 9001 certificate submitted?	Yes/No	Yes	
xv.	Has manufacturer exported units?	Yes/No	Yes	
xvi.	User's certificate submitted?	Yes/No	Yes	
xvii.	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....
As representative for.....
Address.....
Date.....





TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.20: 132/66 kV CONTROL AND RELAY PANEL FOR TRANSFORMER					Sheet 1 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled	
1	CONTROL AND RELAY PANEL TYPE Duplex				
1.1	Manufacturer and Country of Origin				
1.2	Year of manufacturing experience	Years	10		
1.3	Manufacturing's Designation as per submitted catalogue				
2	CONTROL DISCREPANCY SWITCHES				
2.1	Manufacturer and Country of Origin				
2.2	Type		Discrepancy		
2.3	Current Rating	A			
2.3	Catalogue furnished	Yes/No	Yes		
3	PUSH BUTTON				
3.1	Manufacturer and Country of Origin				
3.2	Type				
3.3	Contact Rating, continuous Making Current Breaking Current	Amp Amp Amp			
3.3	Catalogue furnished	Yes/No	Yes		
4	INDICATING LAMPS				
4.1	Manufacturer				
4.2	Voltage Rating	V			
4.3	Wattage	W			
5	INDICATING INSTRUMENTS				
5.1	Ammeter				
i.	Manufacturer and Country of Origin				
ii.	Type		Digital		
iv.	Accuracy class		0.5		
v.	Scale				
	-Type of scale		Center zero		
	-Range of indication (...../1 Amp CT operated)	A	100-50-0-50- 100		
	-Overload range	%	1.5		
vi.	VA Burden				
vi.	Transducer operated	Yes/No	Yes		
5.2	Apparent Power Meter (VAr)				
i.	Manufacturer and Country of Origin				
ii	Type		Digital		
iii	Rated voltage	kV	132/√3 : 0.11/√3		
iv	Rated current	A	/1		
vi	Accuracy class		0.5		
vii	Scale		Centre zero		



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.20 :132/66kV CONTROL AND RELAY PANEL FOR TRANSFORMER			Sheet 2 of 7	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
	-Range of indication	MVA	100-50-0-50-100	
viii.	VA Burden Current Coil Voltage Coil			
x	Transducer operated	Yes/No	Yes	
5.3	KWh Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital, 3-phase, 4 wire	
iii.	Applicable standard	IEC	IEC	
iv.	Accuracy class		0.2	
v.	Import and Export meter provided	Yes/No	Yes	
vi.	Rated voltage	kV	132/√3 : 0.11/√3	
vii.	Rated current	A	/1	
viii.	Operating current range	A	1-10A	
ix.	Operating Voltage range	A	0-480V	
x.	VA Burden Current Coil Voltage Coil	VA		
xi.	Impulse contact provided	Yes/No	Yes	
xii.	Programmable at Site		Yes	
xiii.	Software and optical probe provided as per Price schedule & BOQ		Yes	
5.4	Wattmeter, MW Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iii.	Accuracy class		0.5	
iii	Rated voltage	kV	132/√3 : 0.11/√3	
iv	Rated current	A	/1	
	-Range of indication	MW	20-10-0-10-20	
5.5	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
viii.	Number of column	No.	6	
ix.	Type of mounting		Flush	



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.20:132/66 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 3 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
x.	Replacement of individual inscription plates and lamps from front panel possible	Yes/No	Yes	
xi.	Sequence of operation as per specification	Yes/No	Yes	
5.6	RTCC Facility			
i.	RTCC Facility in the Panel Provided	Yes/No	Yes	
ii.	Manufacturer and Country of Origin of AVR		Shortlisted	
iii.	Type			
iv.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
5.5	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
6	PROTECTIVE RELAYS			
6.1	PHASE OVERCURRENT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Non Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple Pole	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xiv.	Technical literature submitted	Yes/No	Yes	



TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

ITEM No.20:132/66 kV CONTROL AND RELAY PANEL FOR TRANSFORMER

Sheet 4 of 7

	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
6.2	EARTH FAULT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical, Non-Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	x In		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts, Nos	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xvi.	Technical literature submitted	Yes/No	Yes	
6.3	Directional Over current Relay			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics Characteristic Angle		IDMT(standard inverse), 45°	
x.	Instantaneous unit provided -Current setting range -Operating range	Yes/No % of rated current, mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		



TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.20: 132/66kV CONTROL AND RELAY PANEL FOR TRANSFORMER				
			Sheet 5 of 7	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
xiii.	Auxiliary DC Supply	V _{dc}	110	
6.4	Directional Earth fault Relay			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	xIn		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics Characteristic Angle		IDMT(standard inverse), 45°	
x.	Instantaneous unit provided -Current setting range -Operating range	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Technical literature submitted	Yes/No	Yes	
6.5	Transformer Differential relay			
i.	Manufacturer / Country of Origin			
ii.	Standard Reference	IEC	IEC	
iii.	Type of Construction			
iv.	Type		Numerical	
v.	Voltage Rating	V	110	
vi.	Type of Mounting		Flush	
vii.	Operating Time Setting, Sec	mS	<30	
viii.	Sensitivity Setting		20-50% x In	
ix.	Bias Setting			
x.	CT Ratio Compensating Range			
xi.	Burden for Current Circuit	VA		
xii.	DC Burden	VA		
xiii.	Tripping	A		
xiv.	Making current	A		
xv.	Closing Load (At 110V DC)	A		
6.6	AUXILIARY TRIPPING & LOCKOUT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type			



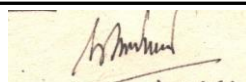
TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.20:132/66 kV CONTROL AND RELAY PANEL FOR TRANSFORMER					Sheet 6 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled	
iii.	Manufacturer's type designation				
iv.	Applicable standard	IEC	IEC		
v.	Operating time	mS	<15		
vi.	Does the lockout relay reset by the manually operated or electrically operated reset device				
vii.	Is the cut-off contact provided to interrupt the operating coil ?	Yes/No			
viii.	Contact rating at 125V DC	A			
xi.	Technical literature submitted	Yes/No	Yes		
6.7	Breaker Fail Lockout Relay, 86K				
i.	DC Voltage Rating, V	V	110		
ii.	Nos. of Electrically separate NO & NC Contacts				
6.8	Breaker Failure Lockout Relay, 86BF & LBB Protection				
i.	DC Voltage Rating, V	V	110		
ii.	Nos of Electrically separate NO & NC Contacts				
v.	Technical literature submitted	Yes/No	Yes		
6.9	BREAKER FAILURE PROTECTION RELAYS				
i.	Manufacturer and Country of Origin				
ii.	Manufacturer's type designation				
iii.	Applicable standard	IEC	IEC		
iv.	Triple pole or single pole		Triple Pole		
v.	Current setting range	% of rated current	20-200%		
vi.	Time setting range	sec			
vii.	Reset time	mS			
viii.	Insulating test according to IEC	Yes/No			
ix.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No			
x.	Auxiliary DC Supply	V _{dc}	110		
xi.	Is manufacturer ISO 9001 holder?	Yes/No	Yes		
xii.	ISO certificate submitted	Yes/No	Yes		
xiii.	Technical literature submitted	Yes/No	Yes		
7	CONSTRUCTION OF CONTROL & RELAY PANEL				
i.	Type(Simplex/Duplex)		Duplex		
ii.	Manufacturer's type designation				
iii.	Applicable standard	IEC	IEC		
iv.	Control panels furnished as per specifications	Yes/No	Yes		
v.	Enclosure protection class	IP	IP 4X		
vi.	Thickness of sheet metal used -Front and rear portion -Side, top and bottom covers -Doors	mm mm mm	>=3 >=2 >=3		



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.20:132/66 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 7 of 7
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
vii.	All instruments, meters, relays and control switches flush or semi-flush type		Flush	
viii.	Ground bus -Material -Size	mm x mm	Copper 25 X 6	
ix.	Internal Wiring - Type of Insulation - Voltage Grade of Wires - Cross Section of wire Current circuit Voltage & auxiliary Circuit	V Sq.mm	600	
x.	Overall dimension of control boards (LxWxH)	mm		
xi.	Shipping data -Size of large package -Weight of the heaviest package	mm Kg		
xii.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
xiii.	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
xiv.	ISO 9001 certificate submitted?	Yes/No	Yes	
xv.	Has manufacturer exported units?	Yes/No	Yes	
xvi.	User's certificate submitted?	Yes/No	Yes	
xvii.	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

Signed.....
As representative for.....
Address.....
Date.....





ITEM No.21: 66/11kV TRANSFORMER CONTROL AND RELAY PANEL

ITEM No.21: 66/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 1 of 5
	DESCRIPTION	UNIT		DATA to be Filled
1	CONTROL AND RELAY PANEL TYPE	Duplex		
1.1	Manufacturer and Country of Origin			
1.2	Year of manufacturing experience	Years	5	
1.3	Manufacturing's Designation as per submitted catalogue			
2	CONTROL DISCREPANCY SWITCHES			
2.1	Manufacturer and Country of Origin			
2.2	Type		Discrepancy	
2.3	Current Rating	A		
2.3	Catalogue furnished	Yes/No	Yes	
3	PUSH BUTTON			
3.1	Manufacturer and Country of Origin			
3.2	Type			
3.3	Contact Rating, continuous Making Current Breaking Current	Amp Amp Amp		
3.3	Catalogue furnished	Yes/No	Yes	
4	INDICATING LAMPS			
4.1	Manufacturer			
4.2	Voltage Rating	V		
4.3	Wattage	W		
5	INDICATING INSTRUMENTS			
5.1	Ammeter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iv.	Accuracy class		0.5	
v.	Scale			
	-Type of scale		Center zero	
	-Range of indication (...../1 Amp CT operated)	A	400-200-0- 200-400	
	-Overload range	%	1.5	
vi.	VA Burden			
vi.	Transducer operated	Yes/No	Yes	
5.2	Apparent Power Meter (VA)			
i.	Manufacturer and Country of Origin			
ii	Type		Digital	
iii	Rated voltage	kV	$66/\sqrt{3}$: $0.11/\sqrt{3}$	
iv	Rated current	A	/1	
vi	Accuracy class		0.5	
vii	Scale		Centre zero	
	-Range of indication	MVA	40-20-0-20- 40	
viii.	VA Burden Current Coil Voltage Coil			
x	Transducer operated	Yes/No	Yes	



ITEM No.21:66/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 2 of 5
	DESCRIPTION	UNIT		DATA to be Filled
5.3	KWh Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital, 3-phase, 4 wire	
iii.	Applicable standard	IEC	IEC	
iv.	Accuracy class		0.2	
v.	Import and Export meter provided	Yes/No	Yes	
vi.	Rated voltage	kV	$66/\sqrt{3}$: $0.11/\sqrt{3}$	
vii.	Rated current	A	/1	
viii.	Operating current range	A	1-10A	
ix.	Operating Voltage range	A	0-480V	
x.	VA Burden Current Coil Voltage Coil	VA		
xi.	Impulse contact provided	Yes/No	Yes	
xii.	Programmable at Site		Yes	
xiii.	Software and optical probe provided as per Price schedule & BOQ		Yes	
5.4	Varmeter, MVar			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iii.	Accuracy class		0.5	
iii	Rated voltage	kV	$66/\sqrt{3}$: $0.11/\sqrt{3}$	
iv	Rated current	A	/1	
	-Range of indication	MVar	0-10-20	
5.6	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
viii.	Number of column	No.	6	
ix.	Type of mounting		Flush	
x.	Replacement of individual inscription plates and lamps from front panel possible	Yes/No	Yes	
xi.	Sequence of operation as per specification	Yes/No	Yes	
6	PROTECTIVE RELAYS			
6.1	PHASE OVERCURRENT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Non Directional	
ITEM No.21: 66/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 3 of 5



	DESCRIPTION	UNIT		DATA to be Filled
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple Pole	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	Sec	3	
viii.	Reset time	mS		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xiv.	Technical literature submitted	Yes/No	Yes	
6.2	EARTH FAULT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical, Non- Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	x I _n		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	Sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts, Nos	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xvi.	Technical literature submitted	Yes/No	Yes	
6.5	Transformer Differential relay			
i.	Manufacturer / Country of Origin			
ii.	Standard Reference	IEC	IEC	
iii.	Type of Construction			
iv.	Type		Numerical	
ITEM No. 21: 66/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER				Sheet 4 of 5



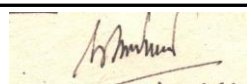
	DESCRIPTION	UNIT		DATA to be Filled
v.	Voltage Rating	V	110	
vi.	Type of Mounting		Flush	
vii.	Operating Time Setting, Sec	mS	<30	
viii.	Sensitivity Setting		20-50% x In	
ix.	Bias Setting			
x.	CT Ratio Compensating Range			
xi.	Burden for Current Circuit	VA		
xii.	DC Burden	VA		
xiii.	Tripping	A		
xiv.	Making current	A		
xv.	Closing Load (At 110V DC)	A		
6.6	AUXILIARY TRIPPING & LOCKOUT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Operating time	mS	<15	
vi.	Does the lockout relay reset by the manually operated or electrically operated reset device			
vii.	Is the cut-off contact provided to interrupt the operating coil?	Yes/No		
viii.	Contact rating at 125V DC	A		
xi.	Technical literature submitted	Yes/No	Yes	
6.7	Breaker Fail Lockout Relay, 86K			
i.	DC Voltage Rating, V	V	110	
ii.	Nos. of Electrically separate NO & NC Contacts			
6.8	Breaker Failure Lockout Relay, 86BF & LBB Protection			
i.	DC Voltage Rating, V	V	110	
ii.	Nos of Electrically separate NO & NC Contacts			
v.	Technical literature submitted	Yes/No	Yes	
6.9	BREAKER FAILURE PROTECTION RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Manufacturer's type designation			
iii.	Applicable standard	IEC	IEC	
iv.	Triple pole or single pole		Triple Pole	
v.	Current setting range	% of rated current	20-200%	
vi.	Time setting range	Sec		
vii.	Reset time	mS		
viii.	Insulating test according to IEC	Yes/No		
ix.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
x.	Auxiliary DC Supply	V _{dc}	110	
ITEM No. 21: 66/11 kV CONTROL AND RELAY PANEL FOR TRANSFORMER Sheet 5 of 5				



	DESCRIPTION	UNIT		DATA to be Filled
xi.	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
xii.	ISO certificate submitted	Yes/No	Yes	
xiii.	Technical literature submitted	Yes/No	Yes	
7	CONSTRUCTION OF CONTROL & RELAY PANEL			
i.	Type(Simplex/Duplex)		Duplex	
ii.	Manufacturer's type designation			
iii.	Applicable standard	IEC	IEC	
iv.	Control panels furnished as per specifications	Yes/No	Yes	
v.	Enclosure protection class	IP	IP 4X	
vi.	Thickness of sheet metal used -Front and rear portion -Side, top and bottom covers -Doors	mm mm mm	>=3 >=2 >=3	
vii.	All instruments, meters, relays and control switches flush or semi-flush type		Flush	
viii.	Ground bus -Material -Size	mm x mm	Copper 25 X 6	
ix.	Internal Wiring - Type of Insulation - Voltage Grade of Wires - Cross Section of wire Current circuit Voltage & auxiliary Circuit	V Sq.mm	600	
x.	Overall dimension of control boards (LxWxH)	Mm		
xi.	Shipping data -Size of large package -Weight of the heaviest package	mm Kg		
xii.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	Month		
xiii.	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
xiv.	ISO 9001 certificate submitted?	Yes/No	Yes	
xv.	Has manufacturer exported units?	Yes/No	Yes	
xvi.	User's certificate submitted?	Yes/No	Yes	
xvii.	Technical literature/drawings submitted?	Yes/No	Yes	
xviii.	Is CRP panel SAS compatible?	Yes/No	Yes with existing one.	

Deviations from technical requirements:

Signed..... As representative for.....
Address..... Date.....





