

# BIDDING DOCUMENT

FOR

## IMPLEMENTATION OF SMART GRID INFRASTRUCTURE INCLUDING ENHANCING OF EXISTING NETWORK IN NDMC POWER DISTRIBUTION AREA

**SUB HEAD: - STRENGTHENING OF SUB-TRANSMISSION AND  
DISTRIBUTION NETWORK UNDER INTEGRATED POWER  
DEVELOPMENT SCHEME (IPDS) OF MINISTRY OF  
POWER, GOVERNMENT OF INDIA.**

### VOLUME-I

#### (CONTRACT CONDITIONS & SCOPE OF WORKS)

- Section-I :** Invitation for Bids (IFB)  
**Section-II :** Instruction to Bidders (ITB)  
**Section-III :** Bid Data Sheets (BDS)  
**Section-IV :** General Conditions of Contract (GCC)  
**Section-V :** Special Conditions of Contract (SCC)  
**Section-VI :** Sample Forms and Procedures  
**Section-VII :** Scope of Works

NIT NO.:- NDMC/SMART GRID/2016-17/02



CONSULTANT: WAPCOS LIMITED

NEW DELHI MUNICIPAL COUNCIL

VOLUME-I: SECTION – I  
INVITATION FOR BIDS (IFB)

INVITATION FOR BIDS (IFB)

IMPLEMENTATION OF SMART GRID INFRASTRUCTURE INCLUDING ENHANCING OF EXISTING NETWORK IN NDMC POWER DISTRIBUTION AREA

(DOMESTIC COMPETITIVE BIDDING)

(SINGLE STAGE TWO ENVELOPE BIDDING)

DATE OF ISSUANCE OF IFB: 30.01.2017

- 1.0 This invitation for bids follows the procurement notice (Invitation for Bids) for the subject package(s) which shall also be available on NDMC website as well as on e- Procurement website of Govt. of NCT Delhi given at para 5.0 from 30.01.2017.
- 2.0 NEW DELHI MUNICIPAL COUNCIL (hereinafter referred to as 'NDMC' ) have been entrusted to execute the Project i.e. Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA on behalf of NDMC/Government of INDIA. The execution of the project shall be funded out of the proceeds of financial assistance of Ministry of Power to be received by NDMC from Power Finance Corporation Ltd (PFC) and the ownership of the project shall remain vested with NDMC. The project shall be executed by NDMC on turnkey basis and all eligible payment under the project shall be made from the proceeds of financial assistance to be received by NDMC & from NDMC own fund. For the purpose of all procurement activities related to the aforesaid project, NDMC shall be referred to as 'Employer'.
- 3.0 NDMC, therefore, invites sealed bids from eligible bidders for the following package(s) for aforesaid project on Domestic Competitive Bidding basis:

Sl. No.	Package
1	Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA.
2	Estimated cost :- Rs 185,44,20,070/- (Rupees One Eighty Five Crore Forty Four Lakhs Twenty Thousand and Seventy Only)

This Invitation for Bids extended through media, website or written communication or by any other means, and issuance of Bidding Documents as per para 7.0 below shall not be construed to mean that the prospective bidders to whom the Invitation for Bids has been extended and/or Bidding Documents have been issued is deemed to be an eligible bidder. The eligibility of the bidders shall be determined as per the provisions of Bidding Documents.

- 3.1 This Specification covers the following scope of works:

The scope of work under the subject package includes site survey, planning, design, engineering, testing, supply, loading, transportation, unloading, insurance, delivery at site, handling, storage, installation, testing, commissioning and documentation of all items/material required to complete all over the NDMC.

The above scope of work is indicative and the detailed scope of work is given in the Bidding Documents.

3.2 The completion period for Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA shall be 24 (Twenty four) months from the date of notification of award.

3.3 Bidding will be conducted through the domestic competitive bidding procedures as per the provisions of ITB/BDS and the contract shall be executed as per the provisions of the Contract.

4.0 The detailed Qualifying Requirements (QR) are given in the Bidding Document.

5.0 The complete Bidding Documents including tender drawings and technical specifications are available at NDMC website <http://www.ndmc.gov.in> or e- Procurement website of Govt. of NCT Delhi i.e <http://www.govtprocurement.delhi.gov.in>. Interested bidders can download the Bidding Documents and commence preparation of bids to gain time.

Note: - To participate in e- tender in NDMC, registration with application service provider NIC is mandatory

7.0 Interested Bidders will be required to download the Bidding Documents from Delhi Govt E- Portal.

The cost of Bid Document is Rs 25,000/-. The demand draft/banker cheques should be in favour of Secretary NDMC and is non- refundable. The acceptance of price bid/commercial bid shall be subjected to acceptance of documents fee.

The Bidding Documents are meant for the exclusive purpose of bidding against this specification and shall not be transferred to any other party or reproduced or used otherwise for any purpose other than for which they are specifically issued.

8.0 A pre-bid meeting will be held in Council Room, Third floor, Palika Kendra, New Delhi (Location of meeting), India on 14.02.2017 at 11:00 hrs to clarify the bidders various issues raised in accordance with clause 6.4 of ITB.

9.0 A Single Stage Bid Envelope Bidding Procedure followed by e-bidding for price bids will be adopted and will proceed as detailed in the Bidding Documents.

9.1 Bids must be delivered in single sealed envelopes to the address below at or before 1530 hours (IST) on 28.02.2017. Price breakup shall be submitted electronically. Late bids will be rejected. Bid Envelope i.e. Techno Commercial Part shall be opened on the same day i.e. 28.02.2017 in the presence of the bidders' representatives who choose to attend in person at the address below at 16:00 hours (IST). Price Bids shall be opened in the presence of the bidders' representatives who choose to attend at the time and date at the address given in the intimation for opening of Price bids in accordance with Clause 25 of ITB.

All bids must be accompanied by a bid security of Rs. 3,70,88,401- (2% of tender value)

10.0 NDMC reserves the right to cancel/withdraw this invitation for bids without assigning any reason and shall bear no liability whatsoever consequent upon such a decision.

11.0 All correspondence with regard to the above shall be to the following address.

(By Post/In Person)

Name of bid documentation issuance official: Sundeep Gaur

Designation of the officer : Executive Engineer (IPDS)

Complete postal Address : Room No. 1804 A,

18<sup>th</sup> Floor, Palika Kendra, New Delhi Municipal Council

New Delhi – 110001

Email ID :- eeipds.elect@ndmc.gov.in

For more information, visit our site at <http://www.ndmc.gov.in>

----- End of Section-I (IFB) ----

VOLUME-I: SECTION – II  
INSTRUCTION TO BIDDERS  
(ITB)

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EMPLOYER-NDMC

OWNER\_NDMC

Preamble:

Volume-I: Section – II

INSTRUCTION TO BIDDERS (ITB)

This part, Instruction to Bidders (ITB), Section II of the Bidding Documents provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Employer. It also provides information on bid submission, opening and evaluation and on contract award. ITB Section II contains provisions that are to be used unchanged unless part Special Condition of Contract, Section V, which consists of provisions that supplement, amend, or specify in detail, information or requirements included in ITB Section II and that are specific to each procurement, states otherwise. If there is a conflict between the provisions of ITB Section – II & Special Condition of Contract Section – V, the provisions of Special Condition of Contract, Section – V shall prevail.

However, provisions governing the performance of the Contractor, payments under the contract or matters affecting the risks, rights and obligations of the parties under the contract are not included in this section but instead under Section – IV: General Conditions of Contract and/or Section – V: Special Conditions of Contract.

Further in all matters arising out of the provisions of this Section – II and the Section–III of the Bidding Documents, the laws of the Union of India shall be the governing laws and courts of New Delhi shall have exclusive jurisdiction.

(A) Introduction

1.0 General Instructions

1.1 NDMC hereinafter Called ‘Employer’ will receive bids in respect of equipment to be furnished and erected as set-forth in the accompanying Specifications. All bids shall be prepared and submitted by bidders in accordance with these instructions.

1.2 Source of funds: The Owner named in the Bidding Documents intends to use the capital subsidy {60% infrastructures in the project} under Integrated Power Development Scheme (IPDS), a Government of India flagship program for Strengthening and augmentation of distribution, network balance 40% shall be contributed by NDMC for this project.

1.2.1 All the payments under the contract for the package for which this invitation for Bids is issued shall be made by the NDMC {who is also named as Project Implementing Agency (PIA) by Ministry of Power/GoI} named in Biding Documents.

1.3 For the purpose of implementation of subject package, Project Implementation Agency shall be referred as NDMC as “The Owner”.

2.0 Eligibility of Bidder:

2.1 This Invitation for Bids, issued by NDMC is open to all firms including company(ies), Government Owned Enterprises registered and incorporated in India as per Company Act, 1956/2013 (with amendment from time to time) barring Government department as well as foreign bidders/MNCs not registered and incorporated in India and those bidders with whom business is banned by the Employer.

2.2 A Bidder shall not have a conflict of interest. Any Bidders found to be have a conflict of interest shall be disqualified. The bidder may be considered to have conflict of interest with one or more parties in this bidding process, if:

2.2.1 They have a controlling partner in common,

2.2.2 They receive or have received any direct or indirect subsidy from any of them; or



- 2.2.3 They have the same legal representative for purpose of this bid; or
- 2.2.4 They have a relationship with each other, directly or through common third parties, that puts them in 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
- 2.2.5 A bidder submits more than one bid in the bidding process, either individually [including bid submitted as agent /authorised representative on behalf of one or more manufacturer(s) or through Licensee – Licensor route, wherever permitted as per the provision of Qualification requirement for Bidders] or as partner in a joint venture, except for alternative offers permitted under Invitation to Bid. This results in disqualification of all such bids. However, this does not limit the participation of a Bidder as a sub-contractor in another Bid, or of a firm as a sub-contractor in more than one bid; or
- 2.2.6 A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specification of the materials and services/works that are subject of the bid, or
- 2.2.7 The Bidder, directly or indirectly shall not be a dependent agency of the Employer.
- 2.2.8 A prequalification process will be conducted prior to the bidding process, or conducted during process of the bidding, this bidding is open only to prequalified Bidders.
- 2.3 This bidding is open to any manufacturer or erector who provides satisfactory evidence concerning the following that he:
- 2.3.1 is a qualified manufacturer or erector who supply, erect, testing and commission of the type specified and has adequate technical knowledge and practical experience;
- 2.3.2 does not anticipate change in the ownership during the guarantee period after completion of work (if such a change is anticipated, the scope and effect thereof shall be defined);
- 2.3.3 has adequate financial stability and status to meet the financial obligation pursuant to the scope of the works (the Bidders should submit at least 2 copies of their profit and loss account and balance sheet for the last five years);
- 2.3.4 has adequate field services organisation to provide the necessary field erection and management services required to successfully erect, test and commission the equipment as required by the Specifications and Documents; and
- 2.3.5 has established quality assurance systems and organisation designed to achieve high levels of equipment reliability, both during his manufacturing and field installation activities.
- 2.4 The above stated requirements are a minimum and Employer reserves the right to request for any additional information and also reserves the right to reject the Proposal of any Bidder, if in the opinion of NDMC, the qualification data is incomplete or the Bidder is found not qualified to satisfactorily perform the Contract.
- 3.0 Eligible Plant: Equipment and Services
- 3.1 For the purposes of these Bidding Documents, the words “facilities,” “plant and equipment,” “installation services,” etc., shall be construed in accordance with the respective definitions given to them in the General Conditions of Contract.
- 3.2 All plant and equipment to be supplied and installed and services carried out under the contract shall have their origin in our country only.
- 4.0 Cost of Bidding
- 4.1 The Bidder shall bear all costs and expenses associated with preparation and submission of its bid including post-bid discussions, technical and other presentations etc, and Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

(B) The Bidding Documents

5.0 Contents of bidding documents:

5.1 The goods and services required, bidding procedures and Contract terms are prescribed in the Bidding Document. The Bidding Document is a compilation of the following and shall include amendments, if any, thereto:

VOLUME – I: Condition of contract:

- Section I: Invitation for Bid (Section - IFB)
- Section II: Instructions to Bidders (Section – ITB)
- Section III: Bid Data sheets (BDS)
- Section IV: General Conditions of Contract (GCC)
- Section V: Special Conditions of Contract (SCC)
- Section VI: Sample Forms and Procedures (FP)
  - 1. Bid Form & Price Schedule
    - 1.1 Bid Form
    - 1.2 Price Schedule
  - 2. Bid Security Form
  - 3. Form of Notification by the Employer to the Bank
    - 3.a Applicable for forfeiture of Bank Guarantee
    - 3.b Applicable for conditional claim pending extension of Bank Guarantee by the bidder.
  - 4. Form of 'Notification of Award of Contract'
    - 4(a) Form of 'Notification of Award of Contract' for Supply of Plant and equipment
    - 4(b) Form of 'Notification of Award of Contract' for Installation of Plant and equipment
  - 5. Form of Contract Agreement
    - Alternative A
    - Alternative B
  - 5.1 Appendix-1: Terms and Procedures of Payment:
    - Grid/Power Substation, and
    - 11KV, Distribution Transformer, LT and Service connection
  - 5.2 Appendix-2: Price Adjustment
  - 5.3 Appendix-3: Insurance Requirements
  - 5.4 Appendix-4: Time Schedule
  - 5.5 Appendix-5: List of Approved Subcontractors
  - 5.6 Appendix-6: Scope of Works and Supply by the Employer
  - 5.7 Appendix-7: List of Document for Approval or Review
  - 5.8 Appendix-8: Guarantees, Liquidated Damages for Non-Performance
  - 6. Performance Security Form
  - 7. Bank Guarantee Form for Advance Payment
  - 8. Form of Taking over Certificate
  - 9. Form of Indemnity Bond to be executed by the Contractor for the Equipment handed over in one lot by Employer for performance of its contract.
  - 10. Form of Indemnity Bond to be executed by the Contractor for the Equipment handed over in instalment by Employer for performance of its contract.
  - 11. Form of Authorisation Letter
  - 12. Form of Trust Receipt for Plant, Equipment and Materials received
  - 13. Form of Extension of Bank Guarantee
  - 14. Form of Undertaking by the Joint Venture Partners
  - 15. Format for Evidence of Access to or Availability of Credit/ Facilities
  - 16. Form of Operational Acceptance
  - 17. Form of Safety Plan to be submitted by the Contractor within sixty days of award of contract
  - 18. Form of joint deed of undertaking by the Sub-contractor along with the bidder /contractor

19. Form of Certificate of Financial Parameters for QR

Section VII: Scope of work.

VOLUME-II: PMS, Quality Assurance & Evaluation Mechanism, Bid forms and Price Schedule

Section I: Project Management System (PMS), Quality Assurance Mechanism (QAM) & Documentation

Section II: Bid Forms

Section III: Price Schedule

Volume-III: Technical Specifications

Section I: Technical specifications

Volume-IV: Details of Substations

5.2 Understanding of bid documents: A prospective Bidder is expected to examine all instructions, forms, terms, technical specifications, tender drawings and scope of works in the Bid documents and fully inform himself as to all the conditions and matters which may in any way affect the scope of work or the cost thereof. Failure to furnish all information required in the Bid document or submission of a Bid not substantially responsive to the Bid document in every respect will be at the Bidder's risk and may result in the rejection of its bid.

6.0 Clarifications on Bid Documents; and Pre-Bid Meeting:

6.1 If the prospective Bidder finds discrepancies or omissions, in specifications and document or is in doubt as to the true meaning of any part, he shall at once make a request, in writing, for an interpretation/clarification, to Employer at his mailing address indicated in Bidding Documents. Similarly, if a Bidder feels that any important provisions in the documents, such as Governing laws, Taxes and Duties, Defect Liability, Limitation of Liability, Settlement of Disputes, Arbitration, Form of Contract Agreement, Price Adjustment, Bid Guarantees, Contract Performance Guarantee, Compensation for Delay, Payments Terms, Schedule of Execution/Completion of works, will be unacceptable, such an issue should be raised as above. Employer, then, will issue interpretation(s) and clarification(s) as he may think fit in writing or modification of the Bidding Documents that it receives no later than twenty-eight (28) days prior to original deadlines prescribed for submission of bids by Employer. The Employer shall not be obliged to respond to any request for clarification received later than the above period. Further, mere request for clarification received from the Bidder shall not be a ground for seeking extension in the deadline for submission of bids. Written copies of Employer's response (including an explanation of the query but not identification of its source) will be sent to all prospective bidders that have received the Bidding Documents.

6.2 Verbal clarification and information given by Employer's or his employee(s) or his representative(s) shall not in any way be binding on Employer.

6.3 LOCAL CONDITIONS: It will be imperative on each Bidder to fully inform himself of all local conditions and factors, which may have any effect on the execution of the Contract covered under these documents and specifications. Employer shall not entertain any request for clarifications from the Bidders, regarding such local conditions. It must be understood and agreed that such factors have properly been investigated and considered while submitting the Proposals. No claim for financial adjustment to the Contract, awarded under these specifications and documents, will be entertained by Employer. Neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Employer, which are based on the lack of such clear information or its effect on the cost of the Works to the Bidder.

6.4 The bidder's designated representative(s) is/are invited to attend a pre-bid meeting, which, if convened, will take place at the venue and time specified in the Bidding Documents. The purpose of the meeting

shall be to clarify any issue regarding the Bidding Documents in general and the Technical Specification in particular. The Bidder is requested, as far as possible to submit any question in writing, to reach the Employer not later than three days before the meeting. Minutes of the Meeting, including the text of the questions raised (without identifying the name of the bidders) and the responses given, together with any responses prepared after the meeting, will be transmitted without any delay to all the purchasers of the Bidding Documents.

- 6.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.
- 7.0 Amendment to Bidding Document
- 7.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Document by amendment (s).
- 7.2 The amendment will be notified in writing or e-mail to all prospective Bidders, which have received the Bidding Document at the address contained in the letter of request for issue of Bidding Document from the Bidders. Bidders are required to immediately acknowledge receipt of any such amendments, and it will be assumed that the information contained therein will have been taken into account by the Bidder in its bid. The Employer will bear no responsibility or liability arising out of non-receipt of the same in time or otherwise.
- 7.3 In order to afford prospective Bidders reasonable time in which to take the amendment into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bid, in such cases, the Employer shall notify all the bidders in writing of the extended deadline.
- 7.4 All notifications and clarifications also be uploaded by Employer on his web portal / tender portal.
- 7.5 Such amendments, clarifications, etc, shall be binding on the Bidders and will be given due consideration by the Bidders while they submit their bids and invariably enclose such documents as a part of the bid.

(C) Preparation of Bids

8.0 Language of Bid

The bid prepared by the Bidder and all correspondences and documents relating to the bid, exchanged by the Bidder and Employer shall be written in the English language, provided that any printed literature furnished by the Bidder may be written in another language so long as accompanied by an English translation of its pertinent passages. Failure to comply with this may disqualify a bid. For purposes of interpretation of the bid, the English translation shall govern.

9.0 Documents Comprising The Bid

- 9.1 The bidding shall be e-tendering basis. On due date of submission of bids, bids shall be submitted by the Bidder under "Single Stage – Bid Envelope" procedure of bidding. Under this procedure, the bid submitted by the Bidder in one envelope – Bid Envelope (also referred to as Techno - Commercial Part). The Bid envelope shall be submitted by bidders at notified date and time in hard copies. Price bid in form of Price schedule shall be uploaded by bidder on schedule date and time of submission of bids. It shall be opened, in presence of eligible bidders on notified date, time and venue.

The price schedule shall be uploaded by the bidder on web portal on which the NIT is floated on due date and time for submission of bids. The locked price bid shall be opened on notified date and time in presence of participating bidders who have qualified technically and commercially. The price breakup shall be uploaded by bidders on-line on web portal on due date of submission of bids. The price bids shall be locked and opened on notified date and time pertains to technically and commercially cleared bidders only in presence of participating bidders. Due intimation shall be given to technically and commercially cleared bidders about date and time of opening of on-line bids. The bids shall comprise of the following documents:

**Bid Envelope:**

- (a) Bid Form (Bid Envelope) duly completed and signed by the Bidder, together with all Attachments (available in Volume-II). All Attachments have been identified in ITB Sub-Clause 9.3 below.
- (b) Technical Data Sheets (available in Volume-III), if any, duly completed by the Bidder.

9.2 Alternative bids shall not be accepted,

9.3 Each Bidder shall submit with its Techno - Commercial Part (Bid Envelope) the following attachments:

- a. Attachment 1: Bid Security (If required): A bid security in sealed separate Packet shall be furnished in accordance with ITB Clause 13 & ITB Clause 16.
- b. Attachment 2: Power of Attorney: A power of attorney, duly notarized, indicating that the person(s) signing the bid has (ve) the authority to sign the bid and thus that the bid is binding upon the Bidder during full period of its validity, in accordance with ITB Clause 14.
- c. Attachment 3: Bidder's Eligibility and Qualifications: In the absence of prequalification, documentary evidence establishing that the Bidder is eligible to bid in accordance with ITB Clause 2 and is qualified to perform the contract in accordance with Annexure – A (BDS), if its bid is accepted.

The documentary evidence of the Bidder's eligibility to bid shall establish to the Employer's satisfaction that the Bidder, at the time of submission of its bid, is eligible as defined in ITB Clause 2.

The documentary evidence of the Bidder's qualifications to perform the contract, if its bid is accepted, shall establish to the Employer's satisfaction that the Bidder has the financial, technical, production, procurement, shipping, installation and other capabilities necessary to perform the contract, and, in particular, meets the experience and other criteria outlined in the Qualification Requirement for the Bidders in Annexure – A (BDS) and shall also include the complete annual reports together with Audited statement of accounts of the company for last five years of its own (separate) immediately preceding the date of submission of bid.

[Note I. In the event the Bidder is not able to furnish the above information of its own (i.e., separate), being a subsidiary company and its accounts are being consolidated with its Group/ Holding/ Parent company, the Bidder should submit the audited balance sheet, income statement, other information pertaining to it only (not of its Group/Holding/Parent company) duly certified by any one of the authority [(i) Statutory Auditor of the Bidder/(ii) Company Secretary of the Bidder a (iii) A certified Public Accountant] certifying that such information/documents are based on the audited accounts as the case may be.

Note II. Similarly, if the Bidder happens to be a Group/Holding/ Parent company, the Bidder should submit the above documents/information of its own (i.e., exclusive of its subsidiaries) duly certified by any one of the authority mentioned in Note I above certifying that these information/documents are based on audited accounts, as the case may be.]

Unless otherwise mentioned in BDS, bids submitted by a joint venture having not more than three partners with one partner as lead partner, if allowed as per stipulated Qualification Requirements in Annexure-A (BDS), shall comply with the following requirements:

- i. The bid shall include all the information required for Attachment 3 as described above for each joint venture partner.
- ii. The bid shall be signed so as to be legally binding on all partners.

- iii. One of the partners responsible for performing a key component of the contract shall be designated as leader; this authorization shall be evidenced by submitting with the bid a power of attorney signed by legally authorized signatories as per Form-14 of Volume-I : Section-VI (Sample Forms and Procedures).
  - iv. All partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms.
  - v. A copy of the agreement entered into by the joint venture partners shall be submitted with the bid as per Form-15 of Volume-I : Section-VI (Sample Forms and Procedures), including interalia delineation of responsibilities and obligations of each partners appended thereto, notwithstanding the joint and several liability.
  - vi. The joint venture agreement should indicate precisely the responsibility of all members of JV in respect of planning, design, manufacturing, supply, installation, commissioning and training.
  - vii. All members of JV should have active participation in execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the Employer; and
  - viii. In order for a joint venture to qualify, each of its partners or combination of partners must meet the minimum criteria listed in the Qualification Requirement for the Bidder in enclosed Annexure-A (BDS) for an individual Bidder for the component of the contract they are designated to perform. Failure to comply with this requirement will result in rejection of the joint venture bid.
  - ix. A firm can be a partner in only one joint venture; bids submitted by joint ventures or consortia including the same firm as partner will be rejected.
  - x. In the case of a Bidder who offers to supply and/or install plant and equipment under the contract that the Bidder did not manufacture or otherwise produce and/or install, the Bidder shall (i) have the financial and other capabilities necessary to perform the contract; (ii) have been duly authorized by the manufacturer or producer of the related plant and equipment or component as per proforma in attachment 8 to supply and/or install that item in the Employer's country; and (iii) be responsible for ensuring that the manufacturer or producer complies with the requirements of ITB Sub-Clause 3.2 and meets the minimum criteria listed for an individual Bidder for that item.
- d. Attachment 4: Eligibility and Conformity of the Facilities- Documentary evidence established in accordance with ITB Clause 3 that the facilities offered by the Bidder in its bid are eligible and conform to the Bidding Documents.

The documentary evidence of the eligibility of the facilities shall consist of a statement on the country of origin of the plant and equipment offered, which shall be confirmed by a certificate of origin issued at the time of shipment.

- e. Attachment 5: Subcontractors Proposed by the Bidder: The Bidder shall include in its bid details of all major items of supply or services that it proposes to purchase or sublet, and shall give details of the name and nationality of the proposed Subcontractor, including vendors, for each of those items. Bidders are free to list more than one

Subcontractor against each item of the facilities. Their participation should be confirmed with a letter of intent between the parties, as needed, in Attachment 8. Quoted rates and prices will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices will be permitted.

The Bidder shall be responsible for ensuring that any Subcontractor proposed complies with the requirements of ITB Clause 2, and that any plant, equipment or services to be provided by the Subcontractor comply with the requirements of ITB Clause 3 and Qualification Requirement for the Bidder, enclosed as Annexure-A(BDS).

The Employer reserves the right to delete any proposed Subcontractor from the list prior to award of contract, and after discussion between the Employer and the Contractor, the Appendix-5 of Volume-I: Section VI - Form of Contract Agreement shall be completed, listing the approved Subcontractors for each item concerned.

- f. Attachment 6: Deviations: In order to facilitate evaluation of bids, deviations, if any, from the terms and conditions or Technical Specifications shall be listed in Attachment 6 to the bid. The Bidder is required to provide the cost of withdrawal for such deviations. However, the attention of the bidders is drawn to the provisions of ITB Sub-Clause 22.3 regarding the rejection of bids that are not substantially responsive to the requirements of the Bidding Documents.

Bidder's attention is also drawn to the provisions of ITB Sub-Clause 22.3.1.

- g. Attachment 8: Manufacturer's Authorisation Form
- h. Attachment 9: Work Completion Schedule.
- i. Attachment 10: Guarantee Declaration.
- j. Attachment 11: Information regarding ex-employees of Employer in Bidder's firm.
- k. Attachment 12: Price Adjustment Data
- l. Attachment 14: Integrity Pact: The Bidder shall complete the accompanying Integrity Pact, which shall be applicable for bidding as well as contract execution, duly signed on each page by the person signing the bid and shall be returned by the Bidder in two (2) originals alongwith the Techno - Commercial Part in a separate packet, duly superscripted with 'Integrity Pact'. The Bidder shall submit the Integrity Pact on a non judicial stamp paper of Rs. 100/-.

If the Bidder is a partnership firm or a joint venture, the Integrity Pact shall be signed by all the partners or consortium members.

Bidder's failure to submit the Integrity Pact duly signed in Original alongwith the Bid or subsequently pursuant to ITB Sub-Clause 21 .1 shall lead to outright rejection of the Bid. In case of any grievance above the tender, the same may sent to IEMs/ Vigilance Department of NDMC with the name and address of the sender.

- m. Attachment 15: Option for Initial Advance (either Interest Bearing Initial Advance or No Initial Advance) and Information for E-payment, PF details and declaration regarding Micro/Small & Medium Enterprises

In this Attachment, the Bidder is required to clearly mention whether the Bidder would opt for Interest bearing initial advance in addition to providing the other information as above.

- n. Attachment 16: Additional Information:
- i. Certificate from their Banker(s) (as per prescribed formats in Form 16, Volume-I : Section-VI (Sample Forms and Procedures)) indicating various fund based/non fund based limits sanctioned to the Bidder and the extent of utilization as on date. Such certificate should have been issued not earlier

than three months prior to the date of bid opening. Wherever necessary the Employer may make queries with the Bidders' Bankers.

- ii. Detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder or any partner of JV may result in rejection of Bid.
- iii. Any other information which the Bidder intends to furnish.
  - o. Attachment 17: Declaration for tax exemptions, reductions, allowances or benefits
  - p. Attachment 18: Declaration
  - q. Attachment 19: Bank Guarantee verification checklist

11.0 Bid Form and Price Schedules:

The Bidder shall complete the Bid Form(s) and submit it in hard copy on due date and time of submission of bid. The appropriate Price Schedules furnished in the Bidding Documents as indicated therein, shall be uploaded on web portal on due date and time of submission of bids.

11.0 Bid Prices:

11.1 Unless otherwise specified in the Technical Specifications, bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the Bidding Documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for testing, precommissioning and commissioning of the facilities and, where so required by the Bidding Documents, the acquisition of all permits, approvals and licenses, etc.; the operation, maintenance and training services and such other items and services as may be specified in the Bidding Documents, all in accordance with the requirements of the General Conditions of Contract. Items against which no price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed to be covered by the prices for other items.

11.2 Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the Bidding Documents. If a Bidder wishes to make a deviation, such deviation shall be listed in Attachment 6 of its bid. The Bidder is required to provide the cost of withdrawal for such deviations.

11.3 Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules. Where no Price Schedules are included in the Bidding Documents, Bidders shall present their prices in the following manner:

11.3.1 It shall be the responsibility of the bidders to pay all statutory taxes, duties and levies to the concerned authorities for such surplus material, which would otherwise have been, lawfully payable. The bidders shall submit an indemnity bond to keep Employer harmless from any liability, before release of such material to the bidder by Employer.

11.3.2 Set/Lot/Lumpsum shall be governed as per the requirement of the corresponding item description read in conjunction with relevant provisions of Technical Specifications.

11.4 In the schedules, Bidder shall give the required details and a break-down of their price as follows:

- a. Plant and equipment shall be quoted on an EXW (ex-factory, ex-works, ex-warehouse or off-the-self, as applicable) basis.

In respect of direct transaction between the Employer and the Contractor, EXW price shall be exclusive of all cost as well as duties and taxes (viz., customs duties & levies, duties, sales tax/VAT etc.) paid or payable on components, raw materials and any other items used for their consumption incorporated or to be incorporated in the Plant & Equipment.



Sales tax/VAT, excise duty, local tax and other levies for equipment/items under direct transaction including octroi/entry tax as applicable for destination site/state shall not be included in the EXW price but shall be indicated wherever applicable.

Whenever EXW price is quoted exclusive of excise duty and/or VAT, then the due credit under the CENVAT (Central Value Added Tax)/VAT scheme as per the relevant Government policies wherever applicable shall be taken into account by the Bidder while quoting bid price.

In respect of bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-in-transit), EXW price shall be inclusive of all cost as well as duties and tax (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable. While quoting the EXW price, inclusive of excise duty and/or VAT, the due credit under the CENVAT (Central Value Added Tax)/VAT scheme as per the relevant Government policies wherever applicable shall be taken into account by the Bidder.

Imported goods shall not be acceptable. Only indigenous goods shall be acceptable in the contract.

However, octroi/entry tax as applicable for destination site/state shall not be included in the EXW price but shall be indicated separately.

Requisite Sales Tax Declaration forms for all the equipments/items to be supplied from within India shall be furnished by the Employer.

- b. Local transportation, insurance and other Services incidental to delivery of the Plant and Equipment to be supplied shall be quoted separately.
- c. Installation Charges shall be quoted separately and shall include rates and prices for all labour, Contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, provision of operations and maintenance manuals, etc. wherever identified in the Bidding Documents as necessary for the proper execution of all installation services except those priced in other Schedules.
- ~~d. The break-up of Training Charges shall be furnished separately in Schedule 4 for the training. Similarly, the break-up of Type test charges shall be furnished separately in Schedule 7. – Not Applicable~~
- e. The bidder shall include the Sales Tax/VAT on Works Contract, Turnover Tax or any other similar taxes under the Sales Tax/VAT Act for services to be performed, as applicable in their quoted bid price and Employer would not bear any liability on this account. Employer on behalf of the Owner shall, however, deduct such taxes at source as per the rules and issue Tax Deducted at Source (TDS) Certificate to the bidder.
- f. The Bidder shall include Service Tax and surcharge/cess etc. on it as applicable in their quoted bid price and Employer would not bear any liability whatsoever on this account. NDMC shall, however, deduct such tax at source as per the rules and issue necessary Certificate to the Contractor.
- g. The Bidder shall include insurance charges in its bid prices as per insurance requirement mentioned in Section – IV: General Conditions of Contract (GCC) and Appendix-3: Insurance Requirements to Form of Contract Agreement as contained in Volume-I : Section VI (Sample Forms and Procedures) of the Bidding Documents. Bidder shall further note that the Employer shall not be liable to make any payment/ reimbursement to the Contractor whatsoever for insurance of Contractor's Plant and Machinery.

- 11.5 The prices shall be in accordance with the following:  
The prices shall be in accordance with Appendix-2 of section-VI: Sample forms and procedures
- 12.0 Bid Currencies
- 12.1 Prices shall be quoted in Indian Rupees Only.
- 13.0 BID security:
- 13.1 The Bidder shall furnish, as part of its bid, a bid security in the amount and currency as stipulated in the Bid Documents. The bid security must be submitted in the form provided in the Bidding Documents.
- 13.2 The bid security shall, at the bidder's option, be in the form of a crossed bank draft/pay orders/bank guarantee in favour of Employer from a reputed (i) Public Sector Bank located in India; or (ii) Scheduled Commercial Indian Private Bank as per the attached list only [List is placed at Annexure-I to Section-III (BDS)]. Bid security shall remain valid for a period of thirty (30) days beyond the original bid validity period, and beyond any extension subsequently requested under ITB Sub-Clause 14.2. In case of submission of the Bid Security in form of Bank Guarantee, bid security shall be submitted in standard format (Bid security form) provided at Volume-I : Section-VI "Sample forms and procedures".  
  
The Bid Security shall be in favour of Secretary NDMC payable at New Delhi.
- 13.3 Any bid not accompanied by a bid security or an acceptable bid security shall be rejected by the Employer as being nonresponsive, pursuant to ITB Sub-Clause 22.4. The bid security of a joint venture must be in the name of all the partners in the joint venture submitting the bid.
- 13.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than twenty-eight (28) days after the expiration of the bid validity period.
- 13.5 The successful Bidder shall be required to keep its bid security valid for a sufficient period till the performance security(ies) pursuant to ITB Clause 34 are furnished to the satisfaction of the Employer. The bid security of the successful Bidder will be returned when the Bidder has signed the Contract Agreement, pursuant to ITB Clause 33, and has furnished the required performance security, pursuant to ITB Clause 34.
- 13.6 The bid security may be forfeited
- (a) If the Bidder withdraws its bid during the period of bid validity specified by the Bidder in the Bid Form; or
  - (b) In case the Bidder does not withdraw the deviations proposed by him, if any, at the cost of withdrawal stated by him in the bid and/or accept the withdrawals/rectifications pursuant to the declaration/confirmation made by him in Attachment – Declaration of the Bid; or
  - (c) If a Bidder does not accept the corrections to arithmetical errors identified during preliminary evaluation of his bid pursuant to ITB Sub-Clause 27.2; or
  - (d) If, as per the requirement of Qualification Requirements the Bidder is required to submit a Deed of Joint Undertaking and he fails to submit the same, duly attested by Notary Public of the place(s) of the respective executant(s), within ten days from the date of intimation of post – bid discussion; or
  - (e) In the case of a successful Bidder, if the Bidder fails within the specified time limit
    - (i) to sign the Contract Agreement, in accordance with ITB Clause 33, or
    - (ii) to furnish the required performance security(ies), in accordance with ITB Clause 34 and/or to keep the bid security valid as per the requirement of ITB Sub-Clause 13.5.
- 13.7 No interest shall be payable by the Employer on the above Bid Security.

14.0 Period of Validity of Bid

14.1 Bids shall remain valid for the period of six months after the date of opening of Techno - Commercial Part i.e. Bid Envelope, prescribed by the Employer, pursuant to ITB Sub-Clause 20.1. A bid valid for a shorter period shall be rejected by the Employer as being non-responsive.

14.2 In exceptional circumstance, the Employer may solicit the Bidder's consent to an extension of the bid validity period. The request and responses thereto shall be made in writing or by e-mail. If a Bidder accepts to prolong the period of validity, the bid security shall also be suitably extended. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required or permitted to modify its bid.

15.0 Format and Signing of Bid

15.1 The Bidder shall prepare an original and two number of copies of the bid, clearly marking each one as "Original Bid", "Copy No. 1", "Copy No. 2", as appropriate. In the event of any discrepancy between them, the original shall govern.

15.2 The original and both the copies of the bid, each consisting of the documents listed in ITB Clause 9, shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the contract. The latter authorization shall be indicated by written power of attorney accompanying the bid and submitted as Attachment 2 to the Bid under ITB Sub-Clause 9.3. All pages of the bid, except for unamended printed literature, shall be initialed by the person or persons signing the bid and shall be serially numbered.

15.3 The bid shall contain no alterations, omissions or additions, unless such corrections are initialed by the person or persons signing the bid.

(D) Submission of Bids

16.0 Sealing and Marking of Bids

16.1 The Bidder shall seal the original and each copy of the bid in separate envelopes, duly marking the envelopes as "Original Bid" and "Copy No. [number]" and each containing two inner separately sealed envelopes marked Bid Envelope (Techno – Commercial Part) containing the documents mentioned at ITB Clause 9 in the following manner. These envelopes shall then be sealed in an outer envelope.

Bid Envelope (Techno – Commercial Part) consisting two inner envelopes with following Packets:

Inner Envelope-1:

- a) Packet No.-I mentioning on the envelope the following: "Packet No.-I: Integrity Pact (Part of Bid Envelope Bid)"
- b) Packet No.-II : Bid Price (Cost of bid document, if not paid ON-LINE).
- c) Packet No.-III : Bid Security

Inner Envelope-2:

- a) Packet No.-I: Bid Form (Containing Pre-Qualification Requirements' documents as per 16 Nos. attachments as Attachment -7 and Attachment 13 of Bid forms not required)
- b) Packet No.-II : Techno-commercial offers (copy of entire bid document duly signed and stamped as token of unconditional acceptance to the terms and conditions of the contracts, technical specification, scope of contract, tender drawings, etc as per bid documents)

Inner Envelope-1 and Inner Envelope-2 duly sealed and stamped shall be sealed in an outer envelope named as Bid Envelope.

16.2 The inner and outer envelopes shall

- (a) be addressed to the Employer at the address given in the BDS, and
- (b) bear the contract name indicated in the BDS, the Invitation for Bids title and number indicated in the BDS, and the statement "Do Not Open Before [date]," to be completed with the time and date specified in the BDS, pursuant to ITB Sub-Clause 20.1.

16.3 All the inner envelopes shall also indicate the name and address of the Bidder so that the bid can be returned unopened in case it is declared "late."

16.4 If the outer envelope is not sealed and marked as required by ITB Sub-Clause 16.2 above, the Employer will assume no responsibility for the bid's misplacement or premature opening. If the outer envelope discloses the Bidder's identity, the Employer will not guarantee the anonymity of the bid submission, but this disclosure will not constitute grounds for bid rejection.

17.0 Deadline for Submission of Bids

17.1 Bids must be received by the Employer at the address specified under ITB Sub-Clause 16.2 no later than the time and date stated in the BDS. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the bids will be received upto the appointed time on the next working day. Bids once received by the Employer shall not be returned except otherwise provided in the Bidding Documents.

17.2 The Employer may, at its discretion, extend this deadline for submission of bids by amending the Bidding Documents in accordance with ITB Sub-Clause 7.3 for the reasons specified therein at any time prior to opening of bids by the Employer pursuant to ITB Clause 20, in which case all rights and obligations of Employer and bidders will thereafter be subject to the deadline as extended.

18.0 Late Bids

18.1 Any bid received by the Employer after the bid submission deadline prescribed by the Employer, pursuant to ITB Clause 17, will be rejected and returned unopened to the Bidder.

19.0 Modification and Withdrawal of Bids

19.1 The Bidder may modify or withdraw its bid after submission, provided that modification or written notice of withdrawal is received by the Employer prior to the deadline prescribed for bid submission.

19.2 The Bidder's modifications shall be prepared, sealed, marked and dispatched as follows:

- (a) The Bidders shall provide an original and two number of copies of any modifications to its bid, clearly identified as such, in two inner envelopes duly marked "Bid Modifications ..... Envelope —Original" and "Bid Modifications ..... Envelope —Copies." The inner envelopes shall be sealed in an outer envelope, which shall be duly marked "Bid Modifications."
- (b) Other provisions concerning the marking and dispatch of bid modifications shall be in accordance with ITB Sub-Clauses 16.2, 16.3 and 16.4.

19.3 A Bidder wishing to withdraw its bid shall notify the Employer in writing prior to the deadline prescribed for bid submission. The notice of withdrawal shall

- (a) be addressed to the Employer at the address named in the BDS, and
- (b) bear the contract name, the IFB number, and the words "Bid Withdrawal Notice." Bid withdrawal notices received after the bid submission deadline will be ignored, and the submitted bid will be deemed to be a validly submitted bid.

19.4 No bid may be withdrawn in the interval between the bid submission deadline and the expiration of the bid validity period specified in ITB Clause 14. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security, pursuant to ITB Sub-Clause 13.6.

(E). Bid Opening and Evaluation

20.0 Opening of Bid Envelope by Employer

20.1 The Employer will open the Bid Envelope i.e. Techno – Commercial Part in public, including withdrawals and modifications made pursuant to ITB Clause 19, in the presence of bidders' designated representatives who choose to attend, at the time, date, and location stipulated in the BPS. The bidders' representatives who are present shall sign a register evidencing their attendance. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the bids will be received upto the appointed time on the next working day.

20.2 Envelopes marked "Withdrawal" shall be opened first and the name of the Bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to ITB Clause 19 shall be returned unopened.

20.3 For all other Bids, the bidders' names, deviation having cost of withdrawal, if any, the presence of bid security, Integrity Pact and any such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. Subsequently, all envelopes marked "Modification" shall be opened and the submissions therein read out in appropriate detail. No bid shall be rejected at bid opening except for late bids pursuant to ITB Clause 18. Such bids shall be returned to the Bidder unopened. However, opening of bid, whether or not accompanied with the bid security and/or Integrity Pact, shall not be construed to imply its acceptability which shall be examined in detail pursuant to the provisions contained in this Section-II.

On behalf of Employer, the Integrity Pact will be signed by its representative at the time of Bid Opening. One original of the Integrity Pact will be retained by Employer and the other original will be returned to the representative of the bidders present during bid opening. If the Bidder's representative is not present during the Bid Opening, the other original shall be sent to the bidder by post/courier.

20.4 The Employer shall prepare minutes of the bid opening in the form of Bid Opening Statement, including the information disclosed to those present in accordance with ITB Sub-Clause 20.3.

20.5 Bids not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances and shall be returned to the Bidder unopened.

21.0 Clarification of Bids

21.1 During bid evaluation, the Employer may, at its discretion, ask the Bidder for a clarification of its bid. In case of erroneous/non submission of documents related to/identified in ITB Sub-Clause 9.3 (b), (n) and (r) or Deed of Joint Undertaking pursuant to ITB Sub-Clause 9.3 (c) & (e), required to be submitted by the Bidder as per the provisions of the Bidding Documents, the Employer may give the Bidder not more than 7 working days notice to rectify/furnish such documents, failing which the bid shall be rejected. The request for clarification and the response shall be in writing, and no change in the price or substance of the bid shall be sought, offered or permitted.

22.0 Preliminary Examination of Bid Envelope

22.1 The Employer will examine the bids to determine whether they are complete, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.

- 22.2 The Employer may waive any minor informality, nonconformity or irregularity in a bid that does not constitute a material deviation, whether or not identified by the Bidder in Attachment 6 to its bid, and that does not prejudice or affect the relative ranking of any Bidder as a result of the technical and commercial evaluation, pursuant to ITB Clause 24.
- 22.3 Prior to the detailed evaluation, the Employer will determine whether each bid is of acceptable quality, is complete and is substantially responsive to the Bidding Documents. Any deviations, conditionality or reservation introduced in Attachment-6 and/or in the Bid Form, Technical Data Sheets and covering letter, or in any other part of the bid will be reviewed to conduct a determination of the substantial responsiveness of the bidder's bid. For purposes of this determination, a substantially responsive bid is one that conforms to all the terms, conditions and specifications of the Bidding Documents without material deviations, objections, conditionalities or reservations. A material deviation, objection, conditionality or reservation is one (i) that affects in any substantial way the scope, quality or performance of the contract; (ii) that limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the successful Bidder's obligations under the contract; or (iii) whose rectification would unfairly affect the competitive position of other bidders who are presenting substantially responsive bids.
- 22.3.1 Bids containing deviations from critical provisions relating to GCC Clauses 2.14 (Governing Law), 8 (Terms of Payment), 9.3 (Performance Security), 10 (Taxes and duties), 21.2 (Completion Time Guarantee), 22 (Defect Liability), 23 (Functional Guarantee), 25 (Patent Indemnity), 26 (Limitation of Liability), 38 (Settlement of Disputes), 39 (Arbitration) and Appendix 2 to the Form of Contract Agreement (Price Adjustment) will be considered as non-responsive.
- 22.3.2 Regarding deviations, conditionality or reservations introduced in the bid, which will be reviewed to conduct a determination of substantial responsiveness of the Bidder's bid as stated in ITB Sub-Clause 22.3, the order of precedence of these documents to address contradictions, if any, in the contents of the bid, shall be as follows:
- I. Covering Letter
  - II. Bid Form
  - III. Attachment-6: Deviations
  - IV. Technical Data Sheet
- Contents of the document at Sr. No. I above will have overriding precedence over other documents (Sr. No. II to V above). Similarly, contents of document at Sr. No. II above will have overriding precedence over other documents (Sr. No. III to IV above), and so on.
- 22.4 If a bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by the Bidder by correction of the nonconformity. The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.
- 23.0 Qualification
- 23.1 The Employer will ascertain to its satisfaction whether Bidders determined having submitted substantially responsive bids are qualified, as per the Qualification Requirement specified in Annexure – A (BDS) to satisfactorily perform the contract. The Employer shall be the sole judge in this regard and the Employer's interpretation of the Qualification Requirement shall be final and binding.
- 23.2 The determination will take into account the Bidder's financial, technical capabilities including production capabilities, in particular the Bidder's contract work in hand, future commitments & current litigation and past performance including fatal accidents during execution of contracts that have been awarded by the Employer on the Bidder. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder in Attachment 3 to the bid, as well as such other information as the Employer deems necessary and appropriate. This shall, however, be subject to assessment that may be carried out, if required, by the Employer as per the provisions of Annexure -A (BDS). Subsequent to Bidder's involvement in three cumulative fatal accidents during any financial year, bids submitted by such bidder during next three months period reckoned from the date of the last accident, shall be considered non-responsive. However, if there is no bid from such bidder during the said three months period, any one bid submitted after three months will be considered non-responsive. The Employer shall be the sole judge in this regard.

- 23.3 The Employer may waive any minor informality, nonconformity or irregularity in a bid that does not constitute a material deviation, affecting the capability of the Bidder to perform the Contract.
- 23.4 An affirmative determination will be a prerequisite for the Employer to evaluate the Techno - Commercial Part and to intimate successful bidders to be present on new date, time & location to open the online price schedules of the Bidder. A negative determination will result in rejection of the Bidder's bid.
- 23.5 The bid from those bidders shall not be accepted who failed to submit Performance Security on issue of Letter of Intent (LoI)/Letter of Award (LoA) for any other contract of Employer in past 3 years.
- 24.0 Evaluation of Techno - Commercial Part (Bid envelop)
- 24.1 The Employer will carry out a detailed evaluation of the bids of the qualified bidders in order to determine whether the technical aspects are in accordance with the requirements set forth in the Bidding Documents. In order to reach such a determination, the Employer will examine the information supplied by the bidders, pursuant to ITB Clause 9, and other requirements in the Bidding Documents, taking into account the following factors:
- (a) overall completeness and compliance with the Technical Specifications and Drawings; deviations from the Technical Specifications as identified in Attachment 6 to the bid and those deviations not so identified; suitability of the facilities offered in relation to the environmental and climatic conditions prevailing at the site; and quality, function and operation of any process control concept included in the bid. The bid that does not meet minimum acceptable standards of completeness, consistency and detail will be rejected for non-responsiveness.
  - (b) Achievement of specified performance criteria by the facilities
  - (c) Compliance with the time schedule called for in the corresponding Appendix to the Form of Contract Agreement and evidenced as needed in a milestone schedule provided in the bid;
 

Time schedule (program of performance)

The plant and equipment covered by this bidding shall have the 'Taking Over' by the Employer after successful Completion within the period specified in BDS. Bidders are required to base their prices on the time schedule given in Appendix 4 [Volume-I : Section-VI (Sample Forms and Procedures)] 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 specified period are liable to be rejected.
  - (d) Type, quantity and long-term availability of mandatory and recommended spare parts and maintenance services
  - (e) Any other relevant technical factors that the Employer deems necessary or prudent to take into consideration.
  - (f) Any deviations to the commercial and contractual provisions stipulated in the Bidding Documents.
  - (g) Details furnished by the bidder in response to the requirements specified in Volume-II of the Bidding Documents.
  - (h) The acceptability of the vendors and subcontractors proposed in Attachment 5 to be used by the Bidder will be evaluated. Should a vendor or subcontractor, for the items other than those covered under Annexure-A (BDS), be determined to be unacceptable, the bid will not be rejected, but the Bidder will be required to substitute an acceptable vendor or subcontractor without any change to the bid price.

- (i) The no load and load losses of transformer shall not exceed the values given in IS 1180 (Part-I):2014 & IS 2026 (with up-to-date amendments, if any). In case, Technical Losses found to be more than specified values, transformers shall be rejected.
- (j) Bank Guarantee submitted against Bid Security shall be verified independently from issuing bank. On receipt of certification from issuing bank, eligibility of bidder shall be decided for opening of price bid.

25.0 Opening of Price Schedules (ON-LINE) by Employer

- 25.1 Price Part of only those Bidders shall be opened on-line who are determined as having submitted substantially responsive bids and are ascertained to be qualified to satisfactorily perform the Contract, pursuant to ITB Clause 23 and 24. Such Bidders shall be intimated about the date and time for opening of Price Part by the Employer. A negative determination of the bids pursuant to ITB Clause 23 and 24, shall be notified by the Employer to such Bidders and the price bid uploaded by them shall not be opened.
- 25.2 The Employer will on-line open Price Bid at the specified time and date in the presence of bidders' designated representatives who choose to attend, at the time, date, and location stipulated in the intimation for opening of price bid. The bidders' representatives who are present shall sign a register evidencing their attendance.
- 25.3 The bidders' names, the Bid Prices or any discounts, and any such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. The prices and details as may be read out during the bid opening and recorded in the Bid Opening Statement would not be construed to determine the relative ranking amongst the Bidders, or the successful Bidder, and would not confer any right or claim whatsoever on any Bidder. The successful Bidder (also referred to as the L<sub>1</sub> Bidder) shall be determined as per the provisions of this Section – II and considered for award of contract as provided in ITB Clause 30.
- 25.4 The Employer shall prepare minutes of the bid opening, including the information disclosed to those present in accordance with ITB Sub-Clause 25.3.
- 25.5 Bids not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances.

26.0 Conversion to Single Currency

- 26.1 This shall not be applicable as domestic firms are required to quote the prices in Indian Rupees only.

27.0 Evaluation of Bid (As per clause no. 13 (XV) of special condition of contract)

- 27.1 The Employer will examine the Price Bids to determine whether they are complete, whether any computational errors have been made and whether the bids are generally in order.

The Price Bids containing any deviations and omissions from the contractual and commercial conditions and the Technical Specifications which have not been identified in the Bid Envelope are liable to be rejected.

- 27.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity specified by the Employer, or between subtotals and the total price, the unit or subtotal price shall prevail, and the quantity and the total price shall be corrected. However, in case of items quoted without indicating any quantity or the items for which the quantities are to be estimated by the Bidder, the total price quoted against such items shall prevail. If there is a discrepancy between words and figures, the amount in words will prevail.

The prices of all such item(s) against which the Bidder has not quoted rates/amount (viz., items left blank or against which '-' is indicated) in the Price Schedules will be deemed to have been included in other item(s).



If the discount(s)/rebate(s) offered by the Bidder is a percentage discount and the price component(s) on which the said discount is not indicated in the bid, the same shall be considered on the total bid price [i.e. proportionately on each price component], in the event of award. However, if lump-sum discount is offered, the same shall be considered in full on the Ex-works price component (by proportionately reducing Ex-works price of individual items), in case of award. Further, Conditional discounts/rebates, if any, offered by the bidder shall not be taken into consideration for evaluation. It shall, however, be considered in case of award.

In respect of taxes, duties and other levies indicated by the Bidder in the Bid, which are reimbursable in line with the provisions of the Bidding Documents, the applicable rate and amount thereof shall be ascertained by the Employer based on which, if required, necessary rectification and arithmetical correction shall be carried out by the Employer. The rate and amount so ascertained by the Employer shall prevail.

The subtotal, total price or the total bid price to be identified in Bid Form for this purpose, irrespective of the discrepancy between the amount for the same indicated in words or figures shall be rectified in line with the procedure explained above.

If the Bidder does not accept the correction of errors as per this clause, its bid will be rejected and the amount of Bid Security forfeited.