TECHNICAL DATA SHEET (To Be Completed By the Bidder) ITEM No.22: 33kV LINE CONTROL AND RELAY PANEL				
	DESCRIPTION	UNIT		DATA to be Filled
1	CONTROL AND RELAY PANEL TYPE			
			Simplex	
1.1	Manufacturer and Country of Origin			
1.2	Year of manufacturing experience	Years	10	
1.3	Manufacturing's Designation as per submitted catalogue			
2	CONTROL DISCREPANCY SWITCHES			
2.1	Manufacturer and Country of Origin			
2.2	Type		Discrepancy	
2.3	Current Rating	A		
2.3	Catalogue furnished	Yes/No	Yes	
3	PUSH BUTTON			
3.1	Manufacturer and Country of Origin			
3.2	Type			
3.3	Contact Rating, continuous	Amp		
	Making Current	Amp		
	Breaking Current	Amp		
3.3	Catalogue furnished	Yes/No	Yes	
4	INDICATING LAMPS			
4.1	Manufacturer			
4.2	Voltage Rating	V		
4.3	Wattage	W		
5	INDICATING INSTRUMENTS			
5.1	Ammeter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iv.	Accuracy class		0.5	
v.	Scale			
	-Type of scale		Center zero	
	-Range of indication (...../1 Amp CT operated)	A	1200-600- 300-0-300- 600-1200	
	-Overload range	%	1.5	
vi.	VA Burden			
vi.	Transducer operated	Yes/No	Yes	



5.2	Apparent Power Meter (VA)			
i.	Manufacturer and Country of Origin			
ii	Type		Digital	
iii	Rated voltage	kV	$33/\sqrt{3}$: $0.11/\sqrt{3}$	
	Rated current	A	/1	
vi	Accuracy class		0.5	
vii	Scale		Centre zero	
viii.	VA Burden Current Coil Voltage Coil			
x	Transducer operated	Yes/No	Yes	
5.3	KWh Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital, 3- phase, 4 wire	
iii.	Applicable standard	IEC	IEC	
iv.	Accuracy class		0.2	
v.	Import and Export meter provided	Yes/No	Yes	
vi.	Rated voltage	kV	$33/\sqrt{3}$: $0.11/\sqrt{3}$	
vii.	Rated current	A	/1	
viii.	Operating current range	A	1-10A	
ix.	Operating Voltage range	A	0-480V	
x.	VA Burden Current Coil Voltage Coil	VA		
xi.	Impulse contact provided	Yes/No	Yes	
xii.	Programmable at Site		Yes	
xiii.	Software and optical probe provided as per Price schedule & BOQ		Yes	
5.4	Voltmeter			
i.	Manufacturer & Country of origin			



ii	Type			
iii	Accuracy Class			
iv	VA Burden			
v	Transducer Operated(Yes/NO)	Yes		
5.4	Watt meter, MW			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iii.	Accuracy class		0.5	
iii	Rated voltage	kV	$33/\sqrt{3}$: $0.11/\sqrt{3}$	
iv	Rated current	A	/1	
	-Range of indication	MW	0-50-100	
5.6	Annunciators			
I	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Catalogue furnished	Yes/No	Yes	
vi.	Number of active points	No.	24	
vii.	Number of rows	No.	4	
viii.	Number of column	No.	6	
ix.	Type of mounting		Flush	
x.	Replacement of individual inscription plates and lamps from front panel possible	Yes/No	Yes	
xi.	Sequence of operation as per specification	Yes/No	Yes	
6	PROTECTIVE RELAYS			
6.1	PHASE OVERCURRENT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Non Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple Pole	
vi.	Current setting range	% of rated current	20-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided	Yes/No		



	-Light emitting diode provided	Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xiv.	Technical literature submitted	Yes/No	Yes	
6.2	EARTH FAULT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical, Non-Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Triple pole or single pole		Triple	
vi.	Continuous overload capacity	x I _n		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided	Yes/No	Yes	
	-Current setting range	% of rated current	500-2000%	
	-Operating range	mS		
	-NO Contacts, Nos			
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication			
	-Hand reset flags provided	Yes/No		
	-Light emitting diode provided	Yes/No		
xiii.	Auxiliary DC Supply	V _{dc}	110	
xvi.	Technical literature submitted	Yes/No	Yes	
6.3	AUXILIARY TRIPPING & LOCKOUT RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Applicable standard	IEC	IEC	
v.	Operating time	mS	<15	
vi.	Does the lockout relay reset by the manually operated or electrically operated			



	reset device			
vii.	Is the cut-off contact provided to interrupt the operating coil ?	Yes/No		
viii.	Contact rating at 125V DC	A		
xi.	Technical literature submitted	Yes/No	Yes	
6.4	Breaker Fail Lockout Relay, 86K			
i.	DC Voltage Rating, V	V	110	
ii.	Nos. of Electrically separate NO & NC Contacts			
6.5	Breaker Failure Lockout Relay, 86BF & LBB Protection			
i.	DC Voltage Rating, V	V	110	
ii.	Nos of Electrically separate NO & NC Contacts			
v.	Technical literature submitted	Yes/No	Yes	
6.6	BREAKER FAILURE PROTECTION RELAYS			
i.	Manufacturer and Country of Origin			
ii.	Manufacturer's type designation			
iii.	Applicable standard	IEC	IEC	
iv.	Triple pole or single pole		Triple Pole	
v.	Current setting range	% of rated current	20-200%	
vi.	Time setting range	sec		
vii.	Reset time	mS		
viii.	Insulating test according to IEC	Yes/No		
ix.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
x.	Auxiliary DC Supply	V _{dc}	110	
xi.	Is manufacturer ISO 9001 holder?	Yes/No	Yes	



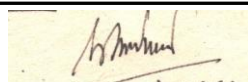
xii.	ISO certificate submitted	Yes/No	Yes	
xiii.	Technical literature submitted	Yes/No	Yes	
7	CONSTRUCTION OF CONTROL & RELAY PANEL			
i.	Type(Simplex/Duplex)		Simplex	
ii.	Manufacturer's type designation			
iii.	Applicable standard	IEC	IEC	
iv.	Control panels furnished as per specifications	Yes/No	Yes	
v.	Enclosure protection class	IP	IP 4X	
vi.	Thickness of sheet metal used -Front and rear portion -Side, top and bottom covers -Doors	mm mm mm	≥ 3 ≥ 2 ≥ 3	
vii.	All instruments, meters, relays and control switches flush or semi-flush type		Flush	
viii.	Ground bus -Material -Size	mm x mm	Copper 25 X 6	
ix.	Internal Wiring - Type of Insulation - Voltage Grade of Wires - Cross Section of wire Current circuit Voltage & auxiliary Circuit	V Sq.mm	600	
x.	Overall dimension of control boards (LxWxH)	mm		
xi.	Shipping data -Size of large package -Weight of the heaviest package	mm Kg		



xii.	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
xiii.	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
xiv.	ISO 9001 certificate submitted?	Yes/No	Yes	
xv.	Has manufacturer exported units?	Yes/No	Yes	
xvi.	User's certificate submitted?	Yes/No	Yes	
xvii.	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements

Signed.....
As representative for.....
Address.....
Date.....



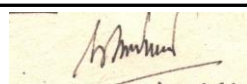

ITEM No.23: 120kV LIGHTNING ARRESTOR				Sheet 1 of 1
	DESCRIPTION	UNIT	REQUIREMENT	OFFERED DATA
1.	Manufacturer and Country of origin			
2.	Years of manufacturing service	Years	10	
3.	Manufacturer's designation as per submitted catalogue / Model No.		To be furnished	
4.	Applicable standard		IEC	
5.	Type		Gap less metal – oxide / Outdoor	
6.	Rated voltage rating of L.A.	kV	120	
7.	Impulse withstand voltage, (crest)	kV	650	
8.	Power frequency withstand voltage	kV	275	
9.	. Rated frequency	Hz	50	
10.	Nominal discharge current	kA	10	
11.	Surge counter with insulating base furnished?	Yes/No	Yes for transmission line	
12.	Leakage current measuring instrument furnished?	Yes/No	Yes for transmission line	
13.	Porcelain creepage distance	mm	3300	
14.	Line terminal with accessories provided	Yes/No	Yes	
15.	Earth terminal with accessories provided	Yes/No	Yes	
16.	Has manufacturer exported such units?	Yes/No	Yes	

Deviations from technical requirements:

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As representative for.....

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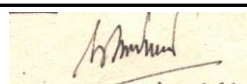
ITEM No.24: 66kV LIGHTNING ARRESTOR

ITEM No.24: 66 kV LIGHTNING ARRESTOR				Sheet 1 of 1
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
			66kV	66 kV
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	5	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, gapless, Zinc-Oxide	
6	Voltage rating of L.A	kV	60	
7	Nominal discharge current	kA	10	
8	Surge counter with insulating base furnished	Yes/No	Yes	
9	Minimum power frequency sparkover voltage	kV		
10	Maximum 1/50 impulse sparkover voltage	kV		
11	Maximum front wave sparkover voltage	kV		
12	Maximum switching surge sparkover voltage	kV		
13	Number of section per Pole		1	
14	Insulation level			
	a)Impulse withstand voltage(peak)	kV	325	
	b)Power frequency withstand voltage (1min, rms)	kV	140	
15	Porcelain creepage distance	mm	1650	
16	Earth terminal with accessories provided	Yes/No	Yes	
17	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
18	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
19	Has manufacturer exported units?	Yes/No	Yes	
20	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

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As representative for.....

Address..... Date.....





ITEM No.25: 33 kV LIGHTNING ARRESTOR				Sheet 1 of 1
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue			
4	Applicable standard		IEC	
5	Type		Outdoor, gapless, Zinc-Oxide	
6	Voltage rating of L.A	kV	30	
7	Nominal discharge current	kA	10	
8	Surge counter with insulating base furnished	Yes/No	Yes	
9	Minimum power frequency sparkover voltage	kV		
10	Maximum 1/50 impulse sparkover voltage	kV		
11	Maximum front wave sparkover voltage	kV		
12	Maximum switching surge sparkover voltage	kV		
13	Number of section per Pole		1	
14	Insulation level			
	a) Impulse withstand voltage(peak)	kV	170	
	b) Power frequency withstand voltage (1min, rms)	kV	70	
15	Porcelain creepage distance	mm	825	
16	Earth terminal with accessories provided	Yes/No	Yes	
17	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		
18	Is manufacturer is ISO 9001 holder?	Yes/No	Yes	
19	Has manufacturer exported units?	Yes/No	Yes	
20	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:

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As representative for.....

Address..... Date.....

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TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.26: 11kV VACUUM CIRCUIT BREAKER				Sheet 1 of 8
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
A	SWITCHGEAR MANUFACTURER			
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturing's Designation as per submitted catalogue		To be furnished	
4	Applicable standard		IEC	
B	BUSBAR			
1	Material			
	-Incomer		Copper	
	-Outgoing feeder		Copper	
2	Size			
	a. Main bus	mm ²		
	b. Ground bus	mm ²		
3	Minimum Clearance			
	a. Phase to phase	mm		
	b. Phase to ground	mm		
4	Bus bar Rated Current			
	a. Continuous at 40 deg. C amb.	A	2500	
	b. Short time current for 3 sec	kA	25	
5	Rated Voltage	kV	12	
6	Bus Support Insulators			
	a. Manufacturer			
	b. Type			
	c. Impulse Withstand Voltage	kV	75	
	d. Power frequency withstand voltage(1 min. rms)	kV	28	
7	Busbar joint silver plated?	Yes/No	Yes	
C	CIRCUIT BREAKER			
1	Manufacturer			
2	Type		Vacuum, with moving carriage	
3	Manufacturing's Designation as per submitted catalogue /Model No.		To be furnished	
4	Rated Voltage	kV	12	
5	Number of possible operation without maintenance			
	-Rated short circuit breaking current	No.	100	
	-Rated normal current	No.	10000	
	-For mechanism	No.	30000	
6	Frequency	Hz	50	
7	Rated current			



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.26: 11kV VACUUM CIRCUIT BREAKER				Sheet 2 of 8
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
7.1	Continuous at 45 degree ambient Incomer Outgoing	A A	2500/2000 1250	
7.2	Short circuit current for 3 sec.	kA	25	
8	Vacuum Interrupter			
	a. Make			
	b. Rating			
9	Rated short circuit breaking current (rms sym.)	kA	25	
10	Interrupting time	ms	60	
11	Rated short circuit making current			
11.1	Peak	kA	63	
12	Closing time, max	mS	120	
13	Insulation level			
	a. Impulse Withstand Voltage	kV	75	
	b. Power frequency withstand Voltage	kV	28	
14	Operating Mechanism			
	a. Type		Spring with motor charging	
	b. Operating voltage range -Closing -Tripping	% of rated voltage	85-110% 70-110%	
	c. Closing and Tripping coils current	A		
	d. Duty cycle		CO-15sec -CO	
15	Spring charging motor			
	a. Type and Manufacturer			
	b. Voltage	V	110 V DC	
	c. Rating	kW	Spring operated	
	d. Time required by motor to charge the spring completely	sec	<30	
16	Total no. of auxiliary contacts			
	a. Normally open	No.	8	
	b. Normally closed	No.	8	
	c. Contact ratings(make and continuous current)			
	-AC at 230V	A	1	
	-DC inductive at 110 Volt	A	0.5	
17	Overall Dimension (L*W*H)	mm		
D	CURRENT TRANSFORMER			
1	Manufacturer			
2	Type		Cubicle mounted, epoxy resin	
3	Manufacturing's Designation as per submitted catalogue /Model No.		To be furnished	
4	Frequency	Hz	50	



TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.26: 11kV VACUUM CIRCUIT BREAKER			Sheet 3 of 8	
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
5	Voltage Class	kV	12	
6	Reference standard		IEC	
7.1	- For Incomer, Buscoupler - Nos. of Core - Ratio / Class / Burden - Metering - Protection - Differential		3 1000-2400/1A 0.5,15VA 5P20, 15VA PS,15VA	
7.2	For Outgoing Feeders - Nos. of Core - Ratio / Class / Burden - Metering - Protection		2 300-600/1A 0.5, 15VA 5P20, 15VA	
8	Insulation level			
	a. Impulse Withstand Voltage	kV	75	
	b. Power frequency withstand Voltage	kV	28	
E	VOLTAGE TRANSFORMER			
1	Manufacturer			
2	Type		Incomer Cubical mounted	
3	Manufacturing's Designation as per submitted catalogue /Model No.		To be furnished	
4	Frequency	Hz	50	
5	Voltage Class	kV	12	
6	Reference standard		IEC	
7	Voltage Transformer for Incomer Feeder - Ratio - Accuracy Class - Burden	kV VA	11/√3/0.11/√3 0.5,3P 100	
8	Insulation level			
	a. Impulse Withstand Voltage	kV	75	
	b. Power frequency withstand Voltage	kV	28	
9	Overall Dimension (L*W*H)	mm		
10	Weight	kg		
11	Fuses(HV/LV)			
	a) Type			
	b) Continuous ratings	A		
	c) Symmetrical fault rating	kV		
F	INDICATING INSTRUMENTS			
1	kWh Meter			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital, 3-phase, 4 wire	
iii.	Applicable standard	IEC	IEC	



TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.26: 11kVVACUUM CIRCUIT BREAKER			Sheet 4 of 8	
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
iv.	Accuracy class		0.5	
v.	Import and Export meter provided	Yes/No	Yes	
vi.	Rated voltage	V	110	
vii.	Rated current	A	1	
viii.	Operating current range	A	0 – 10	
ix.	Operating Voltage range	V	0 - 480	
x.	VA Burden Current Coil Voltage Coil	VA		
xi.	Test Impulse output provided	Yes/No	Yes	
xii.	Programmable at Site	Yes/No	Yes	
xiii.	Software and optical probe provided as per Price schedule & BOQ	Yes/No	Yes	
xiv.	Load profile can be downloaded	Yes/No	Yes	
2	Ammeter			
i.	Manufacturer and Country of Origin			
ii.	Type			
iii.	Accuracy class		0.5	
v.	Scale			
	-Range of indication For Incomer For Outgoing Feeder	A A	As per specification	
	-Overload range	%	1.5	
vi.	VA Burden			
3	Voltmeter for Incomer Only			
i.	Manufacturer and Country of Origin			
ii.	Type		Digital	
iii.	Accuracy class		0.5	
iv.	Scale			
	-Range of indication	kV	0-15	
v.	VA Burden			
4	Watt Meter (MW)			
i.	Manufacturer and Country of Origin			
ii.	Type			
iii.	Rated voltage	kV	11/√3 : 0.11/√3	
iv.	Rated current	A		
vi.	Accuracy class		0.5	
5	Power Factor Meter (PF)			
i.	Manufacturer and Country of Origin			
ii.	Type			
iii.	Rated voltage	kV		
iv.	Rated current	A		
vi.	Accuracy class			



TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.26: 11kVVACUUM CIRCUIT BREAKER			Sheet 5 of 8	
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
vii	Range of indication			
	- Incomer	MW	0-10/20	
	- Outgoing feeder	MW	0-1/2	
G	ANNUNCIATORS			
I	Manufacturer and Country of Origin			
ii.	Type			
vi.	Number of active points	No.	6	
ix.	Type of mounting		Flush	
x.	Replacement of individual inscription plates and lamps from front panel possible	Yes/No	Yes	
xi.	Sequence of operation as per specification	Yes/No	Yes	
H	PROTECTIVE RELAYS			
1	Manufacturer & country of origin			
2	Years of manufacturing service	Years	10	
3	Reference standard		IEC	
4	Overcurrent Relays (Non Directional) for Outgoing Feeders			
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical Non-Directional	
iii.	Manufacturer's type designation			
v.	No of Pole		Three	
vi.	Current setting range	% of rated current	20-250%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 200-2500%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxilliary DC Supply	V	110	
xvi.	Technical literature submitted	Yes/No	Yes	
5	Earth fault relays (non directional) for Outgoing Feeders			



TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

Sheet 6 of 8

ITEM No.26: 11kV VACUUM CIRCUIT BREAKER

	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
i.	Manufacturer and Country of Origin			
ii.	Type		Numerical/ Non-Directional	
iv.	Applicable standard			
vi.	Continuous overload capacity	x In		
vii.	Current setting range	%of In	10-100%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts, Nos	Yes/No % of In	Yes 50-500%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxilliary DC Supply	V	110	
xiv.	Technical literature submitted	Yes/No	Yes	
xv.	Type test certificate submitted	Yes/No	Yes	
6	Directional Phase Over current Relays for Incomer Panel			
i.	Manufacturer and Country of Origin			
ii.	Type		Static (Numerical) Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard			
v.	Triple pole or single pole		triple	
vi.	Current setting range	% of rated current	50-200%	
vii.	Operating time at 10 times current setting	sec	3	
viii.	Reset time	mS		
	Contact rating at 125V DC	A		
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts	Yes/No % of rated current	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxiliary DC Supply	V	110	

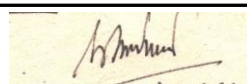


TECHNICAL DATA SHEET				
(To Be Completed By the Bidder)				
ITEM No.26: 11kV VACUUM CIRCUIT BREAKER				Sheet 7 of 8
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
7	DIRECTIONAL EARTH FAULT RELAYS For Incomer Panel			
i.	Manufacturer and Country of Origin			
ii.	Type		Static (Numerical) / Directional	
iii.	Manufacturer's type designation			
iv.	Applicable standard			
v.	Triple pole or single pole		Single	
vi.	Continuous overload capacity	x In		
vii.	Current setting range	% of rated current	10-80%	
viii.	Operating time at 10 times current setting	sec	3	
ix.	Characteristics		IDMT(standard inverse)	
x.	Instantaneous unit provided -Current setting range -Operating range -NO Contacts, Nos	Yes/No % of rated current mS	Yes 500-2000%	
xi.	Insulating test according to IEC	Yes/No		
xii.	Indication -Hand reset flags provided -Light emitting diode provided	Yes/No Yes/No		
xiii.	Auxilliary DC Supply	V	110	
xiv.	Is manufacturer ISO 9001 holder?	Yes/No	Yes	
xv.	ISO certificate submitted	Yes/No	Yes	
xvi.	Technical literature submitted	Yes/No	Yes	
xvii.	Type test certificate submitted	Yes/No	Yes	
xv.	Has manufacturer exported units?	Yes/No	Yes	
xvi.	User's certificate submitted?	Yes/No	Yes	
xvii.	Technical literature/drawings submitted?	Yes/No	Yes	
8	Auxiliary Tripping & Lockout Relays			
i.	Manufacturer and Country of Origin			
ii.	Type			
iii.	Manufacturer's type designation			
iv.	Applicable standard			
v.	Operating time	mS	<15	
viii.	Contact rating at 125V DC	A		
I	EARTHING SWITCH			
	- Type		Integrated	
	- Rating			
	- Interlocking		Yes / No	



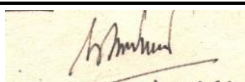
TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.26: 11kV VACUUM CIRCUIT BREAKER				Sheet 8 of 8
	DESCRIPTION	UNIT	NEA REQ. FOR 11kV VCB	DATA OF OFFERED 11kV VCB
J	SURGE ARRESTORS for Incomer Type rating	kA	ZnO 9kV, 10kA	
K	SWITCHGEAR ASSEMBLY			
1	Type of Switchgear			
2	Enclosure			
	a. Type			
	b. Thickness of metal sheet(min)	mm	2	
	c. Degree of protection provided by the enclosure		IP4X	
3	Breaker assembly			
	a. Breaker provided with service test and withdrawn position	Yes/No	Yes	
	b. type of Indication provided for breaker position		LED	
	c. Cubicle door can be closed with breaker in service or test position	Yes/No	Yes	
4	Space Heater			
	a. Thermostat controlled space heater furnished for each cubicle?	Yes/No	Yes	
	b. Ratings			
	-Voltage	V, AC	230	
	-Watts			
5	Overall Mechanical dimension (LXWXH)	mm x mm x mm		
6	Approximate weight (complete panel)			
7	Shipping dimension(LxWxH) of complete panel			
8	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)			
9	Type test certificate submitted?	Yes/No	Yes	
10	Has manufacturer exported units?	Yes/No	Yes	
11	User's certificate submitted?	Yes/No	Yes	
12	Technical literature/drawings submitted?	Yes/No	Yes	

Deviations from technical requirements:




Signed.....
As representative for.....

Address.....
Date.....



TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No. 27 11kV XLPE POWER CABLES				Sheet 1 of 1
	DESCRIPTION	UNIT		DATA to be Filled
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Type		Armoured	
4	Applicable standard		IEC	
5	Voltage rating			
	a) Suitable for max. system Voltage	kV	12	
	b) voltage grade of this cable	kV	6/10(12)	
	c) Rated Voltage between each conductor and screen	kV	11/√ 3	
	d) Rated Voltage between two conductors	kV	11	
6	Conductor material	Copper	Copper	
7	Insulating material		Polyethylene	
	Thickness			
8	Overall jacket material		PVC	
	Thickness			
9.1	Overall Cross sectional Area of the cable, Copper (Single Core)	Sq.mm	800	
10	Type of Cable	Single	Single	
11	Continuous Current Rating at 45DegC Ambient Temperature in Duct	A		
	Aluminum 300 Sq.mm	A		
12	Short Circuit Current rating	kA	> 20	
13	Fire Retardive	Yes	Yes	
14	Mositure Resistant	Yes	Yes	
15	Technical Leaflets provided	Yes / No	Yes	
16	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		

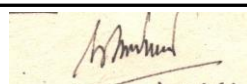
Deviations from technical requirements:

Signed.....

As representative for.....

Address.....

Date.....





TECHNICAL DATA SHEET (To Be Completed By the Bidder)				
ITEM No.28: 33kV XLPE POWER CABLES				Sheet 1 of 1
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin			
2	Year of manufacturing experience	Years	10	
3	Manufacturer's type designation			
4	Type		Armoured	
5	Applicable standard		IEC	
6	Voltage rating			
	e) Suitable for max. system voltage	kV	36	
	f) voltage grade of this cable	kV	19/33	
	g) Rated voltage between each conductor and screen	kV	33/√3	
	h) Rated voltage between two conductors	kV	33	
7	Conductor material	copper	copper	
8	Insulating material		Polyethylene	
	Class of Standing		class 2	
	Thickness of Conductor screen	mm		
	Thickness of XLPE Insulation	mm		
	Thickness of Insulation Screen	mm		
	Thickness of Copper screen	mm		
8	Overall jacket material		PVC	
	Thickness			
9	Overall Cross sectional Area of the cable	Sq.mm	800	
10	Type of Cable		Single Core	
11	Continuous Current Rating at 45DegC Ambient Temperature in Duct	A		
12	Short Circuit Current rating	kA	> 20	
13	Fire Retardive	Yes	Yes	
14	Mositure Resistant	Yes	Yes	
15	Technical Leaflets provided	Yes / No	Yes	
16	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		

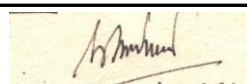
Deviations from technical requirements:

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As representative for.....

Address.....

Date.....



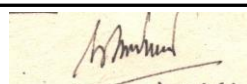


ITEM No.29: CONTROL CABLES			Sheet 1 of 1	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Type		Armoured	
4	Applicable standard		IEC	
5	<i>Voltage rating</i> Suitable for max. system voltage	V	1000	
	voltage grade of this cable	V	600/1100	
6	Conductor material	copper		
7	Insulating material		Polyethylene	
8	Overall jacket material		PVC	
9	Fire Retardive	Yes		
10	Mositure Resistant	Yes		
11	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		

Deviations from technical requirements:

Signed..... As representative for.....

Address..... Date.....



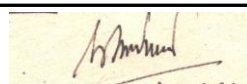


ITEM No.30: LV POWER CABLES			Sheet 1 of 1	
	DESCRIPTION	UNIT	NEA REQ	DATA to be Filled
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Type		Armoured	
4	Applicable standard		IEC	
5	<i>Voltage rating</i> Suitable for max. system voltage voltage grade of this cable	V V	1000 600/1100	
6	Conductor material	copper		
7	Insulating material		Polyethylene	
8	Overall jacket material		PVC	
9	Fire Retardive	Yes		
10	Mositure Resistant	Yes		
11	Delivery of equipment in months following award of contract (Allowing time for approval of drawing)	month		

Deviations from technical requirements:

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Address..... Date.....



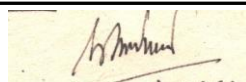


ITEM No.31: GROUNDING SYSTEM			Sheet 1 of 1	
	DESCRIPTION	UNIT	NEA REQ.	DATA to be Filled
1	Main ground grid conductor material		Copper	
2	Main ground grid conductor size	mm x mm		
3	Depth of Buried Main Ground Conductor	m		
4	Type of Joint above and below Ground level			
5	Material of Risers		Copper	
	Cross section of riser conductors	sq. mm	100	
6	Ground electrode -Material		Copper clad steel	
	-Diameter	mm	16	
	-Length	meter	as per IEEE 80	
7	Fence Grounding included			
8	Cross Section of Conductor Rise for Fence Grd	Sq.mm		
9	Fence Separately Grounded by Electrode	Yes/ No	Yes	
10	Calculation for Grounding Grid Length and Conductor Size Furnished	Yes/No	Yes	
11	Earthing system designed for	Ohm	≤1	

Deviations from technical requirements:

Signed..... As representative for.....

Address..... Date.....





TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

ITEM No.32: MISCELLANEOUS MATERIALS

Sheet 1 of 2

	DESCRIPTION	UNIT	NEA REQ.	DATA to be Filled
A	Strain Bus and Fittings		N/A	
1	Manufacturer and Country of Origin			
2	Nominal Sectional Area			
3	Nos. and Size of Wire i. Aluminium ii. Steel			
4	Overall diameter i. Steel Core ii. Complete Conductor			
5	Ultimate Tensile Strength			
6	Continuos Current at 45Deg C			
7	Short Circuit Current, 1S			
8	Resistance			
9	Weight			
B	Fittings			
1	Manufacturer and Country of Origin			
2	Material			
C	Suspension / Tension Insulators			
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Applicable standard			
4	Size - Diameter - Height	mm mm		
5	Number of units per string	No.		
6	Combined electrical and mechanical failing load	kg		
7	Creepage distance per unit	mm		
8	Impulse withstand voltage	kV		
9	Dry power frequency withstand voltage	kV		
10	Wet power frequency withstand test	kV		
11	Puncture voltage	kV		
12	Technical literature submitted	Yes/No		
D	Post Insulator			
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Applicable standard			
4	Rated system voltage	kV		
5	Maximum rated voltage	kV		
6	Unit size (Diameter)	mm		
7	Unit size (Length)	mm		
8	Creepage distance	mm		



TECHNICAL DATA SHEET

(To Be Completed By the Bidder)

ITEM No.32: MISCELLANEOUS MATERIALS

Sheet 2 of 2

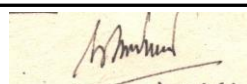
	DESCRIPTION	UNIT	NEA REQ.	DATA to be Filled
9	Insulation level			
	a) Impulse withstand voltage	kV		
	b) Power frequency withstand voltage (1min rms)	kV		
10	Failing load(bending)	kg		
11	Failing load(torsion)	kg-m		
12	Technical literature submitted	Yes/No		
E	ACSR Conductor			
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Applicable standard			
4	Unit size (Diameter x no of strands)			
5	Overall Cross sectional area			
6	Technical literature submitted	Yes/No	Yes	
F	Tubular Bus of Aluminium			
1	Manufacturer and Country of Origin			
2	Type of Round Tube			
3	Rated Voltage	kV	132	
4	Continuous Current at 45Deg C	A	2000	
5	Minimum 0.2% proof stress (yield strength)kg/mm2			
6	Minimum % Elongation on 50 mm gauge length			
7	Material & grade			
8	Minimum Electrical Conductivity			
9	Cross Sectional Area	mm sq		
10	Outside Diameter	mm		
11	Wall Thickness	mm		
12	Ultimate Tensile Strength			
13	Short Circuit Current, 1S			
14	Resistance			
15	Weight per meter length			
16	Technical literature submitted	Yes/No	Yes	
G	Tubular Bus of Aluminium			
1	Manufacturer and Country of Origin			
2	Type of Round Tube			
3	Rated Voltage	kV	33	
4	Continuous Current at 45Deg C	A	2500	
5	Minimum 0.2% proof stress (yield strength)kg/mm2			



6	Minimum % Elongation on 50 mm gauge length			
7	Material & grade			
8	Minimum Electrical Conductivity			
9	Cross Sectional Area	mm sq		
10	Outside Diameter	mm		
11	Wall Thickness	mm		
12	Ultimate Tensile Strength			
13	Short Circuit Current, 1S			
14	Resistance			
15	Weight per meter length			
16	Technical literature submitted	Yes/No	Yes	
H	Earth Wire			
1	Manufacturer and Country of Origin			
2	Manufacturer's type designation			
3	Applicable standard			
4	Unit size (Diameter x no of strands)	mm/Nos	10.05/7	
5	Overall Cross sectional area	Sq.mm	61.7	
6	Technical literature submitted	Yes/No	Yes	

Deviations from technical requirements

Signed.....As representative for.....
Address.....Date.....