The Bidder should ensure that the prices furnished in various price schedules are consistent with each other. In case of any inconsistency in the prices furnished in the specified price schedules to be identified in Bid Form for this purpose, the Employer shall be entitled to consider the highest price for the purpose of evaluation and for the purpose of award of the Contract use the lowest of the prices in these schedules.

27.3 The comparison shall be on the total price in Price Schedule No. 5 Grand Summary (Total of Schedule Nos. 1 to 4).

The comparison shall also include the applicable taxes, duties and other levies, which are reimbursable in line with the provisions of the Bidding Documents.

The Employer's comparison will also include the costs resulting from application of the evaluation procedures described in ITB Sub-Clause 27.4 & 27.5.

27.4 The Employer's evaluation of a bid will take into account, in addition to the bid prices indicated in Price Schedule Nos. 1 through 4 (online price schedules), the following costs and factors that will be added to each Bidder's bid price in the evaluation using pricing information available to the Employer, in the manner and to the extent indicated in ITB Sub-Clause 27.5 and in the Technical Specifications:

- (a) the cost of all quantifiable deviations and omissions from the contractual and commercial conditions and the Technical Specifications as identified in the evaluation of Bid Envelope, and other deviations and omissions not so identified;
- (b) the functional guarantees of the facilities offered - deleted
- (c) the performance of the equipment offered;

Bidder shall state the guaranteed performance or efficiency of the Equipments, named in the BDS, in response to the Technical Specifications. Equipment offered shall have a minimum (or a maximum, as the case may be) level of guarantees specified in the Technical Specifications to be considered responsive. Bids offering plant and equipment with guarantees less (or more) than the minimum (or maximum) specified shall be rejected.

- (d) the extra cost of work, services, facilities, etc., required to be provided by the Employer or third parties;
- (e) any other relevant factors listed in BDS.

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.

27.5 Pursuant to ITB Sub-Clause 27.4, the following evaluation methods will be followed:

- (a) Contractual and commercial deviations - deleted

The evaluation shall be based on the evaluated cost of fulfilling the contract in compliance with all commercial, contractual and technical obligations under this Bidding Documents. In arriving at the evaluated cost, towards deviations identified in the evaluation of bid, the cost of withdrawal indicated by the bidder in Attachment-6 of the Bid Form will be used. If such a price is not given, the Employer will make its own assessment of the cost of such a deviation for the purpose of ensuring fair comparison of bids.

(b) Functional Guarantees of the facilities - deleted

For the purposes of evaluation, the adjustment specified in the Technical Specifications will be added to the bid price for each drop (or excess) in the responsive functional guarantees offered by the Bidder, below (or above) either a norm of one hundred (100) or the value committed in the responsive bid with the most performing functional guarantees, as specified in the Technical Specifications.

(c) Performance Guarantees of the Equipments - deleted

For the purposes of evaluation, the adjustment specified in the BDS will be added to the bid price.

(d) Work, services, facilities, etc., to be provided by the Employer - deleted

Where bids include the undertaking of work or the provision of services or facilities by the Employer in excess of the provisions allowed for in the Bidding Documents, the Employer shall assess the costs of such additional work, services and/or facilities during the duration of the contract. Such costs shall be added to the bid price for evaluation.

27.6 Any adjustments in price that result from the above procedures shall be added, for purposes of comparative evaluation only, to arrive at an "Evaluated Bid Price." Bid prices quoted by bidders and rectified as per ITB Sub Clause 27.2 shall remain unaltered.

28.0 Purchase/ Domestic preference:

No preference shall be given to any bidder

29.0 Confidentiality and Contacting the Employer

29.1 After the public opening of bids, information relating to the examination, clarification, and evaluation of bids and recommendations concerning awards shall not be disclosed to Bidders or other persons not officially concerned with this process until the publication of contract award. 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 its bid, it should do so in writing.

29.2 Any effort by a Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in rejection of the Bidder's bid. The Employer shall be the sole judge in this regard.

(F). Award of Contract

30.0 Award Criteria

30.1 Subject to ITB Clause 31, the Employer will award the contract to the successful Bidder (also referred to as the L<sub>1</sub> Bidder) whose bid has been determined to be substantially responsive and to be the lowest evaluated bid, further provided that the Bidder is determined to be qualified, as per the Qualification Requirement specified in Annexure-A (BDS) to perform the contract satisfactorily.

30.2 The Employer may request the Bidder to withdraw any of the deviations listed in the winning bid.

At the time of Award of Contract, if so desired by the Employer, the bidder shall withdraw the deviations listed in Attachment 6 to the Bid Form at the cost of withdrawal stated by him in the bid. In case the bidder does not withdraw the deviations proposed by him, if any, at the cost of withdrawal stated by him in the bid, his bid will be rejected and his bid security forfeited.

Bidder would be required to comply with all other requirements of the Bidding Documents except for those deviations which are accepted by the Employer.

- 30.3 The Employer reserves the right to vary the quantity of any of the spares and/or delete any items of spares altogether at the time of Award of Contract.
- 30.4 The mode of contracting with the successful bidder will be as per stipulation outlined in GCC Sub-Clause 2.1 and briefly indicated below:
- 30.4.1 The award shall be made as follows:
- (i) First Contract: For supply of all equipment and materials including applicable taxes and duties.
  - (ii) Second Contract: For providing all services i.e. inland transportation for delivery at site, insurance, unloading, storage, handling at site, installation, Testing and Commissioning including performance testing in respect of all the equipment supplied under the "First Contract" and any other services specified in the Contract Documents.

Both contracts will contain a cross fall breach clause specifying that breach of one will constitute breach of the other.

- 30.5 Contract Agreement Documentation: The sequence of contract agreement documentation is given here under:
- a. Issuance of Letter of Intent (LoI) by owner and its unconditional acceptance by the bidder within two weeks from date of issuance of LoI
  - b. Mutual agreement on PERT chart / Project Execution Plan duly signed and accepted by turnkey contractor and Employer within two weeks from date of acceptance of LoI
  - c. Submission of Contract Performance Security, within 28 days from date of LoI, against supply & erection contract as per clause 9.3.1 of GCC
  - d. Letter of Award by owner and its unconditional acceptance by the bidder. Letter of Award shall be issued only after mutual agreement & acceptance on PERT chart/Project execution plan (as per 30.5 (b) above) and on timely submission of Contract Performance Security against supply & erection contracts. The acceptance of LoA should be provided with 2 weeks from date of issue of LoA. LoA shall include details of
    - i. Pre-bid discussion
    - ii. Post-bid negotiation/discussions
    - iii. PERT chart
    - iv. Contract Performance Guarantee
  - e. Contract Agreement shall be signed, on unconditional acceptance of Letter of Award by turnkey contractor, within 14 days from date of issue of Letter of Award and submission and acceptance of contract performance guarantees (against supply as well as erection contracts).

### 31.0 Employer's Right to Accept any Bid and to Reject any or all Bids

- 31.1 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 award of contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Employer's action.

### 32.0 Notification of Award

- 32.1 Prior to the expiration of the period of bid validity, the Employer will notify the successful Bidder in writing through Letter of Intent (LoI), that its bid has been technically and commercially accepted. The bidder shall provide unconditional acceptance of LoI within 2 weeks. Bidder will also submit PERT Chart/Project Execution Plan within 2 weeks from date of LoI. PERT Chart/Project Execution Plan shall be signed, accepted and mutually agreed by successful bidder and owner within 2 weeks from date of acceptance by LoI. Contract Performance Security shall be submitted by the successful bidder within 28 days from date of LoI. Thereafter, detailed letter of award shall be issued by owner. On unconditional acceptance of Letter of Award, contract agreement shall be signed on submission and acceptance of contract performance security. The notification of award (Letter of Intent) will constitute the formation of the contract.

32.2 The Employer shall publish the results on its website, identifying the bid and Specification 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 that was evaluated; (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.

The Employer shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with above, requests in writing the grounds on which its bid was not selected.

32.3 Upon the successful Bidder's furnishing of the performance security pursuant to ITB Clause 34 and their independent verification from issuing bank and acceptance thereof, the Employer will promptly discharge the bid securities, pursuant to ITB Sub-Clause 13.4 & 13.5.

### 33.0 Signing the Contract Agreement

33.1 At the same time as the Employer notifies the successful Bidder that its bid has been accepted through Letter of Award, the Employer in consultation with the Bidder will prepare the Contract Agreement provided in the Bidding Documents, incorporating all agreements between the parties.

33.2 On unconditional acceptance of Letter of Award, contract agreement shall be signed on submission and acceptance of contract performance security within 2 weeks from date of issue of Letter of Award.

### 34.0 Performance Security

34.1 Within twenty-eight (28) days after receipt of the Notification of Award through LoI, the successful Bidder shall furnish the performance security for 10% (Ten percent) of the contract price in line with the requirement of Qualification Requirements, in the amount given in the BDS and in the form provided in Volume-I : Section VI, Sample Forms and Procedures, of the Bidding Documents. The performance security of a joint venture shall be in the name of joint venture.

34.2 Failure of the successful Bidder to comply with the requirements of ITB Clause 33 or Clause 34.1 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security, in which event the Employer may make the award to the next lowest evaluated Bidder or call for new bids.

34.3 Till receipt and acceptance of contract performance securities of successful bidder, validity of all bids shall be kept valid to facilitate action as per clause 34.2 above.

### 35.0 Fraud and Corruption

It is the Employer's policy that requires the Bidders, suppliers and contractors and their subcontractors under the contracts to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Employer:

(a) defines, for the purpose of this provision, the terms set forth below as follows:

- (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 Employer's 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 Employer's inspection and audit rights.

- (b) will reject a proposal for award 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;
- (c) will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a 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 contract; and
- (d) will have the right to require that the provision be included in Bidding Documents and in contracts, requiring Bidders, suppliers, and contractors and their sub-contractors to permit the Employer to inspect their accounts and records and other documents relating to bid submission and contract performance and to have them audited by auditors appointed by the Employer.

36.0

The contractor whose bid is accepted will also be required to furnish either copy of applicable licences/registrations or proof of applying for obtaining labour licences, registration with EPFO, ESI and BOCW welfare Board including provident fund code number if applicable and also ensure the compliance of aforesaid provision by the sub- contractor, if any engaged by the contractor for the said work and programme chart (time & progress) with in the period specified.

----- End of Section-II (ITB) -----

# VOLUME-I: SECTION – III

## BID DATA SHEETS (BDS)

BID DATA SHEETS (BDS)

The following bid specific data for the Plant and Equipment to be procured shall amend and/or supplement the provisions in the Instruction to Bidders (ITB)

SI. No.	ITB Clause Ref. No.	Bid Data Details
1.	ITB 1.1	The Owner is: New Delhi Municipal council
2.	ITB 1.1	The Employer is: New Delhi Municipal council
3.	ITB 1.1	Supplementing ITB 1.1 with the following: For the purpose of execution of the contract, the contractual activities shall be performed by the Employer "for and on behalf of the Owner" except in cases where the Owner itself is statutorily required to do so.
4.	ITB 2.1, 2.2, 2.3 & 3.2	Replace the word "Employer" with "Employer/Owner".
5.	ITB 6.1	Executive Engineer (E) IPDS New Delhi Municipal Council Room no1804 F , 18 <sup>th</sup> Floor Palika Kendra New Delhi - 110001 Telephone Nos.: 011-2336199 Mobile:9810145477 Email Address: eeipds.elect@ndmc.gov.in
6.	ITB 6.4	<u>Venue, date and time for Pre-bid Meeting:</u>  The Bidder's designated representative is invited to attend a pre-bid meeting, which will take place at the venue and time as given below:  Venue: Council Room, Third floor, Palika Kendra, New Delhi Municipal Council New Delhi -110001 Date:14.02.2017 Time:11:00 hrs
7.	ITB 9.2	Alternative bids shall not be permitted

8.	ITB 9.3 (p)	<p>Supplementing ITB clause 9.3(p) with the following:</p> <p>(iv) Bidder shall also furnish information/documentation in support that the Bidder have adequate design infrastructure and erection facilities and capacity and procedures including quality control related to the work.</p> <p>(v) The Bidder shall furnish the CV and experience details of a project manager with 15 years' experience in executing such contract of comparable nature including not less than five years as manager</p>
9.	ITB 13.1	<p>Amount of Bid Security: Rs. 3,70,88,401/-</p> <p>(2% of tender value)</p>
10.	ITB 16.2(a), ITB 16.2(b), ITB 17.1, ITB 19.3 (a) and ITB 20.1	<p>Address for submission of Bids and its modification and withdrawal, if any;</p> <p>Address in Person or by Post:</p> <p>Executive Engineer (E) IPDS New Delhi Municipal Council Room no1804 A , 18<sup>th</sup> Floor Palika Kendra New Delhi - 110001</p> <p>Deadline for submission of Bids and its modification and withdrawal, if any</p> <p>Upto 15:30 hrs (time of submission) on 28.02.2017 (Date of submission) (Indian Standard Time)</p> <p>Address for Bid Opening:</p> <p>Executive Engineer (E) IPDS New Delhi Municipal Council Room no1804 A , 18<sup>th</sup> Floor Palika Kendra New Delhi - 110001 Time and date for Bid Opening : Date :28.02.2017 Time: 16:00 hrs (Indian Standard Time)</p> <p>(a) Bid Title: Strengthening of Sub-transmission &amp; Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power,</p>
11.	ITB 16.3	<p>Supplementing ITB clause 16.3 with the following:</p> <p>In case, pursuant to Ministry of Finance, GOI's Circular dated 17th July, 2012, the Bank Guarantee is issued using SFMS Platform by the bank's located in India, the copy of such Bank Guarantee shall be submitted by the bidder along with the Bid Envelope.</p>
12.	ITB 24.1 (c)	The Time for Completion for all the Packages shall be 24 (Twenty Four) months from the date of Notification of Award.
13.	ITB 27.4 (b)	Deleted as Functional Guarantees are not applicable.
14.	ITB 27.4(c)	Applicable for 1600/1000 KVA, 11/0.415 kV, 3 Ph. Distribution Transformer
15.	ITB 27.5 (a) (b)	Deleted.
16.	ITB 27.5 (c)	Deleted.



Sl. No.	ITB Clause Ref. No.	Bid Data Details
17.	ITB 34.1	In addition to the Performance Security of 10% of the Contract Price, the successful bidder is required to furnish additional performance security(ies), if applicable, as per Clause no. 4 of Joint Deed of Undertaking mentioned at Sl. No. 19 of Section – VI : Sample Forms and Procedures.
18.	ITB 27.5 (d)	Deleted.

-- End of Section-III (BDS) --

IMPLEMENTATION OF SMART GRID INFRASTRUCTURE INCLUDING ENHANCING OF EXISTING NETWORK IN NDMC POWER DISTRIBUTION AREA

Qualification of bidder will be based on meeting the minimum pass/fail criteria specified in 1.0 Pre-qualifying criteria Part-A and 2.0 Pre-qualifying criteria Part-B as demonstrated by the Bidder's responses in the corresponding Bid Schedules.

Subcontractors' technical experience and financial resources shall not be taken into account in determining the Bidder's compliance with the qualifying criteria. The bid can be submitted by an Indian individual firm only or by Joint Venture firm having Indian partner firms only.

Notwithstanding anything stated herein above, the Employer reserves the right to assess the capacity and capability of the bidder, should the circumstances warrant such assessment in an overall interest of the Employer. The employer reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract.

1.0 Pre-qualification criteria Part A:

1.01 Technical:

(I) Part I: Supply, Erection, Testing and Commissioning, New/Augmentation of existing 11/0.415 KV Distribution Transformer substation

i. The bidder must have successfully erected, tested & commissioned a single turnkey contract in last 7 years as on the date of bid opening, having installation of at least 50% of the Distribution Transformer Capacity considered in proposed bid (i.e. Sum of KVA ratings of Distribution transformers proposed in the present bid) and the system so created must be in satisfactory operation for at least one (1) year as on date of opening of bid

Or

ii. The bidder must have successfully erected, tested & commissioned in TWO turnkey contracts in last 7 years as on the date of bid opening, each having installation of at least 40% of the Distribution Transformer Capacity considered in proposed bid (i.e. Sum of KVA ratings of Distribution transformers proposed in the present bid and the system so created must be in satisfactory operation for at least one (1) year as on date of opening of bid

OR

iii. The bidder must have successfully erected, tested & commissioned in THREE turnkey contract in last 7 years as on the date of bid opening, each having installation of at least 30% of the Distribution Transformer Capacity considered in proposed bid (i.e. Sum of KVA ratings of Distribution transformers proposed in the present bid and the system so created must be in satisfactory operation for at least one (1) year as on date of opening of bid,

Bids may also be submitted by joint venture firms (having not more than three partners with one partner as lead partner) wherein

- a) All the partners should jointly meet qualification requirements set forth in para I (i) or I (ii) or I (iii) above,

AND

- b) The lead partner should have successfully erected, tested & commissioned in a single turnkey contract in last 7 years as on the date of bid opening, at least 40% of the Distribution Transformer Capacity considered in proposed bid (i.e. Sum of KVA ratings of Distribution transformers proposed in the present bid) and the system so created must be in satisfactory operation for at least one (1) year as on date of opening of bid,

AND

- c) Each of the other partners should have successfully erected, tested & commissioned in a single turnkey contract in last 7 years as on the date of bid opening, of at least 25% of the Distribution Transformer Capacity considered in proposed bid (i.e. Sum of KVA ratings of Distribution transformers proposed in the present bid) and the system so created must be in satisfactory operation for at least one (1) year as on date of opening of bid,

Bidder's experience in higher voltage capacity substation will also be considered fit for above calculation. That means, if a Bidder is having experience of erection, testing and commissioning, through turnkey contract in past 7 years 50 MVA capacity EHT substation, he shall be eligible for 11/0.4 KV Distribution substation part having sum of transforming capacity of up-to 100 MVA capacity.

1.01.1 DELETED

1.01.2 The bidder should possess Class-I license issued by the Electrical inspectorate of Govt of NCT/Central Inspectorial organization of Govt. of India/ other state Govt. In case bid submitted joint venture firm, any of partner should possess class-I electrical license as stated above.

1.01.3 Work experiences of the bidder as per above shall be considered only if the works have been executed under Govt./semi-Govt./autonomous body of Central/State Govt./Electricity Power Utility/ Power Deptt. in India only.

1.02 Commercial:

For the purpose of this bid, the bidder shall meet the following requirements:

1.02.1 For the purpose of this particular bid, bidder shall meet the following minimum commercial criteria in past 5 years (up to 31.03.2016):

- i. Experience in Single completed work of projects execution in electrical Transmission or sub- transmission & distribution sector costing not less than the amount equal to 50% of the estimated amount of the project.

Or

- ii. Experience in Two completed work of projects execution in electrical Transmission or sub- transmission & distribution sector costing not less than the amount equal to 40% of the estimated amount of the project.

- iii. Experience in three completed work of projects execution each in electrical Transmission or sub-transmission & distribution sector costing not less than the amount equal to 30% of the estimated amount of the project individually.
- 1.02.2 Net Worth for the each of the last three Financial Years should be positive. Net worth means the sum total of the paid up capital and free reserves (excluding reserves created out of revaluation) reduced by aggregate value of accumulated losses (including debit balance in profit and loss account for current year) and intangible assets.
- 1.02.3 Minimum Average Annual Turnover (MAAT) for best three years out of last five financial years of the bidder should not be less than Rs. 55, 63, 26,021 /- i.e. 30% of the estimated cost of the project.
- 1.02.1 Bidder shall have liquid assets (LA) and/ or evidence of access to or availability of fund based credit facilities of not less than Rs 18, 54, 42,007/- i.e. 10% of the estimated cost of the project and the Banker should confirm that the Credit facility is earmarked for the Work specified under Bid on receipt of the Bid. Liquid assets would include cash (and equivalents), bank deposits, securities that can be freely traded and receivables which has general certainty of getting received. In case a bidder is quoting for more than one project, Pre-Qualification requirement shall be examined on the basis of sum of project wise requirements of LA of all quoted projects.
- 1.02.2 In case a bid is submitted by a Joint Venture (JV), all the partners of the JV shall meet, individually, the qualification set forth at para 1.02.1 & 1.02.2 above and collectively the requirement of para 1.02.3 & 1.02.4 above. The figures for each of the partner of the joint venture shall be added together to determine the bidder's compliance with the minimum qualifying criteria set out in para 1.02.3 & 1.02.4 above; however in order for a joint venture to qualify, the partner(s) of joint venture must meet the following minimum criteria:
- 1.02.2.1 At least one partner shall meet, not less than 40% of the minimum criteria given at Para 1.02.3 & 1.02.4 above
- AND
- 1.02.2.2 Each of the other partner(s) shall meet not less than 25% of the criteria given at Para 1.02.3 & 1.02.4 above
- 1.02.3 Failure to comply with this requirement will result in rejection of the joint venture's bid. Sub contractors' experience and resources shall not be taken into account in determining the bidder's compliance with qualifying criteria.
- 1.02.4 One of the partners shall be nominated as lead partner, and the lead partner shall be authorized to incur liabilities and receive instruction for and on behalf of any and all partners of the joint venture and the entire execution of the contract including receipt of payment shall be done exclusively through the lead partner. This authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners as per proforma in section "Annexure" of Special Conditions of Contract-Vol.-IA.
- 1.02.5 All partner of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms and a copy of the agreement entered into by the joint venture partners having such a provision shall be submitted with the bid.
- 1.02.6 A statement to this effect shall be included in the authorization mentioned under para 1.02.6 above as well as in the Bid Form and in the Contract Form (in case of a successful bid);

2.0 Pre-qualification criteria – Part B:

The Bidder shall also furnish following documents/details with its bid:

- 2.01.1 A certificate from banker (as per format) indicating various fund based/non fund based limits sanctioned to the bidder and the extent of utilization as on date Such certificate should have been issued not earlier than three months prior to the date of bid opening. Wherever necessary, the employer may make queries with the Bidders' bankers.
- 2.01.2 The complete annual reports together with Audited statement of accounts of the company for last five years of its own (separate) immediately preceding the date of submission of bid.
- 2.01.3 Note:
- 2.01.3.1 In the event the bidder is not able to furnish the information of its own (i.e. separate), being a subsidiary company and its accounts are being consolidated with its group/holding/parent company, the bidder should submit the audited balance sheets, income statements, other information pertaining to it only (not of its group/Holding/Parent Company) duly certified by any one of the authority [(i) Statutory Auditor of the bidder /(ii) Company Secretary of the bidder or (iii) A certified Public Accountant] certifying that such information/documents are based on the audited accounts as the case may be.
- 2.01.3.2 Similarly, if the bidder happens to be a Group/Holding/Parent Company, the bidder should submit the above documents/information of its own (i.e. exclusive of its subsidiaries) duly certified by any one of the authority mentioned in Note - 2.01.3.1 above certifying that these information/ documents are based on the audited accounts, as the case may be.
- 2.01.4 Litigation History:
- 2.01.4.1 The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder or any partner of JV may result in rejection of Bid.
- 2.01.4.2 Notwithstanding anything stated hereinabove, the Employer reserves the right to assess the capacity and capability of the bidder, should the circumstances warrant such assessment in an overall interest of the Employer. The Employer reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract.
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LIST OF ELIGIBLE SCHEDULED COMMERCIAL PRIVATE INDIAN BANKS

Sl. No.	Name of Banks
1	HDFC Bank Ltd.
2	Axis Bank Ltd.
3	Kotak Mahindra Bank Ltd.
4	Federal Bank Ltd.
5	Indusind Bank Ltd.
6	Development Credit Bank Ltd.
7	ING Vysya Bank Ltd.
8	Karnataka Bank Ltd.
9	Karur Vysya Bank Ltd.
10	Ratnakar Bank Ltd.
11	South Indian Bank Ltd.
12	Yes Bank Ltd.
13	ICICI Bank

VOLUME-I: SECTION – IV  
GENERAL CONDITIONS OF  
CONTRACT (GCC)

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## GENERAL CONDITIONS OF CONTRACT (GCC)

### Preamble

The Section-IV of the Bidding Documents is named as General Conditions of Contract (GCC) and provides all the rights and obligations of the parties under the Contract. This Section contains provisions which are to be used unchanged unless Section – V named as Special Conditions of Contract (SCC) states otherwise as any changes in GCC or any complementary information that may be needed has been shown in SCC. If there is a conflict between the provisions of Section – IV & Section – V, the provisions of Section – V shall prevail.

A. Definitions and Interpretation

1. Definitions

1.1. The following words and expressions shall have the meanings hereby assigned to them:

- (a) "Arbitrator" means the person or persons 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 Sub-Clause 39.1 (Arbitration) hereof.
- (b) "Associate" means a party who has been conjoined by the Contractor to independently execute a pre-selected part of facilities of the contract and grant him the associated contractual rights and obligations, without diluting the overall responsibility of the contractor in respect of the Facilities under the contract.
- (c) "Collaborator" or "Parent Company" means the firms/corporations who has provided technological support to the manufacturer for establishing production line for the specific Equipment.
- (d) "Commissioning" means operation of the Facilities or any part thereof, if any, as per GCC Sub-Clause 1.1(e) by the Contractor as specified in the Technical Specifications, which operation is to be carried out by the Contractor as provided in GCC Sub-Clause 20.1.3 (Commissioning), for the purpose of Trial – Operation (GCC Sub-Clause 20.1.4).
- (e) "Completion" means that the Facilities (or a specific part thereof where specific parts are specified in the SCC) have been completed operationally and structurally and put in a tight and clean condition and that all works in respect of pre-commissioning of the Facilities (or a specific part thereof where specific parts are specified in the SCC) has been completed (wherever required, as per Technical Specifications) and Commissioning followed by Trail – Operation has been completed, as provided in GCC Sub-Clause 20.1 (Completion of Facilities) hereof.
- (f) "Contract" means the Contract Agreement entered into between the Employer and the Contractor together with the Contract Documents referred to therein.
- (g) "Contract Documents" means the documents listed in Clause 1.1 of Article 1 (Contract Documents) of the Form of Contract Agreement (including any amendments thereto); Volume-I :Section-VI.
- (h) "Contract Price" means the sum specified in Clause 2.1 of Article 2 (Contract Price) of the Contract Agreement, subject to such additions or deductions therefrom, as may be made pursuant to the Contract. For the purpose of Liquidated Damages and Contract Performance Guarantee, the "Contract Price" means the sum specified in Clause 2.1 of Article 2 (Contract Price) of the Contract Agreement.
- (i) "Contractor" means the firms whose bid to perform the Contract has been accepted by the Employer and is named in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.
- (j) "Contractor's Equipment" means all plant, 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 and Equipment, or other things intended to form or forming part of the Facilities.

- (k) "Contractor's Representative" means any person nominated by the Contractor and approved by the Employer in the manner provided in GCC Sub-Clause 13.2 (Contractor's Representative and Construction Manager) hereof to perform the duties delegated by the Contractor.
- (l) "Day" means calendar day of the Gregorian Calendar.
- (m) "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, if any, as per GCC Sub-Clause 1.1(e), during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GCC Clause 22 (Defect Liability) hereof.
- (n) "Effective Date" means the date of Notification of Award from which the Time for Completion shall be determined.
- (o) "Employer" means the firm/corporation/ government entity, named in the SCC, who is responsible for getting the Facilities implemented. The Employer may be Owner himself or an agency appointed by the Owner (State/Central PSU) and shall include the legal successors or permitted assigns of the Employer.
- (p) "Facilities" means the Plant and Equipment to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.
- (q) "GCC" means the General Conditions of Contract hereof.
- (r) "Guarantee Test(s)" means the test(s) specified in the Technical Specifications to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Technical Specifications in accordance with the provisions of GCC Sub-Clause 20.2.1 (Guarantee Test) hereof during/after successful Commissioning followed by Trial - Operation.
- (s) "Installation Services" means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., 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.
- (t) "Month" means calendar month of the Gregorian Calendar.
- (u) "Notification of Award" means the official notice issued by the Employer notifying the Contractor that his bid has been accepted.
- (v) "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 Sub-Clause 20.2.2 (Operational Acceptance) hereof after successful Commissioning followed by Trial - Operation.

- (w) "Owner" means the firm/corporation/government entity, named in the SCC, who has decided to set up the Facilities and shall include the legal successors or permitted assigns of the Owner.
- (x) "Plant and Equipment" 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 3.3 hereof), but does not include Contractor's Equipment.
- (y) "Pre-commissioning" means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out by the Contractor in preparation for Commissioning as provided in GCC Sub-Clause 20.1.2 (Pre-Commissioning) hereof.
- (z) "Project Manager" or "Engineer" or "Engineer – in Charge" means the person appointed by the Employer in the manner provided in GCC Sub-Clause 13.1 hereof to perform the duties delegated by the Employer.
- (aa) "SCC" means the Special Conditions of Contract.
- (bb) "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.
- (cc) "Subcontractor"/"vendor"/"sub-vendor" means firms/ corporations/government entities to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant and Equipment, is sub-contracted directly or indirectly by the Contractor with the consent of the Employer in writing, and includes its legal successors or permitted assigns.
- (dd) "Taking Over" means the Employer's written acceptance of the Facilities under the Contract, after successful Trial – Operation for the specified period in accordance with the Contract, as provided in GCC Sub-Clause 20.1.5.
- (ee) "Time for Completion" means the time within which Completion of the Facilities is to be attained in accordance with the scope of work and specifications, as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed in the SCC) and "Taking Over" by the Employer is to be attained.

## 2. Interpretation

### 2.1 Contract

The Contracts to be entered into with the successful Bidder shall be as defined in SCC.

### 2.2 Contract Documents

All documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory, subject to Article 1.2 (Order of Precedence) of the Contract Agreement. The Contract shall be read as a whole.

2.3 Language

The ruling language of the Contract and the language for communications shall be English.

2.4 Singular and Plural

The singular shall include the plural and the plural the singular, except where the context otherwise requires.

2.5 Headings

The headings and marginal notes in the General Conditions of Contract are included for ease of reference, and shall neither constitute a part of the Contract nor affect its interpretation.

2.6 Entire Agreement

Subject to GCC Sub-Clause 12.4 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.

2.7 Amendment

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.

2.8 Independent Contractor

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.

2.9 Joint Venture

If the Contractor is a joint venture of two or more firms, all such firms shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such firms to act as a leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior written consent of the Employer.

2.10 Non-Waiver

2.10.1 Subject to GCC Sub-Clause 2.10.2 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.

2.10.2 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.

## 2.11 Severability

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.

## 2.12 Country of Origin

"Origin" means the place where the materials, equipment and other supplies for the Facilities are mined, grown, produced or manufactured, and from which the services are provided. Plant and equipment are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

## 2.13 Notices

2.13.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by personal delivery, special courier, telegraph, facsimile or Electronic Data Interchange (EDI) to the address of the relevant party set out in the Contract Agreement, with the following provisions:

- (a) Any notice sent by telegraph, facsimile or EDI shall be confirmed within two (2) days after dispatch by notice sent by special courier, except as otherwise specified in the Contract.
- (b) Any notice sent by special courier shall be deemed (in the absence of evidence of earlier receipt) to have been delivered ten (10) days after dispatch. In proving the fact of dispatch, it shall be sufficient to show that the envelope containing such notice was properly addressed, stamped and conveyed to the postal authorities or courier service for transmission by special courier. Provided further that whenever the postal authorities or courier service provide a proof of delivery, the same shall also be applicable for presenting the fact of dispatch.
- (c) Any notice delivered personally or sent by telegraph, facsimile or EDI shall be deemed to have been delivered on date of its dispatch.
- (d) Either party may change its postal, facsimile or EDI address or addressee for receipt of such notices by ten (10) days' notice to the other party in writing.

- 2.13.2 Notices shall be deemed to include any approvals, consents, instructions, orders and certificates to be given under the Contract.
- 2.14 **Governing Law & its Jurisdiction**  
The Contract shall be governed by and interpreted in accordance with laws of Union of India and the High Court of Delhi shall have exclusive jurisdiction in all matters arising under this Contract.
- B. **Subject Matter of Contract**
3. **Scope of Facilities**
- 3.1 **Standards and Regulations:** Following CEA regulations shall be applicable during execution of work:
- a. Construction Regulation – Central Electricity Authority (Technical Standards for construction of electrical plants and electric lines) Regulation, 2010 (as amended time to time)
  - b. Safety Regulation for construction and O&M - Central Electricity Authority (Safety requirements for construction, Operation and Maintenance of electrical plants and electric lines) Regulation, 2011 (as amended time to time)
  - c. Connectivity Regulation – Technical Standard for connectivity to the grid (Amendment) Regulation 2013; Technical Standards for connectivity of the Distributed Generation resources, 2013; Central Electricity Authority (Grid Standard) Regulation, 2010 (as amended time to time)
  - d. Metering Regulations – Central Electricity Authority (Installation and Operation of meters) Regulations, 2006; Central Electricity Authority (Installation and Operation of meters) (Amendment) Regulations, 2010 and 2015 (as amended time to time)
  - e. Central Electricity Authority (Measures relating to safety and Electric supply regulations), 2010 and amendment regulation 2015 (as amended time to time)
- 3.2 Unless otherwise expressly limited in the Technical Specifications, the Contractor's obligation shall include the provision of all Plant and Equipment 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 Equipment and the installation, completion, commissioning and performance testing of the facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Technical specifications. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labour, materials, equipment, spare parts (as specified in GCC Sub-Clause 3.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including without limitation, custom clearance, port handling, unloading and hauling to, from and at the Site); storage and training except for those supplies, works and services that will be provided or performed by the Employer, as set forth in Appendix-6 (Scope of Works and Supply by the Employer) to the Contract Agreement.
- 3.3 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.

- 3.4 The Contractor shall ensure the availability of spare parts required for the operation and maintenance of the Facilities to the Employer for a minimum period of 5 years from Completion of the Facilities. The Contractor shall carry sufficient inventories to ensure an ex-stock supply of consumable spares for the plant and equipment. If so desired by the Employer, the Contractor shall submit the specifications, price and the terms and conditions relating to the supply thereof for such spares identified by the Employer with validity period of 6 months within 30 days of receipt of request from Employer for its consideration and placement of order.
- 3.5 The Contractor shall guarantee that in the event of termination of production of spare parts by the Contractor or his Sub-Contractor:
- (i) The Contractor shall send advance notification to the Employer of the pending termination, with 2 (two) years time to permit the Employer to procure needed requirements, and
  - (ii) Following such termination, the Contractor shall furnish at no cost to the Employer the blueprints, drawings and specification of the spare parts, if requested.
- 3.6 In case the Contractor fails to supply the spares parts in accordance with the terms stipulated above, the Employer shall sanction the Contractor declaring them ineligible for a stated period of time for future projects.
4. Time for Commencement and Completion
- 4.1 The Contractor shall commence work on the Facilities from the Effective Date of Contract i.e. date of issuance of Letter of Intent (LoI) and without prejudice to GCC Sub-Clause 21.2 hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule specified in the corresponding Appendix – 4 (Time Schedule) to the Contract Agreement of Volume-I : Section-VI (Sample Forms and Procedures).
- 4.2 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 under Time for Completion or within such extended time to which the Contractor shall be entitled under GCC Clause 34 hereof.
- 4.3 The work under the contract shall preferably start from the "Sansad Adardh Gram" in presence of public representatives of the project. Hon'ble sitting Member of Parliament and Hon'ble sitting member of State Legislative Assembly shall be cordially invited on the occasion.
5. Contractor's Responsibilities
- 5.1 The Contractor shall design, manufacture (including associated purchases and/or subcontracting), install and complete the Facilities with due care and diligence in accordance with the Contract.
- 5.2 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 twenty-eight (28) 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.

- 5.3 The Contractor shall acquire in its name 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 that 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 Sub-Clause 6.3 hereof and that are necessary for the performance of the Contract.
- 5.4 The Contractor shall comply with all laws in force in India. 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 Sub-Clause 6.1 hereof.
- 5.5 Any Plant, Material and Services that will be incorporated in or be required for the Facilities and other supplies shall have their origin as specified under GCC Sub-Clause 2.12 (Country of Origin).
- 5.6 The Contractor shall permit the Employer to inspect the Contractor's accounts and records relating to the performance of the Contractor.
- 5.7 First-aid: The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor's personnel shall be trained in administering first-aid.
- 5.8 Cleanliness: The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area atleast once in a day. All such rubbish and scrap material shall be stacked or disposed off in a place to be identified by the Project Manager. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.
- Similarly the labour colony, the offices and the residential areas of the Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the Project Manager. Proper sanitary arrangement shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.
- 5.9 Fire Protection: The work procedures that are to be used during the erection shall be those, which minimize fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least once each day. Fuels, oils and volatile or inflammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Un-treated materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the Site, the same shall be removed and replaced with acceptable materials before moving into the construction or storage area.

Similarly, corrugated paper fabricated cartons etc. will not be permitted in the construction area either storage or for handling of materials. All such materials used shall be of waterproof and flame resistant type. All other materials such as working drawings, plans etc., which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.

All the Contractor's supervisory personnel and sufficient number of workers shall be trained for firefighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the Site during the entire period of the Contract.

The Contractor shall provide enough fire protection equipment of the types and numbers for the warehouses, office, temporary structures, labour colony area etc. Access to such fire protection equipment shall be easy and kept open at all times.

5.10 Security: The Contractor shall have total responsibility for all equipment and materials in his custody/stores, loose, semi-assembled and/or erected by him at Site. The Contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the project site only with the written permission of the Project Manager in the prescribed manner.

5.11 Contractor's Area Limits: The Project Manager will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and the Contractor shall not trespass the areas not so marked out for him. The Contractor shall be responsible to ensure none of his personnel move out of the areas marked out for his operations. In case of such a need for the Contractor's personnel to work out of the areas marked out for him, the same shall be done only with the written permission of the Project Manager.

5.12 Contractor's Co-Operation with the Employer: In case where the performance of the erection work by the Contractor affects the operation of the system facilities of the Employer, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the Project Manager and the same shall be acceptable at all times to the Contractor. The Project Manager may impose such restrictions on the facilities provided to the Contractor such as electricity, water, etc. as he may think fit in the interest of the Employer and the Contractor shall strictly adhere to such restrictions and co-operate with the Project Manager. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems, which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and erected by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in the document and specifications.

## 6. Employer's Responsibilities

6.1 The Employer shall ensure the accuracy of all information and/or data to be supplied by the Employer as described in the corresponding Appendix - 6 (Scope of Works and Supply by the Employer) to the Contract, except when otherwise expressly stated in the Contract.

6.2 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 corresponding Appendix – 6 (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.

- 6.3 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 such authorities or undertakings require the Employer to obtain them in the Employer's name, are necessary for the execution of the Contract (they include those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract), including those specified in Appendix 6 (Scope of Works and Supply by the Employer) to the Contract Agreement.
- 6.4 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.
- 6.5 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, to enable the Contractor to properly carry out Commissioning, all in accordance with the provisions of Appendix 6 (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 Sub-Clause 14.2 (Program of Performance) hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.
- 6.6 The Employer shall be responsible for the continued operation of the Facilities after Taking Over, in accordance with GCC Sub-Clause 20.1.5.
- 6.7 All costs and expenses involved in the performance of the obligations under this GCC Clause 6 shall be the responsibility of the Employer.
- 6.8 facilities to be provided by the employer:
- a) Space: Land for Contractor's Office, Store, Workshop etc. –  
The Project Manager shall at his discretion and for the duration of execution of the Contract make available at site, land for construction of Contractor's field office, workshop, stores, magazines for explosives in isolated locations, assembling yard, etc. required for execution of the Contract. Any construction of temporary roads, offices, workshop, etc. as per plan approved by the Project Manager shall be done by the Contractor at his cost.
  - b) Electricity (Construction Power supply): Where power supply is available with the Employer for construction purpose the same will be provided at the job site at one point of the distribution system on chargeable basis for consumption in works. Electricity provided for construction site will be of 440 volts, 3 phase, 50 cycles and 230 volts, 1 phase, 50 cycles. Contractor shall provide and install all necessary switchgears, wiring fixtures, bulbs and other temporary equipment for further distribution and utilization of energy for power and lighting and shall remove the same on completion of the work. Should, however, electricity be

used in the Contractor's labour/staff colony, the power so consumed shall be charged at the prevailing tariff rate of State as prevalent for that area at the time of its use; the supply may be withdrawn if the power is used for purposes other than for the work of the project.

- c) Water: Free supply of water will be made available for the construction purpose wherever water is available and the same shall be given at an agreed single point at the Site. Any further distribution will be the responsibility of the Contractor. Free drinking water, if available, will also be provided at one agreed point in the Site. Further distribution either to his labour colony or his work Site or to his office shall be the responsibility of the Contractor. If water source is not available with the employer at site for construction works, the contractor at his own cost shall arrange the water supply.

C. Payment

7. Contract Price

- 7.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Form of Contract Agreement.
- 7.2 The Contract Price shall be subject to adjustment in accordance with the provisions of Appendix 2 (Price Adjustment) to the Contract Agreement. The Contract Price shall be increased or reduced on account of variation in quantity in accordance with Clause 33 of GCC.
- 7.3 Subject to GCC Sub-Clauses 5.2 and 6.1 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.

8. Terms of Payment

- 8.1 The Contract Price shall be paid as specified in the corresponding Appendix – 1 (Terms and Procedures of Payment) to the Contract Agreement of Volume-I: Section-VI (Sample Forms and Procedures). The procedures to be followed in making application for and processing payments shall be those outlined in the same Appendix.
- 8.1.1 The mounting accessories/structure supplied along with any material like circuit breaker, Lightning arrestor, Capacitor Bank, Control Panel, Isolator, AB Switch, CT/PT etc. as part of main equipment shall not be paid extra under Price Schedules. The equipment price in all such cases shall be inclusive of its mounting accessories/structure. For example: if Circuit Breaker has been supplied along with its mounting structure, the contractor shall not be paid separately for mounting structure/accessories associate with Circuit Breaker.
- 8.2 All payments shall be made in Indian Rupees under the Contract.
- 8.3 The Project Manager shall within twenty-one (21) days after receipt of invoices enclosing requisite documents as per payment terms release the payment through electronic mode in designated bank account of the contractor.

9. Securities

9.1 Issuance of Securities

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.

9.2 Advance Payment Security

9.2.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security in an amount equal to the advance payment calculated in accordance with the corresponding Appendix - 1 (Terms and Procedures of Payment) to the Contract Agreement, and in the same currency(ies) with initial validity of up to ninety (90) days beyond the date of Completion of the Facilities in accordance with GCC Sub-Clause 20.1. The same shall be extended by the Contractor time to time till ninety (90) days beyond the actual date of Completion of the Facilities, as may be required under the Contract.

9.2.2 The security shall be in the Form of unconditional Bank Guarantee attached hereto in Volume-I: Section VI - Sample Forms and Procedures. The security shall be discharged after completion of the facilities or relevant part thereof. The advance guarantee shall be reduced on two occasions. First reduction shall be on receipt of 50% supply cost of equipment and second reduction shall be on receipt of 75% supply cost of equipment. The advance BG shall also proportionately reduced to 50% and 25% value respectively of initial advance BG.

- Procedure for submission, reduction of Advance Payment Security is detailed in Appendix-1: Terms and Procedures of payments (refer Volume-I : Section-VI (Sample Forms and Procedures)

9.3 Performance Security

9.3.1 The Contractor shall, within twenty-eight (28) days of the notification of Letter of Intent, provide a performance security for the due performance of the Contract in the amount equivalent to Ten percent (10%) of the Contract Price, with a validity upto ninety (90) days beyond the Defect Liability Period. The same shall be extended by the Contractor time to time till ninety (90) days beyond the actual Defect Liability Period, as may be required under the Contract.

Apart from the Contractor's performance security, the Contractor shall be required to arrange additional performance securities, as specified in SCC, within twenty-eight (28) days of the notification of award in favour of the Employer in the form acceptable to the Employer.

9.3.2 The performance security shall be in the Form of unconditional Bank Guarantee attached hereto in the Volume-I : Section VI - Sample Forms and Procedures.

9.3.3 Reduction in the security pro rata to the Contract Price of any part of the Facilities is not admissible. However, if the Defects Liability Period has been extended on any part of the Facilities pursuant to GCC Sub-Clause 22.8 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 Sub-Clause 22, is liable for an extended warranty obligation, the performance security shall be reduced to ten percent (10%) of the value of the component covered by the extended warranty.

9.3.4 In case of award of the contract to a Joint Venture, the Bank Guarantees for performance security and the Bank Guarantee for advance payment shall be submitted in the name of all the partner(s) of the Joint Venture

#### 9.4 Issuing Banks

The Bank Guarantee for Advance Payment Security and Performance Security are to be provided by the Contractor, which should be issued either :

(a) by a Public Sector Bank located in India, or

(b) a scheduled Indian Bank having paid up capital (net of any accumulated losses) of Rs. 1,000 Million or above (the latest annual report of the Bank should support compliance of capital adequacy ratio requirement) as per attached list only [List is placed at Annexure-I to Section-V (SCC)], or

#### 9.5 Indemnity

9.5.1 For the equipment/material to be provided by the Contractor, it will be the responsibility of the Contractor to take delivery, unload and store the materials at Site and execute an Indemnity Bond and obtain authorisation letter from Employer as per proforma enclosed at Serial No. 9 – 'Form for Indemnity Bond to be executed by the Contractor' of Volume-I : Section VI (Sample Forms and Procedures), in favour of the Employer against loss, damage and any risks involved for the full value of the materials. This Indemnity Bond shall be furnished by the Contractor before commencement of the supplies and shall be valid till the scheduled date of Taking Over of the equipment by the Employer.

9.5.2 In case of divisible Contracts, where the Employer hands over his equipment to the Contractor for executing the Contract, then the Contractor shall, at the time of taking delivery of the equipment through Bill of Landing or other dispatch documents, furnish trust Receipt for Plant, Equipment and Materials and also execute an Indemnity Bond in favour of the Employer in the form acceptable to the Employer for keeping the equipment in safe custody and to utilize the same exclusively for the purpose of the said Contract. Samples of proforma for the Trust receipt and Indemnity Bond are enclosed at Serial No. 10 of Volume-I : Section VI (Sample Forms and Procedures). The Employer shall also issue a separate Authorization Letter to the Contractor to enable him to take physical delivery of plant, equipment and materials from the Employer as per proforma enclosed under Section VI (Sample Forms and Procedures).

#### 10. Taxes and Duties

10.1 The Contractor shall be entirely responsible for payment of all taxes, duties, license fees and other such levies legally payable/incurred until delivery of the contracted supplies to the Employer.

If it is statutory requirement to make deductions towards such taxes and duties or any other applicable taxes and duties, the same shall be made by the Employer and a certificate for the same shall be issued to the Contractor.

10.2 The Contractor shall be solely responsible for the taxes that may be levied on the Contractor's persons or on earnings of any of his employees and shall hold the Employer indemnified and harmless against any claims that may be made against the Employer. The Employer does not take any responsibility whatsoever regarding taxes under Indian Income Tax Act, for the

Contractor or his personnel. If it is obligatory under the provisions of the Indian Income Tax Act, deduction of Income Tax at source shall be made by the Employer.

- 10.3 In respect of direct transaction between the Employer and the Contractor, the ex-works price is exclusive of all cost as well as duties and tax (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable on components, raw materials and any other items used for their consumption incorporated or to be incorporated in the Plant & Equipment.

Sales tax/VAT, excise duty, local tax and other levies for the Equipment/items under 'direct transaction' including octroi/entry tax as applicable for destination site/state are not included in the ex-works price. These amounts will be payable (along with subsequent variation if any), by the Employer on the supplies made by the Contractor but limited to the tax liability on the transaction between the Employer and the Contractor. The requisite Sales Tax declaration forms shall be issued as under:

- a) When project implementing agency or employer is a Central Public Sector Undertaking, form shall be issued by State Distribution Company to Employer for onward issuance to contractor
- b) When State Distribution Company is Employer, the form shall be issued by them.

In respect of bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Project site (sale-in-transit), the ex-works price is inclusive of all cost as well as duties and taxes (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable and any such taxes, duties, levies additionally payable will be to Contractor's account and no separate claim on this behalf will be entertained by the Employer. The requisite Sales Tax declaration forms shall be issued as under:

- a) When project implementing agency or employer is a Central Public Sector Undertaking, form shall be issued by State Distribution Company to Employer for onward issuance to contractor
- b) When State Distribution Company is Employer, the form shall be issued by them.

Further, the ex-works price of (i) bought-out finished Equipments/items as 'Off the Self' items or dispatched directly from the Contractor's works are exclusive of all cost as well as duties and taxes (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable and no separate claim on this behalf will be entertained by the Employer. Employer shall, however, issue requisite sales tax declaration form. 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 such tax savings to the maximum allowable extent.

For payment/reimbursement of Sales Tax, wherever applicable, in respect of despatches made directly from Contractor's works, invoices raised by the Contractor shall be accepted as documentary evidence and for payment/reimbursement of VAT, Vatable invoices raised by the Contractor shall be accepted as documentary evidence. Similarly, pre-numbered invoices duly signed by authorized signatory shall be considered as evidence for payment of Excise Duty.

- 10.4 Octroi/entry tax as applicable for destination site/state on all items of supply including bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-in-transit) are not included in the Contract price. The applicable

octroi/entry tax in respect of all the items of supply would be reimbursed to the Contractor separately by the Employer subject to furnishing of documentary proof.

- 10.5 Employer would not bear any liability on account of Service Tax. Employer shall, however, deduct such tax at source as per the rules and issue necessary Certificate to the Contractor.
- 10.6 Sales Tax/VAT on Works Contract, Turnover Tax or any other similar taxes under the Sales Tax/VAT Act for services to be performed in India, as applicable is included in Contract Price and Employer would not bear any liability on this account. Employer shall, however, deduct such taxes at source as per the rules and issue Tax Deduction at Source (TDS) Certificate to the Contractor.
- 10.7 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 seven (07) days prior to the last date of bid submission (hereinafter called "Tax" in this GCC Sub-clause 10.7). 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 the Contract, which was or will be assessed on the Contractor 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 31 (Changes in Laws and Regulations) hereof. However, these adjustments would be restricted to direct transactions between the Employer and the Contractor for which the taxes and duties are reimbursable by the Employer as per the Contract. These adjustments shall not be applicable on procurement of raw materials, intermediary components etc by the Contractor and also not applicable on the bought out items dispatched directly from sub-vendor's works to site.

In respect of raw materials, intermediary components etc and bought out items, neither the Employer nor the Contractor shall be entitled to any claim arising due to increase or decrease in the rate of Tax, introduction of a new Tax or abolition of an existing Tax in the course of the performance of the Contract.

#### D. Intellectual Property

##### 11. Copy Right

- 11.1 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 supplies of materials, the copyright in such materials shall remain vested in such third party.

The Employer shall however be free to reproduce all drawings, documents and other material furnished to the Employer for the purpose of the Contract including, if required, for operation and maintenance.

- 11.2 The copyright in all drawings, documents and other materials containing data and information furnished to the Contractor by the Employer herein shall remain vested in the Employer.



12. Confidential Information

12.1 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 12.

12.2 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 and Equipment, construction or such other work and services as are required for the performance of the Contract.

12.3 The obligation of a party under GCC Sub-Clauses 12.1 and 12.2 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
- (c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

12.4 The above provisions of this GCC Clause 12 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.

12.5 The provisions of this GCC Clause 12 shall survive termination, for whatever reason, of the Contract.

E. Execution of the Facilities

13. Representatives

13.1 If the Project Manager is not named in the Contract, then within fourteen (14) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of 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 a notice of the name of such other person to the Contractor without delay. The Employer shall take all reasonable care to see that no such appointment is made at such a time or in such a manner as to impede the progress of work on the Facilities. The Project Manager shall represent and act for the Employer at all times during the currency 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.

13.2 Contractor's Representative & Construction Manager

- 13.2.1 If the Contractor's Representative is not named in the Contract, then within fourteen (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 fourteen (14) days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days giving the reason therefor, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, and the foregoing provisions of this GCC Sub-Clause 13.2.1 shall apply thereto.
- 13.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the currency 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 Sub-Clause 13.2.1.
- 13.2.3 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 Sub-Clause 13.2.3 shall be deemed to be an act or exercise by the Contractor's Representative.
- 13.2.3.1 Notwithstanding anything stated in GCC Sub-Clause 13.1 and 13.2.1 above, for the purpose of execution of Contract, the Employer and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all the communication under the Contract shall be in accordance with such Contract Coordination Procedure.
- 13.2.4 From the commencement of installation of the Facilities at the Site until Operational Acceptance, the Contractor's Representative shall appoint a suitable person as the construction manager, (hereinafter referred to 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 through-out 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, a suitable person shall be appointed to act as his or her deputy.
- 13.2.5 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 Sub-Clause 18.3. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Facilities.

- 13.2.6 If any representative or person employed by the Contractor is removed in accordance with GCC Sub-Clause 13.2.5, the Contractor shall, where required, promptly appoint a replacement.

#### 14. Work Program

##### 14.1 Contractor's Organization

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. The chart shall include the identities of the key personnel together with the curricula vitae of such key personnel to be employed within twenty-one (21) days of the Effective Date. The Contractor shall promptly inform the Employer and the Project Manager in writing of any revision or alteration of such an organization chart.

##### 14.2 Program of Performance

Within twenty-eight (28) days after the date of Notification of Award, the Contractor shall prepare and submit to the Project Manager a detailed program of performance of the Contract (L2 Network) in the form of the Critical Path Method (CPM), the PERT network, or other internationally used programs and showing the sequence in which it proposes to design, manufacture, transport, assemble, install and pre-commissioning 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 Appendix-4 (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 under GCC Sub-Clause 4.2 and any extension granted in accordance with GCC Clause 34, and shall submit all such revisions to the Project Manager.