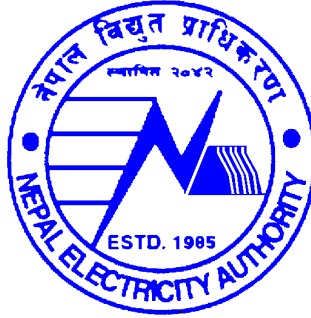




NEPAL ELECTRICITY AUTHORITY

(An Undertaking of Government of Nepal)

**TRANSMISSION DIRECTORATE
GRID OPERATION DEPARTMENT**



BIDDING DOCUMENT FOR

PROCUREMENT OF SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF
POWER TRANSFORMERS AT VARIOUS SUBSTATIONS

INTERNATIONAL COMPETITIVE BIDDING (ICB) (SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE)

Invitation for Bid (IFB) No.: Re-GOD/2079/080-03

VOLUME –III OF III (Bid Price Schedules)

Nepal Electricity Authority
Grid Operation Department
Min Bhawan, New Baneshwor, Kathmandu, Nepal
Tel. : + 977 (01) 4621465, 4620486, 4620619
Fax : + 977 (01) 4620586
Electronic mail address: gridoperation@nea.org.np

June 2023

Abbreviations

BD	Bidding Document
BDF.....	Bidding Forms
BDS.....	Bid Data Sheet
BOQ	Bill of Quantities
COF	Contract Forms
DP	Development Partners
ELI	Eligibility
EQC	Evaluation and Qualification Criteria
EXP	Experience
FIN	Financial
GCC	General Conditions of Contract
GoN	Government of Nepal
ICB	International Competitive Bidding
ICC.....	International Chamber of Commerce
ITB	Instructions to Bidders
JV	Joint Venture
LIT	Litigation
NCB	National Competitive Bidding
NEA.....	Nepal Electricity Authority
PAN	Permanent Account Number
PPA	Public Procurement Act
PPMO	Public Procurement Monitoring Office
PPR	Public Procurement Regulations
PL	Profit and Loss
SBD.....	Standard Bidding Document
SCC	Special Conditions of Contract
TS.....	Technical Specifications
VAT	Value Added Tax
ERQ	Employer's Requirements

**Nepal Electricity Authority
Transmission Directorate
Grid Operation Department
Grand Summary for Bid Price Schedules**

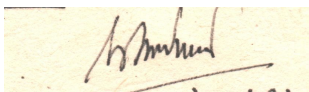
Job Title: Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No.: Re-GOD/2079/080-03

Part	Descriptions		Qty	Unit	Currency Type (LC/FC)	Amount	Amount
						Excluding Applicable Taxes and VAT	
A	Electrical Part	Supply & Delivery of Plant and Equipment	1	Lot			
		Installation, Testing & Commissioning Services	1	Lot			
B	Spare Part	Supply & Delivery of Mandatory Spares Parts	1	Lot			
C	Civil Part	Civil Works (Construction)	1	Lot			
	Grand Total					-	0.00

Name of Bidder

Signature of Bidder



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

**Work name: Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at
Various Substations**

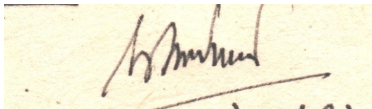
Tender No.: Re-GOD/2079/080-03

GENERAL SUMMARY

Package Nos.	Description	Total Amount	
		FC	LC
1	Nawalpur Substation		
2	Rupani Substation		
3	Hetauda Substation		
4	Piluwa Substation		
5	Mainahiya Substation		
6	Birgunj Substation		
7	Simara Substation		
8	New Bharatpur Substation		
9	Pokhara Substation		
10	Parwanipur Substation		
	<i>Grand Total</i>	-	-

Name of Bidder _____

Signature of Bidder _____



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Work name: Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

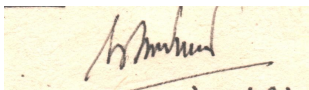
Tender No.: Re-GOD/2079/080-03

Price Schedule No. 5: Grand Total Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No. 3: Design Services (Not Applicable)			
4	a) Price Schedule No. 4A: Installation, Testing and Commissioning Services			
	b) Price Schedule No. 4B: Civil Works (Construction)			
5	Price Schedule No. 6: Recommended Spare Parts			
Grand Total				

Signature of Bidder _____

Name of Bidder _____



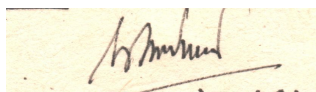
Price Schedules

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.
B. Pricing	
4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).



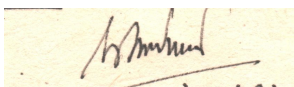

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/33kV, 63 MVA Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		1	Set				
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		2	Set				
1.4	132kV (300-600-900/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		3	Nos				
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification(as per existing type)		1	Set				
1.6	132kV Post Insulator with Steel Structure complete as specified		9	Nos				
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		3	Nos				
1.8	33 kV, 2000 A Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified		5	Set				
1.9	33kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified		7	Set				
1.10	33kV 2000 A Disconnecting Switch with Earthing Switch complete with all accessories and Steel Structure as specified		4	Set				




Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
1.11	33kV, 3 Core 30 VA Current Transformer complete with all accessories and Steel Structure as specified		15	Nos.				
1.12	33kV Potential Transformer supporting structurers and with all accessories as specified		3	Nos				
1.13	33kV Lightening Arrestor with Steel Structure complete as specified		12	Nos				
1.14	33kV Post Insulator with Steel Structure complete as specified		3	Nos.				
1.15	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)		4	Set				
1.16	Adaption work for Bus Bar Protection		1	Lot				
1.17	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/33kV Power Transformer Bay		1	Lot				
1.18	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay		4	Lot				
	[A]Sub Total (1)							
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	33 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection		1	Lot				
2.4	ACSR conductors for connecting with all accessories for 33kV Interconnection		5	Lot				



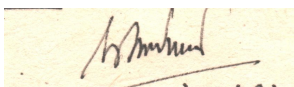
Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
2.5	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification		90	m				
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
2.7	Tubular bus for 33 kV Bus including all other accessories and hardwares required to complete the specified scope of work:		1	Lot				
	[B]Sub Total (2)							
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 132/33kV Power Transformer Bay		1	Lot				
3.2	Earthing of Equipments with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay		1	Lot				
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							




Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 33kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				
5.6	Complete Set of Gaskets		1	lot				
5.7	Complete set of Pressure Relief Device		1	set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor, Nos		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		2	Nos				
6.2	Closing Coils,		2	Nos				
6.3	Pressure Switches, Relays and Contactors (One of each type),		2	Set				
6.4	Motor for Mechanism		2	Nos				
6.5	Complete Sets of O-rings and Gaskets		2	Lot				
6.6	SF6 Gas filling Nozzle & Adaptor		2	Nos				



Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							



Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9	For 33kV Vacuum Circuit Breaker							
9.1	Tripping Coils, Nos		6	Nos.				
9.2	Closing Coils, Nos		6	Nos.				
9.3	Relays and Contactors (One of each type), Sets		2	Nos.				
9.4	Motor for Mechanism, Set		2	Set				
9.5	Interrupter for VCB, No		2	Nos.				
	[J]Sub Total of (9)							
10	33kV Disconnecting Switches							
10.1	Main contact assemblies, Set		4	Set				
10.2	Auxiliary contacts, Set		4	Set				
10.3	Interlocking coil, Set		4	Set				
	[K]Sub total of (10)							
11	For Line Control and Relay Panel							
11.1	Indicating Lamps(100% of used)		2	Lot				
11.2	Fuses of each type(100% of used)		2	Lot				
11.3	Color caps for each color for indicating lamps(20% of used)		2	Lot				
11.4	One of each type of Switch, Relay, Timer and other Special Device		2	Lot				
11.5	Each type of Auxiliary Relays(1each)		2	Lot				
11.6	Protection Relays							
11.6.1	3 Phase over current relays		2	Nos.				
11.6.2	Ground Fault Relays							



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

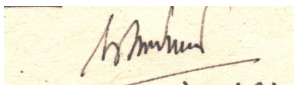
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
11.6.3	Tripping Control Circuit Relays,		2	Nos.				
11.7	Ammeter		2	Nos.				
11.8	MVA Meter		2	Nos.				
	[L]Sub Total of (11)							
	Total of Spare Part (B) [F+G+H+I+J+K+L]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Signature of Bidder _____
Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

10 March



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

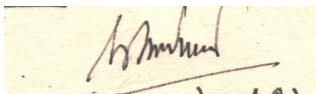
Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

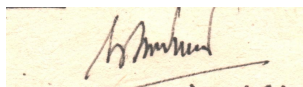
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/33kV, 63 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified	1	Set			
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	2	Set			
1.4	132kV (300-600-900/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	3	Nos			
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification(as per existing type)	1	Set			
1.6	132kV Post Insulator with Steel Structure complete as specified	9	Nos			
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	3	Nos			
1.8	33 kV, 2000 A Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified	5	Set			
1.9	33kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified	7	Set			
1.10	33kV 2000 A Disconnecting Switch with Earthing Switch complete with all accessories and Steel Structure as specified	4	Set			
1.11	33kV, 3 Core 30 VA Current Transformer complete with all accessories and Steel Structure as specified	15	Nos.			
1.12	33kV Potential Transformer supporting structurers and with all accessories as specified	3	Nos			
1.13	33kV Lightening Arrestor with Steel Structure complete as specified	12	Nos			
1.14	33kV Post Insulator with Steel Structure complete as specified	3	Nos.			
1.15	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)	4	Set			




Nepal Electricity Authority

Transmission Directorate

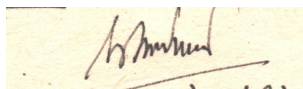
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.16	Adaption work for Bus Bar Protection	1	Lot			
1.17	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/33kV Power Transformer Bay	1	Lot			
1.18	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay	4	Lot			
	[A]Sub Total (1)					
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	33 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection	1	Lot			
2.4	ACSR conductors for connecting with all accessories for 33kV Interconnection	5	Lot			
2.5	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification	90	m			
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
2.7	Tubular bus for 33 kV Bus including all other accessories and hardwares required to complete the specified scope of work.	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay	1	Lot			
3.2	Earthing of Equipments with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay	1	Lot			




Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

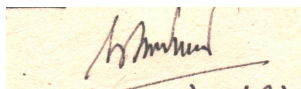
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
	[E]Total of Electrical Part (A) [A+B+C+D]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

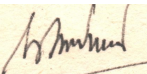
Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____





**Tender No. Re-GOD/2079/080-03; Package 1 : Nawalpur Substation
Schedule No.6. Recommended Spare Parts**

Signature of Bidder _____
Name of Bidder _____

Page 1 of 1

Price Schedules

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

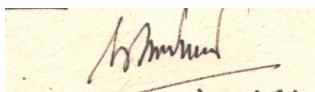
PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

B. Pricing

4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).



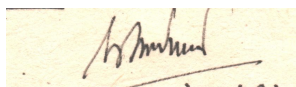

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/33kV, 63 MVA Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		1	Set				
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		2	Set				
1.4	132kV (300-600-900/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		3	Nos				
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification(as per existing type)		1	Set				
1.6	132kV Post Insulator with Steel Structure complete as specified		9	Nos				
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		3	Nos				
1.8	33 kV, 2000 A Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified		5	Set				
1.9	33kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified		7	Set				
1.10	33kV 2000 A Disconnecting Switch with Earthing Switch complete with all accessories and Steel Structure as specified		4	Set				
1.11	33kV, 3 Core 30 VA Current Transformer complete with all accessories and Steel Structure as specified		15	Nos.				
1.12	33kV Potential Transformer supporting structurers and with all accessories as specified		3	Nos				
1.13	33kV Lightening Arrestor with Steel Structure complete as specified		12	Nos				
1.14	33kV Post Insulator with Steel Structure complete as specified		3	Nos.				



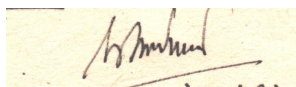

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
1.15	33 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 33kV Incomer Bay to 132/33kV Power Transformer, two cables per phase)		400	Metre				
1.16	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)		4	Set				
1.17	Adaption work for Bus Bar Protection		1	Lot				
1.18	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/33kV Power Transformer Bay		1	Lot				
1.19	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay		4	Lot				
	[A]Sub Total (1)							
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	33 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection		1	Lot				
2.4	ACSR conductors for connecting with all accessories for 33kV Interconnection		5	Lot				
2.5	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification		90	m				
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				




Nepal Electricity Authority
Transmission Directorate
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
2.7	Tubular bus for 33 kV Bus including all other accessories and hardware required to complete the specified scope of work:		1	Lot				
	[B]Sub Total (2)							
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 132/33kV Power Transformer Bay		1	Lot				
3.2	Earthing of Equipments with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay		1	Lot				
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 33kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				



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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				
5.6	Complete Set of Gaskets		1	lot				
5.7	Complete set of Pressure Relief Device		1	set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor, Nos		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		1	Nos.				
6.5	Complete Sets of O-rings and Gaskets		1	Lot				
6.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				



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Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenential Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							
9	For 33kV Vaccum Circuit Breaker							
9.1	Tripping Coils, Nos		6	Nos.				
9.2	Closing Coils, Nos		6	Nos.				



Nepal Electricity Authority

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9.3	Relays and Contactors (One of each type), Sets		2	Nos.				
9.4	Motor for Mechanism, Set		2	Set				
9.5	Interrupter for VCB, No		2	Nos.				
	[J]Sub Total of (9)							
10	33kV Disconnecting Switches							
10.1	Main contact assemblies, Set		4	Set				
10.2	Auxiliary contacts, Set		4	Set				
10.3	Interlocking coil, Set		4	Set				
	[K]Sub total of (10)							
11	For Line Control and Relay Panel							
11.1	Indicating Lamps(100% of used)		2	Lot				
11.2	Fuses of each type(100% of used)		2	Lot				
11.3	Color caps for each color for indicating lamps(20% of used)		2	Lot				
11.4	One of each type of Switch, Relay, Timer and other Special Device		2	Lot				
11.5	Each type of Auxiliary Relays(1each)		2	Lot				
11.6	Protection Relays							
11.6.1	3 Phase over current relays		2	Nos.				
11.6.2	Ground Fault Relays							
11.6.3	Tripping Control Circuit Relays,		2	Nos.				
11.7	Ammeter		2	Nos.				
11.8	MVA Meter		2	Nos.				



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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

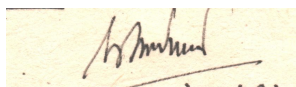
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
	[L]Sub Total of (11)							
	Total of Spare Part (B) [F+G+H+I+J+K+L]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Signature of Bidder _____
Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

W. M. M. M.



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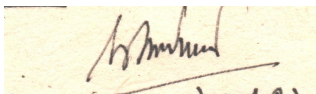
Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

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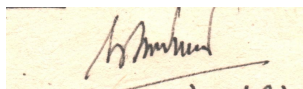
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/33kV, 63 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified	1	Set			
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	2	Set			
1.4	132kV (300-600-900/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	3	Nos			
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification(as per existing type)	1	Set			
1.6	132kV Post Insulator with Steel Structure complete as specified	9	Nos			
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	3	Nos			
1.8	33 kV, 2000 A Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified	5	Set			
1.9	33kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified	7	Set			
1.10	33kV 2000 A Disconnecting Switch with Earthing Switch complete with all accessories and Steel Structure as specified	4	Set			
1.11	33kV, 3 Core 30 VA Current Transformer complete with all accessories and Steel Structure as specified	15	Nos.			
1.12	33kV Potential Transformer supporting structurers and with all accessories as specified	3	Nos			
1.13	33kV Lightening Arrestor with Steel Structure complete as specified	12	Nos			
1.14	33kV Post Insulator with Steel Structure complete as specified	3	Nos.			