##### 14.3 Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GCC Sub-Clause 14.2 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.

##### 14.4 Progress of Performance

If at any time the Contractor's actual progress falls behind the program referred to in GCC Sub-Clause 14.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or 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 Sub-Clause 4.2, any extension thereof entitled under GCC Sub-Clause 34.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

#### 14.5 Work Procedures

The Contract shall be executed in accordance with the Contract Documents and the procedures given in the section on Sample Forms and Procedures of the Contract Documents.

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.

14.6 It is emphasized to conduct monthly contract review meeting with senior most officers of turnkey contractor at their headquarters or at project site. Employer shall decide venue of such monthly contract review meeting. In this meeting, three months rolling plan of mobilisation of materials and manpower shall be reviewed. Progress of works achieved on ground shall also be reviewed along with all pending issues related to availability of fronts, payments, contractual issues, if any, etc. Minutes of the meeting shall be issued by Employer within a week time. Performance of contractor shall be reviewed based on commitment and actual achievement on ground. Planning, commitment, review and evaluation of performance of contractor through this meeting shall be under overall agreed project execution plan (PERT Chart).

14.7 It is also emphasized to conduct monthly contract review meeting with sub-contractor in presence of senior most officers of turnkey contractor at their headquarters or at project site. Employer shall decide venue of such review meeting. In this meeting, three months rolling plan of mobilisation of materials and manpower shall be reviewed. Progress of works achieved on ground shall also be reviewed along with all pending issues related to availability of fronts, payments, contractual issues, if any, etc.

#### 15. Subcontracting

The Contractor may, after informing the Project Manager and getting his written approval, assign or sub-let the Supply Contract or any part thereof other than for raw material, for minor details or for any part of the plant for which makes are identified in the Contract. Suppliers of the equipment not identified in the Contract or any change in the identified suppliers shall be subjected to approval by the Project Manager. The experience list of equipment vendors under consideration by the Contractor for this Contract shall be furnished to the Project Manager for approval prior to procurement of all such items/equipment.

Field execution of the contract shall not be sub-contracted without written permission of the Employer. On case to case basis, if employer gets satisfied with, permission for sub-contracting entire or part project execution work may be permitted (level-1). However, further sub-letting of field execution works by sub-contractor (Level-2) shall not be acceptable by employer. In case of further sub-letting of contract, it would be construed as non-performance and breach of the contract. Contractual action shall then be initiated as per provisions of the contract.

Such assignment/sub-letting shall not relieve the Contractor of any obligation, duty or responsibility under the Contract.

15.1 The corresponding Appendix (List of Approved Subcontractors) to the Contract Agreement specifies major items of supply or services and a list of approved Subcontractors against each item, including vendors. 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.

15.2 For items or parts of the Facilities not specified in the corresponding Appendix (List of Approved Subcontractors) to the Contract Agreement for Supply Contract(s), the Contractor may employ such Subcontractors as it may select, at its discretion.

## 16. Design and Engineering

### 16.1 Specifications and Drawings

16.1.1 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.

16.1.2 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.

### 16.2 Codes and Standards

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 twenty-eight (28) 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 after approval by the Employer and shall be treated in accordance with GCC Clause 33.

### 16.3 Approval/Review of Technical Documents by Project Manager

16.3.1 The Contractor shall prepare (or cause its Subcontractors to prepare) and furnish to the Project Manager the documents listed in Appendix-7 (List of Documents for Approval or Review) to the Contract Agreement for its approval or review as specified and as in accordance with the requirements of GCC Sub-Clause 14.2 (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 Sub-Clauses 16.3.2 through 16.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only.

- 16.3.2 Within twenty one (21) days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GCC Sub-Clause 16.3.1, 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.
- 16.3.3 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.
- 16.3.4 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 16.3.2. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), and upon resubmission with the required modifications the document shall be deemed to have been approved.

The procedure for submission of the documents by the Contractor and their approval by the Project Manager shall be discussed and finalized with the Contractor.

- 16.3.5 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 an Arbitrator for determination in accordance with GCC Sub-Clause 39 hereof. If such dispute or difference is referred to an Arbitrator, 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 Arbitrator upholds the Contractor's view on the dispute and if the Employer has not given notice under GCC Sub-Clause 39 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 Arbitrator shall decide, and the Time for Completion shall be extended accordingly.
- 16.3.6 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.
- 16.3.7 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 Sub-Clause 16.3. If the Project Manager requests any change in any already approved document and/or in any document based thereon, the provisions of GCC Clause 33 shall apply to such request.

## 17. Plant and Equipment

- 17.1 Subject to GCC Sub-Clause 10.2, the Contractor shall manufacture or procure and transport all the Plant and Equipment in an expeditious and orderly manner to the Site.

17.2 Employer-Supplied Plant, Equipment, and Materials

If the corresponding Appendix – 6 (Scope of Works and Supply by the Employer) to the Contract Agreement provides that the Employer shall furnish any specific items of machinery, equipment or materials to the Contractor, the following provisions shall apply:

17.2.1 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 Sub-Clause 14.2, unless otherwise mutually agreed.

17.2.2 The equipment & materials to be furnished by the Employer shall be supplied to the Contractor at the depots established by the Contractor or the Employer. The Lorry Receipts for the materials will be handed over to the Contractor by the representative of the Employer as and when the same are received. The Contractor shall be responsible for taking delivery of these materials from the railways/road transporter, unloading them from the transporter, carting them to different stores built by him for the purpose, the unloading and cartage being at the cost of the Contractor. All wharfage and demurrage charges incurred due to delay in taking delivery will be to the Contractor's account, except those due to reasons beyond his control in which case the Contractor shall immediately intimate the Project Manager for settling the claims. The Contractor shall be responsible for proper handling and storage of these materials from the time of receipt upto the time of Taking Over of the Facilities by the Employer.

17.2.3 Yards and store provided by the Contractor for stacking and storage of materials shall be open for inspection by the Employer as and when required. The cost of handling and storage shall be to the Contractor's account.

17.2.4 Upon receipt of such item, the Contractor shall inspect the same visually and notify the Project Manager of any detected shortage, defect or default. For the material being arranged by the Employer and supplied to the Contractor for erection, are received short, broken or damaged, an entry shall be made in the delivery register of the railway authorities/road transporter as far as possible and a report of the same giving full details of shortage and damages along with a copy of report entered in the delivery register of the road transporter/railways shall be submitted by the Contractor to the Project Manager and Employer's consignee immediately. 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 Sub-Clause 17.2.4 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.

17.2.5 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 22 or under any other provision of Contract.

17.3 Transportation

- 17.3.1 The Contractor shall at its own risk and expense transport all the Plant and Equipment and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.
- 17.3.2 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 Plant and Equipment and the Contractor's Equipment.
- 17.3.3 Upon dispatch of each shipment of the Plant and Equipment and the Contractor's Equipment, the Contractor shall notify the Employer by telex, facsimile or Electronic Data Interchange (EDI) of the description of the Plant and Equipment 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.
- 17.3.4 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the Plant and Equipment 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 Plant and Equipment and the Contractor's Equipment to the Site.
- 17.4 Delivery and Documents
- 17.4.1 Delivery Documents
- Upon shipment, the Contractor shall notify the Employer with full details of the dispatch and shall furnish the documents as specified in the corresponding Appendix - 1 (Terms and Procedures of Payment) to the Contract Agreement
- 17.4.2 Packing
- 17.4.2.1 The Contractor shall provide such packing of the Goods as it is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods final destination and the absence of heavy handling facilities at all points in transit.
- 17.4.2.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract and, subject to any subsequent instruction ordered by the Employer consistent with the requirements of the Contract.
- 17.4.3 Materials Handling and Storage:
- All the equipment furnished under the Contract and arriving at Site shall be promptly received, unloaded, transported and stored in the storage spaces by the Contractor.



Contractor shall be responsible for examining all the shipment and notify the Project Manager immediately of any damages, storage, discrepancy etc, for the purpose of Project Manager's information only. The Contractor shall submit to the Project Manager every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/ or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc, shall be to the account of the Contractor.

The Contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the Project Manager.

All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the Project Manager. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at Site.

All electrical panels, control gears, motors and such other devices shall be properly dried by heating before they are installed and energized. Motor bearings, slip ring, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months from the date of receipt till the date of commissioning and a record of such measured insulation values maintained by the Contractor. Such records shall be opened for inspection by the Project Manager.

The Contractor shall ensure that all the packing materials and protection devices, used for various equipment during transit and storage, are removed before the equipment are installed.

The consumable and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.

All the materials stored in the open or dusty location must be covered with suitable weatherproof and flame proof covering material wherever applicable.

If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Project Manager will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.

The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment, which require indoor storage. Normally all the electrical equipment such as motors, control gears, generators, exciters and consumables like electrodes, lubricants etc. shall be stored in the closed storage space. The Project Manager, in addition, may direct the Contractor to move certain other materials, which in his opinion will require indoor storage, to indoor storage areas, which the Contractor shall strictly comply with.

18. Installation

18.1 Setting Out/Supervision/Labor

18.1.1 Bench Mark: 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.

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.

18.1.2 Contractor's Supervision: 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.

18.1.3 Labor:

- (a) 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.
- (b) Unless otherwise provided in the Contract, the Contractor at its own expense shall be responsible for the recruitment, transportation, accommodation and catering of all labor, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.
- (c) 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.
- (d) 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.

18.2 Contractor's Equipment

18.2.1 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.

18.2.2 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.

18.2.3 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.

### 18.3 Site Regulations and Safety

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.

#### 18.3.1 Compliance with Labour Regulations

18.3.1.1 During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all applicable existing labour enactments and rules made thereunder, regulations notifications and byelaws of the State or Central Government or local authority and any other labour law (including rules), regulations bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The employees of the Contractor and the Sub-contractor in no case shall be treated as the employees of the Employer at any point of time.

18.3.1.2 The Contractor shall keep the Project Manager indemnified in case any action is taken against the Contractor by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments.

18.3.1.3 If the Project Manager/Employer is caused to pay under any law as principal employer such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/ byelaws/Acts/ Rules/regulations including amendments, if any, on the part of the Contractor, the Project Manager shall have the right to deduct any money due to the Contractor under this contract or any other contract with the Project Manager/Employer including his amount of performance security for adjusting the aforesaid payment. The Project Manager shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Project Manager/Employer.

Notwithstanding the above, the Contractor shall furnish to the Project Manager the details/documents evidencing the Contractor's compliance to the laws applicable to establishments engaged in building and other construction works, as may be sought by the Project Manager. In particular the Contractor shall submit quarterly certificate regarding compliance in respect of provisions of Employees' Provident Fund and Misc. Provisions Act 1952 or latest to the Project Manager.

18.3.1.4 Salient features of some major laws applicable to establishments engaged in building and other construction works:

- (a) Workmen Compensation Act 1923 or latest: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (b) Payment of Gratuity Act 1972 or latest: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (c) Employee P.F. and Miscellaneous Provision Act 1952 or latest: The Act provides for monthly contribution by the turnkey Contractor plus his workers @10% or 8.33%. The benefits under the Act are:
  - (i) Pension or family pension on retirement or death, as the case may be.
  - (ii) Deposit linked insurance on death in harness of the worker.
  - (iii) Payment of P.F. accumulation on retirement/death etc.
- (d) Maternity Benefit Act 1951 or latest: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (e) Contract Labour (Regulation & Abolition) Act 1970 or latest: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by law. The Principal Employer is required to take Certification of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.
- (f) Minimum Wages Act 1948 or latest: The Contractor is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provision of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.
- (g) Payment of Wages Act 1936 or latest: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (h) Equal Remuneration Act 1979 or latest: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (i) Payment of Bonus Act 1965 or latest: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs. 3500/- per month or less. The bonus is to be paid to employees getting Rs. 2500/- per month or above upto Rs. 3500/- per month shall be worked out by taking wages as Rs. 2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain

circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

- (j) Industrial Dispute Act 1947 or latest: the Act lays down the machinery the procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (k) Industrial Employment (Standing Orders) Act 1946 or latest: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer (i.e. turnkey contractor) on matters provided in the Act and get the same certified by the designated Authority.
- (l) Trade Unions Act 1926 or latest: The Act lays down the procedure for registration of trade unions of workmen and contractors. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- (m) Child Labour (Prohibition & Regulation) Act 1986 or latest: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.
- (n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service Act 1979 or latest: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.
- (o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 or latest and the Cess Act of 1996 or latest: All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The turnkey contractor of the establishment is required to provide safety measures at the electrical construction site, substations, building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The turnkey contractor to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the government.
- (p) Factories Act 1948 or latest: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

### 18.3.2 Protection of Environment

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

During continuance of the Contract, the Contractor and his Sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made thereunder, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

Salient features of some of the major laws that are applicable are given below:

The Water (Prevention and Control of Pollution) Act, 1974 or latest, This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981 or latest, This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986 or latest, This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

The Public Liability Insurance Act, 1991 or latest, This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under Environment (Protection) Act, 1986 or latest, and exceeding such quantity as may be specified by notification by the Central Government.

### 18.3.3 Safety Precautions

#### 18.3.3.1 The Contractor shall observe all applicable regulations regarding safety on the Site.

Unless otherwise agreed, the Contractor shall, from the commencement of work on Site until Taking Over, provide:

- a) fencing, lighting, guarding and watching of the Works, and

- b) temporary roadways, footways, guards and fences which may be necessary for the accommodation and protection of Employer / his representatives and occupiers of adjacent property, the public and others.

18.3.3.2 The Contractor shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to Employer or to others, working at the Site. The Contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislations and the Project Manager, as he may deem necessary.

18.3.3.3 The Contractor will notify well in advance to the Project Manager of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. The Project Manager shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contractor shall strictly adhere to and comply with such instructions. The Project Manager shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by the Employer and the Employer shall not entertain any claim of the Contractor towards additional safety provisions/conditions to be provided for/constructed as per the Project Manager's instructions.

Further, any such decision of the Project Manager shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by the Project Manager, the Contractor shall use alternative methods with the approval of the Project Manager without any cost implication to the Employer or extension of work schedule.

18.3.3.4 Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and/or storage in accordance with the rules and regulations laid down in Petroleum Act 1934 or latest, Explosives Act, 1948 or latest and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Project Manager. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.

18.3.3.5 All equipment used in construction and erection by Contractor shall meet Indian/International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipment shall be strictly operated and maintained by the Contractor in accordance with manufacturer's Operation Manual and safety instructions and as per Guidelines/rules of Employer in this regard.

18.3.3.6 Periodical examinations and all tests for all lifting/hoisting equipment & tackles shall be carried-out in accordance with the relevant provisions of Factories Act 1948 or latest or latest, Indian Electricity Act 2003 and associated Laws/Rules in force from time to time. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by the Project Manager or by the person authorised by him.

18.3.3.7 The Contractor shall be fully responsible for the safe storage of his and his Sub-Contractor's radioactive sources in accordance with BARC/DAE Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, storage and handling of such material will be taken by the Contractor.

- 18.3.3.8 The Contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need, as may be directed by the Project Manager who will also have right to examine these safety equipment to determine their suitability, reliability, acceptability and adaptability.
- 18.3.3.9 Where explosives are to be used, the same shall be used under the direct control and supervision of an expert, experienced, qualified and competent person strictly in accordance with the Code of Practice/Rules framed under Indian Explosives Act pertaining to handling, storage and use of explosives.
- 18.3.3.10 The Contractor shall provide safe working conditions to all workmen and employees at the Site including safe means of access, railings, stairs, ladders, scaffoldings etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection, good and standard quality of material only shall be used by the Contractor.
- 18.3.3.11 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Employer or other Contractors under any circumstances, whatsoever, unless expressly permitted in writing by Employer to handle such fuses, wiring or electrical equipment
- 18.3.3.12 Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Employer, he shall:
- a. Satisfy the Project Manager that the appliance is in good working condition;
  - b. Inform the Project Manager of the maximum current rating, voltage and phases of the appliances;
  - c. Obtain permission of the Project Manager detailing the sockets to which the appliances may be connected.
- 18.3.3.13 The Project Manager will not grant permission to connect until he is satisfied that:
- a. The appliance is in good condition and is fitted with suitable plug;
  - b. The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.
- 18.3.3.14 No electric cable in use by the Contractor/Employer will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.
- 18.3.3.15 No repair work shall be carried out on any live equipment. The equipment must be declared safe by the Project Manager and a permit to work shall be issued by the Project Manager before any repair work is carried out by the Contractor. While working on electric lines/equipment, whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the Contractor to electricians/workmen/officers.
- 18.3.3.16 The Contractors shall employ necessary number of qualified, full time electricians/electrical supervisors to maintain his temporary electrical installation.



18.3.3.17 The Contractor employing more than 250 workmen whether temporary, casual, probationer, regular or permanent or on contract, shall employ at least one full time officer exclusively as safety officer to supervise safety aspects of the equipment and workmen, who will coordinate with the Project Safety Officer. In case of work being carried out through Sub-Contractors, the Sub-Contractor's workmen/employees will also be considered as the Contractor's employees/workmen for the above purpose.

The name and address of such Safety Officers of the Contractor will be promptly informed in writing to Project Manager with a copy to Safety Officer-In charge before he starts work or immediately after any change of the incumbent is made during currency of the Contract.

18.3.3.18 In case any accident occurs during the construction/ erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Project Manager in prescribed form and also to all the authorities envisaged under the applicable laws.

18.3.3.19 The Project Manager shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.

18.3.3.20 The Contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in GCC Sub-Clause 18.3.3.19 above and the period of such stoppage of work will not be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.

18.3.3.21 It is mandatory for the Contractor to observe during the execution of the works, requirements of Safety Rules which would generally include but not limited to following:

#### Safety Rules

- a) Each employee shall be provided with initial indoctrination regarding safety by the Contractor, so as to enable him to conduct his work in a safe manner.
- b) No employee shall be given a new assignment of work unfamiliar to him without proper introduction as to the hazards incident thereto, both to himself and his fellow employees.
- c) Under no circumstances shall an employee hurry or take unnecessary chance when working under hazardous conditions.
- d) Employees must not leave naked fires unattended. Smoking shall not be permitted around fire prone areas and adequate fire fighting equipment shall be provided at crucial location.

- e) Employees under the influence of any intoxicating beverage, even to the slightest degree shall not be permitted to remain at work.
- f) There shall be a suitable arrangement at every work site for rendering prompt and sufficient first aid to the injured.
- g) The staircases and passageways shall be adequately lighted.
- h) The employees when working around moving machinery, must not be permitted to wear loose garments. Safety shoes are recommended when working in shops or places where materials or tools are likely to fall. Only experienced workers shall be permitted to go behind guard rails or to clean around energized or moving equipment.
- i) The employees must use the standard protection equipment intended for each job. Each piece of equipment shall be inspected before and after it is used.
- j) Requirements of ventilation in underwater working to licensed and experienced divers, use of gum boots for working in slushy or in inundated conditions are essential requirements to be fulfilled.
- k) In case of rock excavation, blasting shall invariably be done through licensed blasters and other precautions during blasting and storage/transport of charge material shall be observed strictly.

18.3.3.22 The Contractor shall follow and comply with all Employer Safety Rules, relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any demur, protest or contest or reservations. In case of any discrepancy between statutory requirement and Employer Safety Rules referred above, the latter shall be binding on the Contractor unless the statutory provisions are more stringent.

18.3.3.23 If the Contractor fails in providing safe working environment as per Employer Safety Rules or continues the work even after being instructed to stop work by the Project Manager as provided in GCC Sub-Clause 18.3.3.19 above, the Contractor shall promptly pay to Employer, on demand by the Employer, compensation at the rate of Rs. 5,000/- per day of part thereof till the instructions are complied with and so certified by the Project Manager. However, in case of accident taking place causing injury to any individual, the provisions contained in GCC Sub-Clause 18.3.3.24 shall also apply in addition to compensation mentioned in this Clause.

18.3.3.24 If the Contractor does not take adequate safety precautions and/or fails to comply with the Safety Rules as prescribed by the Employer or under the applicable law for the safety of the equipment and plant or for the safety of personnel or the Contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other Contractors or Employer's employees or any other person who are at Site or adjacent thereto, then the Contractor shall be responsible for payment of a sum as indicated below to be deposited with the Employer, which will be passed on by the Employer to such person or next to kith and kin of the deceased:

a.	Fatal injury or accident causing death	Rs. 1,000,000/- per person
b.	Major injuries or accident causing 25% or more permanent disablement	Rs. 100,000/- per person

Permanent disablement shall have same meaning as indicated in Workmen's Compensation Act. The amount to be deposited with Employer and passed on to the person mentioned above shall be in addition to the compensation payable under the relevant provisions of the Workmen's Compensation Act and rules framed there under or any other applicable laws as applicable from time to time. In case the Contractor does not deposit the above mentioned amount with Employer, such amount shall be recovered by Employer from any monies due or becoming due to the Contractor under the contract or any other on-going contract.

18.3.3.25 If the Contractor observes all the Safety Rules and Codes, Statutory Laws and Rules during the currency of Contract awarded by the Employer and no accident occurs then Employer may consider the performance of the Contractor and award suitable 'ACCIDENT FREE SAFETY MERITORIOUS AWARD' as per scheme as may be announced separately from time to time.

18.3.3.26 The Contractor shall also submit 'Safety Plan' as per proforma specified in Section – Sample Forms and Procedures of the Bidding Documents alongwith all the requisite documents mentioned therein and as per check-list contained therein to the Project Manager for its approval within 60 days of award of Contract.

Further, one of the conditions for release of first progressive payment / subsequent payment towards Services Contract shall be submission of 'Safety Plan' alongwith all requisite documents and approval of the same by the Project Manager.

#### 18.4 Opportunities for Other Contractors

18.4.1 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.

18.4.2 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.

18.4.3 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.

18.4.4 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.

#### 18.5 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. In case such work is not in the scope of the Contractor, the cost of such remedial work shall be borne by the Employer.

#### 18.6 Site Clearance

18.6.1 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.

18.6.2 Clearance of Site after Completion: 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 clean and safe.

#### 18.7 Watching and Lighting

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.

#### 18.8 Work at Night and on Holidays

18.8.1 Unless otherwise provided in the Contract, no work shall be carried out during the night and on public holidays of the country where the Site is located without prior written consent of the Employer, except where work is necessary or required to ensure safety of the Facilities or for the protection of life, or to prevent loss or damage to property, when the Contractor shall immediately advise the Project Manager, provided that provisions of this GCC Sub-Clause 18.8.1 shall not apply to any work which is customarily carried out by rotary or double-shifts.

18.8.2 Notwithstanding GCC Sub-Clauses 18.8.1 or 18.1.3, 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 Employer's consent thereto, the Employer shall not unreasonably withhold such consent.

#### 19. Test and Inspection

- 19.1 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 Equipment and any part of the Facilities as are specified in the Contract.
- 19.2 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.
- 19.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give four weeks 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.
- 19.4 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.
- 19.5 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 impedes 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.
- 19.6 If any Plant and Equipment or any part of the Facilities fails to pass any test and/or inspection, the Contractor shall either rectify or replace such Plant and Equipment or part of the Facilities and shall repeat the test and/or inspection upon giving a notice under GCC Sub-Clause 19.3.
- 19.7 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 and Equipment or part of the Facilities that cannot be settled between the parties within a reasonable period of time, it may be referred to an Arbitrator for determination in accordance with GCC Sub-Clause 39.
- 19.8 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 and Equipment 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.
- 19.9 The Contractor agrees that neither the execution of a test and/or inspection of Plant and Equipment 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 Sub-Clause 19.4, shall release the Contractor from any other responsibilities under the Contract.
- 19.10 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 part 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.

- 19.11 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 Sub-Clause 19.10 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.

## 20. Completion of the Facilities and Operational Acceptance

### 20.1 Completion of the Facilities

#### 20.1.1 Physical Completion

- 20.1.1.1 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 Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer in writing.

#### 20.1.2 Pre-Commissioning

- 20.1.2.1 Within seven (7) days after receipt of the notice from the Contractor under GCC Sub-Clause 20.1.1.1, the Project Manager shall deploy the operating and maintenance personnel and other material if so specified in the corresponding Appendix – 6 (Scope of Works and Supply by the Employer) to the Contract Agreement for Precommissioning of the Facilities or any part thereof.

- 20.1.2.2 As soon as reasonably practicable after the operating and maintenance personnel have been deployed by the Employer and other materials have been provided by the Employer in accordance with GCC Sub-Clause 20.1.2.1, the Contractor shall commence Precommissioning of the Facilities or the relevant part thereof, in presence of the Employer's representatives, as per procedures detailed in Technical Specifications in preparation for Commissioning.

- 20.1.2.3 As soon as all works in respect of Precommissioning are successfully completed and, in the opinion of the Contractor, the Facilities or any part thereof is ready for Commissioning, the Contractor shall notify the Project Manager in writing.

- 20.1.2.4 The Project Manager shall, within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 20.1.2.3, notify the Contractor in writing of any defects and/or deficiencies.

- 20.1.2.5 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 Sub-Clause 20.1.2.2. If in the opinion of the Contractor, the Facilities or any part thereof is now ready for Commissioning, the Contractor shall again notify the Project Manager in writing. If further defects and/or deficiencies are not notified by the Project Manager and if the

Project Manager is satisfied that the Precommissioning of Facilities or that part thereof have been successfully completed, the Project Manager shall, within seven (7) days after receipt of the Contractor's such notice, advise the Contractor to proceed with the Commissioning of the Facilities or part thereof.

20.1.2.6 If the Project Manager fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 20.1.2.4 or within seven (7) days after receipt of the Contractor's notice on completion of repeat procedure under GCC Sub-Clause 20.1.2.5, then the Precommissioning of the Facilities or that part thereof shall be considered to have been successfully completed as of the date of the Contractor's notice.

20.1.2.7 As soon as possible after Precommissioning, 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.

20.1.2.8 In the event that the Contractor is unable to proceed with the Precommissioning of the Facilities pursuant to Sub-Clause 20.1.2 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 following provisions shall apply:

When the Contractor is notified by the Project Manager that he will be unable to proceed with the activities and obligations pursuant to above GCC Sub-Clause 20.1.2.8, 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 Sub-Clause 21.2.
- b) payments due to the Contractor in accordance with the provisions specified in Appendix I (Terms and Procedures of Payment) to the Contract Agreement, which would have not been payable in normal circumstances due to non-completion of the said activities and obligations, 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 these payments, subject to the provisions of GCC Sub-Clause 21.2.9 below.
- c) the expenses payable by the Contractor to the Bankers toward the extension of above security and extension of other securities under the Contract, of which validity need to be extended, shall be reimbursed to the Contractor by the Employer against documentary evidence.
- d) the additional charges toward the care of the Facilities pursuant to GCC Sub-Clause 28.1 shall be reimbursed to the Contractor by the Employer for the period between the notification mentioned above and the notification mentioned in GCC Sub-Clause 20.1.2.10 below. The provisions of GCC Sub-Clause 29.2 shall apply to the Facilities during the same period.

20.1.2.9 In the event that the period of suspension under GCC Sub-Clause 20.1.2.8 actually exceeds one hundred eighty (180) days, the Employer and the Contractor shall mutually agree to any additional compensation payable to the Contractor.

- 20.1.2.10 As and when, after the period of suspension under GCC Sub-Clause 20.1.2.8, the Contractor is notified by the Project Manager that the Facilities are ready for Precommissioning, the Contractor shall proceed without delay in performing all activities and obligations under the Contract.
- 20.1.3 Commissioning
- 20.1.3.1 Commissioning of the Facilities or any part thereof shall be commenced by the Contractor immediately after being advised by the Project Manager, pursuant to GCC Sub-Clause 20.1.2.5 or immediately after the Precommissioning is considered to be completed under GCC Sub-Clause 20.1.2.6.
- 20.1.3.1.1 Commissioning of the Facilities or any part thereof shall be completed by the Contractor as per procedures detailed in bid documents.
- 20.1.3.2 The Employer shall, to the extent specified in Appendix – 6 (Scope of works and supply by the Employer), deploy the operating and maintenance personnel and supply all raw materials, utilities, lubricants, chemicals, catalysts, facilities, services and other materials required for commissioning.
- 20.1.3.3 In the event that the Contractor is unable to proceed with the Commissioning of the Facilities pursuant to Sub-Clause 20.1.3 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 of GCC Sub-Clause 20.1.2.8 to 20.1.2.9 shall apply.
- 20.1.3.4 As and when, after the period of suspension under GCC Sub-Clause 20.1.2.8, the Contractor is notified by the Project Manager that the Facilities are ready for Commissioning, the Contractor shall proceed without delay in performing all activities and obligations under the Contract.
- 20.1.4 Trial - Operation
- 20.1.4.1 Trial – Operation of the Facilities or any part thereof shall be commenced by the Contractor immediately after the Commissioning is completed pursuant to GCC Sub-Clause 20.1.3.1.1.
- 20.1.4.2 Trial – Operation of the Facilities or any part thereof shall be completed by the Contractor for the period specified in Technical Specification (or for a continuous period of 24 hours where such period is not specified in Technical Specification) and as per procedures detailed in Technical Specifications.
- 20.1.4.3 At any time after the events set out in GCC Sub-Clause 20.1.4.2 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Taking Over Certificate in the form provided in the Bidding Documents or in another form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as of the date of such notice.
- 20.1.4.4 The Project Manager shall within twenty-one (21) days after receipt of the Contractor's notice, issue an Taking Over Certificate.
- 20.1.5 Taking Over



- 20.1.5.1 Upon successful Trial – Operation of the Facilities or any part thereof, pursuant to GCC Sub-Clause 20.1.4, the Project Manager shall issue to the Contractor a Taking Over Certificate as a proof of the acceptance of the Facilities or any part thereof. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of Contract after issue of such certificate.
- 20.1.5.2 If within twenty one (21) days after receipt of the Contractor's notice, the Project Manager fails to issue the Taking Over Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Taking Over Certificate, the Facilities or the relevant part thereof shall be deemed to have been Taken Over as at the date of the Contractor's said notice.
- 20.1.5.3 Upon Taking Over of the Facilities or any part thereof, 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.
- 20.2 Operational Acceptance
- 20.2.1 Guarantee Test
- 20.2.1.1 The Guarantee Test (and repeats thereof), if any specified in the SCC and/or the Technical Specification, shall be conducted by the Contractor after successful Trial – Operation 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 Contract Documents or if otherwise required as per the Technical Specifications. The Contractor's and Project Manager's advisory personnel may witness the Guarantee Test. The Contractor shall promptly provide the Employer with such information as the Employer may reasonably require in relation to the conduct and results of the Guarantee Test (and any repeats thereof).
- 20.2.1.2 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 time stipulated in the Technical Specifications the period for completing the same shall be as agreed upon by the Employer and the Contractor.
- 20.2.2 Operational Acceptance
- 20.2.2.1 Operational Acceptance shall occur in respect of the Facilities or any part thereof as mentioned below:
- (I) In case no Functional Guarantees are applicable, Operational Acceptance shall occur when the Facilities or part thereof have been successfully Commissioned and Trial – Operation for the specified period have been successfully completed
- (II) In case Functional Guarantees are applicable, Operational Acceptance shall occur when the Functional Guarantees are met or the Contractor has paid liquidated damages specified in GCC Sub-Clause 23.3 hereof; or
- 20.2.2.2 At any time after any of the events set out in GCC Sub-Clause 20.2.2.1 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 Bidding Documents or in another form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as of the date of such notice.

20.2.2.3 The Project Manager shall within twenty-one (21) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.

20.2.2.4 Upon Operational Acceptance, pursuant to GCC Sub-Clause 20.2.2.2, the Project Manager shall issue to the Contractor a Operational Acceptance Certificate as a proof of the final acceptance of the Plant and Equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of Contract after issue of such certificate.

20.2.2.5 If within twenty one (21) 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 at the date of the Contractor's said notice.

20.3 Partial Acceptance

20.3.1 If the Contract specifies that Commissioning shall be carried out in respect of parts of the Facilities, the provisions relating to Commissioning including the Trial – Operation and 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.

20A. Quantity Variation

- I. The quantity of all equipment/materials given in the Price Schedules of the bidding documents are provisional. The variation in quantity shall be limited to plus/minus (+/-) twenty percent (20%) for the individual items, total variations in all items under the contract shall be limited to ten percent (10%) of the contract price. For quantity variation of the individual items beyond twenty percent (20%), the matter shall be referred to the Employer for mutually agreed rates.
- II. However, in case of highly quoted rate of individual item as compared to its estimated cost, efforts shall be made so that no positive deviation in quantity during execution shall be permitted to its award quantity. However, in case, deviations are found inevitable, present market rate analysis of the item shall be made.
- III. The Contractor shall be responsible for supply and execution of such final quantities for completion of the project and they shall be paid for such finalized quantity within plus ten percent (+) 10% overall deviation limit.

20B. Electrical Inspector inspection:

After successful completion of the work permission from State Electrical Inspectorate is required. Necessary fee etc. shall be paid by the Employer. However if Contractor pays such fee it shall be reimbursed on actual basis on documentary evidence.

Defects / in-complete works notified by Electrical Inspectorate shall be completed by the agency at no extra cost implication to Employer.

21. Completion Time Guarantee

21.1 The Contractor guarantees that it shall attain Completion of the Facilities (or a part for which a separate time for completion is specified in the SCC) within the Time for Completion specified in the SCC pursuant to GCC Sub-Clause 4.2, or within such extended time to which the Contractor shall be entitled under GCC Clause 34 hereof.

21.2 If the Contractor fails to comply with the Time for Completion in accordance with Clause GCC 21 for the whole of the facilities, (or a part for which a separate time for completion is agreed) then the Contractor shall pay to the Employer a sum equivalent to half percent (0.5%) of the Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed) as liquidated damages for such default and not as a penalty, without prejudice to the Employer's other remedies under the Contract, for each week or part thereof which shall elapse between the relevant Time for Completion and the date stated in Taking Over Certificate of the whole of the Works (or a part for which a separate time for completion is agreed) subject to the limit of five percent (5%) of Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed). The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

21.3 No bonus will be given for earlier Completion of the Facilities or part thereof.

21A. Pre-dispatch Inspection:

Pre-dispatch inspection shall be performed on various materials at manufacturer's work place for which contractor shall be required to raise requisition giving at least 10-day time. Depending on requirement, inspection shall be witnessed by representatives of Employer, PMA, PFC /MoP or any appointed agency.

The contractor shall ensure receipt of material at site within 21 days from date of receipt of dispatch instructions.

The turnkey contractor shall ensure that pre-dispatch inspection for materials are intimated only when the material is completely ready for inspection. On due date of inspection, if it is found that materials are not ready in required quantities, all expenditures incurred on deployment of various inspecting officials along with a fine of Rs 50,000/- shall be recovered from the bills of the agency. 2<sup>nd</sup> such situation at same manufacturer/supplier shall result in rejection of name of manufacturer from list of approved vendors/sub-vendors.

22. Defect Liability

22.1 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 and Equipment supplied and of the work executed.

22.1.1 Volume of concreting: If it was observed by employer, quality monitoring agencies and/or PFC/MoP that volume and quality of concreting used in foundation of support, equipment foundation, gantry structure foundation, stay set etc. are not as per requirement specified in the scope of work/technical specifications, the

contractor has to dismantle the supports, foundation and redo the concreting of all the supports in that particular section of line/redo all the foundations in that particular substation at his own cost. To ensure this, the employer reserves the right to withhold the payment of contractor for such defective works till such time the contractor conforms to scope of works, technical specification and tender drawings.

22.1.2 Galvanization of metallic structure: Metallic structure of substation (wherever specified) must be galvanized. In case metallic structure found rusted during execution of works, the contractor has to redo the galvanization of item used at all places. To ensure this, the employer reserves the right to withhold the payment of contractor for such works till such time the contractor conforms to scope of works, technical specification and tender drawings.

22.1.3 Painting of metallic structure and poles: Painting of metallic structure and poles in overhead lines, distribution transformer substation and Power substation shall be ensured as per specifications. In case metallic structure and poles found rusted during execution of works, the contractor has to remove inferior painting, clean the surface and re-paint it as per given specifications. To ensure this, the employer reserves the right to withhold the payment of contractor for such works till such time the contractor conforms to scope of works, technical specification and tender drawings.

22.2 The Defect Liability Period shall be sixty (60) months from the date of Taking Over /Completion of Facilities (or any part thereof).

If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant and Equipment 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, at its discretion, determine) 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
- (c) normal wear and tear.

22.3 The Contractor's obligations under this GCC Clause 22 shall not apply to

- (a) any materials that are supplied by the Employer under GCC Sub-Clause 17.2, 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
- (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 Sub-Clause 22.7.

- 22.4 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.
- 22.5 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 22. The Contractor may, with the consent of the Employer, remove from the Site any Plant and Equipment 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.
- 22.6 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.
- 22.7 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 fifteen (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.
- 22.8 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.
- 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 mentioned in GCC Sub-Clause 22.2 from the time of such replacement/repair of the facilities or any part thereof.
- 22.8.1 At the end of the Defect Liability Period, the Contractor's Liability ceases except for latent defects. The Contractor's liability for latent defects warranty shall be limited to period of ten (10) years from the end of Defect Liability Period. For the purpose of this clause, the latent defects shall be the defects inherently lying within the material or arising out of design deficiency, which do not manifest themselves during the Defect Liability Period defined in this GCC Clause 22, but later.
- 22.9 Except as provided in GCC Clauses 22 and 29, 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 and Equipment, design or engineering or work executed that appear after Defect Liability Period except for the liability towards obligations that may survive in terms of the Contract after Defect Liability Period, except where such defects are the result of the gross negligence, fraud, criminal or willful action of the Contractor.

23. Functional Guarantees

23.1 The Contractor guarantees that the Facilities and all parts thereof shall attain the Functional Guarantees specified in the Technical Specifications, subject to and upon the conditions therein specified.

23.2 If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees specified in the Technical Specifications 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 Sub-Clause 36.2.2 and recover the payments already made to the Contractor.

23.3 If, for reasons attributable to the Contractor, the Functional Guarantees specified in the Technical Specifications are not attained either in whole or in part, but the minimum level of the Functional Guarantees specified in the Technical Specifications 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 within a mutually agreed time 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 SCC.

23.4 In case the Employer exercises its option to accept the equipment after levy of liquidated damages, the payment of liquidated damages under GCC Sub-Clause 23.3, upto the limitation of liability specified in the SCC, shall completely satisfy the Contractor's guarantees under GCC Sub-Clause 23.3, 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.

24. Equipment Performance Guarantees

24.1 The Contractor guarantees that the Equipment, named in the SCC, shall attain the rating and performance requirements specified in Appendix – 8 (Guarantees, Liquidated Damages for Non – Performance) to the Contract Agreement, subject to and upon the conditions therein specified.

24.2 If the guarantees specified in Appendix – 8 (Guarantees, Liquidated Damages for Non – Performance) to the Contract Agreement are not established, then the Employer shall reject the equipment.

24.3 In case the Employer rejects the equipment, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the equipment or any part thereof as may be necessary to meet the specified 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 Test until the level of the specified guarantee has been met.

- 24.4 Whenever the Employer exercises its option to accept the equipment after levy of liquidated damages, the payment of liquidated damages under GCC Sub-Clause 24.2, upto the limitation of liability specified in the SCC, shall completely satisfy the Contractor's guarantees under GCC Sub-Clause 24.2, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof.

25. Patent Indemnity

- 25.1 The Contractor shall, subject to the Employer's compliance with GCC Sub-Clause 25.2, 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.

- 25.2 If any proceedings are brought or any claim is made against the Employer arising out of the matters referred to in GCC Sub-Clause 25.1, 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 twenty-eight (28) 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 twenty-eight (28) 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.

- 25.3 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.

26. Limitation of Liability

26.1 Except in cases of gross negligence or willful misconduct,

(a) the Contractor and the Employer shall not be liable to the other party 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 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.

26.2 All payments to subcontractor shall be made by contractor. Contractor shall indemnify Employer from any legal issues related to delay in payment or not making any payment to sub-vendor/sub-contractor.

G. Risk Distribution

27. Transfer of Ownership

27.1 Imported finished items are not covered under the contract. Only indigenous finished items are covered under the contract.

27.2 Ownership of the Plant and Equipment (including spare parts) procured in India, shall be transferred to the Employer upon loading on to the mode of transport to be used to carry the Plant and Equipment from the works to the site and upon endorsement of the dispatch documents in favour of the Employer.

27.3 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.

27.4 Ownership of any Plant and Equipment 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 and Equipment in question are no longer required for the Facilities provided quantity of any Plant and Equipment specifically stipulated in the Contract shall be the property of the Employer whether or not incorporated in the Facilities.

27.5 Notwithstanding the transfer of ownership of the Plant and Equipment, 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 28 (Care of Facilities) hereof until Completion of the Facilities and Taking Over pursuant to GCC Clause 20 or the part thereof, if any, as per GCC Sub-Clause 1.1(e) in which such Plant and Equipment are incorporated.

28. Care of Facilities

28.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Taking Over Certificate pursuant to GCC Clause 20 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 22. Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Facilities or that part thereof caused by 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.

29. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification

29.1 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.

29.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GCC Sub-Clause 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 twenty-eight (28) 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 twenty-eight (28) 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 Notwithstanding anything in this Contract to the contrary, it is agreed that neither the Contractor nor the Employer shall be liable to the other party for loss of production, loss of profit, loss of use or any other indirect or consequential damages.

30. Insurance

30.1 To the extent specified in the corresponding Appendix-3 (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) Marine Cargo Policy/Transit Insurance Policy:

(1)(i) Marine Cargo policy for imported equipment

Since imported finished materials are not permitted under the contract, this policy shall not be applicable,

(I)(ii) Transit Insurance Policy for indigenous equipment

Transit Insurance Policy shall be taken wherein only inland transit is involved for the movement of Plant and Equipment supplied from within India. The policy shall cover movement of Plant and Equipment from the manufacturer's works to the project's warehouse at final destination site. Inland Transit Clause (ITC) 'A' along with war & Strike Riots & Civil Commotion (SRCC) extension cover shall be taken. The policy shall cover movement of Plant and Equipment from the manufacturer's works to the project's warehouse at final destination site. The policy shall cover all risk for loss or damage that may occur during transit of Plant and Equipment from the Contractor/sub-Contractor's works or stores until arrival at project's warehouse/ store at final destination. Institute Cargo Clause (ICC) 'A' along with war & Strike Riots & Civil Commotion (SRCC) cover shall be taken.

(II) If during the execution of Contract, the Employer requests the Contractor to take any other add-on cover(s)/ supplementary cover(s) in aforesaid insurance, in such a case, the Contractor shall promptly take such add-on cover(s)/ supplementary cover(s) and the charges towards such premium for such add-on cover(s)/ supplementary cover(s) shall be reimbursed to the Contractor on submission documentary evidence of payment to the Insurance company. Therefore, charges towards premium for such add-on cover(s)/ supplementary cover(s) are not included in the Contract Price.

(III) The Contractor shall take the policy in the joint names of Employer and the Contractor. The policy shall indicate the Employer as the beneficiary. However, if the Contractor is having an open policy for its line of business, it should obtain an endorsement of the open cover policy from the insurance company indicating that the dispatches against this Contract are duly covered under its open policy and include the name of the Employer as jointly Insured in the endorsements to the open policy.

(b) Erection All Risk Policy/Contractor All Risk Policy:

(I) The policy should cover all physical loss or damage to the facility at site during storage, erection and commissioning covering all the perils as provided in the policy as a basic cover and the add on covers as mentioned at Sl. No. (III) below.

(II) The Contractor shall take the policy in the joint name of Employer and the Contractor. All these policies shall indicate Employer as the beneficiary. The policy shall be kept valid till the date of the Operational Acceptance of the project and the period of the coverage shall be determined with the approval of the Employer.

If the work is completed earlier than the period of policy considered, the Contractor shall obtain the refund as per provisions of the policy and pass on the benefit to Employer. In case no refund is payable by the insurance

company then the certificate to that effect shall be submitted to Employer at the completion of the project.

- (III) The following add-on covers shall also be taken by the Contractor:
- i) Earthquake
  - ii) Terrorism
  - iii) Escalation cost (approximately @10% of sum insured on annual basis)
  - iv) Extended Maintenance cover for Defect Liability Period
  - v) Design Defect
  - vi) Other add-on covers viz., 50-50 clause, 72 hours clause, loss minimization clause, waiver of subrogation clause (for projects of more than 100 crores, cover for offsite storage/fabrication (over 100 crores).
- (IV) Third Party Liability cover with cross Liability within Geographical limits of India as on ADD-on cover to the basic EAR cover:

The third party liability add-on cover shall cover 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 which have been accepted by the Employer) occurring in connection with supply and installation of the Facilities.

- (V) As per para 30.8 below, the cost of insurance premium is to be reimbursed to the Contractor for Employer Supplied Materials (OSM) for which the insurer is to be finalized by the Contractor as detailed therein. Alternatively, the Contractor may take a single policy covering the entire cost of the project including the cost of OSM. For this purpose, the Contractor shall submit documentary evidence for the premium paid for the entire project to the Employer and Employer shall reimburse to the Contractor the proportion of premium equal to value of OSM to total sum insured.
- (VI) If during the execution of Contract, the Employer requests the Contractor to take any other add-on cover(s)/ supplementary cover(s) in aforesaid insurance, in such a case, the Contractor shall promptly take such add-on cover(s)/ supplementary cover(s) and the charges towards such premium for such add-on cover(s)/ supplementary cover(s) shall be reimbursed to the Contractor on submission documentary evidence of payment to the Insurance company. Therefore, charges towards premium for such add-on cover(s)/ supplementary cover(s) are not included in the Contract Price.

(c) Automobile Liability Insurance

The Contractor shall ensure that all the vehicles deployed by the Contractor or its Subcontractors (whether or not owned by them) in connection with the supply and installation of the Facilities in the project are duly insured as per RTA act. Further the Contractor or its Subcontractors may also take comprehensive policy (own damage plus third party liability) of each individual vehicles deployed in the project on their own discretion in their own name to protect their own interest.

(d) Workmen Compensation Policy:

(I) Workmen Compensation Policy shall be taken by the Contractor in accordance with the statutory requirement applicable in India. The Contractor shall ensure that all the workmen employed by the Contractor or its Subcontractors for the project are adequately covered under the policy.

(II) The policy may either be project specific covering all men of the Contractor and its Subcontractors. The policy shall be kept valid till the date of Operational Acceptance of the project.

Alternatively, if the Contractor has an existing 'Workmen Compensation Policy' for all its employees including that of the Subcontractor(s), the Contractor must include the interest of the Employer for this specific Project in its existing 'Workmen Compensation Policy'.

(III) Without relieving the Contractor of its obligations and responsibilities under this Contract, before commencing work the Contractor shall insure against liability for death of or injury to persons employed by the Contractor including liability by statute and at common law. The insurance cover shall be maintained until all work including remedial work is completed including the Defect Liability Period. The insurance shall be extended to indemnify the Principal for the Principal's statutory liability to persons employed by the Contractor.

The Contractor shall also ensure that each of its Subcontractors shall effect and maintain insurance on the same basis as the 'Workmen Compensation Policy' effected by the Contractor.

(e) Contractor's Plant and Machinery (CPM) Insurance

The Employer (including without limitation any consultant, servant, agent or employee of the Employer) shall not in any circumstances be liable to the Contractor for any loss of or damage to any of the Contractor's Equipment or for any losses, liabilities, costs, claims, actions or demands which the Contractor may incur or which may be made against it as a result of or in connection with any such loss or damage.

30.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 30.1, except for the Third Party Liability, Workmen Compensation Policy Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 30.1 except for the Cargo Insurance During Transport, Workmen Compensation Policy 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.

30.3 The Contractor shall, in accordance with the provisions of the corresponding Appendix – 3 (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 twenty-one (21) days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.

- 30.4 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.
- 30.5 The Employer shall at its expense take out and maintain in effect during the performance of the Contract those insurances specified in the corresponding Appendix – 3 (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 twenty-one (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 Sub-Clause 30.5.
- 30.6 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GCC Sub-Clause 30.1, 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 30.5, 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.
- 30.7 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 30, and the monies payable by any insurers under all the insurance except Third Party Liability Insurance and Workmen Compensation Policy, shall be paid to the joint account of the Employer and the Contractor as mutually agreed and such amounts paid shall be apportioned between the Employer and the Contractor in accordance with the respective responsibilities under the Contract. 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.
- 30.8 Further all equipment and materials being supplied by Employer for the erection (as per Technical Specification) shall be kept insured by the Contractor against any loss, damage, pilferage, theft, fire, etc. from the point of unloading up to the time of taking over by Employer including handling, transportation, storage, erection, testing and commissioning etc. The premium paid to the Insurance company by the Contractor for such insurance shall be reimbursed by Employer to the Contractor. The Contractor shall obtain competitive quotation for such insurance and shall take prior approval from Employer before taking the insurance. The insurable value of the equipment being supplied by Employer shall be intimated to the Contractor for arranging the insurance.

30.9 It will be the responsibility of the Contractor to lodge, pursue and settle all claims with the insurance company in case of any damage, loss, theft, pilferage or fire during execution of Contract and Employer shall be kept informed about it. The Contractor shall replace the lost/damaged materials promptly irrespective of the settlement of the claims by the underwriters and ensure that the work progress is as per agreed schedules. The losses, if any, in such replacement will have to be borne by the Contractor.

31. Change in Laws and Regulations

31.1 If, after the date seven (07) days prior to the date of Bid Opening, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed in India (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. 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 for which the Employer shall be the sole judge. 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 Appendix-2 to the Contract Agreement.

32. Force Majeure

32.1 "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 war be declared or not), invasion, act of foreign enemy and civil war,
- (b) rebellion, revolution, insurrection, mutiny, usurpation of government, conspiracy, riot and civil commotion,
- (c) earthquake, landslide, volcanic activity, flood or cyclone, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster,

32.2 Neither party shall be considered to be in default or in breach of his obligations under the Contract to the extent that performance of such obligation is prevented by any circumstances of Force majeure, which arises after date of Notification of Award.

32.3 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 fourteen (14) days after the occurrence of such event.

32.4 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 34.

H. Change in Contract Elements

33. Change in the Facilities

33.1 Introducing a Change

33.1.1 Subject to GCC Sub-Clause 33.2.5, 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.

33.1.2 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.

33.1.3 Changes made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be not be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

33.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Sub-Clauses 33.2 and 33.3.

33.2 Changes Originating from Employer

33.2.1 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.

33.2.2 The Contract Price for (i) the items for which quantities have been indicated as lumpsum or lot or set and/or (ii) where the quantities are to be estimated by the Contractor shall remain constant unless there is change made in the Scope of Work by Employer. The quantities and unit prices (i) subsequently arrived while approving the Bill of Quantities (BOQ)/Billing breakup of lumpsum quantities/lot/Set and/or (ii) estimated by the Contractor shall be for on account payment purpose only. In case additional quantities, over and above the quantities in BOQ/billing breakup and /or estimated by the Contractor, are required for successful completion of the scope of work as per Technical Specification, the Contractor shall execute additional quantities of these items for which no additional payment shall be made over and above the lumpsum Contract Price. In case quantities of these items supplied at site are in excess of that required for successful completion of scope of work, such additional quantities shall be the property of the Contractor and they shall be allowed to take back the same from

the site for which no deduction from the lumpsum Contract Price shall be made. Further, in case actual requirement of quantities for successful completion of scope of work is less than the quantities identified in the approved BOQ /billing breakup and/or estimated by the Contractor, the lumpsum contract price shall remain unchanged and no deduction shall be made from the lumpsum price due to such reduction of quantities.

It shall be the responsibility of the Contractor to pay all statutory taxes, duties and levies to the concerned authorities for such surplus material which would otherwise have been, lawfully payable in case of non-deemed export contracts. The Contractor shall submit an indemnity bond to keep Employer harmless from any liability, before release of such material to the Contractor by Employer.

Set/Lot/Lumpsum shall be governed as per the requirement of the corresponding item description read in conjunction with relevant provisions of Technical Specifications and the Billing breakup referred to above shall be issued by the Employer based on Contractor's request, if and as may be required during the currency of the Contract.

- 33.2.3 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 33 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement by more than the percentage specified in SCC, the Employer and the Contractor shall mutually agree on specific rates for valuation of the Change beyond the specified percentage.

For the said purpose, the Contract Price means the Contract Price of the Facilities notwithstanding the Construction of the Contract.

- 33.2.4 If rates and prices of any change are not available in the Contract, the parties thereto shall agree on specific rates for the valuation of the change and all matters therein related to the change. Based on the same, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order.

- 33.2.5 The Employer shall issue the Contractor with a Change Order pursuant to GCC Sub-Clause 33.2 by way of amendment to the Contract or in any other manner deemed appropriate. Even 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 related to the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order" ("Pending Agreement Amendment").

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 sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Arbitrator in accordance with the provisions of GCC Clause 38 & 39.

- 33.3 Changes Originating from Contractor



33.3.1 If the Contractor proposes a Change pursuant to GCC Sub-Clause 33.1.2, the Contractor shall submit to the Project Manager a written "Request for Change Proposal", giving reasons for the proposed Change and 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 any other provisions of the Contract.

Upon receipt of the Request for Change Proposal, the parties shall follow the procedures outlined in GCC Sub-Clauses 33.2.1 and 33.2.5. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Request for Change Proposal.

### 33A. Surplus Materials

- a. On completion of the works all such materials supplied by contractor for erection that remain unutilized, if any, shall be taken back by Contractor after detailed materials and payment reconciliations.
- b. The Contractor, within two (2) months from the taking over of the equipment/ materials under the package, shall submit payment and materials account for the reconciliations, failing which necessary recoveries will be made from the outstanding bills of the Contractor for the cost of the materials left unaccounted as decided by the Project Manager.