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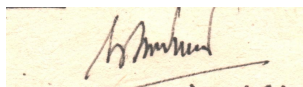
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.15	33 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 33kV Incomer Bay to 132/33kV Power Transformer, two cables per phase)	400	Metre			
1.16	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)	4	Set			
1.17	Adaption work for Bus Bar Protection	1	Lot			
1.18	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/33kV Power Transformer Bay	1	Lot			
1.19	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay	4	Lot			
	[A]Sub Total (1)					
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	33 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection	1	Lot			
2.4	ACSR conductors for connecting with all accessories for 33kV Interconnection	5	Lot			
2.5	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification	90	m			
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
2.7	Tubular bus for 33 kV Bus including all other accessories and hardwares required to complete the specified scope of work.	1	Lot			
	[B]Sub Total (2)					




Nepal Electricity Authority

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

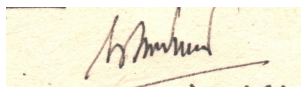
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay	1	Lot			
3.2	Earthing of Equipments with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay	1	Lot			
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
	[E]Total of Electrical Part (A) [A+B+C+D]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

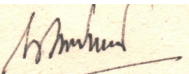
Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____





Tender No. Re-GOD/2079/080-03; Package 2 : Rupani Substation
Schedule No.6. Recommended Spare Parts

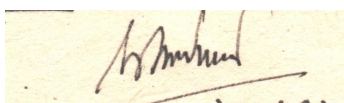
Price Schedules

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.
B. Pricing	
4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).



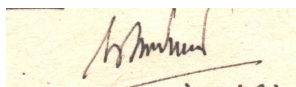

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/66kV, 45 MVA, 3-phase Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC, and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		2	Set				
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		1	Set				
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		2	Set				
1.4	132kV (200-400-600/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		3	Nos				
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)		1	Set				
1.6	132kV Post Insulator with Steel Structure complete as specified		3	Nos				
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		3	Nos				
1.8	66kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		1	Set				
1.9	66kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified		2	Set				
1.10	66kV (400-800-1200/1) 5 Core 30 VA Current Transformer with all accessories and Steel Structure as specified		3	Nos.				
1.11	66kV Lightning Arrestor with all accessories and Steel Structure as specified		3	Nos.				
1.12	66kV Post Insulator with Steel Structure complete as specified		3	Nos.				



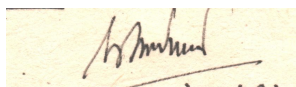

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
1.13	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/66kV Power Transformer Bay		1	Lot				
1.14	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/66kV Power Transformer		1	Lot				
	[A]Sub Total (1)							
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	66kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection		2	Lot				
2.4	ACSR conductors for connecting with all accessories for 66kV Interconnection		2	Lot				
2.5	Aluminium Tubular Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 132kV Bus, required to complete the specified scope of work		50	Metre				
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
2.7	Aluminium Tubular Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 66kV Bus required to complete the specified scope of work		50	Metre				
2.8	Aluminium Pipe for 66kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
	[B]Sub Total (2)							




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay		1	Lot				
3.2	Earthing of Transformer with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works		1	Lot				
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 66kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				
5.6	Complete Set of Gaskets		1	lot				



Nepal Electricity Authority

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Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
5.7	Complete set of Pressure Relief Device		1	set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor, Nos		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		1	Nos.				
6.5	Complete Sets of O-rings and Gaskets		1	Lot				
6.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							
8	For Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				



Nepal Electricity Authority

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							
9	For 66kV Circuit Breaker							
9.1	Tripping Coils		3	Nos.				
9.2	Closing Coils,		3	Nos.				
9.3	Pressure Switches, Relays and Contactors (One of each type),		1	Nos.				
9.4	Motor for Mechanism		1	Set				
9.5	Complete Sets of O-rings and Gaskets		1	Nos.				
9.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[J]Sub Total of (9)							



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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

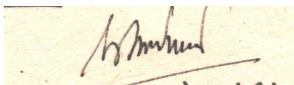
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
10	For 66kV Disconnecting Switches							
10.1	Main contact assemblies, Set		1	Set				
10.2	Auxiliary contacts, Set		1	Set				
10.3	Interlocking coil, Set		1	Set				
	[K]Sub total of (10)							
	Total of Spare Part (B) [F+G+H+I+J+K]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Signature of Bidder _____
Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

W. M. M. M.



Nepal Electricity Authority
Transmission Directorate
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

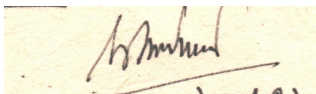
Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

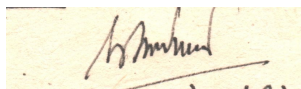
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/66kV, 45 MVA, 3-phase Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC, and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	2	Set			
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified	1	Set			
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	2	Set			
1.4	132kV (200-400-600/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	3	Nos			
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)	1	Set			
1.6	132kV Post Insulator with Steel Structure complete as specified	3	Nos			
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	3	Nos			
1.8	66kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified	1	Set			
1.9	66kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified	2	Set			
1.10	66kV (400-800-1200/1) 5 Core 30 VA Current Transformer with all accessories and Steel Structure as specified	3	Nos.			
1.11	66kV Lightning Arrestor with all accessories and Steel Structure as specified	3	Nos.			
1.12	66kV Post Insulator with Steel Structure complete as specified	3	Nos.			
1.13	600 V Control Cable and Power cable required to complete the scope of work as specified	1	Lot			




Nepal Electricity Authority

Transmission Directorate

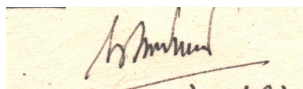
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.14	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/66kV Power Transformer	1	Lot			
	[A]Sub Total (1)					
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	66kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection	2	Lot			
2.4	ACSR conductors for connecting with all accessories for 66kV Interconnection	2	Lot			
2.5	Aluminium Tubular Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 132kV Bus, required to complete the specified scope of work	50	Metre			
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
2.7	Aluminium Tubular Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 66kV Bus required to complete the specified scope of work	50	Metre			
2.8	Aluminium Pipe for 66kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay	1	Lot			




Nepal Electricity Authority

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

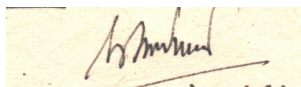
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
3.2	Earthing of Transformer with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works	1	Lot			
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
5	Dismantling Works					
5.1	Dismantling and Removal of 132/66 kV, 20 MVA Transformer and its accessories to safe location within Substation compound	1	Lot			
	[E]Sub Total (5)					
	[F]Total of Electrical Part (A) [A+B+C+D+E]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

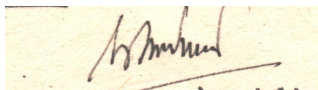
Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____



Tender No. Re-GOD/2079/080-03; Package 3 : Hetauda Substation
Schedule No.6. Recommended Spare Parts

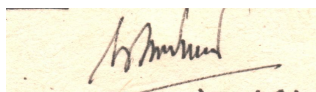
Price Schedules

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.
B. Pricing	
4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/33kV, 100 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		1	Set				
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		2	Set				
1.4	132kV (500-1000/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		3	Nos				
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification(as per existing type)		1	Set				
1.6	132kV Post Insulator with Steel Structure complete as specified		9	Nos				
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		3	Nos				
1.8	33 kV, Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified		6	Set				
1.9	33kV Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified		8	Set				
1.10	33kV Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified		5	Set				
1.11	33kV 3 Core 30 VA Current Transformer complete with all accessories and Steel Structure as specified		18	Nos.				
1.12	33kV Potential Transformer supporting structurers and with alll accessories as specified		3	Nos				
1.13	33kV Lightening Arrestor with Steel Structure complete as specified		15	Nos				



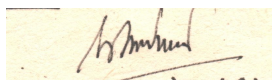
Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
1.14	33kV Post Insulator with Steel Structure complete as specified		3	Nos.				
1.15	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)		5	Set				
1.16	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/33kV Power Transformer Bay		1	Lot				
1.17	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay		5	Lot				
	[A]Sub Total (1)							
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	33 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection		1	Lot				
2.4	ACSR conductors for connecting with all accessories for 33kV Interconnection		6	Lot				
2.5	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification		90	m				
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
2.7	Tubular bus for 33 kV Bus including all other accessories and hardwares required to complete the specified scope of work:		1	Lot				
	[B]Sub Total (2)							




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Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay		1	Lot				
3.2	Earthing of Equipments with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay		5	Lot				
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 33kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				



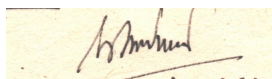
Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
5.6	Complete Set of Gaskets		1	lot				
5.7	Complete set of Pressure Relief Device		1	set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor, Nos		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		1	Nos.				
6.5	Complete Sets of O-rings and Gaskets		1	Lot				
6.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				



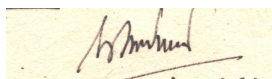

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
	[H]Sub Total of (7)							
8	For Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							
9	For 33kV Vaccum Circuit Breaker							
9.1	Tripping Coils, Nos		6	Nos.				
9.2	Closing Coils, Nos		6	Nos.				
9.3	Relays and Contactors (One of each type), Sets		2	Nos.				



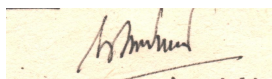

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9.4	Motor for Mechanism, Set		2	Set				
9.5	Interrupter for VCB, No		2	Nos.				
	[J]Sub Total of (9)							
10	33kV Disconnecting Switches							
10.1	Main contact assemblies, Set		4	Set				
10.2	Auxiliary contacts, Set		4	Set				
10.3	Interlocking coil, Set		4	Set				
	[K]Sub total of (10)							
11	For Line Control and Relay Panel							
11.1	Indicating Lamps(100% of used)		2	Lot				
11.2	Fuses of each type(100% of used)		2	Lot				
11.3	Color caps for each color for indicating lamps(20% of used)		2	Lot				
11.4	One of each type of Switch, Relay, Timer and other Special Device		2	Lot				
11.5	Each type of Auxiliary Relays(1each)		2	Lot				
11.6	Protection Relays							
11.6.1	3 Phase over current relays		2	Nos.				
11.6.2	Ground Fault Relays							
11.6.3	Tripping Control Circuit Relays,		2	Nos.				
11.7	Ammeter		2	Nos.				
11.8	MVA Meter		2	Nos.				




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Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

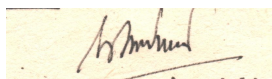
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
	[L]Sub Total of (11)							
	Total of Spare Part (B) [F+G+H+I+J+K+L]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

- Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country**

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

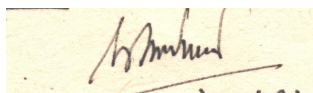
Signature of Bidder _____
Name of Bidder _____

W. M. M. M.



Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

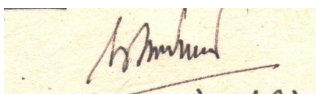
Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

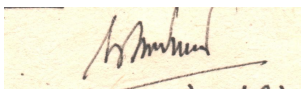
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/33kV, 100 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified	1	Set			
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	2	Set			
1.4	132kV (500-1000/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	3	Nos			
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification(as per existing type)	1	Set			
1.6	132kV Post Insulator with Steel Structure complete as specified	9	Nos			
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	3	Nos			
1.8	33 kV, Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified	6	Set			
1.9	33kV Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified	8	Set			
1.10	33kV Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified	5	Set			
1.11	33kV 3 Core 30 VA Current Transformer complete with all accessories and Steel Structure as specified	18	Nos.			
1.12	33kV Potential Transformer supporting structures and with all accessories as specified	3	Nos			
1.13	33kV Lightning Arrestor with Steel Structure complete as specified	15	Nos			




Nepal Electricity Authority

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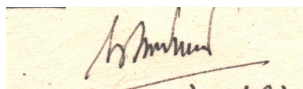
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.14	33kV Post Insulator with Steel Structure complete as specified	3	Nos.			
1.15	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)	5	Set			
1.16	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/33kV Power Transformer Bay	1	Lot			
1.17	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay	5	Lot			
	[A]Sub Total (1)					
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	33 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.3	ACSR conductors for connecting with all accessories for 132kV Interconnection	1	Lot			
2.4	ACSR conductors for connecting with all accessories for 33kV Interconnection	6	Lot			
2.5	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification	90	m			
2.6	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
2.7	Tubular bus for 33 kV Bus including all other accessories and hardwares required to complete the specified scope of work.	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay	1	Lot			
3.2	Earthing of Equipments with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay	5	Lot			




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Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

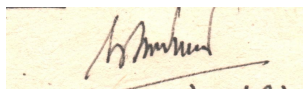
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
	[E]Total of Electrical Part (A) [A+B+C+D]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

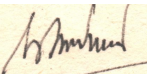
Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____





**Tender No. Re-GOD/2079/080-03; Package 5 : Mainahiya Substation
Schedule No.6. Recommended Spare Parts**

Signature of Bidder _____
Name of Bidder _____

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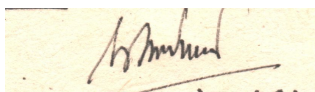
Price Schedules

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.
B. Pricing	
4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	66/11kV, 30 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV sides and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	66kV, 30 VA 5 core Current Transformer (300-600-900/1) with supporting structures and all accessories, as specified.		3	Nos.				
1.3	66/11kV Transformer Control & Relay Panel, complete with all accessories		1	Set				
1.4	66kV, Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		1	Set				
1.5	66 kV Disconnecting Switch without earth switch complete with all accessories and Steel Structure as specified		1	Set				
1.6	66kV Post Insulator complete and Steel Structure as specified		3	Nos				
1.7	66kV Lightening Arrestor complete and Steel Structure as specified		3	Nos				
1.8	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 11 kV Side (2 Cable per phase)		400	Metre				
1.9	11 kV Two Tier Switchgear							
1.9.1	11 kV Incomer Panel, 2000 A		1	Nos.				
1.9.2	11 kV Outgoing Panel, 1250 A (Two Breakers in each panel)		3	Nos.				
1.9.3	11kV Bus Coupler Panel, 2000 A		1	Nos.				
1.9.4	11kV Trunking Chamber		1	Nos.				
1.10	600 V Control Cable and Power cable required to complete the scope of work as specified		1	Lot				
	[A]Sub Total (1)							

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
2	Supply and Delivery of Miscellaneous Materials							
2.1	66kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	ACSR Conductors of suitable size for 66kV Interconnection of equipments with clamps and all accessories as used in the substation as per specification		1	Lot				
2.3	ACSR conductors of suitable size for connecting with clamps and all accessories for 66kV Bus Bar Extension		1	Lot				
	[B]Sub Total (2)							
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay		1	Lot				
3.2	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							
B	Spare Parts							
5	Power Transformer							
5.1	66kV Phase Bushing, 11kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				
5.6	Complete Set of Gaskets		1	Set				
5.7	Complete set of Pressure Relief Device		1	Set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 66kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		1	Nos.				
6.5	VCB Interrupter		1	Nos.				
	[G]Sub Total of (6)							
7	For 66kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							
9	For 11kV Two Tier VCB Switchgear Panels							
9.1	11kV Vacuum Interrupter		1	Nos.				
9.2	Tripping Coils		3	Nos.				
9.3	Closing Coils		3	Nos.				
9.4	Spring Charging Motor		1	Nos.				