### 34. Extension of Time for Completion

34.1 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 33
- (b) any occurrence of Force Majeure as provided in GCC Clause 32
- (c) any suspension order given by the Employer under GCC Clause 35 hereof or reduction in the rate of progress pursuant to GCC Sub-Clause 35.2 or
- (d) any changes in laws and regulations as provided in GCC Clause 31 or
- (e) any other matter specifically mentioned in the Contract

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.

34.2 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 Arbitration, pursuant to GCC Sub-Clause 39.

34.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

### 35. Suspension

35.1 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 ninety (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 twenty-eight (28) days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GCC Clause 33, 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 33 or, where it affects the whole of the Facilities, as termination of the Contract under GCC Sub-Clause 36.1.

35.2 If the Contractor's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GCC Clause 35, then the Time for Completion shall be extended in accordance with GCC Sub-Clause 34.1, 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.

35.3 During the period of suspension, the Contractor shall not remove from the Site any Plant and Equipment, any part of the Facilities or any Contractor's Equipment, without the prior written consent of the Employer.

### 36. Termination

36.1 Termination for Employer's Convenience

36.1.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GCC Sub-Clause 36.1.

36.1.2 Upon receipt of the notice of termination under GCC Sub-Clause 36.1.1, the Contractor shall either immediately or upon the date specified in the notice of termination

- (a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii) below
- (c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition
- (d) In addition, the Contractor, subject to the payment specified in GCC Sub-Clause 36.1.3, shall
  - (i) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination
  - (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant and Equipment as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors
  - (iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of termination in connection with the Facilities.

36.1.3 In the event of termination of the Contract under GCC Sub-Clause 36.1.1, the Employer shall pay to the Contractor the following amounts:

- (a) the Contract Price, properly attributable to the parts of the Facilities executed by the Contractor as of the date of termination
- (b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel
- (c) any amounts to be paid by the Contractor to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges
- (d) costs incurred by the Contractor in protecting the Facilities and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 36.1.2
- (e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third parties in connection with the Contract and that are not covered by paragraphs (a) through (d) above.

36.2 Termination for Contractor's Default

36.2.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefor to the Contractor, referring to this GCC Sub-Clause 36.2:

- (a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt
- (b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GCC Clause 37.
- (c) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
- (d) If the contractor fails to achieve mutually agreed deadline (as set in mutually agreed Project Execution Plan/PERT chart) for consecutive 3 months, Employer shall issue contract termination notice giving suitable time to contractors which may be up to time agreed between employer and contractor. In case, contractor does not improve its performance as per contract termination notice, which shall be within overall plan under mutually agreed project execution plan, employer will terminate the contract and encash performance securities.

For the purpose of this Sub-Clause:

“corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

“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;

“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;

“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;

“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 Employer’s 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 Employer’s inspection and audit rights.

In persuasions of its policy, the Employer will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a 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 contract.

36.2.2 If the Contractor

- (a) has abandoned or repudiated the Contract
- (b) has without valid reason failed to commence work on the Facilities promptly or has suspended (other than pursuant to GCC Sub-Clause 35.2) the progress of Contract performance for more than twenty-eight (28) days after receiving a written instruction from the Employer to proceed
- (c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause
- (d) refuses or is unable to provide sufficient materials, services or labor to execute and complete the Facilities in the manner specified in the program furnished under GCC Sub-Clause 14.2 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain Completion of the Facilities by the Time for Completion as extended,

then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GCC Sub-Clause 36.2.

36.2.3 Upon receipt of the notice of termination under GCC Sub-Clauses 36.2.1 or 36.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

- (a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) below
- (c) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination
- (d) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant and Equipment as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors
- (e) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

36.2.4 The Employer may enter upon the Site, expel the Contractor, and complete the Facilities itself or by employing any third party. The Employer may, to the exclusion of any right of the Contractor over the same, take over and use with the payment of a fair rental rate to the Contractor, with all the maintenance costs to the account of the Employer and with an indemnification by the Employer for all liability including damage or injury to persons arising out of the Employer's use of such equipment, any Contractor's Equipment owned by the Contractor and on the Site in connection with the Facilities for such reasonable period as the Employer considers expedient for the supply and installation of the Facilities.

Upon completion of the Facilities or at such earlier date as the Employer thinks appropriate, the Employer shall give notice to the Contractor that such Contractor's Equipment will be returned to the Contractor at or near the Site and shall return such Contractor's Equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

36.2.5 Subject to GCC Sub-Clause 36.2.6, the Contractor shall be entitled to be paid the Contract Price attributable to the Facilities executed as of the date of termination, the value of any unused or partially used Plant and Equipment on the Site, and the costs, if any, incurred in protecting the Facilities and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 36.2.3. Any sums due to the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

36.2.6 If the Employer completes the Facilities, the cost of completing the Facilities by the Employer shall be determined.

If the sum that the Contractor is entitled to be paid, pursuant to GCC Sub-Clause 36.2.5, plus the reasonable costs incurred by the Employer in completing the Facilities, exceeds the Contract Price or the entire Facilities if entire Facilities have been completed or the price for part of the Facilities if part of the Facilities have been completed, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GCC Sub-Clause 36.2.5, the Contractor shall pay the balance to the Employer, and if such excess is less than the sums due the Contractor under GCC Sub-Clause 36.2.5, the Employer shall pay the balance to the Contractor. For facilitating such payment the Employer shall encash the Bank Guarantees of the Contractor available with the Employer and retain such other payments due to the Contractor under the Contract in question or any other Contract that the Employer may have with the Contractor.

The Employer and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

36.3 In this GCC Clause 36, the expression "Facilities executed" shall include all work executed, Installation Services provided, and all Plant and Equipment acquired (or subject to a legally binding obligation to purchase) by the Contractor and used or intended to be used for the purpose of the Facilities, up to and including the date of termination.

36.4 In this GCC Clause 36, in calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the

Contract, including any advance payment paid pursuant to the corresponding Appendix (Terms and Procedures of Payment) to the Contract Agreement.

37. Assignment

- 37.1 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. Resolution of Disputes

38. Settlement of Disputes

- 38.1 If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the Facilities, whether during the progress of the Facilities or after their completion and whether before or after the termination, abandonment or breach of the Contract, the parties shall seek to resolve any such dispute or difference, to the extent possible, amicably by mutual consultation.

- 38.2 If the parties fail to resolve such a dispute or difference by mutual consultation at the execution site level, then the dispute shall be referred by the Contractor to the Project Manager, who, within a period of thirty (30) days after being requested by Contractor to do so, shall give written notice of his decision.

- 38.2.1 The decision/instruction of the Project Manager shall be deemed to have been accepted by the Contractor unless notified by the Contractor of his intention to refer the matter for Arbitration within thirty (30) days of such decision/instruction.

- 38.2.2 In the event the Project Manager fails to notify his decision as aforesaid within thirty (30) days, the Contractor, if he intends to go for Arbitration, shall notify his intention to the Project Manager within 30 days of expiry of the first mentioned period of thirty days failing which it shall be deemed that there are no dispute or difference between the Employer and the Contractor.

- 38.3 In case of dispute or difference between the Employer and the Contractor, if the Employer intends to go for Arbitration, he shall notify such intention to the Contractor.

39. Arbitration

- 39.1 All disputes or differences in respect of which the decision, if any, of the Project Manager and/or the Head of the Implementing Authority has not become final or binding as aforesaid shall be settled by arbitration in the manner provided herein below:

- 39.2 The arbitration shall be conducted by three arbitrators, one each to be nominated by the Contractor and the Employer and the third to be appointed by both the arbitrators in accordance with the Indian Arbitration Act. If either of the parties fails to appoint its arbitrator within sixty (60) days after receipt of a notice from the other party invoking the Arbitration

clause, the arbitrator appointed by the party invoking the arbitration clause shall become the sole arbitrator to conduct the arbitration.

- 39.3 The language of the arbitration proceedings and that of the documents and communications between the parties shall be English. The arbitration shall be conducted in accordance with the provisions of the Indian Arbitration and Conciliation Act, 1996 or any statutory modification thereof. The venue of arbitration shall be xxxxx (headquarter of Employer).
- 39.4 The decision of the majority of the arbitrators shall be final and binding upon the parties. In the event of any of the aforesaid arbitrators dying, neglecting, resigning or being unable to act for any reason, it will be lawful for the party concerned to nominate another arbitrator in place of the outgoing arbitrator.
- 39.5 During settlement of disputes and arbitration proceedings, both parties shall be obliged to carry out their respective obligations under the Contract.

40. Up-front intimation of approved manufacturers and criterion for Fresh Vendor approval:

Employer shall up-front intimate list containing name of already approved vendors/manufacturers of various sub-transmission and distribution materials. Employer shall up-load the list on their web portal. Turnkey contractor shall choose one or more than one vendors from the pre-approved lists depending upon capacity and capability of vendors to supply the materials for IPDS works. No separate approval for vendor shall be required from Employer.

Also, normal procedure being followed for empanelment of new vendors shall be uploaded and up-front intimated to all turnkey contractors. In case Turnkey Contractor desires to add new vendor, up-front intimation shall be available on criterion and procedure for selection of vendors.

41. Up-front intimation of Guaranteed Technical Particulars:

Technical Specifications are enclosed with the bid documents. Employer shall up-front intimate acceptable Guaranteed Technical Particulars of various materials through their web portal.

Turnkey contractor will examine these documents and supply only those materials which meets the above acceptable criterion. In case there are Employer's approved vendor(s) (one or more) through which Turnkey Contractor wish to procure the materials and are complying with the acceptable GTP parameters of Employer as available on their web portal, there would not be any formality needed like approval of sub-vendor or approval of GTP again.

In event of change in name of vendor or change in GTP parameter, separate approval of Employer shall be sought by successful turnkey contractor.

42. Turnkey Contractor's Store at Project site:

"Project wise separate Site Stores shall be maintained and manned by turnkey contractor. Same store shall not be used for more than one projects even if neighboring districts' projects are awarded to the same agency. The turnkey contractor shall deploy his own manpower in stores for round the clock security and for its day to day operation through trained Store-ki-per.



Since materials received in this stores are owned by Employer and are pre-dispatch inspected by Employer's representative, materials in a lot shall not be issued to the sub-contractor for physical execution by Turnkey Contractor. Instead, day to day requirements shall be issued to the working teams of sub-vendors by authorized store-ki-per. In exceptional cases, on prior written permission of Employer, materials for a week time may be issued to working team of sub-vendor. Daily accounting of materials receipt, materials issues, materials in custody of sub-vendors are to be maintained by Turnkey Contractor. Handing of Stores shall, in no circumstances, be off loaded.

In no case, inter-project transfer of materials shall be permitted.

43. Handing over of assets:

On completion of erection and testing of a section of line, DTR substation, power substation, contracting agency shall submit digital photographs in soft copies of each and every support structures along-with submission of completion report in support of their claim for energisation and handing over of assets. Project Manager within a week time, shall review the photographs for acceptance of quality of works and shall immediately deploy officials for joint measurement and inspection of executed works for energisation. In parallel, a requisition to State Electrical Inspectorate shall also be submitted by Project Manager. Fee/Charges for inspection by electrical inspector shall be paid by Project Manager.

44. Supply of Materials in lots:

Item wise mobilisation of materials shall be planned in 6 lots. Employer shall arrange pre-dispatch inspections for 6 lots at his own expenditure. Any additional resource mobilization for inspection of materials by employer beyond 6 lots shall be chargeable at actual.

45. Contract Closing:

On completion of handing over formality and successfully completion of defect liability / guarantee period, the contract shall be closed on completion of following formality:

- I. Material reconciliation,
- II. Payment reconciliations, submission and verifications that reconciliation of payment toward statutory provisions like CST/VAT/Entry Tax/Excise Duty, any other dues etc. Reconciliation statement shall be verified and vetted by chartered accountant.
- III. Approval for extension of Completion period, with or without compensation, as required.
- IV. Certification from agency regarding payment of dues to its
  - i. Sub-vendors
  - ii. Workers/ contract laborers,
  - iii. Payment of statutory dues toward Provident Funds, wages etc as required.
- V. Certification of Project Manager & agency to the effect that erection, testing and commissioning of the equipment have been completed as per specifications laid down in the contract and defects noted at the time of commissioning and notified to the agency have been liquidated to the satisfaction of Employer.

- VI. Removal of construction meant for site stores, hutment, labour colony etc. in the premises of EMPLOYER.
- VII. Certificate from Project Manager in charge regarding final amendment of drawings and detailed of such amendments,
- VIII. Drawing receipt certificate by the Project Manager,
- IX. Receipt of compliance report on Quality Assurance Mechanism along with photograph, Assurance documents by Project Manager
- X. Shortfall in equipment / Line performance Certificate issued by Project Manager,
- XI. No demand certificate issued by contractor,
- XII. Certificate about completion of Defect Liability Period of the package by Project Manager,
- XIII. Certificate regarding return of Performance Security / Indemnity Bond by Project Manager/Employer.

46. Banning of business dealings

- 46.1. Employer shall ban business dealings with contractor on following grounds for the period as decided by Project Manager:-
  - a. If the contractor fails to submit Performance Security after issuance of Letter of Intent (LoI) within 28 days.
  - b. If the Contractor fails to accept the award of contract or has abandoned or repudiated the Contract.
  - c. If the Contractor is found to be non-performing in execution of contract by the Employer.
  - d. If a disaster / major failure / accident / collapse of a structure / system is caused during erection or during defect liability period due to negligence of contractor or design deficiency or poor quality of execution.
  - e. Misbehavior or physical manhandling by the Contractor or his representative or any person acting on his behalf with any official of the Company dealing with the concerned contract is established.
  - f. If the Director / Owner of the Contractor, proprietor or partner of the Contractor, is convicted by a court of law for offences involving corrupt and fraudulent practices including moral turpitude in relation to its business dealings with the government or State Public Sector Undertakings or Central Public Sector Undertakings or Employer or Employer's group companies, during the last five years.
  - g. If the proprietors of the Contractor have been guilty of malpractices such as bribery, corruption, fraud, substitution of the tenders, interpolations, etc.

- h. If the Contractor continuously refuses to return / refund the dues of Employer or Employer's group companies, without showing adequate reason and this is not due to any reasonable dispute which would attract proceedings in arbitration or court of Law;
- i. If the Contractor employs a public servant dismissed / removed or employs a person convicted for an offence involving corruption or abetment of such offences;
- j. If business dealings with the Contractor have been banned by the Ministry of Power or Government of India and the ban is still in force,
- k. If it is established that Contractor has resorted to corrupt, fraudulent practices including misrepresentation of facts;
- l. If the Contractor uses intimidation/threatening or brings undue outside pressure on the Project Manager or his authorised representatives or its officials in acceptance / performance of the job under the contract.
- m. If the Contractor indulges in repeated and / or deliberate use of delay tactics in complying with contractual stipulations;
- n. If the Contractor is found to be involved in cartel formation during bidding.
- o. On wilful indulgence by the Contractor in supplying sub-standard material with respect to Technical Specifications under the Contract irrespective of whether pre-dispatch inspection was carried out by Employer or not;
- p. If the Contractor is declared bankrupt or insolvent or its financial position has become unsound, and in the case of a limited company, it is wound up or liquidated.
- q. Established litigant nature of the Contractor to derive undue benefit;
- r. Continued poor performance of the Contractor;
- s. If the Contractor violates the provisions of the Integrity Pact provided in the Contract.
- t. If the Contractor commits fraud as defined under the Fraud Prevention Policy of Employer.
- u. If the Contractor has assigned or transferred the contract or engaged subcontractor(s) without the prior approval of the Competent Authority in violation of the provisions of the contract.
- v. If the Contractor misuses the premises or facilities of the Employer, forcefully occupies, tampers or damages the Employer's properties including land, water resources, forests / trees, etc.
- w. If the security consideration, including questions of loyalty of the Contractor to the state, so warrants;

----- End -----

VOLUME-I: SECTION – V  
SPECIAL CONDITIONS OF  
CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

The following bid specific data for the Plant and Equipment to be procured shall amend and/or supplement the provisions in the General Conditions of Contract (GCC)

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC									
1.	GCC 1.1(o)	<p>Supplementing Sub-Clause GCC 1.1(o)</p> <p>The Employer is: NEW DELHI MUNICIPAL COUNCIL</p> <p>For the purpose of execution of the contract, the contractual activities shall be performed by the Executive Engineer (IPDS) "for and on behalf of the NDMC" except in cases where the NDMC itself is statutorily required to do so.</p>									
2.	GCC 1.1(w)	<p>Supplementing Sub-Clause GCC 1.1(w)</p> <p>The Owner is: NEW DELHI MUNICIPAL COUNCIL</p>									
3.	GCC 1.1 (ee)	<p>Supplementing Sub-Clause GCC 1.1(ee)</p> <p>Time for Completion:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sl. No.</th> <th style="text-align: center;">Activities</th> <th style="text-align: center;">Duration in Months from the effective date of Contract</th> </tr> </thead> <tbody> <tr> <td></td> <td>Taking Over by the Employer upon successful Completion of:</td> <td></td> </tr> <tr> <td style="text-align: center;">1.</td> <td>Strengthening &amp; Augmentation of existing distribution Network in NDMC Area under Integrated Power Development Scheme (IPDS)</td> <td style="text-align: center;">24 (Months)</td> </tr> </tbody> </table>	Sl. No.	Activities	Duration in Months from the effective date of Contract		Taking Over by the Employer upon successful Completion of:		1.	Strengthening & Augmentation of existing distribution Network in NDMC Area under Integrated Power Development Scheme (IPDS)	24 (Months)
Sl. No.	Activities	Duration in Months from the effective date of Contract									
	Taking Over by the Employer upon successful Completion of:										
1.	Strengthening & Augmentation of existing distribution Network in NDMC Area under Integrated Power Development Scheme (IPDS)	24 (Months)									
4.	GCC 2.1	<p>GCC 2.1.1 The Contracts to be entered into with the successful Bidder shall be as under :</p> <ul style="list-style-type: none"> <li>- First Contract: For Ex-Works supply of all equipment and materials (Ex-Works Supply Contract)</li> <li>- Second Contract: For providing all services i.e. inland transportation for delivery at site, insurance, unloading, storage, handling at site, installation, Testing and Commissioning including performance testing in respect of all the equipment supplied under the "First Contract", and any other services specified in the Contract Documents (Services Contract).</li> </ul> <p>GCC 2.1.2 The award of two separate Contracts shall not in any way dilute the responsibility of the Contractor for the successful completion of the facilities as per Specification and a breach in one Contract shall automatically be construed as a breach of the other Contract(s) which will confer a right on the Employer to terminate the other Contract(s) also at the risk and the cost of the Contractor.</p> <p>GCC 2.1.3 The Contract will be signed in two originals and the Contractor shall be provided with one signed original and the second will be retained by the Employer.</p> <p>GCC 2.1.4 The Contractor shall provide free of cost to the Employer all the engineering data, drawing and descriptive materials submitted with the bid, in at least two (2) copies to form a part of the Contract immediately after Notification of Award.</p>									

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC
		GCC 2.1.5      Subsequent to signing of the Contract, the Contractor at his own cost shall provide the Employer with at least Twenty (20) true copies of Contract Agreement within fifteen (15) days after signing of the Contract.
5.	GCC 8.3	Addition of following new Sub-Clause after GCC 8.2:  All the payments upto 60% (or 85% for special category states) of project cost of infrastructure to the Contractor shall be made by NDMC strictly out of the funds received from PFC on behalf of the NDMC
6.	GCC 9.3.1	Supplementing Sub-Clause GCC 9.3.1  In addition to the above, the Contractor shall arrange to provide additional Performance Security(ies), if applicable, as per Clause no. 4 of Joint Deed of Undertaking mentioned at Sl. No. 19 of Volume-I : Section-VI (Sample Forms and Procedures). The said security(ies) shall be required to be extended time to time till ninety (90) days beyond the actual Defect Liability Period, as may be required under the Contract.  The Performance Security(ies) to be furnished by the Contractor under the Contract shall be in favour of the Employer. The Owner shall also be entitled to enforce these performance security(ies).
7.	GCC 10.3	Supplementing Sub-Clause GCC 10.3  The requisite Sales Tax declaration forms shall be issued as under:  a) When project implementing agency or Employer is a Central Public Sector Undertaking, form shall be issued by State Distribution Company to Employer for onward issuance to contractor  b) When State Distribution Company is Employer, the form shall be issued by them.
8.	GCC 10.6	Supplementing the Clause GCC 10.6 In case Employer is Central Public Sector Undertaking, the recovery of TDS under CST/VAT/WCT/Income Tax Act and any other acts as per Govt. regulation related to this work shall be done by XXXXX (Name of Employer) on behalf of XXXXX(DISCOM Name)/State Govt.. TDS so deducted by XXXXX (Employer Name) on behalf of the XXXX (Name of DISCOM)/State Govt. shall be deposited with the relevant tax authorities and TDS certificates shall be issued on behalf of XXXXX (DISCOM Name)/State Govt. using PAN, TIN, TAN of XXXXX(DISCOM Name). Relevant challans and copies of the TDS certificates shall be forwarded to XXXXX(DISCOM Name) for filling necessary returns. In case, wherever E-filing system is applicable, the relevant information would be given to the Owner for issuing TDS certificate, filling returns, etc.
9.	GCC 24.1	Supplementing Clause GCC 24.1  Applicable for 1600/1000 KVA, 11/0.415 kV, 3-phase Distribution Transformer only

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC												
10.	GCC 24.2 (b) & GCC 24.3	<p>Supplementing Clause GCC 24.2 (b)</p> <p>LD for Non-Performance of the Equipment</p> <p>The guaranteed loss at rated voltage for each equipment shall be corrected in accordance with IS2026, Part-I for the purpose of comparison of guaranteed losses with measured losses for levy of liquidated damages. However, the equipment (i.e. Power Transformer/Station Transformer) under no circumstances shall be accepted if the measured losses are more than +15 percent of the guaranteed losses at rated voltage, specified in Appendix – 8 (Guarantees, Liquidated Damages for Non – Performance) to the Contract Agreement.</p> <p>In case of Distribution Transformer, the equipment under no circumstances shall be accepted if the total losses exceed the max. limit specified in Technical Specifications.</p> <p>Differential Price Factors for Liquidated Damages</p> <p>The factors and the respective Indian Rupees value per unit of differential loss (applicable for each item/unit of facilities) for purpose of calculation of liquidated damages shall be as stipulated below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sl. No</th> <th style="text-align: center;">Equipment</th> <th style="text-align: center;">Parameter to be taken for applying differential price factor (F)</th> <th style="text-align: center;">Value of F in Indian Rupees (applicable for each item/unit of the facilities) per unit of parameter differential per KW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">12/10/8/6.3/5/3.15/1.6 MVA, 33/11kV or 66/11kV, 3 ph. Power Transformer</td> <td style="text-align: center;">Differential Copper Loss (KW)</td> <td style="text-align: center;">Rs. 1,18,643 /- (Indian Rupees One Lakh Eighteen Thousand Six Hundred Forty Three only)</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">Differential Iron Loss (KW)</td> <td style="text-align: center;">Rs. 2,61,713/- (Indian Rupees Two Lakh Sixty One Thousand Seven Hundred Thirteen only)</td> </tr> </tbody> </table> <p>The amount of liquidated damages so recoverable shall be as per the aforesaid ceiling and shall not prejudice the contractor's other liabilities under the Contract in any manner. The liquidated damages for shortfall in guaranteed parameters and for delay in completion are independent of each other and shall be levied separately and concurrently.</p>	Sl. No	Equipment	Parameter to be taken for applying differential price factor (F)	Value of F in Indian Rupees (applicable for each item/unit of the facilities) per unit of parameter differential per KW	1	12/10/8/6.3/5/3.15/1.6 MVA, 33/11kV or 66/11kV, 3 ph. Power Transformer	Differential Copper Loss (KW)	Rs. 1,18,643 /- (Indian Rupees One Lakh Eighteen Thousand Six Hundred Forty Three only)			Differential Iron Loss (KW)	Rs. 2,61,713/- (Indian Rupees Two Lakh Sixty One Thousand Seven Hundred Thirteen only)
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		Differential Iron Loss (KW)	Rs. 2,61,713/- (Indian Rupees Two Lakh Sixty One Thousand Seven Hundred Thirteen only)											
11.	GCC 33.2.3	<p>Supplementing Sub-Clause GCC 33.2.3</p> <p>Percentage for the Change Proposal under this Clause shall be limited to Ten (10) percent.</p>												
12.	Annexure-I to SCC	Enclosed herewith												
13.	Others	<p>(i) Rating of Transformers - Standard Ratings of Distribution Transformers as per IS are covered in bid documents. Transformers must be confirming to IS specifications. Non Standard ratings shall not be permitted.</p> <p>(ii) Same type of make and model of individual electrical equipment shall be used for entire project.</p> <p>(iii) The Contractor shall make temporary H.T /L.T arrangement for uninterrupted power supply to the consumer before taking shutdown of substation/equipments. Nothing shall be paid extra on this account</p> <p>(iv) For masonry work the contractor shall arrange water at his own cost nothing shall be paid extra on this account. Free electricity will be provided for execution of work only.</p> <p>(v) The minor items which are not included in the Bid document but essentially required for successful completion of work shall be deemed included nothing extra shall be paid on this account.</p>												

	(vi)	The computerised M.B shall be used for make running payment/Final payment as per the provision contain in the CPWD work manual 2014.
	(vii)	Before bidding, the contractor will investigate soil properties and accordingly design the substation earthing to achieve the desired result. During execution of work , if earthing results not achieved then contractor shall provide additional earth electrode to achieve the result. Nothing extra shall be paid on this account. Department will not approve any earthing design.
	(viii)	Before bidding, the Bidder must inspect the each Electric sub-station site for the constraint of passage/ space for cartage and installation of equipment. Nothing extra shall be paid on this account.
	(ix)	The refurbishing including all civil materials of cable duct/floor for installation of HT/LT panel/ transformer plinth shall be included in the scope of work. The contractor shall also arrange water at his own cost for refurbishing work. Nothing shall be paid extra on this account.
	(x)	It is the responsibility of contractor to obtain permission form Delhi traffic police for plying vehicle in NDMC area for cartage of material, however a letter shall be issued to the contractor by Engineer-in-charge for getting permission from Delhi traffic police.
	(xi)	No additional space shall be provided to accommodate the equipment. The bidder should visit each site to ascertain site condition and ensure space compatibility and offer equipment fit in the available space with proper clearance as per specifications and standards.
	(xii)	Performance of the equipments to be installed in this project should be proven for at least 3 year for successful operation. The bidder shall submit the performance certificate of successful operation of particular make and model of equipment to be used in this project for at least 10% of quantity mentioned in the BOQ.
	(xiii)	NDMC shall have the right to retain some of the dismantled equipments including the equipment which have serve their useful life less than 10 years The contractor shall transport the retain dismantled equipments to the place informed by NDMC free of cost.
	(xiv)	It is the duty of contractor to provide security for watch-n-ward of the new as well as dismantled equipments. In case of theft, the contractor will lodge FIR in nearest Police Station. In case of theft of some equipment/material/part, the contractor shall provide new equipment/material/part to complete the work without any delay.
	(xv)	The L-1 bidder shall be decided after considering the amount of credit given by the bidder in the price bid.
	(xvi)	The contractor will installed and commission Distribution transformers/H.T panels/L.T panels available with department at the location directed by Engineer – in – charge. The contractor will paid accordingly as per quoted rate for the item in tender except supply of equipment

----- End of Section-V (SCC) -----



LIST OF ELIGIBLE SCHEDULED COMMERCIAL PRIVATE INDIAN BANKS

Sl. No.	Name of Banks
1	HDFC Bank Ltd.
2	Axis Bank Ltd.
3	Kotak Mahindra Bank Ltd.
4	Federal Bank Ltd.
5	Indusind Bank Ltd.
6	Development Credit Bank Ltd.
7	ING Vysya Bank Ltd.
8	Karnataka Bank Ltd.
9	Karur Vysya Bank Ltd.
10	Ratnakar Bank Ltd.
11	South Indian Bank Ltd.
12	Yes Bank Ltd.
13	ICICI Bank

VOLUME-I: SECTION – VI

SAMPLE FORMS AND PROCEDURES  
(FORMS)

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## SAMPLE FORMS AND PROCEDURES (FORMS)

### Preamble

This Section (Section –VI) of the Bidding Documents [named as Sample Forms and Procedures (FORMS)] provides proforma to be used by the bidders at the time of their bid preparation and by the Contractor subsequent to the award of Contract.

The Bidder shall complete, sign and submit with its bid the relevant FORMS to be used un-amended, in accordance with the requirements included in the Bidding Documents.

The Bidder shall provide the Bid Security, either in the form included hereafter or in another form acceptable to the Employer, pursuant to the provisions in the instructions to Bidders.

The Form of Contract Agreement shall be used un-amended, except for the need to complete Article 1.1 (Contract Documents), as appropriate and as may be required to suit the specific requirement of the Contract. The form shall also include the Appendices listed, as required, which should be completed according to the instructions for their completion provided at the beginning of each Appendix. The Price Schedule deemed to form part of the contract shall be modified according to any corrections or modifications to the accepted bid resulting from price corrections, pursuant to the provisions of the Instructions to Bidders.

The Performance Security(ies) and Bank Guarantee for Advance Payment forms should not be completed by the bidders at the time of their bid preparation. Only the successful Bidder will be required to provide the Performance Security(ies) and Bank Guarantee for Advance Payment, according to one of the forms indicated herein or in another form acceptable to the Employer and pursuant to the provisions of the General and Special Conditions of Contract, respectively.

Depending on specific facts and circumstances related to the Bid, other specific agreement, if any, and the contract, the text of the Forms herein may need to be modified to some extent. The Employer reserves the right to make such modifications in conformity with such specific facts and circumstances and rectify and consequent discrepancies, if any. However, modifications, if any, to the text of the Forms that may be required in the opinion of the Bidder/Contractor shall be effected only if the same is approved by the Employer. The Employer's decision in this regard shall be final and binding.

1. BID FORMS AND PRICE SCHEDULES

1.1 Bid Form

Please see Volume – II.

1.2 Price Schedule

Please see Volume – II.

2. BID SECURITY FORM

(To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper should be in the name of the issuing Bank)

Bank Guarantee No.: .....

Date: .....

To: (insert Name and Address of Employer)

WHEREAS M/s. .... (insert name of Bidder)..... having its Registered/Head Office at .... (insert address of the Bidder) ..... (hereinafter called "the Bidder") has submitted its Bid for the performance of the Contract for.....(insert name of the Package).....under.....(insert Specification No)..... (hereinafter called "the Bid")

KNOW ALL PERSONS by these present that WE ..... (insert name & address of the issuing bank) ..... having its Registered/Head Office at .....(insert address of registered office of the bank)..... (hereinafter called "the Bank"), are bound unto .....(insert name of Employer)..... (hereinafter called "the Employer") in the sum of .....(insert amount of Bid Security in figures & words)..... for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents.

Sealed with the Common Seal of the said Bank this ..... day of ..... 20....

THE CONDITIONS of this obligation are:

- (1) If the Bidder withdraws its bid during the period of bid validity specified by the Bidder in the Bid Form; or
- (2) In case the Bidder does not withdraw the deviations proposed by him, if any, at the cost of withdrawal stated by him in the bid and/or accept the withdrawals/rectifications pursuant to the declaration/confirmation made by him in Attachment – Declaration of the Bid; or
- (3) If the Bidder does not accept the corrections to arithmetical errors identified during preliminary evaluation of his bid pursuant to ITB Clause 27.2; or
- (4) If, as per the requirement of Qualification Requirements the Bidder is required to submit a Deed of Joint Undertaking and he fails to submit the same, duly attested by Notary Public of the place(s) of the respective executant(s) or registered with the Indian Embassy/High Commission in that Country, within ten days from the date of intimation of post – bid discussion; or
- (5) in the case of a successful Bidder, if the Bidder fails within the specified time limit
  - (i) to sign the Contract Agreement, in accordance with ITB Clause 33, or
  - (ii) to furnish the required performance security, in accordance with ITB Clause 34.or
- (6) In any other case specifically provided for in ITB.

WE undertake to pay to the Employer up to the above amount upon receipt of its first written demand, without the Employer having to substantiate its demand, provided that in its demand the Employer will note that the amount claimed by it is due to it, owing to the occurrence of any of the above-named CONDITIONS or their combination, and specifying the occurred condition or conditions.

This guarantee will remain in full force up to and including ..... (insert date, which shall be the date 30 days after the period of bid validity)....., and any demand in respect thereof must reach the Bank not later than the above date.

For and on behalf of the Bank

[Signature of the authorised signatory(ies)]

Signature\_\_\_\_\_

Name\_\_\_\_\_

Designation\_\_\_\_\_

POA Number\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

Fax Number\_\_\_\_\_

email \_\_\_\_\_

Common Seal of the Bank\_\_\_\_\_

Witness:

Signature\_\_\_\_\_

Name\_\_\_\_\_

Address\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

email \_\_\_\_\_

Note:

1. In case the bid is submitted by a Joint Venture, the bid security shall be in the name of the Joint Venture and not in the name of the Lead Partner or any other Partner(s) of the Joint Venture.
2. The Bank Guarantee should be in accordance with the proforma as provided. However, in case the issuing bank insists for additional paragraph for limitation of liability, the following may be added at the end of the proforma of the Bank Guarantee [i.e., end paragraph of the Bank Guarantee preceding the signature(s) of the issuing authority(ies) of the Bank Guarantee]:

Quote

“Notwithstanding anything contained herein:

1. Our liability under this Bank Guarantee shall not exceed \_\_\_\_\_ (value in figures)\_\_\_\_\_  
[\_\_\_\_\_ (value in words)\_\_\_\_\_].
2. This Bank Guarantee shall be valid upto \_\_\_\_\_ (validity date)\_\_\_\_\_.

3. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only & only if we receive a written claim or demand on or before \_\_\_\_\_ (validity date) \_\_\_\_\_."

Unquote



3a. FORM OF NOTIFICATION BY THE EMPLOYER TO THE BANK  
(Applicable for Forfeiture of Bank Guarantee)

To: (insert Name and Address of the issuing Bank)

Ref.: Forfeiture of Bid Security Amount against Bank Guarantee No. .... dated ..... for .....,  
issued by you on behalf of M/s. ....(insert name of the Bidder) .....

Dear Sirs,

Please refer to the subject Bank Guarantee executed by you in our favour for ..... as Bid Security for  
the bid submitted by M/s. ....(insert name of the Bidder) ..... against .... (insert name of the Package)  
..... ; Specification No. ....

As per the terms of the said guarantee, the bank has guaranteed and undertaken to pay immediately on demand  
by the Employer the amount of ..... without any reservation, protest, demur and recourse. Further, any  
demand made by the Employer shall be conclusive and binding on the Bank irrespective of any dispute or difference  
raised by the Bidder.

In terms of the said guarantee, we hereby submit our claim/demand through this letter for remittance of Bid  
Security amount to .... (insert name of the Employer) ..... owing to the occurrence of the condition referred to  
at Sl. No. .... The Bank is requested to remit the full guaranteed sum ..... towards proceeds of the  
bid security in the form of Demand Draft in favour of '.... (insert name of the Employer) .....', payable at ....(insert  
place of the Employer)....'.

Thanking you,

For.....(Name of the Employer)

(AUTHORISED SIGNATORY)

Copy to:

.....(Registered Office of the Bank)....

3b. FORM OF NOTIFICATION BY THE EMPLOYER TO THE BANK  
(Applicable for conditional claim pending extension of Bank Guarantee by the Bidder)

To: (insert Name and Address of the issuing Bank)

Ref.: Conditional Claim against Bank Guarantee No. .... dated ..... for ..... valid up to  
..... issued by you on behalf of M/s. ....(insert name of the Bidder) .....

Dear Sirs,

Please refer to the subject Bank Guarantee executed by you in our favour on behalf of M/s. ....(insert name of the Bidder) ....., who have submitted this Bank Guarantee to us towards Bid Security against .... (insert name of the Package) ..... ; Specification No. ....

We, ..... (insert name of the Employer) ..... do hereby request you to lodge our claim/demand against the subject Bank Guarantee for full guaranteed sum. Kindly note that this claim/demand against the subject Bank Guarantee is without any further notice in case the amendment to Bank Guarantee No. .... dated ..... extending its validity upto ..... is not got arranged by .....(insert name of the Bidder) ..... in our favour and are not received by us upto ..... In such an event you are requested to remit the full guaranteed amount in terms of the subject guarantee in its letter and spirit and proceeds of this Bank Guarantee shall be forwarded to us in form of demand draft in favour of '.... (insert name of the Employer) ....., payable at ....(insert place of the Employer)....'.

This is without prejudice to our right under this guarantee and under the law.

Thanking you,

For.....(Name of the Employer)

(AUTHORISED SIGNATORY)

Copy to:  
(insert Name and Address of the Bidder)

- You are requested to do the needful so that the amendment to the subject Bank Guarantee extending the validity up to ..... is received by us by .....

4. FORM OF 'NOTIFICATION OF AWARD OF CONTRACT'

4a. FORM OF 'NOTIFICATION OF AWARD OF CONTRACT' FOR SUPPLY OF PLANT AND EQUIPMENT

Ref. No. :

Date :

.....(insert Contractor's Name & Address).....

.....

.....

.....

[in case of Joint Venture, the aforesaid details shall be of the Lead Partner and the following shall also be included:  
(Lead Partner of the Joint Venture of M/s. .... and M/s. ....)]

Attn : Mr.....

Sub. : Notification of Award for Ex-works Supply Contract for ..... (insert name of the Package) .....  
Specification No.: ..... Domestic Competitive Bidding. (Project Funding: Domestic).

Dear Sir,

1.0 REFERENCE

This has reference to the following:

1.1 Our Invitation for Bids (IFB) dated .....

1.2 Bidding documents for the subject package issued to you vide our letter Ref. No. .... dated ....., comprising the following:

a) Conditions of Contract Volume-I  
(Document Code No. ....)

b) Technical Specifications, Drawings Volume-II  
(Document Code No. ....)

c) Bid Form, Price Schedules Volume-III  
& Technical Data Sheets  
(Document Code No. ....)

1.2.1 Amendment/Errata No. .... to Bidding Documents issued to you vide our letter no. .... dated .....  
(Applicable only if any Errata/Amendment to the Bidding Documents has been issued subsequently)

1.2.2 Clarifications to the Bidding Documents, pursuant to pre-bid conference held on ....., issued to you  
vide our letters no. .... dated ..... (Use as applicable)  
(Applicable only if any clarification to the Bidding Documents has been issued subsequently)

(INCLUDE AS FURTHER SUB-PARAGRAPHS ANY OTHER CORRESPONDENCE MADE TO THE BIDDER  
AFTER ISSUANCE OF BIDDING DOCUMENTS UP TO BID OPENING)

1.3 First envelope of your Bid submitted/the Bid submitted by the Joint Venture (JV) of M/s. ....  
(Lead Partner) and M/s. .... (Other Partner) for the subject package under Proposal  
reference no. .... dated ..... was opened on ..... (Use as applicable)

- 1.4 Intimation for Opening of Price Schedule issued to you vide our letter no. .... dated .....
- 1.5 Your Bid/the Bid by the Joint Venture (JV) of M/s. .... (Lead Partner) and M/s. .... (Other Partner) under proposal reference no. .... dated ..... was opened on.....(Use as applicable)
- 1.6 Post bid discussions we had with you on various dates from ..... to ..... resulting into the Minutes of Meeting/ Record Notes of Post Bid Discussions enclosed as APPENDIX (NOA)-1 with this Notification of Award.

2.0 AWARD OF CONTRACT AND ITS SCOPE

- 2.1 We confirm having accepted your Bid/Bid of the Joint Venture (JV) of M/s. .... (Lead Partner) and M/s. .... (Other Partner) (Use as applicable) (referred to at para 1.3 & 1.5 above) read in conjunction with all the specifications, terms & conditions of the Bidding Documents (referred to at para 1.2, 1.2.1 & 1.2.2 [modify as applicable] above) and specific confirmations recorded in the Record Notes of Post Bid Discussions (referred to at para 1.6 above), and award on you/the JV (use as applicable) the 'Ex-works Supply Contract' (also referred to as the 'First Contract') covering inter-alia Ex-works supply of all equipment and materials including Type Testing to be conducted, required for the complete execution of the ..... (insert name of Package alongwith name of the Project) ....., as detailed in the documents referred hereinabove. The scope of work inter-alia includes the following:

..... (Indicate brief Scope of Work) .....

The scope of work under this Notification of Award (NOA) shall also include all such items which are not specifically mentioned in the Bidding Documents and/or your bid but are necessary for the successful completion of your scope under the Contract for the construction of ..... (insert name of Package alongwith name of the Project) ....., unless otherwise specifically excluded in the Bidding Documents or in this NOA.

- 2.1.1 You, the Lead Partner of the JV, along with M/s. ...., the Other Partner of JV, shall be liable jointly and severally for the execution of the Contract in accordance with terms and conditions of the Contract. As per the Power of Attorney furnished in your favour by the Joint Venture, as enclosed with Bid Proposal of the JV, you shall act as the Partner In-charge (Lead Partner) of the above Joint Venture for execution of the Contract. (This provision shall be included only in case the Bidder is a Joint Venture)

- 2.2 The notification for award of Contract for performance of all other activities, as set forth in the Bidding Documents, viz.

..... (Indicate brief scope of work of the Second Contract) .....

has been issued on you vide our NOA no. .... dated ..... (hereinafter called the "Second Contract" or "Services Contract").

Notwithstanding the award of work under two separate Contracts in the aforesaid manner, you/the JV (use as applicable) shall be overall responsible to ensure the execution of both the Contracts to achieve successful completion and taking over of the works under the package by the Employer as per the requirements stipulated in the Bidding Documents. It is expressly understood and agreed by you/the JV (use as applicable) that any default or breach under the 'Second Contract' shall automatically be deemed as a default or breach of this 'First Contract' also and vice-versa, and any such default or breach or occurrence giving us a right to terminate the 'Second Contract', either in full or in part, and/or recover damages there under, shall give us an absolute right to terminate this Contract, at your/JV's (use as applicable) risk, cost and responsibility, either in full or in part and/or recover damages under this 'First Contract' as well. However, such default or breach or occurrence in the 'Second Contract', shall not automatically relieve you/the JV (use as applicable) of any of your/JV's (use as applicable) obligations

under this 'First Contract'. It is also expressly understood and agreed by you/the JV (use as applicable) that the equipment/materials supplied by you/the JV (use as applicable) under this 'First Contract', when erected, installed & commissioned by you under the 'Second Contract' shall give satisfactory performance in accordance with the provisions of the Contract.

3.0 CONTRACT PRICE

3.1 The total Contract Price for the entire scope of work under this Contract shall be ..... (Specify the currency and the amount in figures & words) ..... as per the following break-up:

Sl. No.	Price Component	Amount
1.	Ex-Works Price component	
2.	Type Test Charges	Not Applicable
Total for Ex-works Supply Contract		

3.2 Notwithstanding the break-up of the Contract Price, the Contract shall, at all times, be construed as a single source responsibility Contract and any breach in any part of the Contract shall be treated as a breach of the entire Contract.

4.0 You/The JV (use as applicable) are/is required to furnish at the earliest a Performance Security(ies), as per the Bidding Documents, for an amount of ..... (Specify the value) ..... i.e. equal to 10% (Ten percent) of the Contract Price, and valid upto and including ..... and any other securities as per the Bidding Documents.

(In case any other performance security is required to be furnished, the same is to be mentioned here)

5.0 For release of advance payment (admissible as per the Bidding Documents) equal to .....% of the Ex-works Price component of the Contract Price, you are, inter-alia, required to furnish a Bank Guarantee for the equivalent advance amount. The validity of the Advance Bank Guarantee shall be up to and including ..... Further, please note that furnishing of all the Contract Performance Securities under the 'First Contract' and 'Second Contract' shall be one of the conditions precedent to release of advance under this Contract.

6.0 All the bank guarantees shall be furnished from an eligible bank as described in the Bidding Documents.

7.0 The schedule for Taking Over/Completion of Facilities by the Employer upon successful completion of the ..... (insert name of Package alongwith name of the Project) .... shall be ... (indicate the completion schedule) .... months from the date of issue of this Notification of Award for all contractual purposes.

8.0 This Notification of Award constitutes formation of the Contract and comes into force with effect from the date of issuance of this Notification of Award.

9.0 You shall enter into a Contract Agreement with us within twenty-eight (28) days from the date of this Notification of Award.

10.0 This Notification of Award is being issued to you in duplicate. We request you to return its duplicate copy duly signed and stamped on each page including the enclosed Appendix as a token of your acknowledgement.

Please take the necessary action to commence the work and confirm action.

Yours faithfully,

For and on behalf of

.....(Name of the Employer).....

(Authorised Signatory)

Enclosures:

APPENDIX (NOA) – 1

- Record Notes of Post - Bid Discussions held on various dates from ..... to .....

4b. FORM OF 'NOTIFICATION OF AWARD OF CONTRACT' FOR INSTALLATION OF PLANT AND EQUIPMENT

Ref. No. :

Date :

.....(Insert Contractor's Name & Address).....

.....

.....

[in case of Joint Venture, the aforesaid details shall be of the Lead Partner and the following shall also be included:  
(Lead Partner of the Joint Venture of M/s. .... and M/s. ....)]

Attn : Mr.....

Sub. : Notification of Award for Services Contract for ..... (insert name of the Package) ..... Specification  
No.: ..... Domestic Competitive Bidding. (Project Funding: Domestic).

Dear Sir,

1.0 REFERENCE

This has reference to the following:

1.1 Our Invitation for Bids (IFB) dated .....

1.2 Bidding documents for the subject package issued to you vide our letter Ref. No. .... dated  
....., comprising the following:

a) Conditions of Contract Volume-I  
(Document Code No. ....)

b) Technical Specifications Volume-II  
(Document Code No. ....)

c) Bid Form, Price Schedules Volume-III  
& Technical Data Sheets  
(Document Code No. ....)

1.2.1 Amendment/Errata No. .... to Bidding Documents issued to you vide our letter no. .... dated .....  
(Applicable only if any Errata/Amendment to the Bidding Documents has been issued subsequently)

1.2.2 Clarifications to the Bidding Documents, pursuant to pre-bid conference held on ....., issued to you  
vide our letters no. .... dated ..... (Use as applicable)  
(Applicable only if any clarification to the Bidding Documents has been issued subsequently)

(INCLUDE AS FURTHER SUB-PARAGRAPHS ANY OTHER CORRESPONDENCE MADE TO THE BIDDER  
AFTER ISSUANCE OF BIDDING DOCUMENTS UP TO BID OPENING)

1.3 First envelope of your Bid submitted/the Bid submitted by the Joint Venture (JV) of M/s. ....  
(Lead Partner) and M/s. .... (Other Partner) for the subject package under Proposal  
reference no. .... dated ..... was opened on ..... (Use as applicable)

1.4 Intimation for Opening of Price Schedule issued to you vide our letter no. .... dated .....

1.5 Your Bid/the Bid by the Joint Venture (JV) of M/s. .... (Lead Partner) and M/s. .... (Other Partner) under proposal reference no. .... dated ..... was opened on.....(Use as applicable)

1.6 Post bid discussions we had with you on various dates from ..... to ..... resulting into the Minutes of Meeting/ Record Notes of Post Bid Discussions enclosed as APPENDIX (NOA)-1 with this Notification of Award.

2.0 AWARD OF CONTRACT AND ITS SCOPE

2.1 We confirm having accepted your Bid/Bid of the Joint Venture (JV) of M/s. .... (Lead Partner) and M/s. .... (Other Partner) (Use as applicable) (referred to at para 1.3 & 1.5 above) read in conjunction with all the specifications, terms & conditions of the Bidding Documents (referred to at para 1.2, 1.2.1 & 1.2.2 [modify as applicable] above) and specific confirmations recorded in the Record Notes of Post Bid Discussions (referred to at para 1.6 above), and award on you/the JV(use as applicable) the 'Services Contract' (also referred to as the 'Second Contract') for performance of all other activities, as set forth in the documents, viz. .... (Indicate brief scope of work) ..... for the ..... (insert name of Package alongwith name of the Project)....

The scope of work under this Notification of Award (NOA) shall also include all such items which are not specifically mentioned in the Bidding Documents and/or your bid but are necessary for the successful completion of your scope under the Contract for the construction of ..... (insert name of Package alongwith name of the Project) ....., unless otherwise specifically excluded in the Bidding Documents or in this NOA.

2.1.1 You, the Lead Partner of the JV, along with M/s. ...., the Other Partner of JV, shall be liable jointly and severally for the execution of the Contract in accordance with terms and conditions of the Contract. As per the Power of Attorney furnished in your favour by the Joint Venture, as enclosed with Bid Proposal of the JV, you shall act as the Partner In-charge (Lead Partner) of the above Joint Venture for execution of the Contract. (This provision shall be included only in case the Bidder is a Joint Venture)

2.2 The notification for award of Contract for Ex-works Supply of all equipment and materials including Type Testing to be conducted, as set forth in the - documents, viz.

..... (Indicate brief scope of work of the First Contract) .....

has been issued on you vide our NOA no. .... dated ..... (hereinafter called the "Ex-works Supply Contract" or "First Contract").

Notwithstanding the award of work under two separate Contracts in the aforesaid manner, you/the JV (use as applicable) shall be overall responsible to ensure the execution of both the Contracts to achieve successful completion and taking over of the works under the package by the Employer as per the requirements stipulated in the Bidding Documents. It is expressly understood and agreed by you/the JV(use as applicable) that any default or breach under the 'First Contract' shall automatically be deemed as a default or breach of this 'Second Contract' also and vice-versa, and any such default or breach or occurrence giving us a right to terminate the 'First Contract', either in full or in part, and/or recover damages there under, shall give us an absolute right to terminate this Contract, at your/JV's (use as applicable) risk, cost and responsibility, either in full or in part and/or recover damages under this 'Second Contract' as well. However, such default or breach or occurrence in the 'First Contract', shall not automatically relieve you/the JV(use as applicable) of any of your obligations under this 'Second Contract'. It is also expressly understood and agreed by you/the JV(use as applicable) that the equipment/materials supplied by you/the JV(use as applicable) under the 'First Contract', when erected, installed & commissioned by you/the JV(use as applicable) under this 'Second Contract' shall give satisfactory performance in accordance with the provisions of the Contract.



3.0 CONTRACT PRICE

3.1 The total Contract Price for the entire scope of work under this Contract shall be ..... (Specify the currency and the amount in figures & words) ..... as per the following break-up:

Sl. No.	Price Component	Amount
1.	Local Transportation, Insurance and other Incidental Services (including port clearance etc)	
2.	Installation Services	
3.	Training Charges	Not Applicable
Total for Services Contract		

3.2 Notwithstanding the break-up of the Contract Price, the Contract shall, at all times, be construed as a single source responsibility Contract and any breach in any part of the Contract shall be treated as a breach of the entire Contract.

4.0 You/the JV(use as applicable) are/is required to furnish at the earliest a Performance Security(ies), as per the Bidding Documents, for an amount of ..... (Specify the value) ..... i.e. equal to 10% (Ten percent) of the Contract Price, and valid upto and including ..... and any other securities as per the Bidding Documents.

(In case any other performance security is required to be furnished, the same is to be mentioned here)

5.0 All the bank guarantees shall be furnished from an eligible bank as described in the Bidding Documents.

6.0 The schedule for Taking Over/Completion of Facilities by the Employer upon successful completion of the ..... (insert name of Package alongwith name of the Project) .... shall be ... (indicate the completion schedule) .... months from the date of issue of this Notification of Award for all contractual purposes.

7.0 This Notification of Award constitutes formation of the Contract and comes into force with effect from the date of issuance of this Notification of Award.

8.0 You shall enter into a Contract Agreement with us within twenty-eight (28) days from the date of this Notification of Award.

9.0 This Notification of Award is being issued to you in duplicate. We request you to return its duplicate copy duly signed and stamped on each page including the enclosed Appendix as a token of your acknowledgement.

Please take the necessary action to commence the work and confirm action.

Yours faithfully,

For and on behalf of

.....(Name of the Employer).....

(Authorised Signatory)

Enclosures:

APPENDIX (NOA) – 1 - Record Notes of Post - Bid Discussions held on various dates from ..... to .....

Note:

- (1) Instructions indicated in italics in this notification of award are to be taken care of by the issuing authority. The Forms may be modified appropriately to suit the specific requirement of the Contract.

5. FORM OF CONTRACT AGREEMENT

[Alternative – a]

SUPPLY CONTRACT AGREEMENT BETWEEN ..... (Name of Employer) ..... AND M/s. ....  
(Name of Contractor) ...../JOINT VENTURE (JV) OF M/s. .... (Name of Lead Partner).... (THE LEAD  
PARTNER OF THE JV) AND M/s. ....(Name of Other Partner)..... (THE PARTNER OF THE JV) [Use as applicable]

THIS CONTRACT AGREEMENT No. .... (also referred to as 'Ex-Works Supply Contract/the First Contract')  
is made on the .... day of ..... 20.....

BETWEEN

(1) ..... (Name of Employer)..... a company incorporated under the laws of Companies Act  
1956/2013 (with amendment from time to time) and having its Registered Office at .....(registered address of  
the Employer) ..... and its Corporate Office at .....(address of the Employer)..... (hereinafter  
called "the Employer" and also referred to as ".....(insert abbreviated name of the Employer) .....")

and

(2) M/s ..... (Name of Contractor) ....., a company incorporated under the laws of Companies Act  
1956/2013 (with amendment from time to time) and having its Principal place of business at .....(Address of  
Contractor) ..... and Registered Office at .....(Registered address of Contractor) .....  
(hereinafter called "the Contractor" and also referred to as ".....(insert abbreviated name of the Contractor) .....")

or

Joint Venture (JV) of M/s ..... (Name of Lead Partner) ..... (the Lead Partner of JV), a company  
incorporated under the laws of Companies Act 1956 and having its Principal place of business at .....(Address  
of Lead Partner) ..... and Registered Office at .....(Registered address of Lead Partner)  
..... and M/s ..... (Name of Other Partner) ..... (the Partner of JV), a company  
incorporated under the laws of Companies Act 1956/2013 (with amendment from time to time) and having its  
Principal place of business at .....(Address of Other Partner) ..... and Registered Office at  
.....(Registered address of Other Partner) ..... (hereinafter called "the Contractor" and also  
referred to as "Joint Venture"/the 'JV"")  
(Applicable only in case of Joint Venture)

WHEREAS the Employer desires to engage the Contractor for the supply of all equipment and materials including  
taxes and duties as applicable, Type Testing to be conducted inter-alia including ..... (Indicate brief  
scope of work) ..... for the complete execution of the ..... (insert name of Package alongwith  
name of the Project)..... as detailed in the Contract Document ("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 GCC Clause 2.2)

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:

VOLUME – A

1. This Contract Agreement and the Appendices thereto.

2. Invitation for bids (Reference No..... dated.....)
3. Pre-bid clarification (Reference No..... dated.....)
4. Letter of Intent (Reference No..... dated.....)
5. Mutually agreed contract execution plan/PERT chart (Reference No..... dated.....)
6. Contract Performance Securities (Reference No..... dated.....)
7. Letter of Award (Reference No..... dated.....)

VOLUME – B

3. "Bidding Documents" comprising of the following:

The Bidding Document is a compilation of the following and shall include amendments.... to ....., if any, thereto:

- a. VOLUME – I: Condition of contract (Document Code No.: .....):
  - Section I: Invitation for Bid (Section - IFB)
  - Section II: Instructions to Bidders (Section – ITB)
  - Section III: Bid Data sheets (BDS)
  - Section IV: General Conditions of Contract (GCC)
  - Section V: Special Conditions of Contract (SCC)
  - Section VI: Sample Forms and Procedures (FP)
    1. Bid Form & Price Schedule
      - 1.1 Bid Form
      - 1.2 Price Schedule
    2. Bid Security Form
    3. Form of Notification by the Employer to the Bank
      - 3.a Applicable for forfeiture of Bank Guarantee
      - 3.b Applicable for conditional claim pending extension of Bank Guarantee by the bidder.
    4. Form of 'Notification of Award of Contract'
      - 4(a) Form of 'Notification of Award of Contract' for Supply of Plant and equipment
      - 4(b) Form of 'Notification of Award of Contract' for Installation of Plant and equipment
    5. Form of Contract Agreement
      - Alternative A
      - Alternative B
    - 5.1 Appendix-1: Terms and Procedures of Payment: Grid/Power Substation, and 11KV, Distribution Transformer, LT and Service connection
    - 5.2 Appendix-2: Price Adjustment
    - 5.3 Appendix-3: Insurance Requirements
    - 5.4 Appendix-4: Time Schedule
    - 5.5 Appendix-5: List of Approved Subcontractors
    - 5.6 Appendix-6: Scope of Works and Supply by the Employer
    - 5.7 Appendix-7: List of Document for Approval or Review
    - 5.8 Appendix-8: Guarantees, Liquidated Damages for Non-Performance
    6. Performance Security Form
    7. Bank Guarantee Form for Advance Payment
    8. Form of Taking over Certificate
    9. Form of Indemnity Bond to be executed by the Contractor for the Equipment handed over in one lot by Employer for performance of its contract

10. Form of Indemnity Bond to be executed by the Contractor for the Equipment handed over in installments by Employer For performance of its contract
11. Form of Authorisation Letter
12. Form of Trust Receipt for Plant, Equipment and Materials received
13. Form of Extension of Bank Guarantee
14. Form of Power of Attorney for Joint Venture
15. Form of Undertaking by the Joint Venture Partners
16. Format for Evidence of Access to or Availability of Credit/ Facilities
17. Form of Operational Acceptance
18. Form of Safety Plan to be submitted by the Contractor within sixty days of award of contract
19. Form of joint deed of undertaking by the Sub-contractor along with the bidder /contractor
20. Form of Certificate of Financial Parameters for QR

Section VII: Scope of works,

- b. VOLUME-II: Bid –Proposal Sheets (Document Code No.: .....):
  - Section I: Project Management System (PMS), Quality Assurance & Evaluation Mechanism, Documentation & PMA
  - Section II: Bid Forms
  - Section III: Price Schedules
- c. Volume-III: Technical Specifications, Drawings (Document Code No.: .....):
  - Section I: Technical Specifications
  - Section II: Tender Drawings
  - Section III: Technical Specifications for IPDS

#### VOLUME – C

#### 4. Bid Submitted by the Contractor.

(Only relevant extracts are attached herewith for easy reference. Should the circumstances warrant, the original Bid along with the enclosures thereof, shall be referred to.).

#### 1.2 Order of Precedence (Reference GCC 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 GCC Clause 1/SCC Clause 1)

#### 1.3.1 Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions of Contract/Special Conditions of Contract.

#### Article 2. Contract Price and Terms of Payment

#### 2.1 Contract Price (Reference GCC Clause 7)

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 ..... (amount in words) ..... (.....(amount in figures) .....), or such other sums as may be determined in accordance with the terms and conditions of the Contract. The break-up of the Contract price is as under:

Sl. No.	Price Component	Amount
1.	Ex-Works Price Component	
2.	Type Test Charges	Not Applicable
Total for Ex-Works Supply Contract		

The detailed break-up of Contract Price is given in the relevant Appendices hereto.

2.2 Terms of Payment (Reference GCC Clause 8)

The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in Appendix 1 (Terms and Procedures of Payment) hereto.

Article 3. Effective Date for Determining Time for Completion

3.1 Effective Date (Reference GCC Clause 1)

The Time of Completion of Facilities shall be determined from the date of the Notification of Award i.e., from .....

Article 4. Appendices

The Appendices listed in the List of Appendices, as mentioned below, shall be deemed to form an integral part of this Contract Agreement.

Reference in the Contract to any Appendix shall mean the Appendices attached hereto, and the Contract shall be read and construed accordingly.

List of Appendices

Appendix 1	Terms and Procedures of Payment
Appendix 2	Price Adjustment
Appendix 3	Insurance Requirements
Appendix 4	Time Schedule
Appendix 5	List of Approved Subcontractors
Appendix 6	Scope of Works and Supply by the Employer
Appendix 7	List of Document for Approval or Review
Appendix 8	Guarantees, Liquidated Damages for Non-Performance

Article 5.

The Contract Agreement No. .... has also been made on the ..... day of ..... 20...., between the Employer and the Contractor for the Services Contract (hereinafter referred to as the "Second Contract") for the subject package which includes performance of all the services interalia including ..... (Indicate brief scope of work) ..... for the complete execution of the ..... (insert name of Package alongwith name of the Project).....

Notwithstanding the award of contract under two separate contracts in the aforesaid manner, the Contractor shall be overall responsible to ensure the execution of both the contracts to achieve successful

completion and taking over of the facilities by the Employer as per the requirements stipulated in the Contract. It is expressly understood and agreed by the Contractor that any default or breach under the 'Second Contract' shall automatically be deemed as a default or breach of this 'First Contract' also and vice-versa and any such breach or occurrence or default giving the Employer a right to terminate the 'Second Contract' either in full or in part, and/or recover damages there under that Contract, shall give the Employer an absolute right to terminate this Contract at the Contractor's risk, cost and responsibility, either in full or in part and /or recover damages under this 'First Contract' as well. However, such breach or default or occurrence in the 'Second Contract' shall not automatically relieve the Contractor of any of its responsibility/ obligations under this 'First Contract'. It is also expressly understood and agreed by the Contractor that the equipment /materials supplied by the Contractor under this 'First Contract' when installed and commissioned by the Contractor under the 'Second Contract' shall give satisfactory performance in accordance with the provisions of the Contract.

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

5. FORM OF CONTRACT AGREEMENT

[Alternative – b]

SERVICES CONTRACT AGREEMENT BETWEEN ..... (Name of Employer) ..... AND M/s. ....  
(Name of Contractor) ...../JOINT VENTURE (JV) OF M/s. .... (Name of Lead Partner).... (THE LEAD  
PARTNER OF THE JV) AND M/s. ....(Name of Other Partner)..... (THE PARTNER OF THE JV) [Use as applicable]

THIS CONTRACT AGREEMENT No. .... (also referred to as 'Services Contract/the Second Contract') is  
made on the .... day of ..... 20....

BETWEEN

(1) ..... (Name of Employer)..... a company incorporated under the laws of Companies Act  
1956/2013 (with amendment from time to time) and having its Registered Office at .....(registered address of  
the Employer) ..... and its Corporate Office at .....(address of the Employer)..... (hereinafter  
called "the Employer" and also referred to as ".....(insert abbreviated name of the Employer) .....")

and

(2) M/s ..... (Name of Contractor) ....., a company incorporated under the laws of Companies Act  
1956/2013 (with amendment from time to time) and having its Principal place of business at .....(Address of  
Contractor) ..... and Registered Office at .....(Registered address of Contractor) .....  
(hereinafter called "the Contractor" and also referred to as ".....(insert abbreviated name of the Contractor) .....")

or

Joint Venture (JV) of M/s ..... (Name of Lead Partner) ..... (the Lead Partner of JV), a company  
incorporated under the laws of Companies Act 1956 and having its Principal place of business at .....(Address  
of Lead Partner) ..... and Registered Office at .....(Registered address of Lead Partner)  
..... and M/s ..... (Name of Other Partner) ..... (the Partner of JV), a company  
incorporated under the laws of Companies Act 1956/2013 (with amendment from time to time) and having its  
Principal place of business at .....(Address of Other Partner) ..... and Registered Office at  
.....(Registered address of Other Partner) ..... (hereinafter called "the Contractor" and also  
referred to as "Joint Venture"/the 'JV'")  
(Applicable only in case of Joint Venture)

WHEREAS the Employer desires to engage the Contractor for providing all the services inter-alia including  
..... (Indicate brief scope of work) ..... for the complete execution of the .....  
(insert name of Package alongwith name of the Project)..... as detailed in the Contract Document ("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 GCC Clause 2.2)

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:

VOLUME – A



1. This Contract Agreement and the Appendices thereto.
2. Invitation for bids (Reference No..... dated.....)
3. Pre-bid clarification (Reference No..... dated.....)
4. Letter of Intent (Reference No..... dated.....)
5. Mutually agreed contract execution plan/PERT chart (Reference No..... dated.....)
6. Contract Performance Securities (Reference No..... dated.....)
7. Letter of Award (Reference No..... dated.....)

VOLUME – B

3. “Bidding Documents” comprising of the following:

The Bidding Document is a compilation of the following and shall include amendments.... to ....., if any, thereto:

- a. VOLUME – I: Condition of contract (Document Code No.: .....):
  - Section I: Invitation for Bid (Section - IFB)
  - Section II: Instructions to Bidders (Section – ITB)
  - Section III: Bid Data sheets (BDS)
  - Section IV: General Conditions of Contract (GCC)
  - Section V: Special Conditions of Contract (SCC)
  - Section VI: Sample Forms and Procedures (FP)
    1. Bid Form & Price Schedule
      - 1.1 Bid Form
      - 1.2 Price Schedule
    2. Bid Security Form
    3. Form of Notification by the Employer to the Bank
      - 3.a Applicable for forfeiture of Bank Guarantee
      - 3.b Applicable for conditional claim pending extension of Bank Guarantee by the bidder.
    4. Form of ‘Notification of Award of Contract’
      - 4(a) Form of ‘Notification of Award of Contract’ for Supply of Plant and equipment
      - 4(b) Form of ‘Notification of Award of Contract’ for Installation of Plant and equipment
    5. Form of Contract Agreement
      - Alternative A
      - Alternative B
    - 5.1 Appendix-1: Terms and Procedures of Payment: Grid/Power Substation, and 11KV, Distribution Transformer, LT and Service connection
    - 5.2 Appendix-2: Price Adjustment
    - 5.3 Appendix-3: Insurance Requirements
    - 5.4 Appendix-4: Time Schedule
    - 5.5 Appendix-5: List of Approved Subcontractors
    - 5.6 Appendix-6: Scope of Works and Supply by the Employer
    - 5.7 Appendix-7: List of Document for Approval or Review
    - 5.8 Appendix-8: Guarantees, Liquidated Damages for Non-Performance
    6. Performance Security Form
    7. Bank Guarantee Form for Advance Payment
    8. Form of Taking over Certificate

9. Form of Indemnity Bond to be executed by the Contractor for the Equipment handed over in one lot by Employer for performance of its contract
10. Form of Indemnity Bond to be executed by the Contractor for the Equipment handed over in installments by Employer For performance of its contract
11. Form of Authorisation Letter
12. Form of Trust Receipt for Plant, Equipment and Materials received
13. Form of Extension of Bank Guarantee
14. Form of Power of Attorney for Joint Venture
15. Form of Undertaking by the Joint Venture Partners
16. Format for Evidence of Access to or Availability of Credit/ Facilities
17. Form of Operational Acceptance
18. Form of Safety Plan to be submitted by the Contractor within sixty days of award of contract
19. Form of joint deed of undertaking by the Sub-contractor along with the bidder /contractor
20. Form of Certificate of Financial Parameters for QR

Section VII: Scope of works

- d. VOLUME-II: Bid –Proposal Sheets (Document Code No.: .....):
  - Section I: Project Management System (PMS), Quality Assurance & Evaluation Mechanism, Documentation & PMA
  - Section II: Bid Forms
  - Section III: Price Schedules
- e. Volume-III: Technical Specifications, Drawings (Document Code No.: .....):
  - Section I: Technical Specifications
  - Section II: Tender Drawings
  - Section III: Technical Specifications for IPDS

#### VOLUME – C

#### 4. Bid Submitted by the Contractor.

(Only relevant extracts are attached herewith for easy reference. Should the circumstances warrant, the original Bid along with the enclosures thereof, shall be referred to.).

#### 1.2 Order of Precedence (Reference GCC 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 GCC Clause 1/SCC Clause 1)

- 1.3.1 Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions of Contract/Special Conditions of Contract.

#### Article 2. Contract Price and Terms of Payment

2.1 Contract Price (Reference GCC Clause 7)

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 ..... (amount in words) ..... (.....(amount in figures) .....), or such other sums as may be determined in accordance with the terms and conditions of the Contract. The break-up of the Contract price is as under:

Sl. No.	Price Component	Amount
1.	Local Transportation, Insurance and other Incidental Services	
2.	Installation Services	
3.	Training Charges (if required)	Not Applicable
Total for Services Contract		

The detailed break-up of Contract Price is given in the relevant Appendices hereto.

2.2 Terms of Payment (Reference GCC Clause 8)

The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in Appendix 1 (Terms and Procedures of Payment) hereto.

Article 3. Effective Date for Determining Time for Completion

3.1 Effective Date (Reference GCC Clause 1)

The Time of Completion of Facilities shall be determined from the date of the Notification of Award i.e., from .....

Article 4. Appendices

The Appendices listed in the List of Appendices, as mentioned below, shall be deemed to form an integral part of this Contract Agreement.

Reference in the Contract to any Appendix shall mean the Appendices attached hereto, and the Contract shall be read and construed accordingly.

List of Appendices

Appendix 1	Terms and Procedures of Payment
Appendix 2	Price Adjustment
Appendix 3	Insurance Requirements
Appendix 4	Time Schedule
Appendix 5	List of Approved Subcontractors
Appendix 6	Scope of Works and Supply by the Employer
Appendix 7	List of Document for Approval or Review
Appendix 8	Guarantees, Liquidated Damages for Non-Performance

Article 5.

The Contract Agreement No. .... has also been made on the ..... day of ..... 20...., between the Employer and the Contractor for the Ex-Works Supply Contract (hereinafter referred to as the "First Contract") for the subject package which includes Ex-works supply of all equipment and

materials including Type Testing to be conducted interalia including ..... (Indicate brief scope of work) ..... for the complete execution of the ..... (insert name of Package alongwith name of the Project).....

Notwithstanding the award of contract under two separate contracts in the aforesaid manner, the Contractor shall be overall responsible to ensure the execution of both the contracts to achieve successful completion and taking over of the facilities by the Employer as per the requirements stipulated in the Contract. It is expressly understood and agreed by the Contractor that any default or breach under the 'First Contract' shall automatically be deemed as a default or breach of this 'Second Contract' also and vice-versa and any such breach or occurrence or default giving the Employer a right to terminate the 'First Contract' either in full or in part, and/or recover damages there under that Contract, shall give the Employer an absolute right to terminate this Contract at the Contractor's risk, cost and responsibility, either in full or in part and /or recover damages under this 'Second Contract' as well. However, such breach or default or occurrence in the 'First Contract' shall not automatically relieve the Contractor of any of its responsibility/ obligations under this 'Second Contract'. It is also expressly understood and agreed by the Contractor that the equipment /materials supplied by the Contractor under the 'First Contract' when installed and commissioned by the Contractor under this 'Second Contract' shall give satisfactory performance in accordance with the provisions of the Contract.

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

Signed by for and  
on behalf of the Contractor

.....  
Signature

.....  
Signature

.....  
Title

.....  
Title

in the presence of

in the presence of

(Separate Contract Agreements shall be executed by the Employer and the Contractor in accordance with the Construction of the Contract stipulated at BDS Clause [ITB 30.4]. The forms of Contract under both Alternative i.e., a & b shall be used).

### Appendix-1: TERMS AND PROCEDURES OF PAYMENT

- I. "Billable Items" are worked out and attached to Price Schedule. Items otherwise required for completion of work but not listed in the Price Schedule shall also be in the scope of the contractor. The costs of such "Non- billable Items" may be included in the quoted price of "Billable Items" by the bidder in the Price Schedule. The payment shall be made on billable item wise basis only as indicated in Price Schedule.
  - II. The payment to the Contractor under the contract will be made by the Employer in line with Clause 8, Section GCC, Vol.-I and as per the guidelines and conditions specified hereunder.
  - III. All progressive payments shall be released on validity of Contract Performance Security and securities against Initial Advance.
  - IV. The interest rate on advance payment shall be SBI's Base rate on the date of disbursement of advance payment. The interest accrued on interest bearing advance shall be adjusted first before releasing any payment.
  - V. Upon award of the contract, contractor shall be free to take on the work at all the fronts or at specified fronts as advised by Project Manager.
  - VI. Unmeasured ad-hoc payment: In exigencies, to ensure liquidity of funds with the contractor, un-measured ad-hoc bill shall be accepted. In this method, following methodology shall be adopted:
    - a. Submission of certificate on measurement book by Project Manager that materials under consideration have been erected, tested and commissioned as per technical specification, scope of work & approved drawings.
    - b. Quantum and completion of works is certified by Project Manager jointly with contractor and eligible amount of such works are computed as per approved payment terms.
    - c. 50% of such eligible amount shall be released to the contractor immediately within a week. The amount of un-measured bill should not be more than average of previous two measured bill.
    - d. Next bill of the work shall invariably be a measured bill in which, various quantities of unmeasured bill shall be verified and measured jointly by Project Manager and contractor.
- A. Supply, Erection, Testing and Commissioning of works under IPDS:
1. Advance payment (Optional):
    - i. For Ex-works Supply contract, initial interest bearing adjustable Mobilization Advance of 15% of ex-works contract cost excluding taxes and duties shall be released for all the materials in two tranches of 7.5% each, First installment of 7.5% of ex-works price component shall be released on presentation of the following:
      - a. Unconditional acceptance of the Letter of Award and signing of contract agreement by the Contractor.
      - b. Contractor's detailed invoice.

- c. Submission and acceptance of unconditional & irrevocable part Bank Guarantees (as many number as proposed recovery installments and should be of 110% amount of each installment) in favor of employer with total amounting to 110% of total advance amount as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said Bank Guarantees shall be initially valid upto end of ninety (90) days after the scheduled month of supply of materials and shall be extended from time to time till ninety (90) days beyond revised scheduled month of supply of materials, as may be required under the Contract.
- d. An unconditional & irrevocable Bank Guarantee for ten percent (10%) of the total Contract price towards Contract Performance Guarantee (CPG) in accordance with the provisions of Clause 34.1, Section ITB and as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said bank guarantee shall be initially valid up to ninety (90) days after expiry of the Warranty Period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.
- e. Detailed PERT Network/Bar chart and its approval by the Employer.

The bidder must utilize first advance installment of 7.5% of ex-works supply component before requesting for second advance installment. Second installment of 7.5% shall be released on presentation of contractor's invoice and satisfactory utilization certificate of first advance installment.

- ii. For Services Contract, initial interest bearing adjustable Mobilization Advance of 10% of erection contract price excluding taxes and duties shall be released for all the works in two tranches of 5% each. First installment of 5% of total erection price shall be released on presentation of the following:
  - a. Submission of detailed invoice for advance payment.
  - b. Establishment of Contractor's site offices and certification by Engineer that satisfactory mobilization for erection exists.
  - c. Submission and acceptance of unconditional & irrevocable part Bank Guarantees (as many number as proposed recovery installments and should be of 110% amount of each installment) in favor of employer with total amounting to 110% of total advance amount as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said Bank Guarantees shall be initially valid up to end of ninety (90) days after the scheduled month of erection of materials and shall be extended from time to time till ninety (90) days beyond revised scheduled month of erection of materials, as may be required under the Contract.
  - d. Submission of an unconditional & irrevocable Bank Guarantee in favor of Employer for ten percent (10%) of the total Contract price towards Contract Performance Guarantee (CPG) in accordance with Clause 34.1 of Section-ITB, Vol.-I and as per proforma attached with Section-VI of Volume-I (Conditions of Contract). The said Bank Guarantee shall be initially valid up to 90 (ninety) days after the expiry of warranty period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.

The bidder must utilize first advance installment of 5% of total erection price before requesting for second advance installment. Second installment of 5% shall be released on presentation of contractor's invoice and satisfactory utilization certificate of first advance installment.

2. Progressive payments (Supply):

2.1. First Installment (60%) : Sixty percent (60%) payments against various items of price schedule 1 including 100% Excise Duty, Taxes etc shall be paid on receipt and acceptance of Materials on submission of documents indicated herein under:

- a. Unconditional acceptance of the Letter of Award and signing of contract agreement by the Contractor.
- b. An unconditional & irrevocable Bank Guarantee for ten percent (10%) of the total Contract price towards Contract Performance Guarantee (CPG) in accordance with the provisions of Clause 34.1, Section ITB and as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said bank guarantee shall be initially valid upto ninety (90) days after expiry of the Warranty Period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.
- c. Detailed Project Execution Plan/PERT chart and its approval by the Employer.
- d. Evidence of dispatch (R/R or receipted L/R)
- e. Contractor's detailed invoice & packing list identifying contents of each shipment.
- f. Invoice certifying payments of ED, Taxes for the direct transaction between Employer and Contractor,
- g. Copy of Certificate to the effect of payments of State/ Central taxes, duties, levies etc have been made against supply of materials through sub-vendors under the contract.
- h. Certified copy of Insurance policy/Insurance Certificate.
- i. Manufacturer's/Contractor's guarantee certificate of Quality.
- j. Material Dispatch Clearance Certificate (MDCC) / Dispatch Instructions (DI) for dispatch of materials from the manufacturer's works. MDCC/DI shall be issued by authorized officer of Employer
- k. Manufacturer's copy of challan
- l. submission of the certificate by the Employer's representative that the item(s) have been received,
- m. Submission of certificate by Project Manager that materials have been supplied as per technical specification, scope of work & approved drawings enclosing certified copy of inspection reports and dispatch clearances.

60% of proportionate Mobilization Advance against Supply shall be adjusted while making payments of this installment. In case of delay of project, the entire mobilization advance should get recovered from the contractor as per supply and erection contracts' works completion schedule respectively.

2.2. Second Installment (30%): Thirty percent (30%) payments against various items of price schedule 1 shall be paid on following conditions:

- a. Unconditional acceptance of the Letter of Award and signing of contract agreement by the Contractor.
- b. An unconditional & irrevocable Bank Guarantee for ten percent (10%) of the total Contract price towards Contract Performance Guarantee (CPG) in accordance with the provisions of Clause 34.1, Section ITB and as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said bank guarantee shall be initially valid upto ninety (90) days after expiry of the Warranty Period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.
- c. Detailed Project Execution Plan/PERT chart and its approval by the Employer.
- d. Evidence of dispatch (R/R or receipted L/R)
- e. Contractor's detailed invoice & packing list identifying contents of each shipment.
- f. Invoice certifying payments of ED, Taxes for the direct transaction between Employer and Contractor,
- g. Copy of Certificate to the effect of payments of State/ Central taxes, duties, levies etc have been made against supply of materials through sub-vendors under the contract.
- h. Certified copy of Insurance policy/Insurance Certificate.
- i. Manufacturer's/Contractor's guarantee certificate of Quality.
- j. Material Dispatch Clearance Certificate (MDCC) / Dispatch Instructions (DI) for dispatch of materials from the manufacturer's works. MDCC/DI shall be issued by authorized officer of Employer
- k. Manufacturer's copy of challan
- l. submission of the certificate on measurement book by the Project Manager that the item(s) have been received,
- m. Submission of certificate on measurement book by Project Manager that materials under consideration have been erected, tested and commissioned as per technical specification, scope of work & approved drawings.
- n. Test check certification on Measurement Book be recorded by officers in hierarchy with the claim as per policy.  
While releasing 2<sup>nd</sup> installment of 30% supply payment following adjustment shall be made:
  - a. Balance initial mobilization advance shall be adjusted. Also, up-to-date accrued interest shall also be recovered.
  - b. In case of delay of project, the entire mobilization advance shall get recovered at this stage.

2.3. Third and Final Installment (10%):



- a. The balance ten percent (10%) of payment against Supply contracts excluding Excise Duty, Taxes etc shall be reimbursable on successful supply, erection, testing and commissioning of the works in the project and issuance of Taking over Certificate by the Employer.
  - b. 'Commissioning' for the purpose of payments shall mean satisfactory completion of all supplies, erection, commissioning checks and successful completion of all site tests and continuous energisation of the equipment/ materials at rated voltage as per the Contract and to the satisfaction/approval of the Employer.
  - c. On submission of the certificate by the Project Manager that the item(s) have been received, erected, tested and commissioned.
  - d. On certification by Project Manager for validity of an unconditional & irrevocable Bank Guarantee for ten percent (10%) of the total Contract price towards Contract Performance Guarantee (CPG) in accordance with the provisions of Clause 34.1, Section ITB and as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said bank guarantee shall be initially valid upto ninety (90) days after expiry of the Warranty Period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.
  - e. In case, for any reason not attributable to the contractor, the commissioning and charging of equipment/materials is delayed beyond 120 days of successful completion of final checking and testing of works, the balance 10% payment shall be released against an unconditional & irrevocable bank guarantee of equivalent amount initially valid till 6 months from the readiness of works for commissioning and charging at rated voltage, to be extended till 90 days beyond actual commissioning & taking over.
3. Progressive payments (Erection):
- 3.1. First Installment (90%) : Ninety percent (90%) payments against Erection contracts shall be paid on erection, testing and commissioning of works and on submission of documents of all villages indicated herein under:
- a. Unconditional acceptance of the Letter of Award and signing of contract agreement by the Contractor.
  - b. Detailed Project Execution Plan/PERT chart and its approval by the Employer.
  - c. An unconditional & irrevocable Bank Guarantee for ten percent (10%) of the total Erection Contract price towards Contract Performance Guarantee (CPG) in accordance with the provisions of Clause 34.1, Section ITB and as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said bank guarantee shall be initially valid upto ninety (90) days after expiry of the Warranty Period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.
  - d. Certified copy of Insurance policy/Insurance Certificate.
  - e. Material reconciliation statement consisting of the materials utilized for erection, testing & commissioning vis-à-vis erection activity of the lot of villages.
  - o. Submission of certificate on measurement book by Project Manager that materials under consideration have been erected, tested and commissioned as per technical specification, scope of work & approved drawings.

- p. Test check certification on Measurement Book be recorded by officers in hierarchy with the claim as per policy.

While releasing 1<sup>st</sup> installment of 90% erection payment following adjustment shall be made:

- a. 100% Mobilization Advance against Erection shall be fully adjusted while making payments of first installment. Also, up-to-date accrued interest shall also be recovered.
- b. In case of delay of project, the entire mobilization advance shall get recovered from the contractor as per supply and erection contracts' works completion schedule respectively.

### 3.2. Second and Final Installment (10%):

- a. The balance ten percent (10%) of payment against Erection contracts excluding Excise Duty, Taxes etc as shall be released on successful commissioning of the works in the project and issuance of Taking over Certificate of the project.
- b. 'Commissioning' for the purpose of payments shall mean satisfactory completion of all supplies, erection, commissioning checks and successful completion of all site tests and continuous energisation of the equipment/ materials at rated voltage as per the Contract and to the satisfaction/approval of the Employer.
- c. On submission of the certificate by the Project Manager that the equipment/materials have been erected, tested and commissioned.
- d. On certification by Project Manager for validity of an unconditional & irrevocable Bank Guarantee for ten percent (10%) of the total Contract price towards Contract Performance Guarantee (CPG) in accordance with the provisions of Clause 34.1, Section ITB and as per proforma attached with Section-VI of Vol.-I (Conditions of Contract). The said bank guarantee shall be initially valid upto ninety (90) days after expiry of the Warranty Period and shall be extended from time to time till ninety (90) days beyond successful completion of warranty period, as may be required under the Contract.
- e. On certification of Project Manager for reconciliation of materials and payments.
- f. On certification of Project Manager that assets under the project are created and are taken over by Employer.
- g. However, in case, for any reason solely attributable to the Owner/Employer, the commissioning of equipment/materials is delayed beyond 120 days of successful completion of final checking and testing of line for the purpose of commissioning as defined in bid documents, the balance 10% payment shall be released against an unconditional & irrevocable bank guarantee of equivalent amount initially valid till 6 months from the readiness of transmission lines/ distribution transformer/ service connections for commissioning and charging at rated voltage, to be extended till 90 days beyond actual commissioning & taking over.

## Appendix-2: PRICE ADJUSTMENT

The prices for execution of the entire works covered under the scope of this work shall be quoted by the Bidder in the manner specified, in the BPS. The Ex-works price component, less advance will be subject to price adjustment, only for equipment/materials/items of work specifically stated under clause 1.0 below, (for which the bidder shall quote a base price), based on separate formulae as per price adjustment provisions given herein.

Prices for Ex-works price component for all other equipment/items except specified at Clause 1.0 below, Charges for Erection, Inland Freight & Insurance etc shall be FIRM and no price adjustment shall be applicable for these components for the entire duration of the Contract.

No price adjustment shall be applicable on the portion of the Contract Price payable to the Contractor as advance payment.

### 1.0 Materials and Labour portion:

#### 1.0.1 For ACSR Conductor

The price adjustment on the Ex-works price component, less advance, of Conductor shall be as follows:

$$dECc = ECc [0.80 \times \{(A_1 - A_0) / A_0\} + 0.05 \times \{(L_1 - L_0) / L_0\}]$$

Where,

dECc = Price adjustment amount payable on Ex-works price of Conductor, shipment-wise (if it works out negative, that would mean the amount to be recovered by the employer from the contractor).

ECc = Ex-works price for Conductor, shipment wise, less advance (Quoted Price)

A = Published price indices for EC grade aluminum ingots as published by IEEMA

L = All India consumer price index for industrial workers as published by Labour Bureau, Shimla (Govt. of India)

Fixed portion of the ex-works price component shall be 0.15. This shall not be subject to any adjustment.

In the above price adjustment formulae:

Subscript '0' refers to indices as on 30 days prior to date of bid opening (referred to as base date indices),  
Subscript '1' refers to indices as on 60 days prior to date of shipment.

#### 1.0.2 For Station/ Power Transformer (Copper Wound)

The price adjustment on the Ex-works price component, less advance, of Transformers shall be as follows:

##### 1.0.2.1 For power transformer (Copper wound)

$$dP = P_0 \times [0.15 + 0.23 \times (C_1/C_0) + 0.26 \times (ES_1/ES_0) + 0.08 \times (IS_1/IS_0) + 0.05 \times (IM_1/IM_0) + 0.11 \times (TB_1/TB_0) + 0.12 \times (L_1/L_0)] - P_0$$

Where,

- dP = Price adjustment amount shipmentwise,
- P0 = Ex-works price component of Transformer (Quoted Price),
- C, ES, IS, IM, TB & L are the price indices for material and labour as below,
- C = Price of copper wire bars, in Rupees per MT, as published by IEEMA,
- ES = Price of Electrical steel sheets, C&F price of M4 grade Electrical Steel Sheets in Rupees per MT, as published by IEEMA,
- IS (Iron & Steel) = Wholesale Price Index Number for 'Iron & Steel' (Base 2004-05 = 100), as published by IEEMA,
- IM (Insulating Materials) = Price of Insulating Materials, as published by IEEMA,
- TB = Price of Transformer Oil Base Stock (TOBS) in Rs./KL, as published by IEEMA,
- L = All India Average Consumer Price Index Number, for Industrial Workers (base 2001=100) as published / declared by Labour Bureau, Shimla, GOI and circulated by IEEMA.

In the above price adjustment formulae:

Subscript '0' refers to indices as on 30 days prior to date of bid opening (referred to as base date indices),

Subscript '1' refers to indices as on 60 days prior to date of shipment.

### 1.0.3 Station / Distribution Transformer (Aluminium Wound)

The price adjustment on the Ex-works price component, less advance, of Transformers shall be as follows:

1.0.3.1 For station/distribution transformer(Aluminium wound) (of rating up to 160 kVA and voltage up to 33 kV)

$$dP = P_0 \times [0.13 + 0.27 \times (A_1/A_0) + 0.31 \times (ES_1/ES_0) + 0.09 \times (IS_1/IS_0) + 0.02 \times (IM_1/IM_0) + 0.06 \times (TB_1/TB_0) + 0.12 \times (L_1/L_0)] - P_0$$

Where,

- dP = Price adjustment amount shipmentwise,
- P0 = Ex-works price component of Transformer (Quoted Price),
- C, ES, IS, IM, TB & L are the price indices for material and labour as below,
- A = Published price indices for EC grade aluminum ingots as published by IEEMA
- ES = Price of Electrical steel sheets, C&F price of M4 grade Electrical

Steel Sheets in Rupees per MT, as published by IEEMA,

IS (Iron & Steel) = Wholesale Price Index Number for 'Iron & Steel'  
(Base 2004-05 = 100), as published by IEEMA,

IM (Insulating Materials) = Price of Insulating Materials, as published by  
IEEMA,

TB = Price of Transformer Oil Base Stock (TOBS) in Rs./KL, as  
published by IEEMA,

L = All India Average Consumer Price Index Number, for Industrial  
Workers (base 2001=100) as published / declared by Labour Bureau, Shimla,  
GOI and circulated by IEEMA.

In the above price adjustment formulae:

Subscript '0' refers to indices as on 30 days prior to date of bid opening (referred to as base date indices),

Subscript '1' refers to indices as on 60 days prior to date of shipment.

#### 1.0.4 Cables

The price adjustment on the Ex-works price component, less advance, of Cables shall be as follows:

$$dP = P_0 \times \{0.85 + 0.15 \times (A_1/A_0)\} - P_0 + (M_1 - M_0),$$

Where,

dP = Price Adjustment amount per kilometer of cable,

P0 = Ex-works price per kilometer of cable (Quoted Price)

A = Price Index for PVC / XLPE as published by IEEMA,

M1-M0 = Change in metal component of the ex-works price of particular  
type and size of cable,

M = (Weight in MT of metal per kilometer of cable) x (published price  
index of metals per MT as published by IEEMA)

The bidder has to specify in his bid the metal component per km for each type and size of cable.

In the above price adjustment formulae:

Subscript '0' refers to indices as on 30 days prior to date of bid opening (referred to as base date indices),  
Subscript '1' refers to indices as on 60 days prior to date of shipment.

#### 1.0.5 Steel Structure

Steel structure (excluding nuts, bolts) used in fabrication work at various places in Sub-Transmission and Distribution network (such as lattice structure used in ST&D network/line, switchyard etc.), which are billable items in the Bill of quantity (BOQ) shall be covered under this head. The price adjustment formula for such structural steel items shall be as mentioned hereinafter.

The price component of the structural steel for any shipment/ dispatch comprises of a fixed portion (designated as 'F' and the value of which is specified hereunder) and a variable portion linked with the indices for respective materials and labour (description and co-efficient as enumerated below).

The amount of price adjustment towards variable portion payable/recoverable on each shipment/dispatch shall be computed as under:

$$EC = EC1 - EC0$$

EC1 will be computed as follows in any of appropriate manner as applicable (a or b or c):

a) For structure using both heavy and lighter angles:

$$EC1 = EC0 * [F + 0.18 * (HA1/HA0) + 0.40 * (LA1/LA0) + 0.16 * (Zn1/Zn0) + 0.11 * (L1/L0)]$$

b) For structure using only heavy angles:

$$EC1 = EC0 * [F + 0.58 * (HA1/HA0) + 0.16 * (Zn1/Zn0) + 0.11 * (L1/L0)]$$

c) For structure using only lighter angles:

$$EC1 = EC0 * [F + 0.58 * (LA1/LA0) + 0.16 * (Zn1/Zn0) + 0.11 * (L1/L0)]$$

Where

EC = Adjustment to Ex-Works price component payable to contractor for each shipment/dispatch

EC1 = Adjusted amount of Ex-works price component of Contract payable to Contractor for each shipment / dispatch.

EC0 = Ex-works price for the respective item of the Contract, Shipment/dispatch wise (quoted price).

F = Fixed portion of the ex-works/FOB component of the Contract Price (F) shall be 0.15.

HA = Price of Heavy angle steel, as published by IEEMA

LA = Price of Lighter angle steel, as published by IEEMA

Zn = Price of electrolytic high grade zinc, as published by IEEMA

L = All India average Consumer Price Index Number for Industrial Workers (base 2001=100) as published/declared by Labour Bureau, Shimla, Government of India and circulated by IEEMA.

For the indices, subscript 'o' refers to indices as on 30 days prior to date set for opening of bids. Subscript '1' refers to indices as of

- (a) two months/sixty (60) days prior to the date of shipment/dispatch for labour, and
- (b) at the expiry of two third (2/3) period from the date of Notification of Award to the date of shipment/dispatch, for material.

For the purpose of this clause the date of shipment/ dispatch shall mean the Schedule date of shipment/dispatch or actual date of shipment/dispatch, whichever is earlier. The schedule date of shipment/dispatch shall be as identified in line with provisions of Time Schedule in the Contract Agreement.

In case of shipments/ dispatches which are delayed beyond the schedule date of shipment/dispatch for reasons attributable to the Contractor, the price adjustment provision shall not be applicable for the period of time between the schedule date of shipment/dispatch and the actual date of shipment/dispatch.

Note: As per IEEMA Circular No. IEEMA(PVC)/TLT/(R)/02/2007-

- 1) Heavy Steel Angles of size 150mm\*150mm\*12mm as per IS-2062 has been categorized as Heavy Angles (HA).
- 2) Re-rolled steel angles of size 50mm\*50mm\*4 mm Lighter has been categorized as Lighter Angles (LA).
- 3) Input costs for all heavy angles of size above 110m\*110mm are deemed to be related to the price under Sr No.1.
- 4) Input costs for all lighter angles of size below & including 110m\*110mm are deemed to be related to the price under Sr No.2.

1.0.6 66/11 KV & 33/11 KV Switchgear (indoor/outdoor) including 66/33/11 KV Circuit Breakers, RMU, Sectionalizer and Isolators:

The Contract Price shall be subject to price adjustment during performance of the Contract to reflect changes in the cost of labour and material components in accordance with the provisions described below. The Ex-Works price of 66/11 KV & 33/11 KV Switchgear (Indoor/Outdoor), Circuit Breakers, RMU, Sectionalizer and Isolators excluding Mandatory Spares and Type Tests Charges (if any) will be subject to Price adjustment. The price adjustment formula for the components of the Contract Price, as mentioned above shall be as stipulated hereinafter.

The price component of the equipment for any shipment/ dispatch comprises of a fixed portion (designated as 'F' and the value of which is specified hereunder) and a variable portion linked with the indices for various materials and labour (description and co-efficient as enumerated below).

The amount of price adjustment towards variable portion payable/recoverable on each shipment/dispatch shall be computed as under:

$$EC = EC_1 - EC_0$$

EC<sub>1</sub> will be computed as follows:

$$EC_1 = EC_0 * [F + 0.17 * (IS_1/IS_0) + 0.18 * (C_1/C_0) + 0.10 * (AL_1/AL_0) + 0.13 * (ER_1/ER_0) + 0.17 * (L_1/L_0)]$$

Where

EC = Adjustment to Ex-Works price component payable to contractor for each shipment/dispatch

EC<sub>1</sub> = Adjusted amount of Ex-works price component of Contract payable to Contractor for each shipment / dispatch.

EC<sub>0</sub> = Ex-works price for the respective equipment of the Contract, shipment/dispatch wise.

F = Fixed portion of the ex-works/FOB component of the Contract Price (F) shall be 0.25.

IS = Wholesale Price Index Number for 'Iron & Steel' (Base 2004-05=100), as published by IEEMA

C = Price of copper wire bars, as published by IEEMA

AL = Price of EC grade Aluminium rods, as published by IEEMA

ER = Price of Insulating Materials (epoxy resin), as published by IEEMA

L = All India average Consumer Price Index Number for Industrial Workers (base 2001=100) as published/declared by Labour Bureau, Shimla, Government of India and circulated by IEEMA.

For the indices, subscript 'o' refers to indices as on 30 days prior to date set for opening of bids.

Subscript '1' refers to indices as of:

three months/ninety (90) days prior to the date of shipment/dispatch for labour, and

at the expiry of two third (2/3) period from the date of Notification of Award to the date of shipment/dispatch, for material.

For the purpose of this clause the date of shipment/dispatch shall mean the Schedule date of shipment/dispatch or actual date of shipment/dispatch, whichever is earlier. The schedule date of shipment/dispatch shall be as identified in line with provisions of Time Schedule in the Contract

Agreement.

In case of shipments/dispatches which are delayed beyond the schedule date of shipment/dispatch for reasons attributable to the Contractor, the price adjustment provision shall not be applicable for the period of time between the schedule date of shipment/dispatch and the actual date of shipment/dispatch.

- 1.0.7 The price adjustment amount towards price components of aforesaid materials i.e. conductor, transformers, cable, Steel structure and 66/11 KV & 33/11 KV Switchgear shall be subject to a ceiling of twenty percent (20%) of Ex-works price component of the corresponding Contract Price.
- 1.0.8 For the purpose of price adjustment for Ex-works price component, the date of shipment for goods shall mean the scheduled date of shipment or actual date of shipment, whichever is earlier. Scheduled date of shipment will be ex-works date of dispatch, governed by the approved Bar Chart.
- 1.0.9 No price increase shall be allowed beyond the original delivery dates unless specifically stated in the Time Extension letter, if any, issued by the Employer. The Employer will, however, be entitled to any decrease in the Contract price which may be caused due to lower price adjustment amount in case of delivery beyond the original delivery dates. Therefore, in case of delivery of goods beyond the original delivery dates, the liability of the Employer shall be limited to the lower of the price adjustment amount which may be worked out either on scheduled date or actual date of dispatch of goods.
- 1.0.10 In case of non-publication of applicable indices on a particular date, which happens to be the applicable date for price adjustment purposes, the published indices prevailing immediately prior to the particular date shall be applicable.
- 1.0.11 If the price adjustment amount works out to be positive, the same is payable to the Contractor by the Employer and if it works out to be negative, the same is to be recovered by the Employer from the Contractor without any ceiling.
- 1.0.12 The Contractor shall promptly submit the price adjustment invoices for the supplies made and works executed at site, positively within three (3) months from the date of shipment/work done whether it is positive or negative.
- 1.0.13 Bids shall conform to the price adjustment provisions detailed above. Bids specifying prices for items on variable basis run the risk of rejection. A bid submitted on a fixed price basis will not be rejected but the price adjustment will be treated as zero.



### Appendix-3 : INSURANCE REQUIREMENTS

**A) Insurances to be taken out by the Contractor**

In accordance with the provisions of GCC Clause 30, 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. The inability of the insurers to provide insurance cover in the sums and with the deductibles and other conditions as set forth below, shall not absolve the Contractor of his risks and liabilities under the provisions of GCC Clause 30. However, in such a case the Contractor shall be required to furnish to the Employer documentary evidence from the insurer in support of the insurer's inability as aforesaid.

**(a) Marine Cargo Policy/Transit Insurance Policy:**

**(I) Transit Insurance Policy for indigenous equipment**

Similarly, Transit Insurance Policy shall be taken wherein only inland transit is involved for the movement of Plant and Equipment supplied from within India. The policy shall cover movement of Plant and Equipment from the manufacturer's works to the project's warehouse at final destination site. Inland Transit Clause (ITC) 'A' along with war & Strike Riots & Civil Commotion (SRCC) extension cover shall be taken.

Amount	Deduc- tible Limits	Parties insured	From	To
120% of Ex-work Price of all the Plant and Equipment to be supplied from within India plus Excise Duty and Sales Tax/ VAT etc., if additionally payable.	Nil	Contractor & Employer	Mfrs ware- house	Project's ware- house store at final destination

(II) If during the execution of Contract, the Employer requests the Contractor to take any other add-on cover(s)/ supplementary cover(s) in aforesaid insurance, in such a case, the Contractor shall promptly take such add-on cover(s)/ supplementary cover(s) and the charges towards such premium for such add-on cover(s)/ supplementary cover(s) shall be reimbursed to the Contractor on submission documentary evidence of payment to the Insurance company. Therefore, charges towards premium for such add-on cover(s)/ supplementary cover(s) are not included in the Contract Price.

(III) The Contractor shall take the policy in the joint names of Employer and the Contractor. The policy shall indicate the Employer as the beneficiary. However, if the Contractor is having an open policy for its line of business, it should obtain an endorsement of the open cover policy from the insurance company indicating that the dispatches against this Contract are duly covered under its open policy and include the name of the Employer as jointly Insured in the endorsements to the open policy.

**(b) Erection All Risk Policy/Contractor All Risk Policy:**

(I) The policy should cover all physical loss or damage to the facility at site during storage, erection and commissioning covering all the perils as provided in the policy as a basic cover and the add on covers as mentioned at Sl. No. (III) below.

Amount	Deductible limits	Parties insured	From	To
105% of Ex-work Price of all the Plant and Equipment to be supplied from within India plus Excise Duty and Sales Tax/ VAT etc., if additionally payable. and 100% of erection price component	Nil	Contractor & Employer	Receipt at site of first lot of the Plant and Equipment	Up to Operational Acceptance

- (II) The Contractor shall take the policy in the joint name of Employer and the Contractor. All these policies shall indicate Employer as the beneficiary. The policy shall be kept valid till the date of the Operational Acceptance of the project and the period of the coverage shall be determined with the approval of the Employer.

If the work is completed earlier than the period of policy considered, the Contractor shall obtain the refund as per provisions of the policy and pass on the benefit to Employer. In case no refund is payable by the insurance company then the certificate to that effect shall be submitted to Employer at the completion of the project.

- (III) The following add-on covers shall also be taken by the Contractor:

- i) Earthquake
- ii) Terrorism
- iii) Escalation cost (approximately @10% of sum insured on annual basis)
- iv) Extended Maintenance cover for Defect Liability Period
- v) Design Defect
- vi) Other add-on covers viz., 50-50 clause, 72 hours clause, loss minimization clause, waiver of subrogation clause (for projects of more than Rs.100 crores, cover for offsite storage/fabrication (over Rs.100 crores).

- (IV) Third Party Liability cover with cross Liability within Geographical limits of India as on ADD-on cover to the basic EAR cover:

The third party liability add-on cover shall cover 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 which have been accepted by the Employer) occurring in connection with supply and installation of the Facilities.

Amount	Deductible limits	Parties insured	From	To
<ul style="list-style-type: none"> <li>• For projects upto Rs. 100 crores, the third party liability limit shall be 10% of the project value for single occurrence/ multiple occurrences in aggregate during the entire policy period.</li> <li>• For projects from Rs. 100 crores to Rs. 500 crores, the third party liability limit shall be Rs. 10 crores for single occurrence/multiple occurrences in</li> </ul>	Nil	Contractor/ Sub-contractor	Receipt at site	Upto Defect Liability Period.

aggregate during entire policy period. For projects of more than Rs.500 crores, the third party liability limit shall be Rs. 25 crores for single occurrence/ multiple occurrences in aggregate during entire policy period.				
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- (V) As per GCC Clause 30.8, the cost of insurance premium is to be reimbursed to the Contractor for Owner Supplied Materials (OSM) for which the insurer is to be finalized by the Contractor as detailed therein. Alternatively, the Contractor may take a single policy covering the entire cost of the project including the cost of OSM. For this purpose, the Contractor shall submit documentary evidence for the premium paid for the entire project to the Employer and Employer shall reimburse to the Contractor the proportion of premium equal to value of OSM to total sum insured.

If during the execution of Contract, the Employer requests the Contractor to take any other add-on cover(s)/ supplementary cover(s) in aforesaid insurance, in such a case, the Contractor shall promptly take such add-on cover(s)/ supplementary cover(s) and the charges towards such premium for such add-on cover(s)/ supplementary cover(s) shall be reimbursed to the Contractor on submission documentary evidence of payment to the Insurance company. Therefore, charges towards premium for such add-on cover(s)/ supplementary cover(s) are not included in the Contract Price.

(c) Automobile Liability Insurance

The Contractor shall ensure that all the vehicles deployed by the Contractor or its Subcontractors (whether or not owned by them) in connection with the supply and installation of the Facilities in the project are duly insured as per RTA act. Further the Contractor or its Subcontractors may also take comprehensive policy(own damage plus third party liability) of each individual vehicles deployed in the project on their own discretion in their own name to protect their own interest.

(d) Workmen Compensation Policy:

- (I) Workmen Compensation Policy shall be taken by the Contractor in accordance with the statutory requirement applicable in India. The Contractor shall ensure that all the workmen employed by the Contractor or its Subcontractors for the project are adequately covered under the policy.
- (II) The policy may either be project specific covering all men of the Contractor and its Subcontractors. The policy shall be kept valid till the date of Operational Acceptance of the project.

Alternatively, if the Contractor has an existing 'Workmen Compensation Policy' for all its employees including that of the Subcontractor(s), the Contractor must include the interest of the Employer for this specific Project in its existing 'Workmen Compensation Policy'.

- (III) Without relieving the Contractor of its obligations and responsibilities under this Contract, before commencing work the Contractor shall insure against liability for death of or injury to persons employed by the Contractor including liability by statute and at common law. The insurance cover shall be maintained until all work including remedial work is completed including the Defect Liability Period. The insurance shall be extended to indemnify the Principal for the Principal's statutory liability to persons employed by the Contractor.

The Contractor shall also ensure that each of its Subcontractors shall effect and maintain insurance on the same basis as the 'Workmen Compensation Policy' effected by the Contractor.

(e) Contractor's Plant and Machinery (CPM) Insurance

The Employer (including without limitation any consultant, servant, agent or employee of the Employer) shall not in any circumstances be liable to the Contractor for any loss of or damage to any of the Contractor's Equipment or for any losses, liabilities, costs, claims, actions or demands which the Contractor may incur or which may be made against it as a result of or in connection with any such loss or damage.

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 30.1, except for the Third Party Liability, Workmen Compensation Policy Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 30.1 except for the Cargo Insurance During Transport and Workmen Compensation Policy 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.

B) Insurances to be taken out by the Employer

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

Amount	Deductible limits	Parties Insured	From	To
_____ NIL _____				

-- End --

Appendix-4 : TIME SCHEDULE

1. The Project Completion Schedule shall be as follows:

Sl. No.	Activities	Duration in Months from the effective date of Contract
	Taking Over by the Employer upon successful Completion of:	
1.	Strengthening & Augmentation of existing distribution Network in NDMC Area	24 (Twenty Four) 25% work should get completed within 9 months, 25% balance works should get completed in next 5 months, 25% balance works should get completed in next 5 months and final 25% balance works should get completed in next 5 months.

1.1 The activity(ies) under the Contractor's programme for Project Completion shall be in the form a PERT chart and shall identify the various activities like engineering, vendor finalization, placement of orders to sub-vendors, survey, Resource mobilization, erection, testing & commissioning including submission of closure proposals. Format of PERT chart is enclosed at Annexure-A. The PERT Chart shall conform to the above Project Completion Schedule.

This PERT Chart shall be discussed and agreed before Award in line with above, engineering drawing and data submission schedule shall also be discussed and finalised before Award. Liquidated damages for delay in successful Completion of the Facilities or specific part thereof (where specific parts are specified in SCC) and Operational Acceptance at rates specified in Clause 21 of GCC shall be applicable beyond the date specified above.

1.2 The Employer reserves the right to request minor changes in the work schedule at the time of Award of Contract to the successful Bidder.

1.3 The successful Bidder shall be required to prepare detailed PERT Chart and finalise the same with the Employer as per the requirement, which shall form a part of the Contract.