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

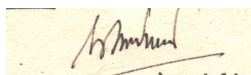
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9.5	Protection Relays							
9.5.1	3 phase Overcurrent Relay		1	Set				
9.5.2	Ground Fault Relay							
9.6	Ammeter		1	Nos				
9.7	Voltmeter		1	Nos				
9.8	kVA Meter		1	Nos				
9.9	11kV CTs as in Outgoing Feeder		1	Nos.				
9.10	Operating Handle		1	Nos				
9.11	Indicating lamps (100% of used)		1	Lot				
	[J]Sub Total of (9)							
	Total of Spare Part (B) [F+G+H+I+J]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Signature of Bidder _____
Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

W. M. M. M.



Nepal Electricity Authority
Transmission Directorate
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

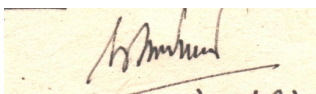
Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

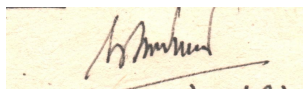
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	66/11kV, 30 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV sides and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	66kV, 30 VA 5 core Current Transformer (300-600-900/1) with supporting structures and all accessories, as specified.	3	Nos.			
1.3	66/11kV Transformer Control & Relay Panel, complete with all accessories	1	Set			
1.4	66kV, Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified	1	Set			
1.5	66 kV Disconnecting Switch without earth switch complete with all accessories and Steel Structure as specified	1	Set			
1.6	66kV Post Insulator complete and Steel Structure as specified	3	Nos			
1.7	66kV Lightening Arrestor complete and Steel Structure as specified	3	Nos			
1.8	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 11 kV Side (2 Cable per phase)	400	Metre			
1.9	11 kV Two Tier Switchgear					
1.9.1	11 kV Incomer Panel, 2000 A	1	Nos.			
1.9.2	11 kV Outgoing Panel, 1250 A (Two Breakers in each panel)	3	Nos.			
1.9.3	11kV Bus Coupler Panel, 2000 A	1	Nos.			
1.9.4	11kV Trunking Chamber	1	Nos.			
1.10	600 V Control Cable and Power cable required to complete the scope of work as specified	1	Lot			
	[A]Sub Total (1)					




Nepal Electricity Authority

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

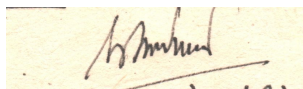
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
2	Miscellaneous Materials					
2.1	66kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	ACSR Conductors of suitable size for 66kV Interconnection of equipments with clamps and all accessories as used in the substation as per specification	1	Lot			
2.3	ACSR conductors of suitable size for connecting with clamps and all accessories for 66kV Bus Bar Extension	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay	1	Lot			
3.2	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
	[E]Total of Electrical Part (A) [A+B+C+D]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

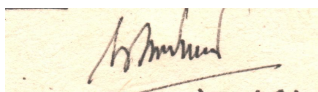
Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____



**Tender No. Re-GOD/2079/080-03; Package 6 : Birgunj Substation
Schedule No.6. Recommended Spare Parts**

Signature of Bidder _____
Name of Bidder _____

Page 1 of 1

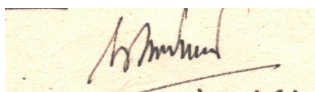
Price Schedules

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.
B. Pricing	
4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	66/11kV, 30 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV sides and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	66kV, 30 VA 5 core Current Transformer (300-600-900/1) with supporting structures and all accessories, as specified.		3	Nos.				
1.3	66/11kV Transformer Control & Relay Panel, complete with all accessories		1	Set				
1.4	66kV, Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified		1	Set				
1.5	66 kV Disconnecting Switch without earth switch complete with all accessories and Steel Structure as specified		1	Set				
1.6	66kV Post Insulator complete and Steel Structure as specified		3	Nos				
1.7	66kV Lightening Arrestor complete and Steel Structure as specified		3	Nos				
1.8	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 11 kV Side (2 Cable per phase)		800	Metre				
1.9	11 kV Two Tier Switchgear							
1.9.1	11 kV Incomer Panel, 2000 A		1	Nos.				
1.9.2	11 kV Outgoing Panel, 1250 A		3	Nos.				
1.9.3	11kV Bus Coupler Panel, 2000 A		1	Nos.				
1.9.4	11kV Trunking Chamber		1	Nos.				
1.10	600 V Control Cable and Power cable required to complete the scope of work as specified		1	Lot				
	[A]Sub Total (1)							

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Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
2	Supply and Delivery of Miscellaneous Materials							
2.1	66kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	ACSR Conductors of suitable size for 66kV Interconnection of equipments with clamps and all accessories as used in the substation as per specification		1	Lot				
2.3	ACSR conductors of suitable size for connecting with clamps and all accessories for 66kV Bus Bar Extension		1	Lot				
	[B]Sub Total (2)							
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay		1	Lot				
3.2	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							

Handwritten signature



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
B	Spare Parts							
5	Power Transformer							
5.1	66kV Phase Bushing, 11kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				
5.6	Complete Set of Gaskets		1	Set				
5.7	Complete set of Pressure Relief Device		1	Set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 66kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		1	Nos.				
6.5	VCB Interrupter		1	Nos.				
	[G]Sub Total of (6)							

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Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
7	For 66kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							

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Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

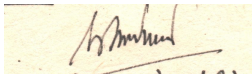
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9	For 11kV Two Tier VCB Switchgear Panels							
9.1	11kV Vacuum Interrupter		1	Nos.				
9.2	Tripping Coils		3	Nos.				
9.3	Closing Coils		3	Nos.				
9.4	Spring Charging Motor		1	Nos.				
9.5	Protection Relays							
9.5.1	3 phase Overcurrent Relay		1	Set				
9.5.2	Ground Fault Relay							
9.6	Ammeter		1	Nos				
9.7	Voltmeter		1	Nos				
9.8	kVA Meter		1	Nos				
9.9	11kV CTs as in Outgoing Feeder		1	Nos.				
9.10	Operating Handle		1	Nos				
9.11	Indicating lamps (100% of used)		1	Lot				
	[J]Sub Total of (9)							
	Total of Spare Part (B) [F+G+H+I+J]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Note:

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Signature of Bidder _____
Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

W. M. M. M.



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

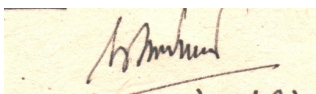
Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	Local Currency Portion	Foreign currency Portion (optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

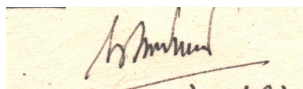
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	66/11kV, 30 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV sides and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	66kV, 30 VA 5 core Current Transformer (300-600-900/1) with supporting structures and all accessories, as specified.	3	Nos.			
1.3	66/11kV Transformer Control & Relay Panel, complete with all accessories	1	Set			
1.4	66kV, Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified	1	Set			
1.5	66 kV Disconnecting Switch without earth switch complete with all accessories and Steel Structure as specified	1	Set			
1.6	66kV Post Insulator complete and Steel Structure as specified	3	Nos			
1.7	66kV Lightening Arrestor complete and Steel Structure as specified	3	Nos			
1.8	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 11 kV Side (2 Cable per phase)	800	Metre			
1.9	11 kV Two Tier Switchgear					
1.9.1	11 kV Incomer Panel, 2000 A	1	Nos.			
1.9.2	11 kV Outgoing Panel, 1250 A	3	Nos.			
1.9.3	11kV Bus Coupler Panel, 2000 A	1	Nos.			
1.9.4	11kV Trunking Chamber	1	Nos.			
1.10	600 V Control Cable and Power cable required to complete the scope of work as specified	1	Lot			
	[A]Sub Total (1)					




Nepal Electricity Authority

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

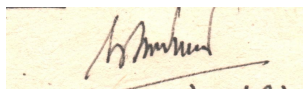
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
2	Miscellaneous Materials					
2.1	66kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	ACSR Conductors of suitable size for 66kV Interconnection of equipments with clamps and all accessories as used in the substation as per specification	1	Lot			
2.3	ACSR conductors of suitable size for connecting with clamps and all accessories for 66kV Bus Bar Extension	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay	1	Lot			
3.2	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
	[E]Total of Electrical Part (A) [A+B+C+D]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
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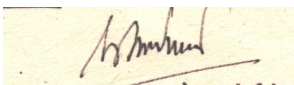
Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

Tender No. Re-GOD/2079/080-03; Package 7: Simara Substation

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____
Name of Bidder _____



Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Schedule No.6. Recommended Spare Parts

[illegible]

Signature of Bidder _____
Name of Bidder _____

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Price Schedules

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

B. Pricing

4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/11kV, 45 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		2	Set				
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified		2	Set				
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		4	Set				
1.4	132kV (200-400-600/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		6	Nos				
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)		2	Set				
1.6	132kV Post Insulator with Steel Structure complete as specified		9	Nos				
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		6	Nos				
1.8	Adaption work for Bus Bar Protection		1	Lot				
1.9	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 11kV Incomer to 132/11kV Power Transformer, 2 cables per phase)		2000	Metre				
1.10	11 kV Two Tier Switchgear							
1.10.1	11 kV Incomer Panel, 2000 A		2	Nos.				
1.10.2	11 kV Outgoing Panel, 1250 A (Two Breakers in each panel)		6	Nos.				
1.10.3	11kV Bus Coupler Panel, 2000 A		2	Nos.				
1.10.4	11kV Trunking Chamber		2	Nos.				
1.11	600 V Control Cable and Power cable required to complete the scope of work as specified for New Transformer Bay		2	Lot				
	[A]Sub Total (1)							

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	ACSR conductors for connecting with all accessories for 132kV Interconnection		2	Lot				
2.3	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification		90	m				
2.4	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
	[B]Sub Total (2)							
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay		1	Lot				
3.2	Earthing of Transformer with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works		1	Lot				
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							

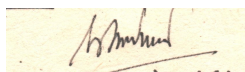
Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 12kV Bushing & Neutral Bushing (1 each)		2	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		2	set				
5.3	Oil Level Gauge		2	set				
5.4	Indicating lamps (100% of used), Lot		2	lot				
5.5	All Types of Fuses (100% of used), Lot		2	lot				
5.6	Complete Set of Gaskets		2	lot				
5.7	Complete set of Pressure Relief Device		2	set				
5.8	One BCT of each type		2	Lot				
5.9	Cooler Control Contactors		2	Lot				
5.10	OLTC Motor Contactor, Nos		2	Nos				
5.11	Complete set of Bucholz Relay		2	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		2	Nos.				
6.5	Complete Sets of O-rings and Gaskets		1	Lot				



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
6.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

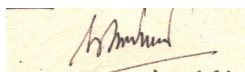
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9	For 11kV VCB Switchgear Panels							
9.1	11kV Vacuum Interrupter		1	Nos.				
9.2	Tripping Coils		3	Nos.				
9.3	Closing Coils		3	Nos.				
9.4	Spring Charging Motor		1	Nos.				
9.5	Protection Relays							
9.5.1	3 phase Overcurrent Relay		1	Set				
9.5.2	Ground Fault Relay							
9.6	Ammeter		1	Nos				
9.7	Voltmeter		1	Nos				
9.8	kVA Meter		1	Nos				
9.9	11kV CTs as in Outgoing Feeder		1	Nos.				
9.10	Operating Handle		1	Nos				
9.11	Indicating lamps (100% of used)		1	Lot				
	[J]Sub Total of (9)							
	Total of Spare Part (B) [F+G+H+I+J]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.



Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Signature of Bidder _____
Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

W. M. M. M.



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

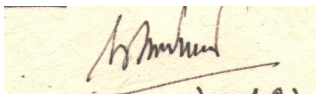
Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur
Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

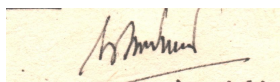
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/11kV, 45 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	2	Set			
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified	2	Set			
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	4	Set			
1.4	132kV (200-400-600/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	6	Nos			
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)	2	Set			
1.6	132kV Post Insulator with Steel Structure complete as specified	9	Nos			
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	6	Nos			
1.8	Adaption work for Bus Bar Protection	1	Lot			
1.9	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 11kV Incomer to 132/11kV Power Transformer, 2 cables per phase)	2000	Metre			
1.10	11 kV Two Tier Switchgear					
1.10.1	11 kV Incomer Panel, 2000 A	2	Nos.			
1.10.2	11 kV Outgoing Panel, 1250 A (Two Breakers in each panel)	6	Nos.			
1.10.3	11kV Bus Coupler Panel, 2000 A	2	Nos.			
1.10.4	11kV Trunking Chamber	2	Nos.			
1.11	600 V Control Cable and Power cable required to complete the scope of work as specified for New Transformer Bay	2	Lot			
	[A]Sub Total (1)					




Nepal Electricity Authority

Transmission Directorate

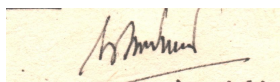
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	ACSR conductors for connecting with all accessories for 132kV Interconnection	2	Lot			
2.3	Aluminium Bus of suitable dimensions for extension of 132kV existing Main Bus with Clamp and Connector for Bus & Line Bay and all accessories as used in the Substation as per specification	90	m			
2.4	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay	1	Lot			
3.2	Earthing of Transformer with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works	1	Lot			
3.3	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
5	Dismantling Works					
5.1	Dismantling and Removal of 132/11 kV, 22.5 MVA Transformer and its accessories to safe location within Substation compound	1	Lot			
	[E]Sub Total (5)					




Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

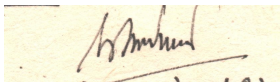
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	[F]Total of Electrical Part (A) [A+B+C+D+E]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

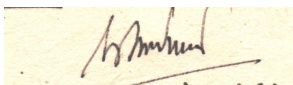
Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____



**Tender No. Re-GOD/2079/080-03; Package 8 : New Bharatpur
Schedule No.6. Recommended Spare Parts**

Signature of Bidder _____
Name of Bidder _____



Price Schedules

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

B. Pricing

4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/11kV, 45 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified		1	Set				
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		2	Set				
1.4	132kV (200-400-600/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		3	Nos				
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)		1	Set				
1.6	132kV Post Insulator with Steel Structure complete as specified		3	Nos				
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		3	Nos				
1.8	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 11kV Incomer to 132/11kV Power Transformer, 2 cables per phase)		800	Metre				
1.9	11 kV VCB Switchgear							
1.9.1	11 kV Incomer Panel, 3000 A		1	Nos.				
1.9.2	11 kV Outgoing Panel, 1250 A		3	Nos.				
1.9.3	11kV Bus Coupler Panel, 3000 A		1	Nos.				
1.9.4	11kV Trunking Chamber		1	Nos.				
1.10	600 V Control Cable and Power cable required to complete the scope of work as specified		1	Lot				
	[A]Sub Total (1)							

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.2	ACSR conductors for connecting with all accessories for 132kV Bay		1	Lot				
2.3	ACSR conductors suitable for 2500A with all accessories for 132kV Busbar upgradation		1	Lot				
	[B]Sub Total (2)							
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for Power Transformer Bay		1	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 11kV Bushing & Neutral Bushing (1 each)		1	Set				
5.2	Dial Type Thermometer (OTI, WTI 1each)		1	set				

Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
5.3	Oil Level Gauge		1	set				
5.4	Indicating lamps (100% of used), Lot		1	lot				
5.5	All Types of Fuses (100% of used), Lot		1	lot				
5.6	Complete Set of Gaskets		1	lot				
5.7	Complete set of Pressure Relief Device		1	set				
5.8	One BCT of each type		1	Lot				
5.9	Cooler Control Contactors		1	Lot				
5.10	OLTC Motor Contactor, Nos		1	Nos				
5.11	Complete set of Bucholz Relay		1	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		3	Nos.				
6.2	Closing Coils,		3	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				
6.4	Motor for Mechanism		2	Nos.				
6.5	Complete Sets of O-rings and Gaskets		1	Lot				
6.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		1	Set				



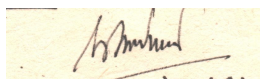
Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
7.2	Auxiliary contacts, Set		1	Set				
7.3	Interlocking coil, Set		1	Set				
	[H]Sub Total of (7)							
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		1	Lot				
8.2	Fuses of each type(100% of used)		1	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		1	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		1	Lot				
8.5	Each type of Auxiliary Relays(1each)		1	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		1	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		1	Nos.				
8.6.4	Tripping Control Circuit Relays,		1	Nos.				
8.7	Ammeter		1	Nos.				
8.8	MVA Meter		1	Nos.				
8.9	Volt meter		1	Nos.				
	[I]Sub Total of (8)							
9	For 11kV VCB Switchgear Panels							
9.1	11kV Vacuum Interrupter		1	Nos.				
9.2	Tripping Coils		3	Nos.				