**Appendix-5 : LIST OF APPROVED SUBCONTRACTORS**

Prior to award of Contract, the following details shall be completed indicating those sub-contractors proposed by the Bidder by Attachment to its bid that are approved by the Employer for engagement by the Contractor during the performance of the contract.

The following Subcontractors 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 15.1, 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.

Item of Facilities	Approved Subcontractors	Nationality

Further, erection portion of the contract shall not be subcontracted without the prior approval of the Employer. However, such approval shall not be necessary for engaging labour.

Appendix-6 : SCOPE OF WORKS AND SUPPLY BY THE EMPLOYER

The following personnel, facilities, works and supplies will be provided/supplied by the Employer, and the provisions of GCC 6, 16, 17 and 20 as well as Employer responsibilities stated in technical specifications 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 Sub-Clause 14.2.

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

Personnel Charge to Contractor – None

-----NIL-----

Facilities Charge to Contractor - None except as noted

Electricity and Water Charge to Contractor - as noted

The Contractor shall be entitled to use for the purposes of the facilities such supplies of electricity and water as may be available on the Site and shall provide any apparatus necessary for such use. The Contractor shall pay the Employer at the applicable tariff plus Employer's overheads, if any, for such use. Where such supplies are not available, the Contractor shall make his own arrangement for provision of any supplies he may require.

Works Charge to Contractor - None

-----NIL-----

Supplies Charge to Contractor – None

-----NIL-----

Appendix-7 : LIST OF DOCUMENTS FOR APPROVAL OR REVIEW

Pursuant to GCC Sub-Clause 16.3.1, the Contractor shall prepare, or cause its Subcontractor to prepare, and present to the Project Manager in accordance with the requirements of GCC Sub-Clause 14.2 (Program of Performance), the following documents for:

A. Approval

- 1.
- 2.
- 3.

B. Review

- 1.
- 2.
- 3.

Note:

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



Appendix-8 : GUARANTEES, LIQUIDATED DAMAGES FOR NON – PERFORMANCE

1. The equipment offered shall meet the rating and performance requirements stipulated in Technical Specification for various equipment or indicated in Data requirement.
2. The ratings and performance figures of the below mentioned equipment are guaranteed as per losses given in respective Indian Standard (up to date) by bidder.

Sl. No.	Description
A.	1600/1000 KVA, 11/0.415 kV, 3 phase Distribution Transformer

3. If the aforementioned guarantees are not established at factory tests, then the Employer shall reject the equipment.

6. PERFORMANCE SECURITY FORM

Bank Guarantee No. ....

Date.....

Contract No.....

.....[Name of Contract].....

To: [Name and address of Employer]

Dear Ladies and/or Gentlemen,

We refer to the Contract ("the Contract") signed on .....(insert date of the Contract)..... between M/s. XXXXX (Name of Employer), having its Registered Office at XXXXX (Registered Address of employer) ("the Employer"/" XXXXX (Name of Employer)") on behalf of XXXX (Name of owner) (hereinafter referred to as 'XXXX (Short Name of Owner)' / 'Owner'), and M/s ..... (Name of Contractor) ....., having its Principal place of business at .....(Address of Contractor) ..... and Registered Office at .....(Registered address of Contractor) ..... ("the Contractor") concerning ..... (Indicate brief scope of work) ..... for the complete execution of the ..... (insert name of Package alongwith name of the Project)..... [Applicable for Bank Guarantees issued by Contractor/Associate for those Contracts awarded to them]

Or

We refer to the Contract signed on .....(insert date of the Contract)..... between M/s. XXXXX (Name of Employer), having its Registered Office at XXXXX (Registered Address of employer) ("the Employer"/" XXXXX (Name of Employer)") on behalf of XXXX (Name of owner) (hereinafter referred to as 'XXXX (Short Name of Owner)' / 'Owner'), and M/s ..... (Name of Contractor) ....., having its Principal place of business at .....(Address of Contractor) ..... and Registered Office at ..... (Registered address of Contractor) ..... ("the Contractor") and the Contract ("the Contract") signed on .....(insert date of the Contract)..... between XXXXX (Name of Employer) on behalf of Owner and M/s ..... (Name of Associate) ....., having its Principal place of business at .....(Address of Associate) ..... and Registered Office at ..... (Registered address of Associate) ....., the Associate of the Contractor for executing the Facilities concerning ..... (Indicate brief scope of work) ..... for the complete execution of the ..... (insert name of Package alongwith name of the Project)..... [Applicable for Bank Guarantees to be issued by Contractor against those Contracts awarded to their Associate]

By this letter we, the undersigned, .....(insert name & address of the issuing bank) ....., a Bank (which expression shall include its successors, administrators, executors and assigns) organized under the laws of ..... and having its Registered/Head Office at .....(insert address of registered office of the bank)..... do hereby irrevocably guarantee payment to the Employer up to ..... i.e., Ten percent (10%) of the Contract Price until ninety (90) days beyond the Defect Liability Period i.e., upto and inclusive of ..... (dd/mm/yy).

We undertake to make payment under this Letter of Guarantee upon receipt by us of your first written demand signed by the Employer duly authorized officer or the authorized officer of Owner declaring the Contractor to be in default under the Contract and without cavil or argument any sum or sums within the above named limits, without your need to prove or show grounds or reasons for your demand and without the right of the Contractor to dispute or question such demand.

Our liability under this Letter of Guarantee shall be to pay to the Employer whichever is the lesser of the sum so requested or the amount then guaranteed hereunder in respect of any demand duly made hereunder prior to

expiry of the Letter of Guarantee, without being entitled to inquire whether or not this payment is lawfully demanded.

This letter of Guarantee shall remain in full force and shall be valid from the date of issue until ninety (90) days beyond the Defect Liability Period of the Facilities i.e. upto and inclusive of ..... (dd/mm/yy) and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s. .... on whose behalf this Letter of Guarantee has been given.

Except for the documents herein specified, no other documents or other action shall be required, notwithstanding any applicable law or regulation.

Our liability under this Letter of Guarantee shall become null and void immediately upon its expiry, whether it is returned or not, and no claim may be made hereunder after such expiry or after the aggregate of the sums paid by us to the Employer shall equal the sums guaranteed hereunder, whichever is the earlier.

All notices to be given under shall be given by registered (airmail) posts to the addressee at the address herein set out or as otherwise advised by and between the parties hereto.

We hereby agree that any part of the Contract may be amended, renewed, extended, modified, compromised, released or discharged by mutual agreement between you and the Contractor, and this security may be exchanged or surrendered without in any way impairing or affecting our liabilities hereunder without notices to us and without the necessity for any additional endorsement, consent or guarantee by us, provided, however, that the sum guaranteed shall not be increased or decreased.

No action, event or condition which by any applicable law should operate to discharge us from liability hereunder shall have any effect and we hereby waive any right we may have to apply such law so that in all respects our liability hereunder shall be irrevocable and, except as stated herein, unconditional in all respects.

For and on behalf of the Bank

[Signature of the authorised signatory(ies)]

Signature\_\_\_\_\_

Name\_\_\_\_\_

Designation\_\_\_\_\_

POA Number\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

Fax Number\_\_\_\_\_

email \_\_\_\_\_

Common Seal of the Bank\_\_\_\_\_

Witness:

Signature\_\_\_\_\_

Name\_\_\_\_\_

Address\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

email \_\_\_\_\_

Note :

1. For the purpose of executing the Bank Guarantee, the non-judicial stamp papers of appropriate value shall be purchased in the name of Bank who issues the 'Bank Guarantee'.
2. The Bank Guarantee shall be signed on all the pages by the Bank Authorities indicating their POA nos. and should invariably be witnessed.
3. The Bank Guarantee should be in accordance with the proforma as provided. However, in case the issuing bank insists for additional paragraph for limitation of liability, the following may be added at the end of the proforma of the Bank Guarantee [i.e., end paragraph of the Bank Guarantee preceding the signature(s) of the issuing authority(ies) of the Bank Guarantee]:

Quote

"Notwithstanding anything contained herein:

1. Our liability under this Bank Guarantee shall not exceed \_\_\_\_\_ (value in figures) \_\_\_\_\_ [ \_\_\_\_\_ (value in words) \_\_\_\_\_].
2. This Bank Guarantee shall be valid upto \_\_\_\_\_ (validity date) \_\_\_\_\_.
3. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only & only if we receive a written claim or demand on or before \_\_\_\_\_ (validity date) \_\_\_\_\_."

Unquote

7. BANK GUARANTEE FORM FOR ADVANCE PAYMENT

Bank Guarantee No. ....

Date.....

Contract No.....

.....[Name of Contract].....

To: [Name and address of the Employer]

Dear Ladies and/or Gentlemen,

We refer to the Contract ("the Contract") signed on .....(insert date of the Contract)..... between you and M/s ..... (Name of Contractor) ....., having its Principal place of business at .....(Address of Contractor) ..... and Registered Office at .....(Registered address of Contractor) ..... ("the Contractor") concerning ..... (Indicate brief scope of work) ..... for the complete execution of the ..... (insert name of Package alongwith name of the Project).....

Whereas, in accordance with the terms of the said Contract, the Employer has agreed to pay or cause to be paid to the Contractor an Advance Payment in the amount of .....(Amount in figures and words).....

By this letter we, the undersigned, .....(insert name & address of the issuing bank) ....., a Bank (which expression shall include its successors, administrators, executors and assigns) organized under the laws of ..... and having its Registered/Head Office at .....(insert address of registered office of the bank)..... do hereby irrevocably guarantee repayment of the said amounts upon the first demand of the Employer without cavil or argument in the event that the Contractor fails to commence or fulfill its obligations under the terms of the said Contract, and in the event of such failure, refuses to repay all or part (as the case may be) of the said advance payment to the Employer.

Provided always that the Bank's obligation shall be limited to an amount equal to the outstanding balance of the advance payment, taking into account such amounts, which have been repaid by the Contractor from time to time in accordance with the terms of payment of the said Contract as evidenced by appropriate payment certificates.

This Guarantee shall remain in full force from the date upon which the said advance payment is received by the Contractor upto ninety (90) days beyond the date on which the entire advance so advanced alongwith the interest if any due thereon has been fully adjusted in terms of the Contract i.e., upto of ninety (90) days beyond the date of Completion of the Facilities under the Contract. This Guarantee may be extended from time to time, as may be desired by M/s. .... on whose behalf this Guarantee has been issued.

Any claims to be made under this Guarantee must be received by the Bank during its period of validity, i.e. upto ninety (90) days beyond the date of Completion of the Facilities by the Employer i.e. upto and inclusive of ..... (dd/mm/yy).

For and on behalf of the Bank

[Signature of the authorised signatory(ies)]

Signature\_\_\_\_\_

Name\_\_\_\_\_

Designation\_\_\_\_\_

POA Number\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

Fax Number\_\_\_\_\_

email \_\_\_\_\_

Common Seal of the Bank\_\_\_\_\_

Witness:

Signature\_\_\_\_\_

Name\_\_\_\_\_

Address\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

email \_\_\_\_\_

Note:

1. For the purpose of executing the Bank Guarantee, the non-judicial stamp papers of appropriate value shall be purchased in the name of Bank who issues the 'Bank Guarantee'.
2. The Bank Guarantee shall be signed on all the pages by the Bank Authorities indicating their POA nos. and should invariably be witnessed.
3. The Bank Guarantee should be in accordance with the proforma as provided. However, in case the issuing bank insists for additional paragraph for limitation of liability, the following may be added at the end of the proforma of the Bank Guarantee [i.e., end paragraph of the Bank Guarantee preceding the signature(s) of the issuing authority(ies) of the Bank Guarantee]:

Quote

"Notwithstanding anything contained herein:

1. Our liability under this Bank Guarantee shall not exceed \_\_\_\_\_ (value in figures)\_\_\_\_\_ [\_\_\_\_\_ (value in words)\_\_\_\_\_].
2. This Bank Guarantee shall be valid upto \_\_\_\_\_(validity date)\_\_\_\_\_.
3. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only & only if we receive a written claim or demand on or before \_\_\_\_\_ (validity date) \_\_\_\_\_."

Unquote

8. FORM OF TAKING OVER CERTIFICATE

Date.....  
Name of Contract.....  
Contract No.....

To :

(Name and address of the Contractor)

Dear Ladies and/or Gentlemen,

Pursuant to GCC 20 (Completion of the Facilities) of the General Conditions of the Contract entered into between yourselves and the Employer dated ..... relating to the ..... (insert 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 .....
2. Date of Completion :.....

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 Defects Liability Period.

Very truly yours,

Title  
(Project Manager)

9. FORM OF INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE EQUIPMENT HANDED OVER IN ONE LOT BY .....(abbreviated name of the Employer)..... FOR PERFORMANCE OF ITS CONTRACT

INDEMNITY BOND

THIS INDEMNITY BOND is made this..... day of ..... 20..... by ..... a Company registered under the Companies Act, 1956/2013 (with amendment from time to time)/Partnership firm/proprietary concern having its Registered Office at.....(hereinafter called as 'Contractor' or "Obligor" which expression shall include its successors and permitted assigns) in favour of ..... (insert name of the Employer)....., a Company incorporated under the Companies Act, 1956/2013 (with amendment from time to time) having its Registered Office at .....(insert registered address of the Employer) and its project at ..... (hereinafter called ".....(abbreviated name of the Employer)....." which expression shall include its successors and assigns):

WHEREAS .....(abbreviated name of the Employer)..... has awarded to the Contractor a Contract for..... vide its Notification of Award/Contract No..... dated..... and its Amendment No. .... (applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which .....(abbreviated name of the Employer)..... is required to hand over various Equipment to the Contractor for execution of the Contract.

And WHEREAS by virtue of Clause No.....of the said Contract, the Contractor is required to execute an Indemnity Bond in favour of .....(abbreviated name of the Employer)..... for the Equipment handed over to it by .....(abbreviated name of the Employer)..... for the purpose of performance of the Contract/Erection portion of the contract (hereinafter called the "Equipment").

AND THEREFORE, This Indemnity Bond witnesseth as follows:

1. That in consideration of various Equipment as mentioned in the Contract, valued at (amount in words.....) handed over to the Contractor for the purpose of performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep .....(abbreviated name of the Employer)..... indemnified, for the full value of the Equipment. The Contractor hereby acknowledges receipt of the Equipment as per despatch title documents handed over to the Contractor duly endorsed in their favour and detailed in the Schedule appended hereto. It is expressly understood by the Contractor that handing over of the despatch title documents in respect of the said Equipments duly endorsed by .....(abbreviated name of the Employer)..... in favour of the Contractor shall be construed as handing over of the Equipment purported to be covered by such title documents and the Contractor shall hold such Equipment in trust as a Trustee for and on behalf of .....(abbreviated name of the Employer).....
2. That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment at .....(abbreviated name of the Employer)..... project Site against all risks whatsoever till the Equipment are duly used/erected in accordance with the terms of the Contract and the Plant/Package duly erected and commissioned in accordance with the terms of the Contract, is taken over by .....(abbreviated name of the Employer)..... The Contractor undertakes to keep .....(abbreviated name of the Employer)..... harmless against any loss or damage that may be caused to the Equipment.
3. The Contractor undertakes that the Equipment shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the equipment shall be utilised for any other work of purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purpose including legal/penal consequences.



4. That .....(abbreviated name of the Employer)..... is and shall remain the exclusive Employer of the Equipment free from all encumbrances, charges or liens of any kind, whatsoever. The equipment shall at all times be open to inspection and checking by the Employee or Employer's Representative in this regard. Further, .....(abbreviated name of the Employer)..... shall always be free at all times to take possession of the Equipment in whatever form the equipment may be, if in its opinion, the Equipment are likely to be endangered, misutilised or converted to uses other than those specified in the Contract, by any acts of omission or commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds himself and undertakes to comply with the directions of demand of .....(abbreviated name of the Employer)..... to return the equipment without any demur or reservation.
  
5. That this indemnity Bond is irrevocable. If at any time any loss or damage occurs to the Equipment or the same or any part thereof is misutilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Employer's Representative as to assessment of loss or damage to the Equipment shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Equipment at his own cost and/or shall pay the amount of loss to .....(abbreviated name of the Employer)..... without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to .....(abbreviated name of the Employer)..... against the Contractor under the Contract and under this Indemnity Bond.
  
6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction of .....(abbreviated name of the Employer)....., THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorized representative under the common seal of the Company, the day, month and year first above mentioned.

SCHEDULE

Particulars of the Equipment handed over	Quantity	Particulars of Despatch title Documents		Value of the Equipment	Signature of the Attorney in token of receipt
		RR/GR No. date of lading	Carrier		

For and on behalf of  
M/s.....

WITNESS

1. Signature.....

Signature.....

Name.....

Name.....

Address.....

Address.....

2. Signature.....

Authorised representative

Name.....

(Common Seal)

Address.....

(In case of Company)

Indemnity Bonds are to be executed by the authorised person and (i) in case of contracting Company under common seal of the Company or (ii) having the power of attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case of (ii), the original Power of Attorney if it is specifically for this Contract or a Photostat copy of the Power of Attorney if it is General Power of Attorney and such documents should be attached to Indemnity Bond.

10. FORM OF INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE EQUIPMENT HANDED OVER IN INSTALLMENTS BY .....(abbreviated name of the Employer)..... FOR PERFORMANCE OF ITS CONTRACT

INDEMNITY BOND

THIS INDEMNITY BOND is made this ..... day of ..... 20..... by ..... a Company registered under the Companies Act, 1956/2013 (with amendment from time to time)/Partnership firm/proprietary concern having its Registered Office at .....(hereinafter called as 'Contractor' or 'Obligor' which expression shall include its successors and permitted assigns) in favour of .....(insert name of the Employer)....., a company incorporated under the Companies Act, 1956/2013 (with amendment from time to time) having its Registered Office at .....(insert registered address of the Employer)..... and its project at ..... (hereinafter called ".....(abbreviated name of the Employer)....." which expression shall include its successors and assigns):

WHEREAS .....(abbreviated name of the Employer)..... has awarded to the Contractor a Contract for .....vide its Notification of Award/Contract No. .... dated .....and Amendment No. .... (applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which .....(abbreviated name of the Employer)..... is required to handover various Equipment to the Contractor for execution of the Contract.

AND WHEREAS by virtue of Clause No.....of the said Contract, the Contractor is required to execute an Indemnity Bond in favour of .....(abbreviated name of the Employer)..... for the Equipment handed over to it by .....(abbreviated name of the Employer)..... for the purpose of performance of the contract/Erection portion of the Contract (hereinafter called the "Equipment".)

NOW THEREFORE, This Indemnity Bond witnesseth as follows:

1. That in consideration of various Equipments as mentioned in the Contract, valued at (amount in words \_\_\_\_\_) to be handed over to the Contractor in installments from time to time for the purpose of performance of the contract, the Contractor hereby undertakes to indemnify and shall keep .....(abbreviated name of the Employer)..... indemnified, for the full value of Equipment. The Contractor hereby acknowledges receipt of the initial installment of the equipment per details in the schedule appended hereto. Further, the Contractor agrees to acknowledge receipt of the subsequent installments of the Equipment as required by .....(abbreviated name of the Employer)..... in the form of Schedules consecutively numbered which shall be attached to this Indemnity bond so as to form integral parts of this Bond. It is expressly understood by the Contractor that handing over the despatch title documents in respect of the said Equipments duly endorsed by .....(abbreviated name of the Employer)..... in favour of the Contractor shall be construed as handing over the Equipment purported to be covered by such title documents and the Contractor shall hold such Equipments in trust as a Trustee for and on behalf of .....(abbreviated name of the Employer).....
2. That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment at .....(abbreviated name of the Employer)..... project Site against all risks whatsoever till the Equipment are duly used/erected in accordance with the terms of the Contract and the Plant/Package duly erected and commissioned in accordance with the terms of the Contract, is taken over by .....(abbreviated name of the Employer)..... The Contractor undertakes to keep .....(abbreviated name of the Employer)..... harmless against any loss or damage that may be caused to the Equipment.
3. The Contractor undertakes that the Equipment shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the equipment shall be utilised for any other work or purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia constitute a

criminal breach of trust on the part of the Contractor for all intents and purpose including legal/penal consequences.

4. That .....(abbreviated name of the Employer)..... is and shall remain the exclusive Employer of the Equipment free from all encumbrances, charges or liens of any kind, whatsoever. The equipment shall at all times be open to inspection and checking by the Employer or Employer's Representative in this regard. Further, .....(abbreviated name of the Employer)..... shall always be free at all times to take possession of the Equipment in whatever form the Equipment may be, if in its opinion, the Equipment are likely to be endangered, misutilised or converted to uses other than those specified in the Contract, by any acts of omission or commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds himself and undertakes to comply with the directions of demand of .....(abbreviated name of the Employer)..... to return the equipment without any demur or reservation.
  
5. That this indemnity Bond is irrevocable. If at any time any loss or damage occurs to the Equipment or the same or any part thereof is misutilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Employer's Representative as to assessment of loss or damage to the Equipment shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Equipment at its own cost and/or shall pay the amount of loss to .....(abbreviated name of the Employer)..... without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to .....(abbreviated name of the Employer)..... against the Contractor under the Contract and under this Indemnity Bond.
  
6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction of .....(abbreviated name of the Employer)....., THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorised representative under the common seal of the Company, the day, month and year first above mentioned.

SCHEDULE No. 1

Particulars of the Equipment handed over	Quantity	Particulars of Despatch title Documents		Value of the Equipment	Signature of the Attorney in token of receipt
		RR/GR No. date of lading	Carrier		

For and on behalf of  
M/s.....

WITNESS

1. Signature.....  
  
Name.....  
  
Address.....

Signature.....  
  
Name.....  
  
Address.....

2. Signature.....

Authorised representative

Name.....

(Common Seal)

Address.....

(In case of Company)

Indemnity Bonds are to be executed by the authorised person and (i) in case of contracting Company under common seal of the Company or (ii) having the power of attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case of (ii), the original Power of Attorney if it is specifically for this Contract or a photostat copy of the Power of Attorney if it is General Power of Attorney and such documents should be attached to Indemnity Bond.

11. FORM OF AUTHORISATION LETTER

Ref. No:

Date :

To

M/s.....  
.....  
.....

REF.: Contract No. .... dated ..... for ..... awarded by ....(insert name of the Employer).....

Dear Sir,

Kindly refer to Contract No. .... dated ..... for ..... You are hereby authorised on behalf of ..... (Name of Employer)..... a company incorporated under the laws of Companies Act 1956/2013 (with amendment from time to time) and having its Registered Office at .....(registered address of the Employer) ..... and its Project at ..... to take physical delivery of materials/equipments covered under Despatch Document/Consignment Note No. ....\*..... dated .....and as detailed in the enclosed schedule for the sole purpose of successful performance of the aforesaid contract and for no other purpose, whatsoever.

(Signature of Project Authority)\*\*

Designation.....

Date.....

Encl: As Above.

\*\* To be signed not below the rank of Manager.

\* Mention LR/RR No.

Schedule of Material/Equipment covered under Despatch Title Document (RR No./LR No. ....)

Sl. No.	Contract Name	NOA No./ CA No.	Description of Materials/ Equipments	Spec. No.	Qty.	Value	Remarks

--	--	--	--	--	--	--	--

(Signature of the Project Authority)

(Designation) .....

(Date) .....

12. FORM OF TRUST RECEIPT FOR PLANT, EQUIPMENT AND MATERIALS RECEIVED

We M/s. ....(insert name of the Contractor) ..... having our Principal place of business at ..... having been awarded a Contract No. .... dated ..... for ..... (insert Package name alongwith name of the Project)..... by .....(insert name of the Employer) .....

We do hereby acknowledge the receipt of the Plant, Equipment and Materials as are fully described and mentioned under Documents of Title/RR/LR etc. and in the schedule annexed hereto, which shall form an integral part of this receipt as "Trustee" of ..... (insert name of the Employer)..... The aforesaid materials etc. so received by us shall be exclusively used in the successful performance of the aforesaid Contract and for no other purpose whatsoever. We undertake not to create any charge, lien or encumbrance over the aforesaid materials etc, in favour of any other person/institution(s)/Banks.

For M/s .....  
(Contractor's Name)

Dated : .....

(AUTHORISED SIGNATORY)

Place : .....

SEAL OF COMPANY



13. FORM OF EXTENSION OF BANK GUARANTEE

Ref. No.....

Dated:.....

To: [Name and address of the Employer]

Dear Sirs,

Sub.: Extension of Bank Guarantee No. .... dated ..... for ....., issued to you on behalf of M/s. ....(insert name of the Contractor) ..... in respect of Contract No. .... dated ..... for ..... (insert name of the Package alongwith the Project name) ..... (hereinafter called original Bank Guarantee).

At the request of M/s..... (insert name of the Contractor) ....., We .....(insert name & address of the issuing bank) ....., a Bank organized under the laws of ..... and having its Registered/Head Office at .....(insert address of registered office of the bank)..... do hereby extend our liability under the above-mentioned Guarantee No. .... Dated ..... for a further period of ..... Years/Months from ..... to expire on ..... Except as provided above, all other terms and conditions of the original Bank Guarantee No. .... dated ..... shall remain unaltered and binding.

Please treat this as an integral part of the original Guarantee to which it would be attached.

For and on behalf of the Bank

[Signature of the authorised signatory(ies)]

Signature\_\_\_\_\_

Name\_\_\_\_\_

Designation\_\_\_\_\_

POA Number\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

Fax Number\_\_\_\_\_

email \_\_\_\_\_

Common Seal of the Bank\_\_\_\_\_

Witness:

Signature\_\_\_\_\_

Name\_\_\_\_\_

Address\_\_\_\_\_

Contact Number(s): Tel.\_\_\_\_\_ Mobile\_\_\_\_\_

email \_\_\_\_\_

Note:

1. For the purpose of executing the Bank Guarantee, the non-judicial stamp papers of appropriate value shall be purchased in the name of Bank who issues the 'Bank Guarantee'.
2. The Bank Guarantee shall be signed on all the pages by the Bank Authorities indicating their POA nos. and should invariably be witnessed.

14. FORM OF 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 ..... 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 "Authorised Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Joint Venture in regard to Specification No..... Package ..... the bids for which have been invited by ..... (insert name of the Employer alongwith address) ..... (hereinafter called the 'Employer') to undertake the following acts :

- i) To 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".

It is clearly understood that 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/Authorised 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:

1. For the purpose of executing the Agreement, the non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture.
2. The Agreement shall be signed on all the pages by the authorised representatives of each of the partners and should invariably be witnessed.

15. FORM OF 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 Specification No..... for ..... (insert name of the package alongwith project name) ..... of ..... (insert names of the Employer) ....., a Company incorporated under the Companies Act of 1956/2013 (with amendment from time to time) having its registered office at .....(insert registered address of the Employer)..... (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 package alongwith project name) .....

AND WHEREAS Clause 9.3, Section-ITB and BDS (documents establishing the Qualification of Bidder) & Qualification Criteria in Annexure-A to BDS forming part of the Bidding Documents, inter-alia stipulates that an Undertaking of two or more qualified manufacturers as partners, meeting the requirements of Qualification Criteria in Annexure-A to BDS, as applicable may bid, provided, the Joint Venture fulfills all other requirements under Clause 9.3 (c) of ITB and Qualification Criteria in Annexure-A to BDS and in such a case, the Bid Forms shall be signed by all the partners 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 Documents 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 9.3, Section-ITB and BDS (documents establishing the Qualification of Bidder) & Qualification Criteria in Annexure-A to BDS, 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) do 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 alongwith this Undertaking in its bid) to this Deed of Undertaking. 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 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 authorised representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of .....  
has been affixed in my/ our  
presence pursuant to Board of  
Director's Resolution dated .....

For Lead Partner (Party No.-1)  
For and on behalf of M/s  
.....

Name .....

Designation .....

Signature .....

(Signature of the authorized  
representative)

WITNESS :

I. ....

II. ....

Common Seal of .....  
has been affixed in my/ our  
presence pursuant to Board of  
Director's Resolution dated .....

For Party No.-2  
For and on behalf of M/s.....

(Signature of the authorized  
representative)

Name .....

Designation .....

Signature .....

WITNESS :

I. ....

II. ....

Common Seal of .....  
has been affixed in my/ our  
presence pursuant to Board of  
Director's Resolution dated .....

For Party No.-3  
For and on behalf of M/s.  
.....

(Signature of the authorized  
representative)

Name .....

Designation .....

Signature .....

WITNESS :

I. ....

II. ....

Note:

1. For the purpose of executing the Joint Deed of Undertaking, the non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture.
2. The Undertaking shall be signed on all the pages by the authorised representatives of each of the partners and should invariably be witnessed.

16. FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT/FACILITIES

BANK CERTIFICATE

This is to certify that M/s. \_\_\_\_\_ (insert Name & Address of the Contractor) \_\_\_\_\_ who have submitted their bid to .....(insert name of the Employer)..... against their tender specification Vide ref. No. .... for ..... (insert name of the package alongwith the project name) ..... is our customer for the past ..... years.

Their financial transaction with our Bank have been satisfactory. They enjoy the following fund based and non fund based limits including for guarantees, L/C and other credit facilities with us against which the extent of utilization as on date is also indicated below:

Sl. No.	Type of Facility	Sanctioned Limit as on Date	Utilisation as on Date

This letter is issued at the request of M/s. \_\_\_\_\_.

Signature \_\_\_\_\_

Name of Bank \_\_\_\_\_

Name of Authorised Signatory \_\_\_\_\_

Designation \_\_\_\_\_

Phone No. \_\_\_\_\_

Address \_\_\_\_\_

SEAL OF THE BANK



17. FORM OF OPERATIONAL ACCEPTANCE

Date.....

Name of Contract.....

Contract No.....

To :

(Name and address of the Contractor)

Dear Ladies and/or Gentlemen,

Pursuant to GCC 20 (Completion of the Facilities) of the General Conditions of the Contract entered into between yourselves and the Employer dated ..... relating to the ..... (insert brief description of the Facilities)..... we hereby notify you that the we System tests and Acceptance tests of the following part(s) of the Facilities were satisfactorily completed on the date specified below :

1. Description of the Facilities or part thereof .....  
.....
2. Date of Operational Acceptance:.....

This letter does not relieve you of your obligation during the Defects Liability Period and Latent Defect warranty.

Very truly yours,

Title  
(Project Manager)

18. FORM OF SAFETY PLAN TO BE SUBMITTED BY THE CONTRACTOR WITHIN SIXTY DAYS OF AWARD OF CONTRACT

[TO BE EXECUTED ON A NON JUDICIAL STAMP PAPER WORTH RS. TWENTY ONLY]

SAFETY PLAN

THIS SAFETY PLAN is made this ..... day of ..... 20..... by ..... a Company registered under the Companies Act, 1956/2013 (with amendment from time to time)/Partnership firm/proprietary concern having its Registered Office at .....[to be modified suitably for JV Contractor] (hereinafter called as 'Contractor' which expression shall include its successors and permitted assigns) for approval of ..... (insert name of the Employer)....., a company incorporated under the Companies Act, 1956/2013 (with amendment from time to time) having its Registered Office at .....(insert registered address of the Employer)..... for its Contract for ..... (insert package name, project name alongwith Specification number of the Contract).....

WHEREAS .....(abbreviated name of the Employer)..... has awarded to the Contractor the aforesaid Contract vide its Notification of Award/Contract No. .... dated .....and Amendment No. .... (applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which the Contractor is required to submit 'Safety Plan' alongwith certain documents to the Engineer In-Charge/Project Manager of the Employer within Sixty (60) days of Notification of Award for its approval.

NOW THEREFORE, the Contractor undertakes to execute the Contract as per the safety plan as follows:

1. THAT the Contractor shall execute the works as per provisions of Bidding Documents including those in regard to Safety Precautions / provisions as per statutory requirements.
2. THAT the Contractor shall execute the works in a well planned manner from the commencement of Contract as per agreed mile stones of work completion schedule so that planning and execution of construction works goes smoothly and consistently through out the contract duration without handling pressure in last quarter of the financial year/last months of the Contract and the shall be finalized in association with XXXX (Name of Employer) Engineer In-charge/Project Manager from time to time as required.
3. THAT the Contractor has prepared the safe work procedure for each activity i.e. foundation works including civil works, erection, stringing (as applicable), testing & commissioning, disposal of materials at site / store etc. to be executed at site, which is enclosed at Annexure – 1A (SP) for acceptance and approval of Engineer In-charge/Project Manager. The Contractor shall ensure that on approval of the same from Engineer In-charge/Project Manager , the approved copies will be circulated to Employer's personnel at site [Supervisor(s)/Executive(s)] and Contractor's personnel at site [Gang leader, supervisor(s) etc.] in their local language / language understood by gang.

THAT the Contractor has prepared minimum manpower deployment plan, activity wise as stated above, which is enclosed at Annexure – 1B (SP) for approval of Engineer In-charge/Project Manager.

4. THAT the Contractor shall ensure while executing works that they will deploy minimum 25% of their own experienced work force who are on the permanent roll of the company and balance 75% can be a suitable mixed with the hired gangs / local workers / casual workers if required. The above balance 75% work force should be provided with at least 10 days training by the construction agencies at sites and shall be issued with a certificate. No worker shall be engaged without a valid certificate. Hired gang workers shall also follow safe working procedures and safety norms as is being followed by company's workmen. It should also be ensured by the contractor that certified workers fitters who are climbing towers / doing stringing operations can be easily identifiable with a system like issue of Badge / Identification cards (ID cards) etc. Colour identification batches should be worn by the workers. Contractor has to ensure that inexperience workers / unskilled workers should not be deployed for skilled job.

5. THAT the Contractor's Gang leader / Supervisor / Senior most member available at every construction site shall brief to each worker daily before start of work about safety requirement and warn about imminent dangers and precautions to be taken against the imminent dangers (Daily Safety Drill). This is to be ensured without fail by Contractor and maintain record of each gang about daily safety instructions issued to workers and put up to XXXX(Name of Employer) site In-charge for his review and record.
  
6. THAT the Contractor shall ensure that working Gangs at site should not be left at the discretion of their Gang Leaders who are generally hired and having little knowledge about safety. Gang leader should be experienced and well versed with the safe working procedures applicable for transmission line/ Sub Station works. In case gang is having Gang leader not on permanent roll of the company then additional Supervisor from company's own roll having thorough knowledge about the works would be deployed so as to percolate safety instructions upto the grass root level in healthy spirits. Contractor has to ensure close supervision while executing critical locations of transmission lines / sub stations and ensures that all safety instructions are in place and are being followed.
  
7. THAT the Contractor shall maintain in healthy and working condition all kind of Equipments / Machineries / Lifting tools / Lifting tackles / Lifting gears / All kind of Ropes including wire ropes / Polypropylene ropes etc. used for Lifting purpose during execution of the project and get them periodically examined and load tested for safe working load in accordance with relevant provisions and requirement of Building & other construction workers Regulation of Employment and Conditions of Services Act and Central Rule 1998 or latest, Factories Act 1948 or latest, Indian Electricity Act 2003 before start of the project. A register of such examinations and tests shall be properly maintained by the contractor and will be promptly produced as and when desired by the Engineer In-charge/Project Manager or by the person authorised by him. The Contractor has to ensure to give special attention on the formation / condition of eye splices of wire rope slings as per requirement of IS 2762 Specification for wire rope slings and sling legs.

THAT the Contractor has prepared a list of all Lifting machines, lifting Tools / Lifting Tackles / Lifting Gears etc. / All types of ropes and Slings which are subject to safe working load is enclosed at Annexure – 2 (SP) for review and approval of Engineer In-charge/Project Manager.

8. THAT the Contractor has to procure sufficient quantity of Personal Protective Equipment (PPE) conforming to Indian / International standards and provide these equipment to every workman at site as per need and to the satisfaction of Engineer-in-charge/Project Manager of XXXX (Name of the Employer). The Contractor's Site Supervisor/ Project Manager has to ensure that all workmen must use Personal Protective Equipment at site. The Contractor shall also ensure that Industrial Safety helmets are being used by all workmen at site irrespective of their working (at height or on ground). The Contractor shall further ensure use of safety shoes by all ground level workers and canvas shoes for all workers working at height, Rubber Gum Boots for workers working in rainy season and concreting job, Use of Twin Lanyard Full body Safety Harness with attachment of light weight such as aluminium alloy etc. and having features of automatic locking arrangement of snap hook, by all workers working at height for more than three meters and also for horizontal movement on tower shall be ensured by contractor. The Contractor shall not use ordinary half body safety harness at site. The Contractor has to ensure use of Retractable type fall arrestors by workers for ascending / descending on suspension insulator string and other similar works etc., Use of Mobile fall arrestor for ascending / descending from tower by all workers. The contractor has to provide cotton / leather hand gloves as per requirement, Electrical Resistance Hand gloves for operating electrical installations / switches, Face shield for protecting eyes while doing welding works and Dust masks to workers as per requirement. The Contractor will have to take action against the workers not using Personal Protective Equipment at site and those workers shall be asked to rest for that day and also their Salary be deducted for that day. XXXX (Name of the Employer) may issue warning letter to Project Manager of contractor in violation of above norms.

THAT the Contractor shall prepare a detailed list of PPEs, activity wise, to commensurate with manpower deployed, which is enclosed at Annexure – 3 (SP) for review and approval of Engineer In-charge/Project Manager. It shall also be ensured that the sample of these equipment shall be got approved from XXXX

(Name of the Employer) supervisory staff before being distributed to workers. The contractor shall submit relevant test certificates as per IS / International Standard as applicable to PPEs used during execution of work. All the PPE's to be distributed to the workers shall be checked by XXXX (Name of the Employer) supervisory staff before its usage.

The Contractor also agrees for addition / modification to the list of PPE, if any, as advised by Engineer In-Charge/Project Manager.

9. THAT the Contractor shall procure, if required sufficient quantity of Earthing Equipment / Earthing Devices complying with requirements of relevant IEC standards (Generally IECs standards for Earthing Equipments / Earthing Devices are – 855, 1230, 1235 etc.) and to the satisfaction of Engineer In-Charge/ Project Manager and contractor to ensures to maintained them in healthy condition.

THAT the Contractor has prepared / worked out minimum number of healthy Earthing Equipments with Earthing lead confirming to relevant IS / European standards per gang wise during stringing activity/as per requirement, which is enclosed herewith at Annexure – 4 (SP) for review and acceptance of Engineer In-Charge/ Project Manager prior to execution of work.

10. THAT the Contractor shall provide communication facilities i.e. Walky – Talkie / Mobile Phone, Display of Flags / whistles for easy communication among workers during Tower erection / stringing activity, as per requirement.
11. THAT the Contractor undertakes to deploy qualified safety personnel responsible for safety as per requirements of Employer/Statutory Authorities.

THAT the Contractor employing more than 250 workmen whether temporary, casual, probationer, regular or permanent or on contract, shall employ at least one full time officer exclusively as qualified safety officer having diploma in safety to supervise safety aspects of the equipment and workmen who will coordinate with Engineer In-charge /Project Manager/Safety Co-ordinator of the Employer. In case of work being carried out through sub contractors the sub – contractor's workmen / employees will also be considered as the contractor's employees / workmen for the above purpose. If the number of workers are less than 250 then one qualified safety officer is to be deployed for each contract. He will report directly to his head of organization and not the Project Manager of contractor He shall also not be assigned any other work except assigning the work of safety. The curriculum vitae of such person shall be got cleared from XXXX (Name of the Employer) Project Manager / Construction staff.

The name and address of such safety officers of contractor will be promptly informed in writing to Engineer In-charge with a copy to safety officer - In-charge before start of work or immediately after any change of the incumbent is made during the currency of the contract. The list is enclosed at Annexure – 5A (SP).

THAT the Contractor has also prepared a list including details of Explosive Operator (if required), Safety officer / Safety supervisor / nominated person for safety for each erection / stringing gang, list of personnel trained in First Aid Techniques as well as copy of organisation structure of the Contractor in regard to safety. The list is enclosed at Annexure – 5B (SP).

12. The Project Manager shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.
13. THAT, if, any Employer's Engineer/ supervisor at site observes that the Contractor is failing to provide safe working environment at site as per agreed Safety Plan / XXXX (Name of the Employer) Safety Rule/

Safety Instructions / Statutory safety requirement and creates hazardous conditions at site and there is possibility of an accident to workmen or workmen of the other contractor or public or the work is being carried out in an un safe manner or he continues to work even after being instructed to stop the work by Engineer / Supervisor at site / RHQ / Corp. Centre, the Contractor shall be bound to pay a penalty of Rs. 10,000/- per incident per day till the instructions are complied and as certified by Engineer / Supervisor of Employer at site. The work will remain suspended and no activity will take place without compliance and obtaining clearance / certification of the Site Engineer / Supervisor of the Employer to start the work.

14. THAT, if the investigation committee of Employer observes any accident or the Engineer In-charge/Project Manager of the Employer based on the report of the Engineer/Supervisor of the Employer at site observes any failure on the Contractor's part to comply with safety requirement / safety rules/ safety standards/ safety instruction as prescribed by the Employer or as prescribed under the applicable law for the safety of the equipment, plant and personnel and the Contractor does not take adequate steps to prevent hazardous conditions which may cause injury to its own Contractor's employees or employee of any other Contractors or Employer or any other person at site or adjacent thereto, or public involvement because of the Contractor's negligence of safety norms, the Contractor shall be liable to pay a compensation of Rs. 10,00,000/- (Rupees Ten Lakh only) per person affected causing death and Rs. 1,00,000/- (Rupees One Lakh only) per person for serious injuries / 25% or more permanent disability to the Employer for further disbursement to the deceased family/ Injured persons. The permanent disability has the same meaning as indicated in Workmen's Compensation Act 1923 or latest. The above stipulations is in addition to all other compensation payable to sufferer as per workmen compensation Act / Rules

THAT as per the Employer's instructions, the Contractor agrees that this amount shall be deducted from their running bill(s) immediately after the accident, That the Contractor understands that this amount shall be over and above the compensation amount liable to be paid as per the Workmen's Compensation Act /other statutory requirement/ provisions of the Bidding Documents.

15. THAT the Contractor shall submit Near-Miss-Accident report alongwith action plan for avoidance such incidence /accidents to Engineer – In-charge/ Project Manager. Contractor shall also submit Monthly Safety Activities report to Engineer – In-charge/ Project Manager and copy of the Monthly Safety Activities report also to be sent to Safety In-charge at RHQ of the Employer for his review record and instructions.
16. THAT the Contractor is submitting a copy of Safety Policy/ Safety Documents of its Company which is enclosed at Annexure – 6 (SP) and ensure that the safety Policy and safety documents are implemented in healthy spirit.
17. THAT the Contractor shall make available of First Aid Box [Contents of which shall be as per Building & other construction workers (Regulation of Employment and Conditions of Services Act and Central Rule 1998 or latest / XXXX (Name of the Employer) Guidelines)] to the satisfaction of Engineer In-Charge/ Project Manager with each gang at site and not at camp and ensures that trained persons in First Aid Techniques with each gang before execution of work.
18. THAT the Contractor shall submit an 'Emergency Preparedness Plan' for different incidences i.e. Fall from height, Electrocution, Sun Stroke, Collapse of pit, Collapse of Tower, Snake bite, Fire in camp / Store, Flood, Storm, Earthquake, Militancy etc. while carrying out different activities under execution i.e. foundation works including civil works, erection, stringing (as applicable), testing & commissioning, disposal of materials at site / store etc. which is enclosed at Annexure – 7 (SP) for approval of the Engineer In-Charge/ Project Manager before start of work.
19. THAT the Contractor shall organise Safety Training Programs on Safety, Health and Environment and for safe execution of different activities of works i.e. foundation works including civil works, erection, stringing (as applicable), testing & commissioning, disposal of materials at site / store etc. for their own employees including sub contractor workers on regular basis.

The Contractor, therefore, submits copy of the module of training program, enclosed at Annexure – 9 (SP), to Engineer In-charge/Project Manager for its acceptance and approval and records maintained.

20. THAT the Contractor shall conduct safety audit, as per Safety Audit Check Lists enclosed at Annexure – 8 (SP), by his Safety Officer(s) every month during construction of Transmission Lines / Sub Stations / any other work and copy of the safety audit report will be forwarded to the Employer's Engineer In-charge / Site In-charge/Project Manager for his comments and feedback. During safety audit, healthiness of all Personal Protective Equipments (PPEs) shall be checked individually by safety officer of contractor and issue a certificate of its healthiness or rejection of faulty PPEs and contractor has to ensure that all faulty PPEs and all faulty lifting tools and tackles should be destroyed in the presence of XXXX (Name of the Employer) construction staff. Contractor has to ensure that each gang be safety audited at least once in two months. During safety audit by the contractor, Safety officer's feedback from XXXX (Name of the Employer) concerned shall be taken and recorded. The Employer's site officials shall also conduct safety audit at their own from time to time when construction activities are under progress. Apart from above, the Employer may also conduct surveillance safety audits. The Employer may take action against the person / persons as deemed fit under various statutory acts/provisions under the Contract for any violation of safety norms / safety standards.
21. THAT the Contractor shall develop and display Safety Posters of construction activity at site and also at camp where workers are generally residing.
22. THAT the Contractor shall ensure to provide potable and safe drinking water for workers at site / at camp.
23. THAT the Contractor shall do health check up of all workers from competent agencies and reports will be submitted to Engineer In-Charge within fifteen (15) days of health check up of workers as per statutory requirement.
24. THAT the Contractor shall submit information alongwith documentary evidences in regard to compliance to various statutory requirements as applicable which are enclosed at Annexure – 10A (SP).

The Contractor shall also submit details of Insurance Policies taken by the Contractor for insurance coverage against accident for all employees are enclosed at Annexure – 10B (SP).

25. THAT a check-list in respect of aforesaid enclosures alongwith the Contractor's remarks, wherever required, is attached as Annexure – Check List herewith.

THE CONTRACTOR shall incorporate modifications/changes in this 'Safety Plan' necessitated on the basis of review/comments of the Engineer In-Charge/Project Manager within fourteen (14) days of receipt of review/comments and on final approval of the Engineer In-Charge/Project Manager of this 'Safety Plan', the Contractor shall execute the works under the Contract as per approved 'Safety Plan'. Further, the Contractor has also noted that the first progressive payment towards Services Contract shall be made on submission of 'Safety Plan' alongwith all requisite documents and approval of the same by the Engineer In-Charge/Project Manager.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorised representative under the common seal of the Company, the day, month and year first above mentioned.

For and on behalf of

M/s.....

WITNESS

1. Signature.....

Signature.....

Name.....

Name.....

Address.....

Address.....

2. Signature.....

Authorised representative

Name.....

(Common Seal)

Address.....

(In case of Company)

Note:

All the annexure referred to in this "Safety Plan" are required to be enclosed by the contractor as per the attached " Check List "

1. Safety Plan is to be executed by the authorised person and (i) in case of contracting Company under common seal of the Company or (ii) having the power of attorney issued under common seal of the company with authority to execute such contract documents etc., (iii) In case of (ii), the original Power of Attorney if it is specifically for this Contract or a Photostat copy of the Power of Attorney if it is General Power of Attorney and such documents should be attached to this Safety Plan.
2. For all safety monitoring/ documentation, Engineer In-charge / Regional In-charge of safety at RHQ will be the nodal Officers for communication.

CHECK LIST FOR SEFETY PLAN

S. N.	Details of Enclosure	Status of Submission of information/ documents	Remarks
1.	<p>Annexure – 1A (SP)</p> <p>Safe work procedure for each activity i.e. foundation works including civil works, erection, stringing (as applicable), testing &amp; commissioning, disposal of materials at site / store etc. to be executed at site.</p>	Yes/No	
2.	<p>Annexure – 1B (SP)</p> <p>Manpower deployment plan, activity wise foundation works including civil works, erection, stringing (as applicable), testing &amp; commissioning, disposal of materials at site / store etc.</p>	Yes/No	
3.	<p>Annexure – 2 (SP)</p> <p>List of Lifting Machines i.e. Crane, Hoist, Triffor, Chain Pulley Blocks etc. and Lifting Tools and Tackles i.e. D shackle, Pulleys, come along clamps, wire rope slings etc. and all types of ropes i.e. Wire ropes, Poly propylene Rope etc. used for lifting purposes along with test certificates.</p>	Yes/No	
4.	<p>Annexure – 3 (SP)</p> <p>List of Personal Protective Equipment (PPE), activity wise including the following along with test certificate of each as applicable:</p> <ol style="list-style-type: none"> <li>1. Industrial Safety Helmet to all workmen at site. (EN 397 / IS 2925) with chin strap and back stay arrangement.</li> <li>2. Safety shoes without steel toe to all ground level workers and canvas shoes for workers working on tower.</li> <li>3. Rubber Gum Boot to workers working in rainy season / concreting job.</li> <li>4. Twin lanyard Full Body Safety harness with shock absorber and leg strap arrangement for all workers working at height for more than three meters. Safety Harness should be with attachments of light weight such as of aluminium alloy etc. and having a feature of automatic locking arrangement of snap hook and comply with EN 361 / IS 3521 standards.</li> <li>5. Mobile fall arrestors for safety of workers during their ascending / descending from tower / on tower.</li> </ol>	Yes/No	



S. N.	Details of Enclosure	Status of Submission of information/ documents	Remarks
	<p>EN 353 -2 (Guided type fall arresters on a flexible anchorage line.)</p> <p>6. Retractable type fall arrestor (EN360: 2002) for ascending / descending on suspension insulator string etc.</p> <p>7. Providing of good quality cotton hand gloves / leather hand gloves for workers engaged in handling of tower parts or as per requirement at site.</p> <p>8. Electrical Resistance hand gloves to workers for handling electrical equipment / Electrical connections. IS : 4770</p> <p>9. Dust masks to workers handling cement as per requirement.</p> <p>10. Face shield for welder and Grinders. IS : 1179 / IS : 2553</p> <p>11. Other PPEs, if any, as per requirement etc.</p>		
5.	<p>Annexure – 4 (SP)</p> <p>List of Earthing Equipment / Earthing devices with Earthing lead conforming to IECs for earthing equipments are – (855, 1230, 1235 etc.) gang wise for stringing activity/as per requirement</p>	Yes/No	
6.	<p>Annexure – 5A (SP)</p> <p>List of Qualified Safety Officer(s) alongwith their contact details</p>	Yes/No	
7.	<p>Annexure – 5B (SP)</p> <p>Details of Explosive Operator (if required), Safety officer / Safety supervisor for every erection / stringing gang, any other person nominated for safety, list of personnel trained in First Aid as well as brief information about safety set up by the Contractor alongwith copy of organisation of the Contractor in regard to safety</p>	Yes/No	
8.	<p>Annexure – 6 (SP)</p> <p>Copy of Safety Policy/ Safety Document of the Contractor's company</p>	Yes/No	
9.	<p>Annexure – 7 (SP)</p> <p>'Emergency Preparedness Plan' for different incidences i.e. Fall from height, Electrocutation, Sun Stroke, Collapse of pit, Collapse of Tower, Snake bite, Fire in camp / Store, Flood, Storm, Earthquake, Militancy etc. while carrying out different activities under execution i.e. foundation works including civil works, erection, stringing (as applicable), testing &amp; commissioning, disposal of materials at site / store etc.</p>	Yes/No	

S. N.	Details of Enclosure	Status of Submission of information/ documents	Remarks
10.	Annexure – 8 (SP)  Safety Audit Check Lists ( Formats to be enclosed)	Yes/No	
11.	Annexure – 9 (SP)  Copy of the module of Safety Training Programs on Safety, Health and Environment, safe execution of different activities of works for Contractor's own employees on regular basis and sub contractor employees.	Yes/No	
12.	Annexure – 10A (SP)  Information alongwith documentary evidences in regard to the Contractor's compliance to various statutory requirements including the following:		
(i)	Electricity Act 2003  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(ii)	Factories Act 1948 or latest  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(iii)	Building & other construction workers (Regulation of Employment and Conditions of Services Act and Central Act 1996 or latest) and Welfare Cess Act 1996 or latest with Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(iv)	Workmen Compensation Act 1923 or latest and Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(v)	Public Insurance Liabilities Act 1991 or latest and Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(vi)	Indian Explosive Act 1948 or latest and Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	

S. N.	Details of Enclosure	Status of Submission of information/ documents	Remarks
(vii)	Indian Petroleum Act 1934 or latest and Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(viii)	License under the contract Labour (Regulation & Abolition) Act 1970 or latest and Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(ix)	Indian Electricity Rule 2003 and amendments if any, from time to time.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(x)	The Environment (Protection) Act 1986 or latest and Rules.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(xi)	Child Labour (Prohibition & Regulation) Act 1986 or latest.  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(xii)	National Building Code of India 2005 or latest (NBC 2005).  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(xiii)	Indian standards for construction of Low/ Medium/ High/ Extra High Voltage Transmission Line  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
(iv)	Any other statutory requirement(s) [please specify]  _____ [Name of Documentary evidence in support of compliance]	Yes/No	
13.	Annexure – 10B (SP)		

S. N.	Details of Enclosure	Status of Submission of information/ documents	Remarks
	Details of Insurance Policies alongwith documentary evidences taken by the Contractor for the insurance coverage against accident for all employees as below:		
(i)	Under Workmen Compensation Act 1923 or latest and Rules.  _____ [Name of Documentary evidence in support of insurance taken]	Yes/No	
(ii)	Public Insurance Liabilities Act 1991 or latest  _____ [Name of Documentary evidence in support of insurance taken]	Yes/No	
(iii)	Any Other Insurance Policies  _____ [Name of Documentary evidence in support of insurance taken]	Yes/No	

19. FORM OF JOINT DEED OF UNDERTAKING BY THE SUB-CONTRACTOR ALONGWITH THE BIDDER/CONTRACTOR

THIS DEED OF UNDERTAKING executed this ..... day of ..... Two Thousand and ..... by M/s. ...., a Company incorporated under the laws of ..... and having its Registered Office at ..... (hereinafter called the "Sub-contractor" which expression shall include its successors, executors and permitted assigns), and M/s. ...., a Company incorporated under the laws of ..... having its Registered Office at ..... (hereinafter called the "Bidder"/"Contractor" which expression shall include its successors, executors and permitted assigns) in favour of XXXX (Name of the Employer) a Company incorporated under the Companies Act of 1956/2013 (with amendment from time to time) having its registered office at XXXX (Registered Address of the Employer) (hereinafter called the "Employer" which expression shall include its successors, executors and permitted assigns)

WHEREAS the "Employer" invited Bid as per its Specification No.....for IPDS works of ..... including installation of Sub-stations, lines, bays, DTs and providing service connections etc.

AND WHEREAS Clause No. ...., Section ....., of ....., Vol.-I... forming part of the Bid Documents inter-alia stipulates that the Bidder and/or Sub-contractor must fulfill the Qualifying Requirements and be jointly and severally bound and responsible for the quality and timely execution of IPDS works in the event the Bid submitted by the Bidder is accepted by the Employer resulting in a Contract.

AND WHEREAS the Bidder has submitted its Bid to the Employer vide Proposal No. .... dated ..... based on tie-up with the Sub-contractor for execution of aforesaid IPDS works. NOW

THEREFORE THIS UNDERTAKING WITNESSETH as under:

- 0.1 In consideration of the award of Contract by the Employer to the Bidder (hereinafter referred to as the "Contract") we, the Sub-contractor and the Bidder/Contractor do hereby declare that we shall be jointly and severally bound unto the XXXX (Name of the Employer), for execution of IPDS works in accordance with the Contract Specifications.
- 0.1 Without in any way affecting the generality and total responsibility in terms of this Deed of Undertaking, the Sub-contractor hereby agrees to depute their representatives from time to time to the Employer's Project site as mutually considered necessary by the Employer, Bidder/Contractor and the Sub-contractor to ensure proper quality, manufacture, testing and supply on FOR destination delivery at site basis and successful performance of IPDS works in accordance with Contract Specifications. Further, if the Employer suffers any loss or damage on account of non-performance of the material fully meeting the performance guaranteed as per Bid Specification in terms of the contract. We the Sub- contractor and the Contractor jointly and severally undertake to pay such loss or damages to the Employer on its demand without any demur.
- 0.1 This Deed of Undertaking shall be construed and interpreted in accordance with the laws of India and the Courts in xxxxx (Headquarter of Employer) shall have exclusive jurisdiction in all matters arising under the Undertaking.
- 0.1 We, the Bidder/Contractor and Sub-contractor agree that this Undertaking shall be irrevocable and shall form an integral part of the Contract and further agree that this Undertaking shall continue to be enforceable till the Employer discharges it. It shall become operative from the effective date of Contract.

IN WITNESS WHEREOF the Sub-contractor and/or the Bidder/Contractor have through their Authorised Representatives executed these presents and affixed Common seals of their respective Companies, on the day, month and year first above mentioned.

WITNESS (For Sub-contractor)

Signature .....

(Signature of the authorized representative)

Name .....

Name .....

Office Address .....

Common Seal of Company .....

WITNESS (For Bidder)

Signature .....

(Signature of the authorized representative)

Name .....

Name .....

Office Address .....

Common Seal of Company .....

Note:

1. For the purpose of executing the Deed of Joint Undertaking, the non-judicial stamp papers of appropriate value shall be purchased in the name of executant(s).
2. The Undertaking shall be signed on all the pages by the authorised representatives of each of the partners and should invariably be witnessed.
3. This Deed of Joint Undertaking duly attested by Notary Public of the place(s) of the respective executant(s), shall be submitted alongwith the bid.
4. In case the bid is submitted by a Joint Venture (JV) of two or more firms as partners, then the Joint deed of undertaking shall be modified accordingly.

20. FORM OF CERTIFICATE OF FINANCIAL PARAMETERS FOR QR  
(as per clause ref. no. 1.02 and 2.0 of Annexure-A(BDS))

(Rupees in Lakhs)

S. No.	Financial parameters	2015-16	2014-15	2013-14	2012-13	2012-11
1.	Net Worth					
a)	Paid up Capital					
b)	Free Reserves and Surplus*					
c)	Misc expenses to the extent not written off					
	Net Worth (a+b-c)					
2.	Annual Turnover **					
3.	Liquid Asset (Total Current Asset – Inventories)					

\* Free Reserve and Surplus should be Exclusive of Revaluation Reserve, written back of Depreciation Provision and Amalgamation.

\*\* Annual total Income/ turnover as incorporated in the Profit and Loss Account excluding non recurring income, i.e. sale of fixed asset etc.

It is certified that all the figures are based on audited accounts read with auditors report and Notes to Accounts etc.

Date

Certified By

Place

(Chartered Accountants)

Membership No.

Seal

PERT Chart Format under IPDS Schemes

Name of State  
 Name of Project  
 Reference No. of PERT Chart (unique code to be given by Employer)  
 Version of PERT Chart

Original/R1/R2/R3...

Name of Employer  
 Name of Turnkey Contractor (TC)  
 Date of approval of PERT Chart  
 Lot No. and date

S. NO.	Activity	Responsibility	Unit	Qty as per Scope	Month																							
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Letter of Intent (zero date)	Employer																										
2	PERT Chart	TC / E																										
3	Submission of CPG	TC																										
4	Upfront sharing of approved sub-vendors by PIA	Employer																										
5	Up Front sharing of existing approved GTPs of Employer	Employer																										
6	LoA	Employer																										
7	Contract Agreement	TC/E																										
8	Finalisation of Subcontract & Vendors	TC/E																										
9	Submission of Engineering Drawing (other than existing approved)	TC																										
10	Approval of Engineering Drawings (other than existing approved)	Employer																										
11	Submission of GTP (other than existing approved)	TC																										
12	Approval of GTP (other than existing approved)	Employer																										
13	Placement of Award for following Key Materials:																											
13.01	Poles																											
13.02	Conductor																											
13.03	Power Transformer																											
13.04	Distribution Transformer																											
13.05	Steel Structure Materials																											
13.06	Vacuum circuit breakers																											
13.07	GI wires																											
13.08	Insulators																											
13.09	Meters																											
13.1	Power & Control Cables																											
13.11	Distribution Box																											
13.12	Line Equipments (LA, isolator, AB switch, CT/PT)																											
13.13	Earthing Materials																											
13.14	Stay Sets																											
14	Establishment of Site Office, Office infrastructure, Vehicle																											
15	Deployment of manpower at site																											
16	Survey																											
16.01	Field survey																											
16.02	Approval of Survey report																											
17	Receipt of following Key Materials at Site:																											
17.01	Poles																											
17.02	Conductor																											
17.03	Power Transformer																											
17.04	Distribution Transformer																											
17.05	Steel Structure Materials																											
17.06	Vacuum circuit breakers																											
17.07	GI wires																											
17.08	Insulators																											
17.09	Meters																											
17.1	Power & Control Cables																											
17.11	Distribution Box																											
17.12	Line Equipments (LA, isolator, AB switch, CT/PT)																											
17.13	Earthing Materials																											
17.14	Stay Sets																											
18	Erection, testing & Commissioning of following works:																											
18.01	33 KV Lines																											
18.02	33/11 KV or 66/11 KV Substations																											
18.03	11 KV Lines																											
18.04	DTR Substation																											
18.05	LT Line																											
18.06	HVDS																											
18.07	Metering																											
18.08	Aux/ R&M of Power Substation																											
18.09	Aux/ R&M of DTR Substation																											
19	Submission of reconciliation & closure proposal																											

(Employer)  
 Signature  
 Name of Authorised Signatory  
 Designation

(Turnkey Contractor)  
 Signature  
 Name of Authorised Signatory  
 Designation

- Note-
- 1 Approving authority of Employer shall sign and stamp the PERT chart on approval.
  - 2 approved PERT chart shall be part of contract agreement.
  - 3 Original PERT chart shall not be changed during execution of project.
  - 4 Revision in PERT chart or acceptance of catch up plan, shall be within overall contract execution period of the project.
  - 5 Revised PERT chart / catch up plan shall be signed by same authorities of Employer and Turnkey contractor.
  - 6 Approved PERT chart shall be basic document to take a decision on extension of time for contract and to evaluate performance of project execution contractor.
  - 7 Item wise responsibility should be identified between Employer and turnkey contractor
  - 8 Clear time line to be agreed for various activities between Employer and Turnkey Contractor
  - 9 Unique reference no. to be assigned with date to approved PERT chart by Employer.
  - 10 Any revision should be clearly assigned with unique reference no., date and revision no. (R1/R2/R3 etc)
  - 11 Items specified may be customised based on project formation.



# VOLUME-I: SECTION – VII

## SCOPE OF WORKS

## Scope of works

### 1.00 Distribution Transformer:

4 star rated {as per Bureau of Energy Efficiency (BEE)}, distribution transformers are standardized in the project:

The Distribution Transformers shall be 11/0.415 KV non-sealed type BEE specified 4 Star Distribution Transformers. The transformers shall be double wound, three phase, CRGO M3 Grade (0.23mm) or better (The core shall be constructed from high grade, non-ageing, Cold Rolled Grain Oriented (CRGO) silicon steel of M3 Grade (0.23mm) laminations only. PRIME CORE M3 Grade (0.23mm) materials are to be used for transformers core. The transformers shall be copper wound.

Distribution Transformers shall be subject to inspection during manufacturing (stage inspection), pre-delivery inspection, and inspection at site during pre-erection/post erection/post commissioning conditions. Project Manager shall select samples from the core laminations and get the same tested in CPRI/ NABL Accredited laboratory to prove the quality of the core material.

The distribution transformers shall be supplied with transformer oil filled up-to maximum permissible level and breather with silica gel.

The distribution transformers must have been successfully type tested within five years from date of Letter of Intent and the designs should have been in satisfactory operation for a period not less than two years as on the date of bid opening. Compliance shall be demonstrated by submitting, (i) authenticated copies of the type test reports and (ii) performance certificates from the users, specifically from Central Govt./State Govt. or their undertakings.

4 STAR LEVEL: Each Distribution Transformers must contain 4 Star Level with style and information provided by the Bureau of Energy Efficiency (B.E.E), Ministry of Power, Government of India.

Transformers should be tested for pre-commissioning checks which includes Insulation Resistance Test, ratio test and oil breakdown voltage test. Before formal energisation, oil leakages from the parts of the transformer, oil level in conservator tank, condition of silica gel, earth connection (two separate) between neutral and earthing, proper jointing of earth wires/flats at the joints and earth resistance of the individual earthing pits are to be checked and recorded. On commissioning of the transformer, phase current and phase to phase voltage, phase to neutral voltage are to be recorded. The loading on the transformers should be balanced. The quantum of neutral current flowing through neutral shall be recorded. A record of pre-commissioning checks/tests are to be prepared and submitted to the Project Manager.

### Testing during pre-commissioning and post commissioning

#### 1.00 Type Test, Routine and Acceptance Tests:

All equipment with their terminal connectors, control cabinets, main protective relays, etc. as well as insulators, insulator strings with hardware, clamps and connectors, marshalling boxes, etc., shall conform to type tests and shall be subjected to routine and acceptance tests in accordance with the requirements stipulated under respective equipment sections.

Contractor shall submit all type test reports/certificates according to the relevant standards and/or specifications for all the equipments/material for Owner's review as a proof of their conformity to type tests along with a certificate regarding conformity of equipments to be supplied with the type test.

The test certificates submitted shall be of the tests conducted within 5 years prior to the date of bid opening. In case the test reports are of the tests conducted earlier than 5 years prior to the date of bid opening, or they do not meet the requirements of the specifications/relevant standards, or they are not available, the Contractor shall conduct these type test(s) under this contract at no extra cost to the Owner.

The Owner will have the right of getting any test of reasonable nature carried out on any component or completely assembled equipment at Contractor's premises or at site or in any other place in addition to the aforesaid type and routine tests, to satisfy that the materials/equipment comply with the specifications.

Failure of any equipment to meet the specified requirements of tests carried out at works or at site shall be sufficient cause for rejection of that equipment lot. Rejection of any equipment lot will not be held as a valid reason for delay in the completion of the works as per schedule. Contractor shall be responsible for removing all deficiencies, and supplying the equipment that meet the requirement.

Test results / Test reports of various tests performed under this contract shall be furnished by the agency in two copies signed jointly by agency and representative of Project Manager along with a soft copy in excel file in the office of Employer.

2.00 General Checks:

- i. Check for physical damages.
- ii. Visual examination of zinc coating/ painting.
- iii. Check from name plate that all items are as per order/ specification.
- iv. Check tightness of all bolts, clamp and connecting terminals using torque wrenches.
- v. For oil filled equipment check for oil leakage, if any. Also check oil level and top up.
- vi. Check ground connections for quality of weld and application of zinc rich paint over weld joint of galvanized surfaces.
- vii. Check cleanliness of insulator and bushings.
- viii. All checks and tests specified by the manufacturers in their drawings and manuals as well as tests specified in the relevant code of erection.
- ix. Visual examination of labelling, danger board, anti-climbing device, muffing, painting, tension on stay wires, straightening of poles, alignment of line/supports etc

Equipment test records, commissioning test records and drawings:

Factory test certificates of equipment, test certificates at the time of pre-dispatch inspections, pre-dispatch inspection reports, pre-commissioning check results and post commissioning check results shall be compiled and provided in three sets to Project Manager for his approval and records.

A copy of such test record shall be offered to electrical inspector and other inspecting officials during his/her visit to substation for inspection.

3.00 Circuit Breakers:

- i. Insulation resistance of each pole.
- ii. Check adjustment, if any, suggested by manufacturer.
- iii. Breaker closing and tripping time.
- iv. Slow and power closing operation and opening.
- v. Trip free and anti-pumping operation.

- vi. Minimum pick up volts of coils
- vii. Contact resistance.
- viii. Interlock with other breakers/circuits,
- ix. Functional checking of all accessories.
- x. Functional checking of control circuits, interlocks, tripping through protective relays and auto-reclose operation.
- xi. Insulation resistance of control circuits, motor etc.
- xii. Resistance of closing and tripping coils.

4.00 Current Transformers:

- i. Insulation Resistance Test
- ii. Polarity test.
- iii. Ratio identification test-checking of all ratios on all cores by primary injection of current.
- iv. Dielectric test of oil (Wherever applicable)
- v. Magnetizing characteristics test.

5.00 Voltage Transformers:

- i. Insulation resistance test
- ii. Polarity test.
- iii. Ratio test
- iv. Dielectric test of oil (if applicable)

6.00 Phasing Out

The phasing out of all supplies in the Sub-station system shall be carried out.

7.00 Station Earthing

- i. Check soil Resistivity
- ii. Check continuity of grid wires
- iii. Check earth resistance of the entire grid as well as various sections of the same.
- iv. Check for weld joint and application of zinc rich paint on galvanized surface.
- v. Dip test on earth conductor prior to use.

8.00 Distribution Transformer substation testing

- i. Visual examination of statutory clearances
- ii. Visual examination of earthing connections for tightness and tidyness
- iii. Measurement of earth resistance of individual earth pit
- iv. Visual examination of termination of wires and cables
- v. Visual examination of operation of AB switch and DO fuse units
- vi. Visual examination of straightening of individual substation pole, composite DP structure
- vii. Visual examination of painting of support and fabricated items
- viii. Insulation resistance of transformer and distribution board
- ix. BDV test of transformer oil
- x. Visual examination of Oil and silica gel leakage in distribution transformer
- xi. Visual examination of breather, filling of oil & silica gel in breather of distribution transformer
- xii. Visual examination of two separate earth connection to neutral bushing of distribution transformer
- xiii. Testing and recording of LV voltages (Ph-Ph and Ph-N) after commissioning of distribution transformer
- xiv. Testing and recording of neutral current after commissioning of distribution transformer

- xv. Checking of transformer oil in conservator tank
- xvi. Visual examination of valves between transformer tank and breathers
- xvii. Visual examination of labelling, danger board, anti-climbing device, muffing
- xviii. Visual examination of tightness and tidiness of stays
  
- ix. Visual examination of labelling, danger board, anti-climbing device, muffing
- x. Visual examination of alignment of line
- xi. Visual examination of tightness and tidiness of stay sets

# BIDDING DOCUMENT

FOR

## IMPLEMENTATION OF SMART GRID INFRASTRUCTURE INCLUDING ENHANCING OF EXISTING NETWORK IN NDMC POWER DISTRIBUTION AREA

**SUB HEAD: - STRENGTHENING OF SUB-TRANSMISSION AND  
DISTRIBUTION NETWORK UNDER INTEGRATED  
POWER DEVELOPMENT SCHEME (IPDS) OF MINISTRY  
OF POWER, GOVERNMENT OF INDIA.**

### VOLUME-II

## (PMS, QUALITY ASSURANCE & EVALUATION MECHANISM, BID FORMS AND PRICE SCHEDULES)

**Section-I: PMS, Quality Assurance & Evaluation Mechanism  
(QAM), Documentation & PMA**

**Section-II: Bid Forms**

**Section-III: Price Schedules**

**NIT NO.:- NDMC/SMART GRID/2016-17/02**



VOLUME-II : SECTION – I

PROJECT MANAGEMENT SYSTEM  
(PMS),  
QUALITY ASSURANCE &  
EVALUATION MECHANISM (QAM),  
DOCUMENTATION & PMA

## PROJECT MANAGEMENT SYSTEM, QUALITY ASSURANCE AND DOCUMENTATION

This section describes the project management system, quality assurance and documentation requirements for the project.

### 1. Project Management System

#### 1.1. General

The Contractor shall assign a project manager with the authority to make commitments and decisions that are binding on the Contractor. Employer will designate a project manager to coordinate all employer project related activities. All communications between employer and the Contractor shall be coordinated through the project managers. The project managers shall also be assisting employer in communicating project related information to other stake holders.

Bidder shall submit the manpower deployment plan along with the bids, describing the key roles of each person.

The role and responsibilities of contractor shall be as follows:

- a) To prepare, maintain and update project detailed Work Execution Plan for successful implementation of project like approval of GTP, approval of sub-contractor, approval of drawings, supply of materials, mobilization of men, material and equipment etc. at site for successful completion of works, Compile and up-load physical as well as financial progresses, compile the progress of works at Employer level and to assist in forwarding it to all stake holders.
- b) To actively participate with employer in resolving all issues relating to project implementation including ROW, Forest Clearances, Railway Crossings, and Payments to contractors/vendors and policy matters.
- c) To actively participate in monitoring, reviewing and analysing the physical, financial and quality assurances works progress of IPDS works and also to take suitable measures on compliance of observations being raised during monitoring/review meetings with employer.
- d) To implement and maintain a dedicated centralized bank account for the project, upload and up-date project wise physical progress in IPDS web portal. Physical as well as financial progresses shall be uploaded in standard Bill of Material format of the contract. Also, to submit claims as per release IPDS guidelines to Employer for release of payments/funds.
- e) To oversee the progress and compliance of the Quality Assurance Mechanism as per IPDS guidelines.

#### 1.2. Project Schedule

As per the schedule the bidder shall submit a preliminary implementation plan along with the bid. The detailed project implementation schedule shall be submitted by the contractor after the award for employer's approval, which shall include at least the following activities:

- (a) Surveying of site.
- (b) Documents submission and approval schedule
- (c) Type Testing Schedule
- (d) Dispatch Schedule
- (e) Installation & commissioning schedule
- (f) Training schedule.

The project schedule shall include the estimated period for completion of project and its linkage with other activities.



1.3. Progress Report

A progress report shall be prepared by the Contractor each month against the activities listed in the project schedule. The report shall be made available to employer on a monthly basis, e.g., the 10th of each month. The progress report shall include all the completed, ongoing and scheduled activities.

1.4. Transmittals

Every document, letter, progress report, change order, and any other written transmissions exchanged between the Contractor and employer shall be assigned a unique transmittal number. The Contractor shall maintain a correspondence index and assign transmittal numbers consecutively for all Contractor documents. Employer will maintain a similar correspondence numbering scheme identifying documents and correspondence that employer initiates.

2. Quality Assurance and Evaluation Mechanism

The Project Implementation Agency (PIA) i.e NDMC shall be solely responsible & accountable for assuring quality in Integrated Power Development Scheme (IPDS) works. Project Implementing Agency (PIA) shall formulate a detailed comprehensive Quality Assurance (QA) plan for the works to be carried out under IPDS scheme with an objective to create quality infrastructure works. The QA and Inspection Plan shall be integral part of the contract agreement with turnkey contractor or equipment supplier and erection agency as the case may be in case of turnkey/ or departmental execution of works. PIA has to ensure that the quality of materials/equipment supplied at site and execution of works carried out at field under IPDS scheme is in accordance to Manufacturing Quality Plan (MQP)/Guaranteed Technical Particulars (GTP) and Field Quality Plan (FQP)/Approved Drawings/Data Sheets respectively.

2.1. Quality checks to be ensured by PIA/Turnkey Contractor:

PIA & Turnkey Contractor shall strictly ensure QA checks during the day to day course of project execution, which are as follows:

- a. 100% pre-dispatch inspections of all materials viz. as per MQP/ Approved Drawings/ Technical Specifications/Datasheet/GTP/applicable national & international standards.
- b. 100% of all 11 kV sub stations (New & Augmented) for quality of material as per MQP/Approved Drawings/Technical Specifications/Datasheet/GTP and erection works in the field as per FQP/approved survey drawings/layout.
- c. 100% verification of materials utilized under the scheme.
- d. 100% verification of works done in System Strengthening.

Also, PIA & Turnkey Contractor have to carry out quality assurance of substation works as per the checklist provided at Annexure-A.

- 2.1.1. Vendor approval: All the materials procured for IPDS works shall be purchased from the authorised vendors approved by their Quality Assurance Department of PIA. Approved vendors list is to be uploaded periodically (monthly) on the PIA web portal.

New vendors/suppliers may be approved by PIAs, provided capability of manufacturer's is assessed suitably by visiting the factory premises and checking the testing facility available before accepting it as approved vendor. If required, State Electricity Board/Power Department/ Distribution Companies may adopt vendors already approved by CPSUs.

- 2.1.2. Material Inspection: All materials of 11kV substations shall be inspected at manufacturer works/premises before dispatch at site. The materials to be used under the scheme shall be as per Technical Specification attached with Standard Bidding Document of IPDS scheme or as per latest relevant Indian Standards/approved Datasheet/drawings/GTP/MQP.

Note: PIA to perform one stage inspection of Power/Distribution transformer for each manufacturer.

- 2.1.3. FQP for Civil works: PIA shall prepare a separate FQP for civil works supported with drawings which shall be approved by their competent authority which shall be uploaded at web portal. The turnkey contractor shall adhere to this FQP while carrying out physical works.
- 2.1.4. FQP for testing & commissioning: PIA shall prepare a comprehensive FQP for testing & commissioning of 11kV substation, Distribution transformer Substation etc. The electrical system shall be energized only after performing all tests as described in the FQP. Proper records in this regard, including tests on earth resistance, insulation resistance of 11 kV line & Distribution Transformer etc. shall be maintained, jointly signed by PIA and turnkey contractor representatives.
- 2.1.5. QA documentation: All the quality assurance checks shall be conducted in the field as per approved Field Quality Plan(FQP) and shall be documented properly and signed by the quality engineer of the turnkey contractor & countersigned by PIA's representative and shall be kept for future reference. These documents shall be maintained by PIAs in proper order and shall be made available at site for verification by Quality Monitors during inspection.

## 2.2. Quality Assurance Mechanism to be envisaged by PFC/MoP for IPDS Projects

IPDS Projects shall have a single tier Quality Assurance Mechanism (QAM). The single tier QAM shall exclude the in-house process quality checks followed by the Project Implementation Agency (PIA) during the physical execution of the project.

Power Finance Corporation (PFC), the nodal agency for the IPDS scheme shall operate for Quality Assurance Mechanism. ~~PFC shall designate a senior officer (ZM/CPM of the state) as PFC State Quality Assurance Coordinator (PSOAC) at its State level Zonal/Project office. PFC corporate office shall designate a senior officer not below the level of AGM/GM as PQAC.~~

Under this mechanism, TPCEA (Third Party Concurrent Evaluation Agency) shall oversee the compliance of IPDS guidelines, adherence to system procedures etc. shall be verified by an independent inspecting agency.

PFC shall outsource independent agency(ies) designated as PFC Quality Monitors (PQM) to ensure quality of materials procured and shall also verify quality of works carried out under the IPDS scheme. PQM shall carry out pre-dispatch inspection of six materials randomly in a single lot containing minimum 10% materials at manufacturer works. PQM shall also verify quality of works carried out in the Project.

- 2.2.1. Material Inspection: Important materials of 11kV substation shall be inspected at manufacturer premises before dispatch.

2.2.1.1. Inspection of substation materials: Following materials have been identified as important materials for 11kV Substation:

- i. Distribution Transformer
- ii. Control & Relay Panel
- iii. Cables(H.T & L.T)
- iv. 11kV Panels
- v. L.T Panels

2.2.1.2. Inspection of materials: The materials which have been identified for pre-dispatch inspection at manufacture premises is as follows:

- i. Distribution Transformer
- ii. Control & Relay Panel
- iii. Cables(H.T & L.T)
- iv. 11kV Panels

v. L.T Panels

At least one type from each of the aforesaid 6 (six) materials to be utilized in substations shall be inspected by the PQM as per MQP. The inspection/testing/witnessing of acceptance tests shall be as per approved Drawings/Technical Specifications/Datasheet/GTP/ and applicable national & international standard.

2.2.1.3. Sampling from field: Any material, including materials listed below, may be picked from site for testing at test laboratory chosen by inspecting official.

- i. Distribution Transformer
- ii. Control & Relay Panel
- iii. Cables(H.T & L.T)
- iv. 11kV Panels
- v. L.T Panels

All expenditures that shall incurred towards packing, transport, inspection, testing charges etc. are to be borne by the NDMC.

2.2.2. Deleted

2.2.3. Deleted

2.2.4. Deleted

2.2.5. TPCEA shall also oversee the Contract Management Part of PIA like adherence to Standard Bidding Document, PMA appointment, adherence to Quality Assurance Mechanism of IPDS scheme, Contractual provisions pertaining to defects identification and rectification, resolution of project related issues and action on delayed project. ~~In their visit, RQM would give thrust on adherence on systems and procedures of IPDS schemes by PIA and turnkey contractors during project implementation. Also, PQM would ensure availability and awareness of project specific drawings, documents, quality assurance plans among all stake holders in PIA contractor staff/workers.~~

2.2.6. ~~PFC Quality Monitors shall oversee the progress of up-loading of monitoring observations raised by inspectors during inspection and submission of compliance by PIA with supporting site photographs details in IPDS web portal.~~

### 2.3. GENERAL

2.3.1. To ensure that the equipment and services under the scope of this Contract whether manufactured or performed within the Contractor's Works or at his Sub-contractor's premises or at the Employer's site or at any other place of Work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points necessary. Such programme shall be broadly outlined by the contractor and finalized after discussions before the award of contract. The detailed programme shall be submitted by contractor after the award of contract and finally accepted by the Employer after discussions. A quality assurance programme of the contractor shall generally cover the following:

- a) His organization structure for the management and implementation of the proposed quality assurance programme :
- b) Documentation control system;
- c) Qualification data for bidder's key personnel;

- d) The procedure for purchases of materials, parts components and selection of sub-Contractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.
- e) System for shop manufacturing and site erection controls including process controls and fabrication and assembly control;
- f) Control of non-conforming items and system for corrective actions;
- g) Inspection and test procedure both for manufacture and field activities.
- h) Control of calibration and testing of measuring instruments and field activities;
- i) System for indication and appraisal of inspection status;
- j) System for quality audits;
- k) System for authorizing release of manufactured product to the Employer.
- l) System for maintenance of records;
- m) System for handling storage and delivery; and
- n) A manufacturing quality plan detailing out the specific quality control measures and procedures adopted for controlling the quality characteristics relevant to each item of equipment furnished and/or services rendered.
- o) A Field quality Plan covering field activities

2.3.2. The manufacturing & Field quality Plans shall be mutually discussed and approved by the Employer after incorporating necessary corrections by the Contractor as may be required.

2.3.3. The Employer or his duly authorized representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Contractor/his vendor's quality management and control activities.

2.3.4. The Contractor would be required to submit all the Quality Assurance documents as stipulated in the Quality Plan at the time of Employer's Inspection of equipment/material.

#### 2.4. TYPE & ACCEPTANCE TESTS

The following type, acceptance and routine tests and tests during manufacture shall be carried-out on the material. For the purpose of this clause:

2.4.1. Contractor shall supply the materials of type & design which has already been Type Tested. Contractor shall provide copy of such tests at site in support of type-tested materials supplied under the contract. No extra payment or time shall be granted for type testing of materials. In exceptional case to case basis, employer will decide to permit type testing of material at contractor's cost.

2.4.1.1. Acceptance Tests shall mean those tests which are to be carried out on samples taken from each lot offered for pre-dispatch inspection, for the purposes of acceptance of that lot.

2.4.1.2. Routine Tests shall mean those tests, which are to be carried out on the material/equipment to check requirements which are likely to vary during production.

2.4.1.3. Tests during Manufacture shall mean those tests, which are to be carried out during the process of manufacture and end inspection by the Contractor to ensure the desired quality of the end product to be supplied by him.

2.4.1.4. The norms and procedure of sampling for these tests will be as per the Quality Assurance Programme to be mutually agreed to by the Contractor and the Owner.

2.4.1.5. The standards and norms to which these tests will be carried out are listed against them. Where a

particular test is a specific requirement of this Specification, the norms and procedure of the tests shall be as per IS/IEC Standard this specification or as mutually agreed to between the Contractor and the Owner in the Quality Assurance Programme.

2.4.1.6. For all type test and acceptance tests, the acceptance values shall be the values specified in this Specification, Approved Quality Plan or guaranteed by the Bidder, as applicable.

## 2.5. TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

- 2.5.1. All equipment being supplied shall conform to type tests including additional type tests, if any as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections. Employer reserves the right to witness any or all the type tests. The Contractor shall intimate the Employer the detailed program about the tests at least three (3) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.
- 2.5.2. The reports for all type tests and additional type tests as per technical specification shall be furnished by the Contractor alongwith equipment/material drawings. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO/IEC Guide 25/17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by the representative(s) of Employer or Utility. The test-reports submitted shall be of the tests conducted within last 10 (ten) years prior to the date of bid opening. In case the test reports are of the test conducted earlier than 10 (ten) years prior to the date of bid opening, the contractor shall repeat these test(s) at no extra cost to the Employer
- 2.5.3. In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all additional type tests not carried out, same shall be carried out without any additional cost implication to the Employer.
- 2.5.4. The Employer, his duly authorized representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times free access to the Contractor's/sub-vendors premises or Works and shall have the power at all reasonable times to inspect and examine the materials and workmanship of the Works during its manufacture or erection if part of the Works is being manufactured or assembled at other premises or works, the Contractor shall obtain for the Engineer and for his duly authorized representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works. Inspection may be made at any stage of manufacture, dispatch or at site at the option of the Employer and the equipment if found unsatisfactory due to bad workmanship or quality, material is liable to be rejected.
- 2.5.5. The Contractor shall give the Employer/Inspector ten (10) days written notice of any material being ready for joint testing including contractor and Employer. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Employer/Inspector, unless witnessing of the tests is virtually waived, will attend such tests within thirty (30) days of the date of which the equipment is notified as being ready for test /inspection, failing which the Contractor may proceed alone with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector duly certified copies of tests in triplicate.
- 2.5.6. The Employer or Inspector shall, within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Contractor, of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The Contractor shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspector giving reasons therein, that no modifications are necessary to comply with the Contract. If any modification is made on the equipment on the basis of test results not in conformity with the contract, the modified equipment shall be subject to same sequence of test again without any additional cost to Employer.

2.5.7. When the factory tests have been completed at the Contractor's or Sub-Contractor's works, the Employer/Inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Employer/Inspector, the certificate shall be issued within fifteen (15) days of receipt of the Contractor's Test certificate by the Engineer/Inspector. Failure of the Employer/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract. The equipment shall be dispatched to site only after approval of test reports and issuance of dispatch instruction by the Employer.

2.5.8. In all cases where the Contract provides for tests whether at the premises or at the works of the Contractor or of any Sub-Contractor, the Contractor except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorized representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspector or to his authorized representative to accomplish testing.

2.5.9. The inspection by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract.

2.5.10. The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

2.5.11. The Employer reserves the right for getting any field tests not specified in respective sections of the technical specification conducted on the completely assembled equipment at site. The testing equipment for these tests shall be provided by the Employer.

2.5.12. The Employer intends that type tests and additional type tests are conducted on Distribution Transformers, Vacuum circuit breaker, Battery Charger etc. The price of conducting type tests and additional type tests shall be included in Bid price.

2.5.13. In case the contractor opts to procure these items from more than one manufacturer, the type test shall be conducted in respect of all the manufactures. No type test / repeat type test charges shall be paid by owner.

2.5.14. Purchaser reserves the right to witness any or all the type tests.

## 2.6. PRE-COMMISSIONING TESTS

On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Employer and the contractor for correctness and completeness of installation and acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed is given in respective chapters or as included in the Contractor's quality assurance programme.

## 2.7. COMMISSIONING TESTS

All required instrumentation and control equipment will be used during such tests and the contractor will use all such measuring equipment and devices duly calibrated as far as practicable. However, the Contractor, for the requirement of these tests, shall take immeasurable parameters into account in a reasonable manner. The tests

will be conducted at the specified load points and as near the specified cycle condition as practicable. The contractor will apply proper corrections in calculation, to take into account conditions, which do not correspond to the specified conditions.

2.7.1. Any special equipment, tools and tackles required for the successful completion of the Commissioning tests shall be provided by the contractor, free of cost.

2.8. The specific tests to be conducted on equipment have been brought out in the respective chapters of the technical specification. However where the pre-commissioning tests have not been specified specifically they shall be as per relevant IS code of practice or as mutually agreed.

2.9. The Contractor shall be responsible for obtaining statutory clearances from the concerned authorities for commissioning and operation of the equipment including the Electrical Inspector. Necessary fee to perform these works shall be paid by NDMC.

### 3. Documentation

#### 3.1. GENERAL

3.1.1. To ensure that the proposed systems conform to the specific provisions and general intent of the Specification, the Contractor shall submit documentation describing the systems to employer for review and approval. The contractor shall obtain approval of employer for the relevant document at each stage before proceeding for manufacturing, system development, factory testing, site testing, training etc. The schedule for submission/approval of each document shall be finalised during the discussions before placement of the contract, this schedule shall be in line to overall project schedule.

3.1.2. Each document shall be identified by a Contractor document number, the employer document number, and the employer purchase order number. Where a document is revised for any reason, each revision shall be indicated by a number, date, and description in a revision block along with an indication of official approval by the Contractor's project manager. Each revision of a document shall highlight all changes made since the previous revision.

3.1.3. All technical description, specifications, literature, correspondence, prints, drawings, instruction manuals, test reports( both factory and at site), progress photographs, booklets, schedules and all supplementary data or documents furnished in compliance with the requirements of the Contract, shall become the property of the Employer and the costs shall be considered as included in the Contract price.

3.1.4. The Contractor shall be responsible for any time delay, misinterpretation, error and conflict during design, manufacturing, testing and erection of the Works resulting from non-compliance with the requirements of this Specification.

3.1.5. The Employer shall have the right to make copies of any documents, data, reports, information etc. supplied by the Contractor in connection with the Works. The Employer shall not impart the information of these documents to any other manufacturer or competitor but he shall be free to use these for preparation of technical papers, reports etc.

3.1.6. All documentation shall be in English language.

#### 3.2. REQUIREMENTS FOR SUBMISSION OF DOCUMENTS, INFORMATION AND DATA BY THE CONTRACTOR

3.2.1. The Contractor shall submit to the Employer all documents in accordance with an approved schedule of submissions and shall submit any further information (in the form of drawings, documents, manuals, literature, reports etc.) when asked by the Employer while commenting/approving any

drawings/documents etc.

- 3.2.2. The documents which are subject to the approval of the Employer shall be identified by the Contractor with the stamp "FOR APPROVAL". All other documents shall be submitted to the Employer for information and shall be identified by the Contractor with the stamp "FOR INFORMATION".
- 3.2.3. The sequence of submission of the documents shall be subject to the approval of the Employer. The sequence of submissions of all documents shall be such that the necessary information is available to enable the Employer to approve or comment the document.
- 3.2.4. The Contractor shall supply 4 hard copies of all drawings and documents.
- 3.2.5. In case a "SUBSEQUENT" revision of any document is made due to any reason whatsoever, a revision of the same, highlighting the changes shall be resubmitted for the Employer's specific approval/information.

### 3.3. DOCUMENTS FOR APPROVAL

- 3.3.1. The Employer shall be allowed fifteen (15) calendar days to approve the Contractor's submissions. The submissions for approval, shall be returned to the Contractor marked in one of the following ways :

Category I:	Approved
Category II:	Approved with Comments.
Category III:	Returned for correction.
Category IV :	For information

- 3.3.2. The first notations "I" or "II" shall be deemed to permit the Contractor to proceed with the work shown on the document, except in the case of notation "II" the work shall be done subject to the corrections indicated thereon and/or described in the letter of transmittal. The Contractor shall bear the full responsibility for proceeding with the Works prior to receipt of the release in notation "I" from the Employer.
- 3.3.3. In case of notation "II", the Contractor shall include the alterations required & resubmit the document within fifteen (15) days from date of Employer's letter of transmittal.
- 3.3.4. In case of notation "III", the Contractor shall include the alterations required and resubmit the document to the Employer, within fifteen (15) days, from date of letter of transmittal, so that such document can be returned with the notation "I" or "II".
- 3.3.5. It may also be noted that the approval/commenting by the Employer does not relieve the Contractor of any of his contractual obligations and his responsibilities for correctness of dimensions, materials, weights quantities or any other information contained therein, as well as the conformity of designs with Indian Statutory Laws and the Technical Specifications as may be applicable. The approval also does not limit the Employer's rights under the Contract.
- 3.3.6. The approved documents shall be considered as the working documents. However the Technical Specification and connected documents shall prevail over these documents in case a decision is required on interpretation.

### 3.4. DOCUMENTS FOR INFORMATION

The Contractor shall not delay the Works pending the receipt by the Contractor of the comments on documents submitted to the Employer for information. However, the Employer shall have the right to comment on all the documents submitted by the Contractor, when, in the opinion of the Employer the document does not comply with the Contract or otherwise. The Contractor shall satisfactorily demonstrate that the information contained in



the aforesaid document does meet the requirements of the Contract or revise the document in order that the information shall comply with the requirements of the Contract.

### 3.5. BASIC REFERENCE DRAWINGS

- 3.5.1. The reference drawings are enclosed with the bid document, which forms a part of the specification. The contractor shall develop a new layout in line with the specification and take the approval of the EMPLOYER. The contractor shall maintain the overall dimensions of the substation, buildings, bay length, bay width, phase to earth clearance, phase to phase clearance and sectional clearances, clearances between buses, bus heights but may alter the locations of equipment to obtain the statutory electrical clearances as required for the substation.
- 3.5.2. All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.
- 3.5.3. Each drawing submitted by the Contractor shall be clearly marked with the name of the Employer, the unit designation, the specifications title, the specification number and the name of the Project. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.
- 3.5.4. Further work by the Contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the Employer, if so required.
- 3.5.5. The review of these data by the Employer will cover only general conformance of the data to the specifications and documents interfaces with the equipment provided under the specifications. This review by the Employer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.
- 3.5.6. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Contractor's risk. The Contractor may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of Contractor's drawing or work by the Employer shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.
- 3.5.7. All engineering data submitted by the Contractor after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

### 3.6. PRE-DISPATCH INSPECTION

Pre-dispatch inspection shall be performed on various materials at manufacturer's work place for which contractor shall be required to raise requisition giving at least 10-day time. Depending on requirement, inspection shall be witnessed by representatives of NDMC, TPIA and/or PFC/MoP.

The contractor shall ensure receipt of material at site within 21 days from date of receipt of dispatch instructions.

In case materials are not received within 21 days from date of issue of dispatch instruction, the dispatch instruction shall stand cancelled. In the event of delay in receipt of materials beyond 21 days due to reasons not attributed to turnkey contractor/supplier, suitable time extension may be permitted by the Employer. All expenditure incurred by Employer in performance of dispatch instruction shall be recovered from turnkey contractor.

The turnkey contractor shall ensure that pre-dispatch inspection for materials are intimated only when the material is completely ready for inspection. On due date of inspection, if it is found that materials are not ready in required quantities or the inspection could not be carried out due to non-availability of requisite calibrated certificate of instruments with manufacturer, closing of works on scheduled date of inspection, non-availability of sufficient testing/material handling staff at manufacturer works etc, all expenditures incurred on deployment of various inspecting officials along with a fine of Rs 50,000/- shall be recovered from the bills of the agency and re-inspection shall be carried out on expense of contractor. 2<sup>nd</sup> such situation at same manufacturer/supplier shall result in rejection of name of manufacturer from list of approved vendors/sub-vendors. In case sub-standard materials (old component, re-cycled materials, re-used core material, re-used transformer coil material etc) offered for inspection and are noticed during the inspection, materials shall be rejected and approval of sub-vendor shall also be cancelled for all IPDS projects.

#### 4. Project Design Management Agency (PDMA)

NDMC has appointed WAPCOS as a Project Management Agency (PDMA) to assist them in Project Planning and Implementation of the project as under:

##### 4.1. Project Planning and Implementation:

- 4.1.1. Assisting Employer in preparation of detailed work implementation schedule in association with turnkey contractor.
- 4.1.2. Coordination & monitoring of project implementation activities.
- 4.1.3. To monitor DPR wise monthly physical & financial progress of the scheme, prepare a consolidated report & submit to utility for onward submission to Nodal Agency.
- 4.1.4. Identification of anticipated bottlenecks in project implementation & preparation of remedial action plan in consultation with Employer&Contractor.
- 4.1.5. To assist Employer in addition of the created assets to their asset register.
- 4.1.6. recommend the claim of utility for fund release from Nodal Agency. The recommendation is to be supported by a report on expenditure, progress and constraints if any for timely completion of project.
- 4.1.7. Submit a report to Nodal Agency, regarding Project Completion and expenditure incurred along with recommendation in accordance with the guidelines.
- 4.1.8. To assist utility in supervision of flow of funds in dedicated bank account of projects.

##### 4.2. Quality Monitoring:

- 4.2.1. To prepare a Quality Assurance (QA) Plan
- 4.2.2. To carry out field quality inspection of ongoing/ completed works
- 4.2.3. Joint inspection of material at site on sample basis i.e. 10% of major materials (Poles, Conductor, Meters, Transformers, Cable etc).

##### 4.3 Check list for quality assurance of all materials will be provided by PDMA after award of work



VOLUME-II : Section-II  
Bid Forms (Bid Envelope)

BID Forms (Bid Envelope)

Bid Proposal Ref. No.:.....

Date: .....

To:

XXXXXXXX (Name of Employer)

XXXXXXXX (Address of Employer)

Name of Contract: Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area

**SUB HEAD: -** Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA.

Dear Sir/ or Madam,

1.0 Having examined the Bidding Documents, including Amendment Nos. (Insert Numbers) ..... dated ..... the receipt of which is hereby acknowledged, we the undersigned, offer to design, manufacture, test, deliver, install and commission (including carrying out Trial operation, Performance & Guarantee Test as per the provision of Technical Specification) the Facilities under the above-named Project in full conformity with the said Bidding Documents. In accordance with ITB Clause 9.1 of the Bidding Documents, as per which the bid shall be submitted by the bidder under "Single Stage - Bid Envelope" procedure of bidding. Accordingly, we hereby submit our Bid, in Bid envelope i.e. Techno – Commercial Part. Price Part i.e. Price is uploaded. We have submitted and uploaded on-line price bid through e-mode to be opened subsequently.

2.0 Attachments to the Bid Form (Bid Envelope)

In line with the requirement of the Bidding Documents, we enclose herewith the following Attachments:

(a) Attachment 1: Bid Security, in a separate envelope, in the form of Bank Draft/Pay Order/Banks certified Cheque/Bank Guarantee\* for a sum of ..... (name of currency and amount in words and figures) initially valid for a period of seven (07) months from the date set for opening of bids.

\* delete whichever is not applicable.

- (b) Attachment 2: A power of attorney duly authorized by a Notary Public indicating that the person(s) signing the bid have the authority to sign the bid and thus that the bid is binding upon us during the full period of its validity in accordance with the ITB Clause 14.
- (c) Attachment 3: The documentary evidence that we are eligible to bid in accordance with ITB Clause 2. Further, in terms of ITB Clause 9.3 (c) & (e), the qualification data has been furnished as per your format enclosed with the bidding documents [Attachment-3(QR)]. \* Further, the required Joint Venture Agreement signed by us and our Partners has also been furnished as per your format [Attachment-3(JV)].  
 \* Delete if not applicable
- (d) Attachment 4: The documentary evidence establishing in accordance with ITB Clause 3, Vol.-I of the Bidding Documents that the facilities offered by us are eligible facilities and conform to the Bidding Documents has been furnished as Attachment 4. A list of Special Tools & Tackles to be used by us for erection, testing & Commissioning and to be handed over to Employer, the cost of which is included in our Bid Price, is also enclosed as per your format as Attachment 4A. A list of Special Tools & Tackles to be brought by the contractor for erection, testing & Commissioning and to be taken back after completion of work, whose cost is not included in our bid price, is enclosed as per your format as Attachment 4B.
- (e) Attachment 5: The details of all major items of services or supply which we propose subletting in case of award, giving details of the name and nationality of the proposed subcontractor/sub-vendor for each item.
- (f) Attachment 6: The variation and deviations from the requirements of the Conditions of Contract, Technical Specification and Drawings (excluding critical provisions as mentioned at clause 6.0 below) in your format enclosed with the Bidding Documents, including, inter alia, the cost of withdrawal of the variations and deviations indicated therein.
- (g) Attachment 7: ~~The details of Alternative Bids made by us indicating the complete Technical Specifications and the deviation to contractual and commercial conditions.~~ [Not Applicable]
- (h) Attachment 8: Manufacturer's Authorisation Forms - registered/notarized
- (i) Attachment 9: Work Completion Schedule.

- (j) Attachment 10: Guarantee Declaration.
- (k) Attachment 11: Information regarding ex-employees of Employer in our firm.
- (l) Attachment 12: Filled up information regarding Price Adjustment Data as per the format enclosed in the bidding documents
- (m) Attachment 13: ~~Declaration regarding Social Accountability~~
- (n) Attachment 14: Integrity Pact, in a separate envelope, duly signed on each page by the person signing the bid.
- (o) Attachment 15: Option for Interest bearing Initial Advance payment and Information for E-payment, PF details and declaration regarding Micro/Small & Medium Enterprises
- (p) Attachment 16: Additional Information
- (q) Attachment 17: Declaration for tax exemptions, reductions, allowances or benefits
- (r) Attachment 18: Declaration
- (s) Attachment 19: Bank Guarantee verification checklist

3.0 We are aware that, in line with Clause No. 27.1 (ITB), our online price bid is liable to be rejected in case the same contains any deviation/omission from the contractual and commercial conditions and technical Specifications other than those identified in this Bid Envelope.

3.1 We are aware that the Price Schedules do not generally give a full description of the Work to be performed under each item and we shall be deemed to have read the technical specifications, scope of works and other sections of the Bidding Documents and Drawings to ascertain the full scope of Work included in each item while filling-in the rates and prices in price schedule quoted and uploaded in e-procurement web-portal.

3.2 We declare that as specified in Clause 11.5, Section –II:ITB, Vol.-I of the Bidding Documents, prices quoted by us in the Price Schedules shall be fixed and firm during the execution of Contract except for the permitted items for which Price Adjustment is applicable, as mentioned in Appendix-2 (Price Adjustment) to the Contract Agreement of Volume-I : Section-VI (Sample Forms and Procedures).

4.0 We confirm that except as otherwise specifically provided our Bid Prices quoted and uploaded in e-procurement web portal include all taxes, duties, levies and charges as may be assessed on us, our

Sub-Contractor/Sub-Vendor or their employees by all municipal, state or national government authorities in connection with the Facilities, in and outside of India.

- 4.1 100% of applicable Taxes and Duties(for direct transaction between Employer and us), which are payable by the Employer under the Contract, shall be reimbursed by the Employer after dispatch of equipment on production of satisfactory documentary evidence by the Contractor in accordance with the provisions of the Bidding Documents.
- 4.2 We further understand that notwithstanding 4.0 above, in case of award on us, you shall also bear and pay/reimburse to us, Excise Duty, Sales Tax/VAT (but not the surcharge in lieu of Sales Tax/VAT), local tax and other levies in respect of direct transaction between you and us, imposed on the Plant & Equipment including Mandatory Spare Parts specified in Schedule No. 1 of our Price Schedule quoted and uploaded on e-procurement web portal, to be incorporated into the Facilities; by the Indian Laws.
- 4.3 We also understand that, in case of award on us, you shall reimburse to us octroi/entry tax as applicable for destination site/state on all items of supply including bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-in-transit). Further, Service Tax, if applicable, for the services to be rendered by us, the same is included in our bid price quoted and uploaded on e-procurement web portal.
- 4.4 We confirm that we shall also get registered with the concerned Sales Tax Authorities, in all the states where the project is located.
- 4.5 We confirm that no Sales Tax/VAT in any form shall be payable by you for the bought out items which shall be dispatched directly by us under the First Contract (as referred in para 5.1 below) to the project site. However, you will issue requisite Sales Tax declaration/Vatable forms in respect of such bought out items, on production of documentary evidence of registration with the concerned Sales Tax Authorities.
- 5.0 Construction of the Contract
- 5.1 We declare that we have studied Clause GCC 2.1 relating to mode of contracting for Domestic Bidders and we are making this proposal with a stipulation that you shall award us two separate Contracts viz 'First Contract' for supply of all equipment and materials including mandatory spares and 'Second Contract' for providing all the services i.e. inland transportation for delivery at site, insurance, unloading, storage, handling at site, installation, testing and commissioning including Trial operation in respect of all the equipment supplied under the 'First Contract' and other services specified in the Contract Documents. We declare that the award of two contracts, will not, in any way, dilute our responsibility for successful operation of plant/equipment and fulfillment of all obligations as per Bidding Documents and that both the Contracts will have a cross-fall breach clause i.e. a breach in one Contract will automatically be classified as a breach of the other contract which will confer on you the right to terminate the other contract at our risk and cost.



6.0 We have read the provisions of following clauses and confirm that the specified stipulations of these clauses are acceptable to us:

(a)	ITB 13	Bid Security
(b)	GCC 2.14	Governing Law
(c)	GCC 8	Terms of Payment
(d)	GCC 9.3	Performance Security
(e)	GCC 10	Taxes and Duties
(f)	GCC 21.2	Completion Time Guarantee
(g)	GCC 22	Defect Liability
(h)	GCC 23	Functional Guarantee
(i)	GCC 25	Patent Indemnity
(j)	GCC 26	Limitation of Liability
(k)	GCC 38	Settlement of Disputes
(l)	GCC 39	Arbitration
(m)	Appendix 2 to Form of Contract Agreement	Price Adjustment

Further we understand that deviation taken in any of the above clauses by us may make our bid non-responsive as per provision of bidding documents and be rejected by you.

7.0 We undertake, if our bid is accepted, to commence the work immediately upon your Notification of Award to us, and to achieve the delivery of goods and related services within the time stated in the Bidding Documents.

8.0 If our bid is accepted, we undertake to provide a Performance Security(ies) in the form and amounts, and within the times specified in the Bidding Documents.

9.0 We agree to abide by this bid for a period of six (06) months from the date fixed for opening of bids as stipulated in the Bidding Documents, and it shall remain binding upon us and may be accepted by you at any time before the expiration of that period.

10.0 Until a formal Contract is prepared and executed between us, this bid, together with your written acceptance thereof in the form of your Notification of Award shall constitute a binding contract between us.

11.0 We understand that you are not bound to accept the lowest or any bid you may receive.

\*12.0 (For Joint Venture only) We, the partners of Joint Venture submitting this bid, do agree and confirm that in case of Award of Contract on the Joint Venture, we shall be jointly and severally liable and responsible for the execution of the Contract in accordance with Contract terms and conditions.

13.0 We, hereby, declare that only the persons or firms interested in this proposal as principals are named here and that no other persons or firms other than those mentioned herein have any interest in this proposal or in the Contract to be entered into, if the award is made on us, that this proposal is made without any connection with any other person, firm or party likewise submitting a proposal is in all respects for and in good faith, without collusion or fraud.

Dated this \_\_\_\_ day of \_\_\_\_\_20\_\_

Thanking you, we remain,

Yours Sincerely,  
For and on behalf of the [Name of the Bidder#]

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....

Date:

Place:

Business Address:

Country of Incorporation:

(State or Province to be indicated)

Name of the Principal Officer:

Address of the Principal Officer:

\*Applicable in case of a bid from Joint Venture of firms.

#In case the bid is submitted by a Joint Venture, the name of the Joint Venture should be indicated

Note: Bidders may note that no prescribed proforma has been enclosed for:

(a) Attachment 2: Power of Attorney.

(For Attachments 2 Bidders may use their own proforma for furnishing the required information with the bid).