Nepal Electricity Authority
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

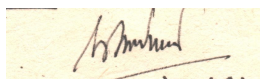
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9.3	Closing Coils		3	Nos.				
9.4	Spring Charging Motor		1	Nos.				
9.5	Protection Relays							
9.5.1	3 phase Overcurrent Relay		1	Set				
9.5.2	Ground Fault Relay							
9.6	Ammeter		1	Nos				
9.7	Voltmeter		1	Nos				
9.8	kVA Meter		1	Nos				
9.9	11kV CTs as in Outgoing Feeder		1	Nos.				
9.10	Operating Handle		1	Nos				
9.11	Indicating lamps (100% of used)		1	Lot				
	[J]Sub Total of (9)							
	Total of Spare Part (B) [F+G+H+I+J]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Note:

- Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country**

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.

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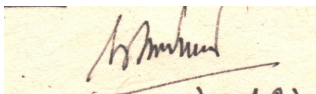
Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara
Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



Nepal Electricity Authority

Transmission Directorate

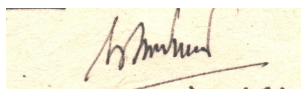
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/11kV, 45 MVA Power Transformer with OLTC, Online Dissolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accessories and Steel Structure as specified	1	Set			
1.3	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	2	Set			
1.4	132kV (200-400-600/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	3	Nos			
1.5	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)	1	Set			
1.6	132kV Post Insulator with Steel Structure complete as specified	3	Nos			
1.7	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	3	Nos			
1.8	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 11kV Incomer to 132/11kV Power Transformer, 2 cables per phase)	800	Metre			
1.9	11 kV VCB Switchgear					
1.9.1	11 kV Incomer Panel, 3000 A	1	Nos.			
1.9.2	11 kV Outgoing Panel, 1250 A	3	Nos.			
1.9.3	11kV Bus Coupler Panel, 3000 A	1	Nos.			
1.9.4	11kV Trunking Chamber	1	Nos.			




Nepal Electricity Authority

Transmission Directorate

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

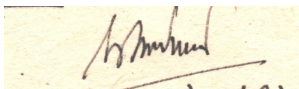
Price Schedule No. 4A: Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.10	600 V Control Cable and Power cable required to complete the scope of work as specified	1	Lot			
	[A]Sub Total (1)					
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.2	ACSR conductors for connecting with all accessories for 132kV Bay	1	Lot			
2.3	ACSR conductors suitable for 2500A with all accessories for 132kV Busbar upgradation	1	Lot			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay	1	Lot			
	[C]Sub Total (3)					
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
	[E]Total of Electrical Part (A) [A+B+C+D]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

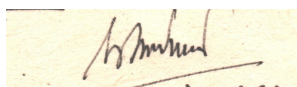
Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____
Name of Bidder _____



**Tender No. Re-GOD/2079/080-03; Package 9 : Pokhara
Schedule No.6. Recommended Spare Parts**

Signature of Bidder _____
Name of Bidder _____

Price Schedules

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

PREAMBLE

A. General

1	The Price Schedules are divided into separate Schedules as follows:
Schedule No. 1:	Plant and Mandatory Spare Parts to be Supplied from Abroad
Schedule No. 2:	Plant and Mandatory Spare Parts Supplied from within the Employer's Country
Schedule No. 3:	Design Services (Not Applicable)
Schedule No. 4:	Installation and Other Services
Schedule No. 5:	Grand Summary
Schedule No. 6:	Recommended Spare Parts
2	The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3	If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

B. Pricing

4	The units and rates in figures entered into the Price Schedules should be type written or if written by hand, must be in print form. Price Schedules not presented accordingly may be considered nonresponsive. Any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
5	Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
6	When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
7	Bidders are instructed to quote the price schedule no. 1 (Plant, and Mandatory Spares Parts to be supplied from abroad) either in foreign currency (USD) or Nepalese Rupees (NRs.) and rest price schedule Price Schedule 2 (Plant, and Mandatory Spares Parts supplied Within Employer's Country) and Price Schedule No 4 (Installation Services) entirely in Nepalese Rupees (NRs).



Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
A	Electrical Part							
1	Main Items							
1.1	132/33kV, 63 MVA, 3-phase Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC, and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		1	Set				
1.2	132/66kV, 63 MVA, 3-phase Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC, and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		2	Set				
1.3	132/11kV, 45 MVA Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified		3	Set				
1.4	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		3	Set				
1.5	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified		6	Set				
1.6	132kV (300-600-900/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.		18	Nos				
1.7	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)		3	Set				
1.8	132kV Post Insulator with Steel Structure complete as specified		9	Nos				
1.9	132 kV Lightning Arrestor with all accessories and Steel Structure as specified		9	Nos				
1.10	66kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified		2	Set				
1.11	66kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified		4	Set				
1.12	66kV (600-1200/1) 5 Core 30 VA Current Transformer with all accessories and Steel Structure as specified		6	Nos.				
1.13	66kV Lightning Arrestor with all accessories and Steel Structure as specified		6	Nos.				
1.14	66kV Post Insulator with Steel Structure complete as specified		6	Nos.				

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
1.15	33 kV, Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified		5	Set				
1.16	33kV Disconnecting Switch without Earthing Switch complete with all accessories as specified		7	Set				
1.17	33kV Disconnecting Switch with Earthing Switch complete with all accessories as specified		4	Set				
1.18	33kV 3 Core 30 VA Current Transformer as specified		15	Nos.				
1.19	33kV Potential Transformer supporting structures and with all accessories as specified		3	Nos				
1.20	33kV Lightening Arrestor with Steel Structure complete as specified		12	Nos				
1.21	33 kV, 630 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 33kV Incomer Bay to 132/33kV Power Transformer, 2 Cables per phase)		2000	Metre				
1.22	33kV Post Insulator complete as specified		12	Nos.				
1.23	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)		4	Set				
1.24	Adaption work for Bus Bar Protection		1	Lot				
1.25	11 kV VCB Switchgear							
1.25.1	11 kV Incomer Panel, 2000 A		3	Nos.				
1.25.2	11 kV Outgoing Panel, 1250 A		12	Nos.				
1.25.3	11kV Bus Coupler Panel, 2000 A		2	Nos.				
1.26	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 11kV Incomer to 132/11kV Power Transformer, 2 cables per phase)		6000	Metre				
1.27	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/66/33kV Power Transformer Bay		3	Lot				
1.28	600 V Control Cable and Power cable required to complete the scope of work as specified for Transformer		3	Lot				
1.29	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay		4	Lot				

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
	[A]Sub Total (1)							
2	Supply and Delivery of Miscellaneous Materials							
2.1	132 kV Insulator strings with clamps to complete the specified scope of works		3	Lot				
2.2	66kV Insulator strings with clamps to complete the specified scope of works		2	Lot				
2.3	33 kV Insulator strings with clamps to complete the specified scope of works		1	Lot				
2.4	ACSR conductors for connecting with all accessories for 132kV Interconnection		6	Lot				
2.5	ACSR conductors for connecting with all accessories for 66kV Interconnection		2	Lot				
2.6	ACSR conductors for connecting with all accessories for 33kV Interconnection		1	Lot				
2.7	Aluminium Tubular Bus including all other accessories and hardware (Clamp and Connector for Bus and Line Bay) for extension of 132kV Bus, required to complete the specified scope of work		270	Metre				
2.8	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
2.9	Aluminium Tubular Bus including all other accessories and hardware (Clamp and Connector for Bus and Line Bay) for extension of 66kV Bus required to complete the specified scope of work		90	Metre				
2.10	Aluminium Pipe for 66kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification		1	Lot				
2.11	Aluminium pipe Bus including all other accessories and hardware (Clamp and Connector for Bus and Line Bay) for extension of 33kV Bus required to complete the specified scope of work		120	Metre				
	[B]Sub Total (2)							

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Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
3	Grounding System							
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay		3	Lot				
3.2	Earthing of Transformer with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works		3	Lot				
3.3	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay		4	Lot				
3.4	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works		3	Lot				
	[C]Sub Total (3)							
4	Illumination System							
4.1	Switchyard Lighting as specified		1	Lot				
	[D]Sub Total (4)							
	[E]Total of Supply and Delivery of Electrical Part (A) [A+B+C+D]							
B	Spare Part							
5	Power Transformer							
5.1	132kV Phase Bushing, 66kV Bushing & Neutral Bushing (1 each)		2	Set				
5.2	132kV Phase Bushing, 33kV Bushing & Neutral Bushing (1 each)		1	Set				
5.3	132kV Phase Bushing, 11kV Bushing & Neutral Bushing (1 each)		4	Set				
5.4	Dial Type Thermometer (OTI, WTI 1each)		7	set				

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
5.5	Oil Level Gauge		7	set				
5.6	Indicating lamps (100% of used), Lot		7	lot				
5.7	All Types of Fuses (100% of used), Lot		7	lot				
5.8	Complete Set of Gaskets		7	lot				
5.9	Complete set of Pressure Relief Device		7	set				
5.10	One BCT of each type		7	Lot				
5.11	Cooler Control Contactors		7	Lot				
5.12	OLTC Motor Contactor, Nos		7	Nos				
5.13	Complete set of Bucholz Relay		7	set				
	[F]Sub Total of (5)							
6	For 132kV SF6 Circuit Breaker							
6.1	Tripping Coils		6	Nos.				
6.2	Closing Coils,		6	Nos.				
6.3	Pressure Switches, Relays and Contactors (One of each type),		2	Set				
6.4	Motor for Mechanism		2	Nos.				
6.5	Complete Sets of O-rings and Gaskets		2	Lot				
6.6	SF6 Gas filling Nozzle & Adaptor		2	Nos.				
	[G]Sub Total of (6)							
7	For 132kV Disconnecting Switches							
7.1	Main contact assemblies, Set		3	Set				

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Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
7.2	Auxiliary contacts, Set		3	Set				
7.3	Interlocking coil, Set		3	Set				
	[H]Sub Total of (7)							
8	For Transformer Control and Relay Panel							
8.1	Indicating Lamps(100% of used)		3	Lot				
8.2	Fuses of each type(100% of used)		3	Lot				
8.3	Color caps for each color for indicating lamps(20% of used)		3	Lot				
8.4	One of each type of Switch, Relay, Timer and other Special Device		3	Lot				
8.5	Each type of Auxiliary Relays(1each)		3	lot				
8.6	Protection Relays							
8.6.1	3 Phase over current relays		3	Nos.				
8.6.2	Ground Fault Relays							
8.6.3	Differenetial Relay		3	Nos.				
8.6.4	Tripping Control Circuit Relays,		3	Nos.				
8.7	Ammeter		3	Nos.				
8.8	MVA Meter		3	Nos.				
8.9	Volt meter		3	Nos.				
	[I]Sub Total of (8)							
9	For 66kV SF6 Circuit Breaker							
9.1	Tripping Coils		3	Nos.				
9.2	Closing Coils,		3	Nos.				
9.3	Pressure Switches, Relays and Contactors (One of each type),		1	Set				

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Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
9.4	Motor for Mechanism		1	Nos.				
9.5	Complete Sets of O-rings and Gaskets		1	Lot				
9.6	SF6 Gas filling Nozzle & Adaptor		1	Nos.				
	[J]Sub Total of (9)							
10	For 66kV Disconnecting Switches							
10.1	Main contact assemblies, Set		1	Set				
10.2	Auxiliary contacts, Set		1	Set				
10.3	Interlocking coil, Set		1	Set				
	[K]Sub Total of (10)							
11	For 33kV Vacuum Circuit Breaker							
11.1	Tripping Coils, Nos		6	Nos.				
11.2	Closing Coils, Nos		6	Nos.				
11.3	Relays and Contactors (One of each type), Sets		2	Nos.				
11.4	Motor for Mechanism, Set		2	Set				
11.5	Interrupter for VCB, No		2	Nos.				
	[L]Sub Total of (11)							
12	33kV Disconnecting Switches							
12.1	Main contact assemblies, Set		4	Set				
12.2	Auxiliary contacts, Set		4	Set				
12.3	Interlocking coil, Set		4	Set				
	[M]Sub Total of (12)							

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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

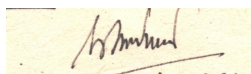
Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad

Item No.	Item Description	Country of Origin	Quantity	Unit	Currency	CIP Project Site including insurance, clearing, forwarding and transportation to site (Excluding Taxes and Duties applicable in Nepal)		Remarks
						Unit Rate	Total Amount	
(1)	(2)		(3)	(4)		(5)	(6)=(3)x(5)	(7)
13	For Line Control and Relay Panel							
13.1	Indicating Lamps(100% of used)		2	Lot				
13.2	Fuses of each type(100% of used)		2	Lot				
13.3	Color caps for each color for indicating lamps(20% of used)		2	Lot				
13.4	One of each type of Switch, Relay, Timer and other Special Device		2	Lot				
13.5	Each type of Auxiliary Relays(1each)		2	lot				
13.6	Protection Relays							
13.6.1	3 Phase over current relays		2	Nos.				
13.6.2	Ground Fault Relays							
13.6.3	Tripping Control Circuit Relays,		2	Nos.				
13.7	Ammeter		2	Nos.				
13.8	MVA Meter		2	Nos.				
	[N]Sub Total of (13)							
	Total of Spare Part (B) [F+G+H+I+J+K+L+M+N]							
	Grand Total of Schedule 1 [A+B]							

Signature of Bidder _____

Name of Bidder _____

Note The prices shall be quoted either in the currency of Nepalese Rupees (NPR) or up to three convertible currencies only as per BDS Clause 15.1.




Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

1. If a Bidder wishes to Supply some item(s) listed in Price Schedule no. 1 from manufacturing plant in Nepal, then such item(s) and price of such item(s) shall be quoted in this Price Schedule no. 2 only. Columns against such item(s) shall be left blank in Price Schedule no. 1.
2. Item No. in the following table shall match those in Price Schedule no. 1

Item No.	Item Description	Quantity	Unit	Total EXW Price (Excluding Taxes and Duties)		Remarks
				Unit Price (in NPR)	Total Price (in NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
	Grand Total of Schedule 2					

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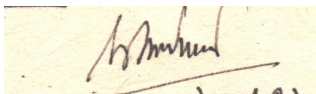
Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur
Price Schedule No 3: Design Services

Item	Item Description	Qty.	Unit Price		Total Price	
			Local Currency Portion	Foreign Currency Portion (optional)	LocalCurrency Portion	Foreign currency Portion(optional)
(1)	(2)	(3)	(4)	(5)	(6)=(4)x(3)	(7)=(5)x(3)
	The scope of the Contract covers the detail design as well. The price of the detail design is deemed to have been covered in the prices of the other schedules	Not Applicable				

Signature of Bidder _____

Name of Bidder _____



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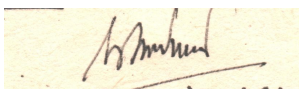
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 4A:. Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
A	Electrical Part					
1	Main Items					
1.1	132/33kV, 63 MVA, 3-phase Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC, and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	1	Set			
1.2	132/66kV, 63 MVA, 3-phase Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC, and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	2	Set			
1.3	132/11kV, 45 MVA Power Transformer with OLTC, Online Disolved Gas Analyser, RTCC Facility, LA Mounted on LV side and Bushing CT, insulating oil for first filling including extra to account for spillage, sampling etc.; Complete with all accessories as specified	3	Set			
1.4	132kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified	3	Set			
1.5	132kV, 2000 A Disconnecting Switch without earthing switch complete with all accessories and Steel Structure as specified	6	Set			
1.6	132kV (300-600-900/1), 5 core 30 VA Current Transformer with all accessories and Steel Structure as specified.	18	Nos			
1.7	132kV Transformer Control & Relay Panel, complete with all accessories as per specification (as per existing type)	3	Set			
1.8	132kV Post Insulator with Steel Structure complete as specified	9	Nos			
1.9	132 kV Lightning Arrestor with all accessories and Steel Structure as specified	9	Nos			
1.10	66kV, 2000 A Outdoor SF6 Circuit Breaker, three Pole type Complete with all accesories and Steel Structure as specified	2	Set			




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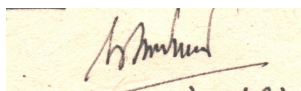
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Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 4A:. Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.11	66kV 2000 A Disconnecting Switch without Earthing Switch complete with all accessories and Steel Structure as specified	4	Set			
1.12	66kV (600-1200/1) 5 Core 30 VA Current Transformer with all accessories and Steel Structure as specified	6	Nos.			
1.13	66kV Lightning Arrestor with all accessories and Steel Structure as specified	6	Nos.			
1.14	66kV Post Insulator with Steel Structure complete as specified	6	Nos.			
1.15	33 kV, Outdoor VCB, three Pole type Complete with all accessories and steel structure as specified	5	Set			
1.16	33kV Disconnecting Switch without Earthing Switch complete with all accessories as specified	7	Set			
1.17	33kV Disconnecting Switch with Earthing Switch complete with all accessories as specified	4	Set			
1.18	33kV 3 Core 30 VA Current Transformer as specified	15	Nos.			
1.19	33kV Potential Transformer supporting structures and with all accessories as specified	3	Nos			
1.20	33kV Lightning Arrestor with Steel Structure complete as specified	12	Nos			
1.21	33 kV, 630 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 33kV Incomer Bay to 132/33kV Power Transformer, 2 Cables per phase)	2000	Metre			
1.22	33kV Post Insulator complete as specified	12	Nos.			
1.23	33kV Line Control & Relay Panel, complete with all accessories as per specification(as per existing type)	4	Set			
1.24	Adaption work for Bus Bar Protection	1	Lot			
1.25	11 kV VCB Switchgear					
1.25.1	11 kV Incomer Panel, 2000 A	3	Nos.			
1.25.2	11 kV Outgoing Panel, 1250 A	12	Nos.			




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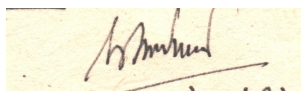
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 4A:. Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
1.25.3	11kV Bus Coupler Panel, 2000 A	2	Nos.			
1.26	11 kV, 800 sq. mm single core XLPE Copper Power Cable including terminal Joints for both end with all accessories complete for 33 kV Side (from 11kV Incomer to 132/11kV Power Transformer, 2 cables per phase)	6000	Metre			
1.27	600 V Control Cable and Power cable required to complete the scope of work as specified for 132/66/33kV Power Transformer Bay	3	Lot			
1.28	600 V Control Cable and Power cable required to complete the scope of work as specified for Transformer	3	Lot			
1.29	600 V Control Cable and Power cable required to complete the scope of work as specified for 33kV Line Bay	4	Lot			
	[A]Sub Total (1)					
2	Miscellaneous Materials					
2.1	132 kV Insulator strings with clamps to complete the specified scope of works	3	Lot			
2.2	66kV Insulator strings with clamps to complete the specified scope of works	2	Lot			
2.3	33 kV Insulator strings with clamps to complete the specified scope of works	1	Lot			
2.4	ACSR conductors for connecting with all accessories for 132kV Interconnection	6	Lot			
2.5	ACSR conductors for connecting with all accessories for 66kV Interconnection	2	Lot			
2.6	ACSR conductors for connecting with all accessories for 33kV Interconnection	1	Lot			
2.7	Aluminium Tubular Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 132kV Bus, required to complete the specified scope of work	270	Metre			




Nepal Electricity Authority

Transmission Directorate

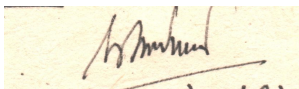
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 4A:. Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
2.8	Aluminium Pipe for 132kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
2.9	Aluminium Tubular Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 66kV Bus required to complete the specified scope of work	90	Metre			
2.10	Aluminium Pipe for 66kV Bus of suitable dimensions for interconnection of equipments and Bus Support as used in the Substation as per specification	1	Lot			
2.11	Aluminium pipe Bus including all other accessories and hardwares (Clamp and Connector for Bus and Line Bay) for extension of 33kV Bus required to complete the specified scope of work	120	Metre			
	[B]Sub Total (2)					
3	Grounding System					
3.1	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for New Power Transformer Bay	3	Lot			
3.2	Earthing of Transformer with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works	3	Lot			
3.3	Earthing of Transformer, Circuit Breaker, and other Equipment with Earthing Mat, Buried Copper strips/Conductors with Risers, Electrode grounding materials and accessories to complete the specified scope of works, complete for 33kV Line Bay	4	Lot			
3.4	Galvanized E.H.S. steel wires of size 7/3.35 for lightning shield wire in take off and internal structures, with accessories to complete the specified scope of works	3	Lot			
	[C]Sub Total (3)					




Nepal Electricity Authority

Transmission Directorate

Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

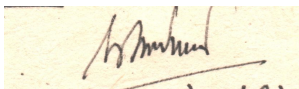
Price Schedule No. 4A:. Installation, Testing and Commissioning Services

Item No.	Item Description	Quantity	Unit	Construction, Installation and Commissioning Price (Excluding Taxes)		Remarks
				Unit Price (NPR)	Total Price (NPR)	
(1)	(2)	(3)	(4)	(5)	(6)=(3)x(5)	(7)
4	Illumination System					
4.1	Switchyard Lighting as specified, Lot	1	Lot			
	[D]Sub Total (4)					
5	Dismantling Works					
5.1	Dismantling and Removal of 132/11 kV 22.5 MVA Transformer and its accessories to safe location within Substation compound	4	Lot			
	[E]Sub Total (5)					
	[F]Total of Electrical Part (A) [A+B+C+D+E]					
	Grand Total of Schedule 4A					

Signature of Bidder _____

Name of Bidder _____

Note: The prices shall be quoted in Nepalese Rupees (NPR) only.




Nepal Electricity Authority
Transmission Directorate
Grid Operation Department

Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various

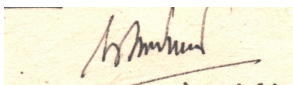
Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur

Price Schedule No. 5: Grand Summary

S.N.	Item Description	Foreign Currency (USD)	Nepalese Rupees (NRP)	Remarks
1	Price Schedule No. 1: Plant and Equipment including Mandatory Spares Parts to be Supplied from Abroad			
2	Price Schedule No. 2: Plant and Equipment including Mandatory Spares Parts Supplied Within Employer's Country			
3	Price Schedule No 3: Design Services			
4	Price Schedule No. 4A: Installation, Testing and Commissioning Services			
Grand Total				

Signature of Bidder _____

Name of Bidder _____



**Tender No. Re-GOD/2079/080-03; Package 10 : Parwanipur
Schedule No.6. Recommended Spare Parts**

Signature of Bidder _____
Name of Bidder _____

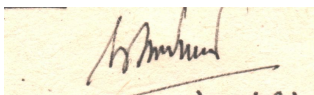
**Nepal Electricity Authority
Transmission Directorate
Grid Operation Department**

Work name: Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations

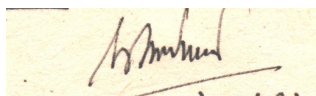
Tender No.: Re-GOD/2079/080-03

Price Schedule 4B: Civil Works (Construction)

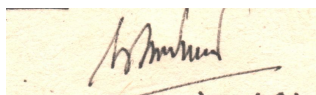
Item No. [1]	Item Description [2]	Unit [3]	Quantity [4]	Rate (NPR) [5]	Total Amount (NPR) [6= 4*5]	Remarks [7]
1	Site preparation work with cutting bushes & trees, levelling the site, disposal of waste, etc. of working areas of all substation as per instruction of site incharge.	Job	1.00			
2	Dismantling of brick masonry and placing the dismantled material inside substation premises as per instruction of site incharge.	Cum	2.23			
3	Dismantling of RCC and placing the dismantled material inside substation premises as per instruction of site incharge.	Cum	7.50			
4	Dismantling of PCC and placing the dismantled material inside substation premises as per instruction of site incharge.	Cum	21.25			
5	Dismantling of Stone masonry and placing the dismantled material inside substation premises as per instruction of site incharge.	Cum	158.40			
6	Dismantling of CGI Sheet along with purlins and rafters and placing the dismantled material inside substation premises as per instruction of site incharge.	Sqm	336.00			



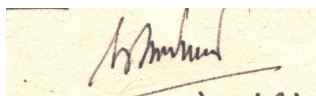

Item No. [1]	Item Description [2]	Unit [3]	Quantity [4]	Rate (NPR) [5]	Total Amount (NPR) [6= 4*5]	Remarks [7]
7	Earthwork in Excavation in Foundation in all types of Soil with necessary lift & lead, shoring and dewatering all complete as per Specification and instruction of Site incharge by manual means.	Cum	4,069.50			
8	Earthwork in Excavation in Foundation in all types of Soil with necessary lift & lead, shoring and dewatering all complete as per Specification and instruction of Site incharge by mechanical means.	Cum	562.50			
9	Earthwork in backfilling with excavated Soil with watering and compaction in each 15 cm layer all complete as per Specification and instruction of Site incharge.	Cum	1,220.85			
10	Earthwork in backfilling by supply of ordinary Soil with watering and compaction in each 15 cm layer all complete as per Specification and instruction of Site incharge.	Cum	15,108.00			
11	Providing and laying of Stone Masonry Work in Cement Mortar 1:4 along with weep hole of HDEP Pipe dia. 150mm complete.	Cum	960.00			
12	Providing and laying of Stone Masonry Work in Cement Mortar 1:4 along with weep hole of HDEP Pipe dia. 150mm complete (Using stone from dismantled structure).	Cum	95.04			
13	Providing, and applying Pointing with cement mortar (1:4) on Stone Masonry work in structure as per Technical Specifications.	Sqm	330.00			
14	Brick masonry in 1:4 cement sand mortar using 1st class brick in perfect line, level and finishing all complete.	Cum	231.31			



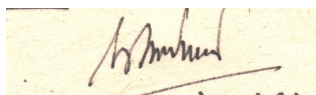

Item No. [1]	Item Description [2]	Unit [3]	Quantity [4]	Rate (NPR) [5]	Total Amount (NPR) [6= 4*5]	Remarks [7]
15	12.5mm thick cement sand plaster (1:4) in perfectline, level and plumb including grooving etc. also including scaffolding and curing all complete.	Sqm	252.00			
16	38mm screeding on floor with concrete 1:2:4 along with punning all complete.	Sqm	72.00			
17	Stone Soling in foundation in perfect line and level with approved quality of stone including ramming, compacting, packing the Joints all complete as per Specification & instruction of Site incharge.	Cum	618.89			
18	Supply, delivery and placing of 40mm down aggregate in perfect line and level over the new extended bay of all substation all complete.	Cum	650.00			
19	Plain cement Concrete (PCC) in 1:3:6 ratio for foundations, flooring and walls with approved quality of cement and sand and crushed stone aggregate including mixing, laying, curing etc all complete in approval of site incharge.	Cum	415.34			
20	Plain Cement Concrete (1:1.5:3) for all foundation, cable trench, drain, superstructure, etc. with supplying approved quality Ordinary Portland Cement (OPC 53 Grade), sand and crushed stone aggregate including mixing, laying and curing with necessary formwork all complete in perfect line and level as per specification and instruction of site incharge.	Cum	1,817.79			
21	Providing and laying, fitting and placing Mild steel/HYSD reinforcement (Fe 500) complete in foundation, superstructure, etc. as per technical specification.	Kg	142,696.38			




Item No. [1]	Item Description [2]	Unit [3]	Quantity [4]	Rate (NPR) [5]	Total Amount (NPR) [6= 4*5]	Remarks [7]
22	Anchor hole of 16 mm diameter for anchoring for modification of transformer foundation and other necessary areas.	Rm	157.50			
23	Providing and fabricating (Cutting, threading, placing) Anchor bars of 12 mm diameter for anchorage.	Kg	418.71			
24	Grouting work with cement anchor grout for grouting the gap between anchor hole and anchor bars.	Kg	199.40			
25	Supply, delivery and installation of rails for transformer foundation with required anchor bars and plates.	Kg	11,970.00			
26	2 coats of weather coat paint of approved colour (Burger or eqv.) with one coat primer Painting over new surface all complete.	Sqm	77.49			
27	2 coats of plastic emulsion paint of approved colour (Burger or eqv.) with one coat primer Painting over properly cleaned surface all complete.	Sqm	161.49			
28	Water proofing works with supply and application of Elastocrete cementitious elastomeric water proofing coating 2 coats at adjoining area of old and newly constructed building.	Sqm	24.00			
29	Supply and installation of UPVC sliding window with net (frame 50 X 80mm sash 58 X 36mm white colour with 5mm double Glass) all complete.	Sqm	8.37			
30	Supply and installation of UPVC Double Door (frame 60 X 60mm sash 60 X 140mm white colour with 5mm Glass) all complete.	Sqm	1.95			




Item No. [1]	Item Description [2]	Unit [3]	Quantity [4]	Rate (NPR) [5]	Total Amount (NPR) [6= 4*5]	Remarks [7]
31	Providing, Fabricating, assembling and erecting heavy zinc coated structural steel components/elements for Gantry structure including nut, bolt, gussetplate, including shop drawings, facilities for inspection & testing with necessary formwork and staging all complete as per specification.	Kg	144,350.00			
32	Supplying and fixing 12.5mm thick Gypsum Board false ceiling along with all necessary fittings.	Sqm	72.00			
33	Electrification works for extension of control building (aapprox. Plinth Area : 72 sqm) at Birgunj Substation as per client requirement all complete.	Job	1.00			
34	Day works for unseen works using skilled manpower as per site requirement.	Hr	1,000.00			
35	Day works for unseen works using unskilled manpower as per site requirement.	Hr	4,000.00			
36	Day works for unseen works using backhoe/hydraulic excavator as per site requirement.	Hr	100.00			
37	Lab test of all construction materials and cube test of concrete of all substations as per relevant standard IS code or any other equivalent standard code.	Job	1.00			
Grand Total					0.00	




SECTION-VI

Bill of Quantities

Notes for Unit Rate Contracts :

Objectives

The objectives of the Bill of Quantities are

- (a) to provide sufficient information on the quantities of Works to be performed to enable Bids to be prepared efficiently and accurately; and
- (b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and brief as possible.

Content

The Bill of Quantities should be divided generally into the following sections:

- (a) Preamble;
- (b) Work Items (grouped into parts);
- (c) Day works Schedule;
- d) Provisional Sums; and
- (d) Summary.

Preamble

The Preamble should indicate the inclusiveness of the unit prices, and should state the methods of measurement which have been adopted in the preparation of the Bill of Quantities and which are to be used for the measurement of any part of the works.

Work Items

The items in the Bill of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. General items common to all parts of the works may be grouped as a separate section in the Bill of Quantities.

Day work Schedule

A Day work Schedule should be included only if the probability of unforeseen work, outside the items included in the Bill of Quantities, is high. To facilitate checking by the Employer of the realism of rates quoted by the Bidders, the Day work Schedule should normally comprise the following:

- (a) A list of the various classes of labor, materials, and Constructional Plant for which basic day work rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor will be paid for work executed on a day work basis.
- (b) Nominal quantities for each item of Day work, to be priced by each Bidder at Day work rates as bid. The rate to be entered by the Bidder against each basic Day work item should include the Contractor's profit, overheads, supervision, and other charges.

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the Contract Data should state the manner in which they will be used, and under whose authority (usually the Project Manager's).

Summary

The Summary should contain a tabulation of the separate parts of the Bill of Quantities carried forward, with provisional sums for Day work, for physical (quantity) contingencies, and for price contingencies (upward price adjustment) where applicable.

These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the Bidding documents. They should not be included in the final documents.

Bill of Quantities

1 Provisional Sum						
Procument Item Details						
SL. No	Item Description	Unit	Quantity	Unit Rate(NPR)	Amount(NPR)	
1	Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations	lot	1.0	1.0	1.00	
2 Electricity gas nuclear energy and fuels steam hot water and other sources of energy						
2.1 Electricity						
Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Procurement of Supply, Installation, Testing and Commissioning of Power Transformers at Various Substations	lot	1.0			
Total of Procument Items						
Total Item Price						
VAT						
Grand Total						