List of Attachments

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Attachment-3(JV)

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA.  
(Joint Venture Agreement and Power of Attorney for Joint Venture\*)

Bidder's Name and Address: To: <Name and Address of Employer>

Dear Sir,

The Joint Venture Agreement (as per the proforma attached at no. 15 in Section-VI, Sample Forms and Procedures, Conditions of Contract, Vol.-I of the Bidding Documents) and Power of Attorney for Joint Venture (as per the proforma attached at no. 14 in Section-VI, Sample Forms and Procedures, Conditions of Contract, Vol.-I of the Bidding Documents) are enclosed herewith.

\* Applicable for Joint Venture.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-3 (QR)

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Qualifying Requirement Data)

Bidders Name & Address:

To

<Name and Address of the Employer>

Dear Ladies and/or Gentlemen,

In support of the Qualification Requirements (QR) for bidders, stipulated in Annexure-A (BDS) of the Section - III (BDS), Volume-I & additional information required as per **ITB clause 9.3(c)** of the Bidding Documents, we furnish herewith our QR data/details/documents etc., alongwith other information, as follows (The QR stipulations have been reproduced in italics for ready reference, however, in case of any discrepancy the QR as given in BDS shall prevail).

\* We have submitted bid as individual firm.

\* We have submitted bid as joint venture of following firms:

(i) .....

(ii) .....

(iii) .....

(\* Strike-off whichever is not applicable)

[For details regarding Qualification Requirements of a Joint Venture, please refer para 4.0 below.]

We are furnishing the following details/document in support of Qualifying requirement for the subject project.

A. Attached copies of original documents defining:

- a) The constitution or legal status;
- b) The principal place of business;
- c) The place of incorporation (for bidders who are corporations); or the place of registration and the nationality of the Owners (for applicants who are partnerships or individually-owned firms).

B. Attached original & copies of the following documents.

- a) Written power of attorney of the signatory of the Bid to commit the bidder.
- b)\*\* Joint Venture Agreement

[\*\* To be submitted only in case of Joint Ventures. Strike off in case of individual firms.]

1.0 Pre-qualification criteria – Part A:

1.01 Technical:

- (I) Part I: Supply, Erection, Testing & Commissioning of New/Augmentation of existing new 11KV lines

The detailed criteria is mentioned at 1.01 (I) of Annexure-A to BDS at Volume-I : Section-III.

Format A: Format for the Bidder (Single Firm / Partner(s) in case of Joint Venture) for technical experience in compliance to para 1.01 (I) {(i) or (ii) or (iii)} of Annexure-A to BDS (Volume-I : Section-III) [In case of Joint Venture bidder, the QR data of each of the partner (in support of meeting the requirement of para 1.01 (I) (iv) of Annexure-A to BDS (Volume-I : Section-III))] is also is to furnished, as applicable, using this format. The bidder (Single Firm / Partner(s) in case of Joint Venture) who is willing to qualify in compliance to para 1.01 (I) {(ii) or (iii)} of para 1.01 (I) (iv) of Annexure-A to BDS (Volume-I : Section-III) shall fill below format for two or all three contracts.

A1.	Name of Bidder/Lead Partner of JV/other partner(s) of JV	
A2.	Name of Contract (executed during the last 7 years as on the originally scheduled date of bid opening):	
A3.	Contract Reference No. & Date of Award	
A4	Name and Address of the Employer/Utility by whom the Contract was awarded	
	e-mail ID _____	
	Telephone No. _____	
	Fax No. _____	
A5(i)	Name of electrical works of sub-station of 33/11 KV or 66/11 KV class and successfully erected, tested and commissioned	_____
(ii)	Transformer capacity successfully erected, tested and commissioned for s/s of 33/11 KV or 66/11 KV (in KVA)	_____
(iii)	% of Transformer capacity executed w.r.t. transformer capacity proposed in bid (in %)	_____
(iv)	Length of 11 kV cable successfully laid, tested & commissioned.(in	_____

	cKms)	
A6(i)	Date of successful execution of the Contract/Date of commissioning	_____
(ii)	No. of years the above referred electrical works is in successful operation as on the date of bid opening	_____ years
A7.	Capacity in which the Contract was undertaken (Check One)	<input type="checkbox"/> Prime Contractor <input type="checkbox"/> Partner of JV <input type="checkbox"/> Subcontractor (Tick whichever is applicable)
A8.	Details/documentary evidence submitted in support of stated experience/Contract	

(Documentary evidence, such as copies of utility certificates etc., in support of its experience shall be attached with the filled-up format for each experience/Contract)

- (II) Part II: Supply, Erection, Testing and Commissioning of New/Augmentation of existing 11/0.4 KV Distribution Transformer substation.  
The detailed criteria is mentioned at 1.01 (II) of Annexure-A to BDS at Volume-I : Section-III.

Format B: Format for the Bidder (Single Firm / Partner(s) in case of Joint Venture) for technical experience in compliance to para 1.01 (II) {(i) or (ii) or (iii)} of Annexure-A to BDS (Volume-I : Section-III) [In case of Joint Venture bidder, the QR data of each of the partner (in support of meeting the requirement of para 1.01 (II) (iv) of Annexure-A to BDS (Volume-I : Section-III))] is also is to furnished, as applicable, using this format. The bidder (Single Firm / Partner(s) in case of Joint Venture) who is willing to qualify in compliance to para 1.01 (II) {(ii) or (iii)} of Annexure-A to BDS (Volume-I : Section-III) shall fill below format for two or all three contracts.

A1.	Name of Bidder/Lead Partner of JV/other partner(s) of JV	
A2.	Name of Contract (executed during the last 7 years as on the originally scheduled date of bid opening):	
A3.	Contract Reference No. & Date of Award	
A4	Name and Address of the Employer/Utility by whom the Contract was awarded	
	e-mail ID	_____
	Telephone No.	_____

	Fax No.	
A5 (i)	Name of electrical works of laying underground cable successfully commissioned.	
(ii)	Distribution transformer capacity successfully erected, tested and commissioned for s/s of 33/11 KV or 66/11 KV (in KVA)	
(iii)	% of Distribution transformer capacity executed w.r.t. Distribution transformer capacity proposed in bid (in %)	
(iv)	Length of LT line/11 KV line successfully erected, tested and commissioned (in Kms)	
A6(i)	Date of successful execution of the Contract/Date of commissioning	
(ii)	No. of years the above referred electrical works is in successful operation as on the date of bid opening	
		_____ years
A7.	Capacity in which the Contract was undertaken (Check One)	<input type="checkbox"/> Prime Contractor <input type="checkbox"/> Partner of JV <input type="checkbox"/> Subcontractor (Tick whichever is applicable)
A8.	Details/documentary evidence submitted in support of stated experience/Contract	

(Documentary evidence, such as copies of utility certificates etc., in support of its experience shall be attached with the filled-up format for each experience/Contract)



(III) Part III: Combined Part of Part-I & II above

The detailed criteria is mentioned at 1.01 (III) of Annexure-A to BDS at Volume-I : Section-III.

Format C: Format for the Bidder (Single Firm / Partner(s) in case of Joint Venture) for technical experience in compliance to para 1.01 (III) {(i) or (ii) or (iii)} of Annexure-A to BDS (Volume-I : Section-III) [In case of Joint Venture bidder, the QR data of each of the partner (in support of meeting the requirement of para 1.01 (III) (iv) of Annexure-A to BDS (Volume-I : Section-III))] is also is to furnished, as applicable, using this format. The bidder (Single Firm / Partner(s) in case of Joint Venture) who is willing to qualify in compliance to para 1.01 (III) {(ii) or (iii)} above shall fill below format for two or all three contracts.

A1.	Name of Bidder/Lead Partner of JV/other partner(s) of JV	
A2.	Name of Contract (executed during the last 7 years as on the originally scheduled date of bid opening):	
A3.	Contract Reference No. & Date of Award	
A4	Name and Address of the Employer/Utility by whom the Contract was awarded	
		e-mail ID _____
		Telephone No. _____
		Fax No. _____
A5(i)	Name of electrical works of 33/11 KV or 66/11 KV class substation and its associated 33 KV/66 KV lines successfully erected, tested and commissioned	_____
(ii)	Transformer capacity successfully erected, tested and commissioned for 33/11 KV or 66/11 KV s/s(in KVA)	_____
(iii)	% of Transformer capacity executed w.r.t. transformer capacity proposed in bid (in %)	_____

A6(i)	Name of electrical works of LT line or 11 KV class successfully erected, tested and commissioned	_____
(ii)	Distribution transformer capacity successfully erected, tested and commissioned (in KVA)	_____
(iii)	% of Distribution transformer capacity executed w.r.t. Distribution transformer capacity proposed in bid (in %)	_____
(iv)	Length of LT line/11 KV line successfully erected, tested and commissioned (in Kms)	_____
A7(i)	Date of successful execution of the Contract/Date of commissioning	_____
(ii)	No. of years the above referred electrical works is in successful operation as on the date of bid opening	_____ years
A8.	Capacity in which the Contract was undertaken (Check One)	<input type="checkbox"/> Prime Contractor <input type="checkbox"/> Partner of JV <input type="checkbox"/> Subcontractor (Tick whichever is applicable)
A9.	Details/documentary evidence submitted in support of stated experience/Contract	

(Documentary evidence, such as copies of utility certificates etc., in support of its experience shall be attached with the filled-up format for each experience/Contract)

1.01.1 The bidder should possess Class-I license issued by the Electrical inspectorate of Govt of (...) <sup>1</sup> /Central Inspectorial organization of Govt. of India/ other state Govt. In case bid submitted joint venture firm, any of partner should possess class-I electrical license as stated above.

1.02 Commercial

The detailed criteria is mentioned at 1.02 of Annexure-A to BDS at Volume-I : Section-III.

Format C: Format for the Bidder (Single Firm / Partner(s) in case of Joint Venture) for commercial experience in compliance to para 1.02.1 (i) of Annexure-A to BDS at Volume-I : Section-III [In case of Joint Venture bidder, the QR data of each of the partner (in support of meeting the requirement of para 1.02.5 of Annexure-A to BDS at Volume-I : Section-III) is also is to furnished, as applicable, using this format. The bidder (Single Firm / Partner(s) in case of Joint Venture) who is willing to qualify in compliance to

<sup>1</sup> Name of state where work is to be executed.

para 1.02.1 { (ii) or (iii) } of Annexure-A to BDS at Volume-I : Section-III shall fill below format for two or all three contracts.

A1.	Name of Bidder/Lead Partner of JV/other partner(s) of JV	
A2.	Name of Contract (executed during the last 5 years up to 31.03.2013):	
A3.	Contract Reference No. & Date of Award	
A4	Name and Address of the Employer/Utility by whom the Contract was awarded  e-mail ID _____ Telephone No. _____ Fax No. _____	
A5(i)	Name of completed work of project execution in electrical Transmission or sub-transmission & distribution sector Cost of the project	_____
(ii)	% of cost w.r.t. estimated cost of this bid (in %)	_____
(iii)		
A6(i)	Date of successful execution of the Contract/Date of commissioning	_____
A7.	Capacity in which the Contract was undertaken (Check One)	<input type="checkbox"/> Prime Contractor <input type="checkbox"/> Partner of JV <input type="checkbox"/> Subcontractor (Tick whichever is applicable)
A8.	Details/documentary evidence submitted in support of stated experience/Contract	

(Documentary evidence, such as copies of utility certificates etc., in support of its experience shall be attached with the filled-up format for each experience/Contract)

Format D: Format for the Bidder (Single Firm / Partner(s) in case of Joint Venture) for commercial experience in compliance to para 1.02.2, 1.02.3 & 1.02.4 of Annexure-A to BDS at Volume-I : Section-III [In case of Joint Venture bidder, the QR data of each of the partner (in support of meeting the requirement of para 1.02.5 of Annexure-A to BDS at Volume-I : Section-III) is also to furnished, as applicable, using this format.

A1.	Name of Bidder/Lead Partner of JV/other partner(s) of JV	
A2.	<p>Net-worth in last three years</p> <p style="margin-left: 40px;">1. Financial Year 2013-14</p> <p style="margin-left: 40px;">2. Financial Year 2014-15</p> <p style="margin-left: 40px;">3. Financial Year 2015-16</p>	<p style="margin-left: 100px;">: Rs. ----- lakhs</p> <p style="margin-left: 100px;">: Rs. ----- lakhs</p> <p style="margin-left: 100px;">: Rs. ----- lakhs</p>
A3.	<p>Minimum Average Annual Turnover (MAAT)</p> <p style="margin-left: 40px;">1. Financial Year 2011-12</p> <p style="margin-left: 40px;">2. Financial Year 2012-13</p> <p style="margin-left: 40px;">3. Financial Year 2013-14</p> <p style="margin-left: 40px;">4. Financial Year 2014-15</p> <p style="margin-left: 40px;">5. Financial Year 2015-16</p>	<p style="margin-left: 100px;">: Rs. ----- lakhs</p> <p style="margin-left: 100px;">: Rs. ----- lakhs</p> <p style="margin-left: 100px;">: Rs. ----- lakhs</p> <p style="margin-left: 100px;">: Rs. ----- lakhs</p> <p style="margin-left: 100px;">: Rs. ----- lakhs</p>
A4	liquid assets (LA) and/ or evidence of access to or availability of credit facilities	: Rs. ----- lakhs
A4.	Details/documentary evidence submitted in support of stated experience/Contract	

(Documentary evidence, such as copies of utility certificates etc., in support of its experience shall be attached with the filled-up format for each experience/Contract)

1.02.1 Failure to comply with this requirement will result in rejection of the joint venture's bid. Sub contractors' experience and resources shall not be taken into account in determining the bidder's compliance with qualifying criteria.

1.02.2 One of the partners shall be nominated as lead partner, and the lead partner shall be authorized to incur liabilities and receive instruction for and on behalf of any and all partners of the joint venture and the entire execution of the contract including receipt of payment shall be done exclusively through the lead partner. This authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners as per proforma in section "Annexure" of Special Conditions of Contract-Vol.-IA.

1.02.3 All partner of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms and a copy of the agreement entered into by the joint venture partners having such a provision shall be submitted with the bid.

2.0 Pre-qualification criteria – Part B:

The Bidder shall also furnish following documents/details with its bid:

2.01.1 A certificate from banker (as per format) indicating various fund based/non fund based limits sanctioned to the bidder and the extent of utilization as on date Such certificate should have been issued not earlier than three months prior to the date of bid opening. Wherever necessary Employer may make queries with the Bidders' bankers.

2.01.2 The complete annual reports together with Audited statement of accounts of the company for last five years of its own (separate) immediately preceding the date of submission of bid.

2.01.3 Note:

2.01.3.1 In the event the bidder is not able to furnish the information of its own (i.e. separate), being a subsidiary company and its accounts are being consolidated with its group/holding/parent company, the bidder should submit the audited balance sheets, income statements, other information pertaining to it only (not of its group/Holding/Parent Company) duly certified by any one of the authority [(i) Statutory Auditor of the bidder / (ii) Company Secretary of the bidder or (iii) A certified Public Accountant] certifying that such information/documents are based on the audited accounts as the case may be.

2.01.3.2 Similarly, if the bidder happens to be a Group/Holding/Parent Company, the bidder should submit the above documents/information of its own (i.e. exclusive of its subsidiaries) duly certified by any one of the authority mentioned in Note - 2.01.3.1 above certifying that these information/ documents are based on the audited accounts, as the case may be.

2.01.4 Litigation History:

2.01.4.1 The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder or any partner of JV may result in rejection of Bid.

2.01.4.2 Notwithstanding anything stated hereinabove, the Employer reserves the right to assess the capacity and capability of the bidder, should the circumstances warrant

such assessment in an overall interest of the Employer. The Employer reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract.

Attachment-4

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Form of Certificate of Origin and Eligibility)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

We hereby certify that equipment and materials to be supplied are produced in ..... , an eligible source country.

We hereby certify that our company is incorporated and registered in ..... , an eligible source country.

Date:..... (Signature).....

Place:..... (Printed Name).....

(Designation).....

(Common Seal).....

Attachment-4A

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(List of Special Maintenance Tools & Tackles)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

We are furnishing below the list of special maintenance tools & tackles for various equipment under the subject project. The prices for these tools & tackles are included in our lumpsum bid price. We further confirm that the list of special maintenance tools & tackles includes all the items specifically identified in your bidding documents as brought out below:

---

S.No.	For Equipment	Item Description	Unit	Quantity
-------	---------------	------------------	------	----------

---

Notwithstanding what is stated above, we further confirm that any additional special maintenance tools and tackles, required for the equipment under this project shall be furnished by us at no extra cost to the employer.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....



Attachment-4B

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(List of Special Maintenance Tools & Tackles)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

We are furnishing below the list of special maintenance tools & tackles for various equipment under the subject Project. The prices for these tools & tackles which are to be taken back after the completion of the work by us are not included in our lumpsum bid price. We further confirm that the list of special maintenance tools & tackles includes all the items specifically identified in your bidding documents as brought out below:

(a) .....

(b) .....

Date:.....

Place:.....

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-5

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA  
 (Bought-out & Sub-contracted Items)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

1.0 We hereby furnish the details of the items/ sub-assemblies, we propose to buy for the purpose of furnishing and installation of the subjectProject:

Sl. No.	Item Description	Quantity proposed to be bought/sub-contracted	Details of the proposed sub-contractor/sub-vendor	
			Name	Nationality
1.				
2.				
3.				
4.				
5.				
6.				

2.0 We hereby declare that, we would not subcontract the erection portion of the contract without the prior approval of Employer.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-6

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Alternative, Deviations and Exceptions to the Provisions)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

The bidder shall itemize any deviation from the Specifications included in his bid. Each item shall be listed (separate sheets may be used and enclosed with this Attachment) with the following information:

Sl. No.	Reference clause in the Specifications	Deviation	Cost of withdrawal of the deviation

The above deviations and variations are exhaustive. We confirm that we shall withdraw the deviations proposed by us at the cost of withdrawal indicated in this attachment, failing which our bid may be rejected and Bid Security forfeited.

Except for the above deviations and variations, the entire work shall be performed as per your specifications and documents. Further, we agree that any deviations, conditionality or reservation introduced in this Attachment-6 and/or in the Bid form, Price schedules & Technical Data Sheets and covering letter, or in any other part of the bid will be reviewed to conduct a determination of the substantial responsiveness of the bid.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-8

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA  
(Manufacturer's Authorization Form)  
(On Manufacturer's Letterhead, see Clause 9.3(c) of the ITB)

To: [Insert: name of Employer]

Dear Ladies and/or Gentlemen,

WE [insert: name of Manufacturer] who are established and reputable manufacturers of [insert: name and/or description of the plant & equipment] having production facilities at [insert: address of factory] do hereby authorize [insert: name & address of Bidder] (hereinafter, the "Bidder") to submit a bid, and subsequently negotiate and sign the Contract with you against IFB [insert: title and reference number of Invitation for Bids] including the above plant & equipment or other goods produced by us.

We hereby extend our full guarantee and warranty for the above specified plant & equipment materials or other goods offered supporting the supply, installation and achieving of Operational Acceptance of the plant by the Bidder against these Bidding Documents, and duly authorize said Bidder to act on our behalf in fulfilling these guarantee and warranty obligations. We also hereby declare that we and ....., [insert: name of the Bidder] have entered into a formal relationship in which, during the duration of the Contract (including warranty / defects liability) we, the Manufacturer or Producer, will make our technical and engineering staff fully available to the technical and engineering staff of the successful Bidder to assist that Bidder, on a reasonable and best effort basis, in the performance of all its obligations to the Purchaser under the Contract.

For and on behalf of the Manufacturer

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

In the capacity of [insert: title of position or other appropriate designation] and this should be signed by a person having the power of attorney to legal bind the manufacturer.

Date:.....

Place:.....

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....

- Note 1. The letter of Undertaking should be on the letterhead of the Manufacturer and should be signed by a person competent and having Power of Attorney to legally bind the Manufacturer. It shall be included by the bidder in its bid.
2. Above undertaking shall be registered or notarized so as to be legally enforceable.

Attachment-9

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Work Completion Schedule)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

We hereby declare that the following Work Completion Schedule shall be followed by us in furnishing and installation of the subject Project for the period commencing from the effective date of Contract to us:

Sl. No.	Description of Work	Period in months from the effective date of Contract
1.	Detailed Engineering and drawing submission a) commencement b) completion	
2.	Procurement of equipment/ components & assembly a) commencement b) completion	
3.	<del>Type Tests</del> <del>a) commencement</del> <del>b) completion</del>	
4.	Manufacturing a) commencement b) completion	
5.	Shipments & Delivery a) commencement b) completion	

Sl. No.	Description of Work	Period in months from the effective date of Contract
6.	Establishment of site office	
7.	Installation at Site  a) commencement  b) completion	
8.	Testing & Pre-commissioning  a) commencement b) completion	
9.	Trial Operation a) commencement  b) completion	

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Note: Bidders to enclose a detailed network covering all the activities to be undertaken for completion of the project indicating key dates for various milestones for each phase constituent-wise.

Attachment-10

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Guarantee Declaration)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

We hereby declare that this Attachment of "Guarantee Declaration" is furnished by us in Packet-I of Inner Envelope-2 of bid envelope.

Date:.....

Place:.....

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....



Attachment-11

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Information regarding Ex-employees of XXXXX (Name of Employer) in our Organisation)

Bidder's Name and Address: To: XXXXX (Name and Address of Employer)

Dear Sir,

We hereby furnish the details of ex-employees of XXXXX (Name of Employer) who had retired/ resigned at the level of XXXXXXX (Define suitable post) from XXXXX (Name of Employer) and subsequently have been employed by us:

Sl. No.	Name of the person with designation in XXXXX (Name of Employer)	Date of Retirement/ resignation from XXXXX (Name of Employer)	Date of joining and designation in our Organisation
1.	.....	.....	.....
2.	.....	.....	.....
3.	.....	.....	.....
4.	.....	.....	.....
5.	.....	.....	.....

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Note: The information in similar format should be furnished for each partner of joint venture in case of joint venture bid.

Attachment-12

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Price Adjustment Data as per Appendix-2 of section-VI : Sample forms and procedures)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

We hereby furnish the details of Price Adjustments:

Name of Material	Price as on 30 days prior to date of bid opening*	Price as on 60 days prior to date of shipment*	Variation*
ACSR conductor			
Power / Station / Distribution Transformer (Copper / Aluminium wound)			
Cables			

\*Detailed calculations as per appendix-2 of section-VI : sample forms and procedures to be enclosed

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-14

(PRECONTRACT INTEGRITY PACT)

General

This pre-bid pre-contract Agreement (herein after called the Integrity Pact) is made on day of the month of 2016, between, on one hand, the ..... (Name of Owner) acting through Shri..... (Name and designation of Project Manager) (herein after called the "BUYER", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s..... (Name of Bidder) represented by Shri\_\_\_\_\_, The Executive Engineer (herein after called the Principal / Owner" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second Part.

WHEREAS the Principal / Owner proposes to procure (Name of the Stores/Equipment/Item) through the Bidder(s)/ Contractor(s) and the Bidder(s)/ Contractor(s) is willing to offer/has offered the stores and

WHEREAS the BIDDER is a Government undertaking constituted in accordance with the relevant law in the matter and the Principal / Owner is the Municipal Govt of New Delhi. Established as per NDMC act 1994 performing its functions on behalf of the ..... (Name of owner).

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-

Enabling the Principal / Owner to obtain the desired said stores/equipment at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling BIDDERS to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

Commitments of the Principal / Owner

- 1.1 The Principal / Owner undertakes that no official of the Principal / Owner, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER, either for themselves or for any person, organization or third

party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the contract.

1.2 The Principal / Owner will, during the pre-contract stage, treat all BIDDERS alike and will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERS.

1.3 All the officials of the Principal / Owner will report to the CVO, NDMC any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach

2.0 In case any such preceding misconduct on the part of such official(s) is reported by the BIDDER to the CVO, NDMC with full and verifiable facts and the same is prima facie found to be correct by the Principal / Owner, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the NDMC and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the NDMC the proceedings under the contract would not be stalled.

#### Commitments of Bidder(s)/ Contractor(s)

3.0 The Bidder(s)/ Contractor(s) commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid during any pre-contractor post-contract stage in order to secure the contract or in furtherance to secure it and in particular commit itself to the following:-

3.1 The Bidder(s)/ Contractor(s) will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Principal / Owner, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.

3.2 The Bidder(s)/ Contractor(s) further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Principal / Owner or otherwise in procuring the Contractor for bearing to door having one any act in relation to the obtaining or execution of the contract or any other contract with the New Delhi Municipal Council for showing or for bearing to show favour or disfavor to any person in relation to the contract or any other contract with Government.

3.3 Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives and Indian Bidder(s)/ Contractor(s) shall disclose their foreign principals or associates.

3.4 Bidder(s)/ Contractor(s) shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract.

3.5. Deleted

3.6 The Bidder(s)/ Contractor(s), either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the Principal / Owner or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.

3.7 The Bidder(s)/ Contractor(s) will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

3.8 The Bidder(s)/ Contractor(s) will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

3.9 The Bidder(s)/ Contractor(s) shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Principal / Owner as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.

3.10 The Bidder(s)/ Contractor(s) commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts. Either to principal / owner or to IEMs so appointed by NDMC.

3.11 The Bidder(s)/ Contractor(s) shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

3.12 If the Bidder(s)/ Contractor(s) or any employee of the Bidder(s)/ Contractor(s) or any person acting on behalf of the Bidder(s)/ Contractor(s), either directly or indirectly, is relative of any of the officers of the Principal / Owner, or alternatively, if any relative of an officer of the Principal / Owner has financial interest/stake in the Bidder(s)/ Contractor(s) firm, the same shall be disclosed by the Bidder(s)/ Contractor(s) at the time of filing of tender.

The term 'relative' for this purpose would be as defined in Section 6 of the Companies Act 1956.

3.13 The Bidder(s)/ Contractor(s) shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal / Owner.

#### 4. Previous Transgression

- 4.1 The Bidder(s)/ Contractor(s) declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India that could justify BIDDERS' exclusion from the tender process.
- 4.2 The Bidder(s)/ Contractor(s) agrees that if it makes incorrect statement on this subject, Bidder(s)/ Contractor(s) can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

#### 5. Deleted

#### 6. Sanctions for Violations

- 6.1 Any breach of the aforesaid provisions by the Bidder(s)/ Contractor(s) or anyone employed by it or acting on its behalf (whether with or without the knowledge of the Bidder(s)/ Contractor(s)) shall entitle the Principal / Owner to take all or any one of the following actions, wherever required:-
- (i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the Bidder(s)/ Contractor(s). However, the proceedings with the other Bidder(s)/ Contractor(s) would continue.
  - (ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is signed) shall stand forfeited either fully or partially, as decided by the Principal / Owner and the Principal / Owner shall not be required to assign any reason therefore.
  - (iii) To immediately cancel the contract, if already signed, without giving any compensation to the Bidder(s)/ Contractor(s).
  - (iv) To recover all sums already paid by the Principal / Owner, and in case of an Indian Bidder(s)/ Contractor(s) with interest thereon at 2% higher than the prevailing Prime Lending Rate of State Bank of India, while in case of a BIDDERS from a country other than India with interest thereon at 2% higher than the UBOR. If any outstanding payment is due to the BIDDERS from the B Principal / Owner in connection with any other contract for any other stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.
  - (v) To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the Bidder(s)/ Contractor(s), in order to recover the payments, already made by the Principal/ Owner along with interest.
  - (vi) To cancel all or any other Contracts with the Bidder(s)/ Contractor(s). The Bidder(s)/

Contractor(s) shall be liable to pay compensation for any loss 'or damage to the Principal / Owner resulting from such cancellation/rescission and the Principal / Owner shall be entitled to deduct the amount so payable from the money(s) due to the Bidder(s)/ Contractor(s)

(vii) To debar the Bidder(s)/ Contractor(s) from participating in future bidding processes of the Government of India for a minimum period of five years, which may be further extended at the discretion of the Principal / Owner

(viii) To recover all sums paid in violation of this Pact by Bidder(s)/ Contractor(s) to any middleman or agent or broker with a view to securing the contract.

(ix) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the Principal / Owner with the Bidder(s)/ Contractor(s), the same shall not be opened.

(X) Forfeiture of Performance Bond in case of a decision by the Principal / Owner to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

6.2 The Principal/Owner will be entitled to take all or any of the actions mentioned at para 6.1(i) to (x) of this Pact also on the Commission by the Bidder(s)/ Contractor(s) or anyone employed by it or acting on its behalf (whether with or without the knowledge of the Bidder(s)/ Contractor(s), of an offence as defined in Chapter IX of the Indian Penal code, 1860 or Prevention of Corruption Act, 1988 or any other statute enacted for prevention of corruption.

6.3 The decision of the Principal / Owner to the effect that a breach of the provisions of this Pact has been committed by the Bidder(s)/ Contractor(s) shall be final and conclusive on the Bidder(s)/ Contractor(s). However, the Bidder(s)/ Contractor(s) can approach the Independent Monitor(s) appointed for the purposes of this Pact IEMs shall examine the transgression and its severity and submit the report to Chairman, NDMC for further action after providing an opportunity and hearing to the affected parties. .

7. Fall Clause:- Deleted

8. Independent Monitors

8.1 The Principal / Owner has appointed Independent Monitors (hereinafter referred to as IEMs) for this Pact in consultation with the Central Vigilance to as Monitors) for this Pact in consultation with the Central Vigilance Commission names and E-mail IDs have been given in the NIT.

8.2 The task of the IEMs shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

8.3 The IEMs shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

8.4 Both the parties accept that the M IEMs have the right to access all the documents relating to the



project/procurement, including minutes of meetings.

8.5 As soon as the IEMs notices, or has reason to believe, a violation of this Pact, he will so inform to Chairman NDMC.

8.6 The BIDDER(s) accepts that the IEMs has the right to access without restriction to all Project documentation of the Principal / Owner including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will also grant the IEMs, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The IEMs shall be under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s) /Subcontractor(s) with confidentiality.

8.7 The Principal / Owner will provide to the IEMs sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the IEMs the option to participate in such meetings.

8.8 The IEMs will submit a written report to the Chairman NDMC in the Department/ within 8 to 10 weeks from the date of reference or intimation to him by the Principal / Owner / BIDDER and, should the occasion arise, submit proposals for correcting problematic situations. However an opportunity shall be provided by the IEMs to the buyers/ Bidders before submitting their written report.

#### 9. Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the Principal / Owner or its agencies shall be entitled to examine all the documents including the Books of Accounts of the the Bidder(s)/Contractor(s) and the Bidder(s)/Contractor(s) shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

#### 10. Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the Principal / Owner.

#### 11. Other Legal Actions

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings

#### 12. Validity

12.1 The validity of this Integrity Pact shall be from date of its signing and extend upto 12 month beyond the defects liability period of the contracts. In case Bidder(s)/Contractor(s) is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

12.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

13. The parties hereby sign this Integrity Pact at .....on.....

Principal / Owner	Bidder(s)/Contractor(s)
Name of the Officer	
Designation	
Deptt./PSU	
New Delhi Municipal Council	
Witness	Witness
1.....	1.....
2.....	2.....

\* Provisions of these clauses would need to be amended/ deleted in line with the policy of the Principal / Owner in regard to involvement of Indian agents of foreign suppliers

Attachment-15

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Option for Initial Advance (either Interest Bearing Initial Advance or No Initial Advance) and Information for E-payment, PF details and declaration regarding Micro/Small & Medium Enterprises)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

- I. We have read the provisions in the Bidding Documents regarding furnishing the option for advance payment. Accordingly, as per ITB Clause 9.3 as provided in Section BDS, Section III, Vol.-I of the Bidding Documents, we hereby confirm to opt the following:

Interest Bearing Initial Advance

Supply Portion : Yes\* [ ] No\* [ ]  
 Installation Portion : Yes^ [ ] No^ [ ]

(\*^ tick ONLY ONE of the selected options)

- II. We are furnishing the following details of Statutory Registration Numbers and details of Bank for electronic payment.

1.	Name of the Supplier/ Contractor in whose favour payment is to be made	
2.	Address with PIN Code and State	Registered Office:  Branch Office:  Correspondence Address:
3.	Status – Company/others [Declaration of Micro/ Small/ Medium Enterprise under Micro/ Small & Medium Enterprises Development Act 2006, if applicable]	

4.	Permanent Account (PAN) No.	
5.	Central Sales Tax (CST) No.	
6.	State Sales Tax No.	
7.	Work Contract Tax No.	
8.	Service Tax Registration No.	
9.	PF Registration No. of the Company	
10.	PF Regional Office covered (with Address)	
11.	Name of Contact Person	
12.	Telephone No(s).  Email	Landline(s):  Mobile(s):  Email ID :
13.	Bank Details for Electronic Payment	Name of the Bank:  Address of Branch:  Account No.: Type of Account:  [ ] Saving  [ ] Current
14.	9 digit MICR code printed at bottom in middle, next to cheque no.	
15.	IFSC (for RTGS)/NEFT Code (to be obtained from the Bank)  Sample Cancelled Cheque to be enclosed	

We hereby declare that the above information is true and correct and we agree that the payment on account of this Contract, in the event of award, be made in the above account maintained in the above mentioned Bank.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-16

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA  
(Additional Information)

Bidder's Name and Address: To: XXXXX (Name and Address of Employer)

Dear Sir,

In support of the additional information required as per ITB Sub-Clause 9.3 (p) of the Bidding Documents, we furnish herewith our data/details/documents etc., alongwith other information, as follows (the stipulations have been reproduced in italics for ready reference):

1.0 The Bidder shall furnish

A certificate from their Banker(s) (as per prescribed formats in Form 16, Volume-I:Section-VI: Sample Forms and Procedures) indicating various fund based/non fund based limits sanctioned to the Bidder and the extent of utilization as on date. Such certificate should have been issued not earlier than three months prior to the date of bid opening. Wherever necessary the Employer may make queries with the Bidders' Bankers.[Reference ITB clause 9.3(p)(i)]

1.1 In accordance with 1.0, certificate(s) from banker as per requisite format, indicating various fund based/non fund based limits sanctioned to the bidder or each member of the joint venture and the extent of utilization as on date is/are enclosed, as per the following details:

Name of the Bidder/partner of Joint Venture	
Name of the Banker by whom certificate issued	
Date of certificate (should not be earlier than 3 months prior to date of bid opening)	
Whether fund based/non fund based limits are indicated in the certificate	
Whether extent of utilization is indicated in the certificate	

1.2 The Bidder should accordingly also provide the following information/documents (In case of JV bidders, information should be provided separately for all the Partners of JV in the given format):

(i) Details of Banker:

Name of Banker	
Address of Banker	_____ _____ _____
Telephone No.	_____
Contact Name and Title	_____
Fax No.	_____
E-mail ID	_____

(ii) As per para 1.0, Authorization Letter(s) from the bidder (in case of JV bidder, from all the partners) addressed to the Banker(s), authorizing XXXXX (Name of Employer) to seek queries about the bidder with the Banker(s) and advising the Banker(s) to reply the same promptly, is/are enclosed as per following details:

Sl. No.	Letter Ref.	Date	Addressed to (name of the Bank)

2.0 Litigation History

The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder or any partner of JV may result in rejection of Bid. [Reference ITB clause 9.3(p)(ii)]

2.1 Details of litigation history resulting from Contracts completed or under execution by the bidder over the last five years

Year	Name of client, cause of litigation/arbitration and matter in dispute	Details of Contract and date	Award for or against the bidder	Disputed amount

3.0 OTHER INFORMATION

3.1 Current Contract Commitments of works in progress

Bidders (individual firms or each partners of 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.

Details of Contract	Value of outstanding work (Rs.)	Estimated completion date

3.2 Financial Data :

(In Rs. Millions)

	Actual					Projection for next five years				
	(previous five years)					years				
1. Total Assets										
2. Current Assets										
3. Total Liability										
4. Current Liability										
5. Profit before taxes										
6. Profit after taxes										

4. The information/documentation in support of Bidder's design infrastructure and erection facilities and capacity and procedures including quality control related to the work, are enclosed at \_\_\_\_\_ herewith.
  
5. The CV and experience details of a project manager with 15 years experience in executing such contract of comparable nature including not less than five years as manager and the CVs of other employees to be deputed for the subject work, are enclosed at \_\_\_\_ herewith.

Date:.....

(Signature) .....

Place:.....

(Printed Name) .....

(Designation) .....

(Common Seal) .....



Attachment- 17

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Declaration for tax exemptions, reductions, allowances or benefits)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sirs,

1. We confirm that we are solely responsible for obtaining following tax exemptions, reductions, allowances or benefits in respect of supplies under the subject Project, in case of award. We further confirm that we have considered the same in our bid thereby passing on the benefit to XXXXX (Name of Employer) while quoting our prices. In case of our failure to receive such benefits, partly or fully, for any reason whatsoever, the Employer will not compensate us.
2. We are furnishing the following information required by the Employer for issue of requisite certificate if and as permitted in terms of the applicable Govt. of India policies/procedures(in case of award):

Applicable Notification Clause Ref. No.	Act, and	Sl. No.	Description of item on which applicable	Country of origin	Remarks, if any

(The requirements listed above are as per current Notification of Govt. of India indicated above. These may be modified, if necessary, in terms of the Notifications.)

Date:.....

Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-18

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA

(Declaration)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

Dear Sir,

We confirm that Bid Form have been filled up by us as per the provisions of the Instruction to Bidders. We have also uploaded price bid electronically as per the provisions of the Instruction to Bidders. Further, we have noted that the same shall be evaluated as per the provisions of the Bidding Documents.

Further, we hereby confirm that except as mentioned in the Attachment – 6 (Alternative, Deviations and Exceptions to the Provisions) hereof and/or the Covering Letter, forming part of our Bid Envelope:

- (i) there are no discrepancies/inconsistencies and deviations/omissions/ reservations to the Bidding Documents, in the price bid;
- (ii) the description of items and the unit thereof in the price schedules are in conformity with those indicated in the price schedule of the Bidding Documents without any deviation to the specified scope of work.

We also confirm that in case any discrepancies/ inconsistencies and deviations/ omissions/ reservations, as referred to in para (i) and (ii) above, is observed in the online price bid, the same shall be deemed as withdrawn/rectified without any financial implication, whatsoever to XXXXX (Name of Employer). However, in case of any arithmetical errors, the same shall be governed as per the provision of ITB Sub-Clause 27.2 read in conjunction with BDS.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Attachment-19

Implementation of smart grid infrastructure including enhancing of existing network in NDMC power distribution area.

SUB HEAD:- Strengthening of Sub-transmission & Distribution network under Integrated Power Development Scheme (IPDS) of Ministry of Power, Government of INDIA  
 (Bank Guarantee verification Check list)

Bidder's Name and Address:

To: XXXXX (Name and Address of Employer)

S. No.	Checklist	Yes	No
1	Does the bank guarantee compare verbatim with standard proforma for BG?		
2(a)	Has the executing Officer of BG indicated his name designation & Power of Attorney No. / Signing power Number etc. on BG?		
2(b)	Is each page of BG duly Signed/ initialed by the executants and last page is signed with full particulars as required in the standard proforma of BG and under the seal of the bank?		
2(c)	Does the last page of the BG carry the signatures of two witnesses alongside the signature of the executing Bank Manager?		
3(a)	Is the BG on non-judicial stamp paper of appropriate value?		
3(b)	Is the date of sale of non-judicial stamp paper shown on the BG and the stamp paper is issued not more than Six months prior to the date of execution of BG?		
4(a)	Are the factual details such as Bid specification No., LOA No. contract price, etc, correct?		
4(b)	Whether Overwriting /cutting, if any on the BG, authenticated under signature & seal of executants?		
5	Is the amount and validity of BG is inline with contract provisions?		
6	Whether the BG has been issued by a Nationalized bank / Non-Nationalized Bank acceptable to Buyer /Scheduled Bank in India (the applicability of the bank should be in line with the provisions of bidding documents)?		

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

# VOLUME-II: SECTION – III

## Price Schedules

PART - A (System Strengthening work)  
SECTION 1 - Supply of Material

1	2	3	4	5	6	7	8	9	10	3*(5+6+7+8+9+10) = 11	
S.No.	Description of Item	Quantity	Unit	Base Rate	Excise Duty	Sales Tax /VAT	Any Other Statuary Tax	Cartage & Insurance	Installation/Erection Charges	Total Amount	
1	SITC of 11/0.415 KV voltage level, oil type distribution transformer having energy efficiency of Level 2 according to IS-1180 (Part 1) and as per Technical specifications at annexure -TS-I including refurbishing of Plinth of following rating:-										
	(a) 1000 KVA	76	No.								
	(b) 1600 KVA	78	No.								
2	SITC of 11/0.415 KV voltage level, Dry type distribution transformer as per Technical specifications at annexure -TS- II including refurbishing of Plinth of following rating:-										
	(a) 1000 KVA	16	NO.								
	(b) 1600 KVA	65	NO.								
3	SITC of 11 KV 350 MVA 1250 Amp. VCB switch gear panels ( MC VCB) - Indoor, as per Technical specifications at annexure -TS- III including refurbishing of cable duct and floor beneath the Panel of following rating:-										
	(a) VCB Panel for Incoming feeder with CT ratio 1200 -600/5(0.5)- 5(1.0) - 5(5P 10) - 1(PS) - 0.578 (PS) Amp.	6	NO.								
	(b) VCB Panel for Incoming feeder with CT ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp.	199	NO.								
	(c) VCB Panel for Outgoing feeder with CT ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp	332	NO.								
	(d) VCB Panel for Outgoing feeder with CT ratio 200 -100/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp	198	NO.								
	(e) VCB Panel for Capacitor bank with Provision of Undervoltage/ OverVoltage relay with C.T ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp.	3	NO.								
	(f) VCB Panel for Bus couplar with bus riser.	48	NO.								
4	SITC of 11 KV- 1250 Amp. VCB switch gear panel (Annexure TS-III) board for 66/11 kV and 33/11 kV Electric Substation comprising of 15 panels including their C&R panels (Annexure TS - IV) including refurbishing of cable duct and floor beneath the Panel and other accessories of following rating.										
	(i)VCB Panel for Incomer transformer with CT ratio 1200 -600/5(0.5)- 5(1.0) - 5(5P 10) - 1(PS) - 0.578 (PS) Amp.- 1 No.	13	Set								
	(ii) VCB Panel for Outgoing feeder with CT ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp. -11 Nos.										
	(iii) VCB Panel for Outgoing feeder with CT ratio 200 -100/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp. -1 No.										
	(iv) VCB Panel for Capacitor bank with Provision of Undervoltage/ OverVoltage relay of ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp. -1 No.										
	(v) VCB Panel for Bus couplar with bus riser - 1 No.										
5	SITC of 415 V, 35 MVA, 2000 A main bus bar arrangement at top , two tier LT ACB panels, as per Technical specifications enclosed at annexure -TS-V including refurbishing of cable duct and floor beneath the panel, in following configuration.										
	(a) I/C+O/G (1600 A/800A)	81	NO.								
	(b) I/C+B/C (1600 A/1600A)	67	NO.								
	(c) O/G+O/G (800 A/800A)	188	NO.								
6	SITC of 415 V, 35 MVA 3000 A main bus bar arrangement at top, Two tier LT ACB panels, as per Technical specifications enclosed at annexure-TS- V including refurbishing of cable duct and floor beneath the panel, in following configuration.										
	(a) I/C+O/G (2500 A/800A)	34	NO.								
	(b) I/C+B/C (2500 A/2500A)	38	NO.								
	(c) O/G+O/G (800 A/800A)	117	NO.								

7		SITC of cubicle type 7.2 Mvar, 12.65 kV (Design) 5.43 Mvar, 11 kV (working) four steps, including all control cable required for independent functioning of each steps, auto switch capacitor bank with isolator with cubicle or separate isolator in cubicle as per space available at site and technical specification enclosed at Annexure - TS- VI	10	Set							
8	a)	SITC of Bus ducting suitable for 1600 A, 415 V, A/C, 50 Hz rating in convenient sections complete with three runs of 2 No. 100x 10 mm aluminium bus bar for three phase and one run of 1 No. 100 x 10mm aluminium bus bar for neutral including jointing at sections, joint expansions on bends . 2 Nos. run of appropriate size aluminium bus bar shall be fixed on the surface of bus ducting for earthing purpose and shall be connected to main earthing at both end, complete as per Technical specifications at annexure-TS- VII.	1385	mtr.							
	b)	Providing and fixing 1600A rating Copper flexible Connection fabricated with copper leaf for connecting the ends of bus ducting at both end of bus trunking.	110	Each							
9	a)	SITC of Bus ducting suitable for 2500 Amp, 415 V, A/C, 50 Hz rating in convenient sections complete with three runs of 2 Nos. 150 x 10 mm aluminium bus bar for three phase and one run of 1 No. 150 x 10 mm aluminium bus bar for neutral including jointing at sections, joint expansions on bends. 2 Nos. runs of appropriate size aluminium bus bar shall be fixed on the surface of bus ducting for earthing purpose and shall be connected to main earthing at both ends, complete in all respect as required at site as per Technical specifications at annexure-TS- VII.	1713	mtr.							
	b)	Providing and fixing 2500A rating Copper flexible connection fabricated with copper leaf for connecting the ends of bus ducting at both end of bus trunking.	184	Each							
10		SITC of 30V, 100 AH VRLA battery unit complete with maintenance free battery cell and battery charger for trickle/ boost charging along with DCDB as per Technical specification at annexure - TS - VIII	132	Nos.							
11		Supply of 1.1 kV grade unarmoured L.T XLPE Cable of Size 1000 Sqmm / SC as per Technical specification at Annexure- TS- IX and laying in existing masonry/open duct	3105	mtr							
12		Supply and laying of 11 kV grade H.T XLPE Cable of Size 150 Sqmm / 3 C as per Technical specifications at Annexure- TS - X	4415	mtr							
13	a)	Supply and making Heat Shrink cable end termination for 1.1 kV grade L.T PVC/XLPE cable of size 1000 sq.mm/ SC .	340	Job							
	b)	Making end termination of 1.1 grade , PVC /XLPE insulated, aluminium conductor cable of size 400/300X 3.5 C.	802	Job							
14		SITC of 1.1 KV grade, ISI marked XLPE insulated, armoured, sheathed stranded copper conductor control cable of following Size									
	a)	2.5 Sq.mm x 12 core	5778	mtr							
	b)	2.5 Sq.mm x 24 core	4500	mtr							
15		SITC of indoor type, 11 KV HT , H.S type end termination as per Technical Specifications At annexure - TS- XI for HT XLPE cable of following size.									
	(a)	1000 Sq.mm/Sc	44	each							
	(b)	400 Sq.mm/3c	102	each							
	(c)	300 Sq.mm/3c	168	each							
	(d)	150 Sq.mm/3c	322	each							
	(e)	70 Sq.mm/3c	10	each							
16		SITC of 11 KV HT , indoor type, H.S type end termination as per Technical Specifications At annexure - TS- XI for HT PILCA cable of following size.									
	(a)	300 Sq.mm/3c	180	each							
	(b)	150 Sq.mm/3c	400	each							
	(c)	70 Sq.mm/3c	18	each							
17		SITC of three element relay, 30 volts DC for winding temperature/ oil temprature, Alarming/ tripping and transformer door open trip on existing outgoing HT panel for local transformer including cutting of M.S. Sheet of HT panel for making cut out according to size of relay, control wiring with tripping circuit of HT panel and marshalling box of D.T, complete in all respect as required at site	110	Nos.							

18	Modification in the Existing Bus Trunking/Bus Bars, upto 1 mtr length at the end of bus trunking connected at Transformer end/ L.T Panel end to make capable to connect with replaced distribution transformer/ L.T Panel by extension/modification in Aluminium bus bar/bus trunking	171	Job							
19	Providing maintenance free & water less Earth Grid to deliver earth result not exceed more than two ohm for substations equipment i.e distribution transformer body and neutral, HT panel board and LT panel board by providing & fixing copper bonded, MS earth electrodes of appropriate size and length in Convenient pieces and embedded vertically in ground after making a bore of appropriate diameter and filling the bore with an earth enhancing compound. Interconnecting the multiple earth electrodes with 50 x6 mm copper bonded MS strip below 500 mm surface level. Filling the surrounding of bore with fresh soil, complete in all respect including connecting test link at two places and providing masonry enclosure with RCC frame & cover.Two connections point with test link from earth electrode shall be taken up to surface level for connecting conductor to the equipment. All earthing connections should be exothermically welded. Annexure TS-XIII	715	Set							
20	Providing and fixing 50x6 mm copper bonded MS strip with exothermic welding on running joints by way of fixing on wall by providing saddle & screws or any other way, complete in all respect to connect from equipment to earth grid for transformers ,HT and LT panel board in substation.	22700	per mtr							
21	Feeder pillar earthing with GI earth pipe 4.5 meter. long, 40mm dai including accessories, and providing masonry enclosure with RCC frame & cover and watering pipe etc. with charcoal/coke and salt as per CPWD specification and connect the earthing with feeder pillar by supplying and laying 25mmx 5mm GI strip at 0.50 meter below ground as strip earth electrode, including connection/ terminating with GI nut, bolt, spring, washer etc. as required. (jointing shall be done by overlapping and with 2 sets of GI. Nut bolt & spring washer spaced at 50 mm) Annexure TS-XII	8000	Nos.							
22	Supplying including Fixing of Synthetic insulated mats 2.5 mm in thickness and one meter in width (ISI Marked ) conforming to IS 15652/2006 in front of H.T/L.T Panel board	1110	per mtr							
GRAND TOTAL - PART - A			Rs							

## Part-B Credit for Buy Back

i) Item wise rate quoted by bidder less than reserve price shall not be accepted.

ii) The quantity taken in the Credit Sheet is tentative, the credit shall be given as per actual quantity of item dismantled/measured during execution of works.

S.No	Description	Quantity	Unit	Reserve Value per Unit (Rs)	Quoted Rate (Rs)	Amount (Rs)
1	Oil Type Transformer 250 KVA	3	No.	1,45,918		
2	Oil Type Transformer 500 KVA	52	No.	1,38,794		
3	Oil Type Transformer 750 KVA	8	No.	2,36,403		
4	Oil Type Transformer 1000 KVA	175	No.	3,07,101		
5	Dry Type Transformer 1000 KVA	1	No.	3,93,925		
6	Oil Type Transformer 1500 KVA	4	No.	5,09,460		
7	HT Fuse Unit /Isolator	32	No.	6,847		
8	H.T (Oil Circuit Breaker) SBB Panel	874	No.	11,863		
9	H.T (Oil Circuit Breaker) DBB Panel	68	No.	21,021		
10	H.T (SF6) Panel	15	No.	10,656		
11	Control & Relay (C&R) Panel for HT Switch	180	No.	1,254		
12	ACB Type (Single Tier) LT Panel	14	No.	4,759		
13	ACB Type (Two Tier) LT Panel	554	No.	6,625		
14	OCB Type (Single Tier) LT Panel	6	No.	6,785		
15	HT (PILCA) Cable - 70 Sq mm/ 3 C	1002	mtr	204		
16	H.T (PILCA) Cable - 150 Sq mm/3 C	3289	mtr	336		
17	H.T (PILCA) Cable - 300 Sq mm/3C	56	mtr	585		
18	H.T (XLPE) Cable - 70 Sq mm/3 C	57	mtr	78		
19	Bus Ducting 1600 Amp Capacity					
(i)	Al. Bus Bar + M.S Sheet trunking	1046	mtr	3,014		
(ii)	Cu. Flexible	180	Set	6,702		
20	L.T (PVC/XLPE) Cable - 1000 Sq mm/SC	1984	mtr	383		
21	L.T (PVC/XLPE) Cable - 500 Sq mm/SC	10626	mtr	192		
22	L.T (PILCA) Cable - 1000 Sq mm/ SC	389	mtr	580		
23	L.T (PVC/XLPE) Cable - 400 Sq mm/3.5 C	537	mtr	499		
24	L.T (PVC/XLPE) Cable - 300 Sq mm/3.5 C	155	mtr	390		
25	Battery Charger Unit/Power pack	129	no	702		
26	Copper scrap including earthing	2846	Kg	319		
27	Iron scrap including earthing	200	Kg	17		
28	Capacitor Bank 5.04 MVAR	10	No.	1776		
29	Control Cable 2.5 Sq.mm	3700	mtr	78		
30	T-Switch	1	No.	14106		
<b>Total - PART - B</b>					<b>Rs</b>	
PART- C - Total Amount (Rs) = (Part A - Part B)						

Note:- The L-1 bidder shall be decided after considering the amount of credit given by the bidder in Part B of the Price Bid.





## INDEX

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TECHNICAL SPECIFICATION

3-Phase Distribution Transformers 11 KV/0. 415 KV (indoor oil Type) energy efficiency Level 2.

1. SCOPE:

- i) This specification covers design, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of oil immersed, naturally cooled 3-phase 11 KV/0.415 KV distribution transformers for indoor use.
- ii) The equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered equipment shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of bidder's supply irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.
- iii) The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment.
- iv) All indoor apparatus, including bushing insulators with their mountings, shall be designed so as to avoid any accumulation of water.

2 STANDARD RATINGS:

The standard ratings shall be 1000 kVA, 1600 kVA for 11 kV distribution transformers.

3 STANDARDS:

3.1 The major materials used in the transformer shall conform in all respects to the relevant/specified Indian Standards and international Standards with latest amendments thereof as on bid opening date, unless otherwise specified herein. Some of the applicable Indian Standards are listed as hereunder:

3.2

Indian Standard	Title	International
IS -2026	Specification for Power Transformers	IEC 76
IS 1180 (Part-I): 2014	Outdoor Type Oil Immersed Distribution Transformers upto and including 2500kVA, 33kV-Specification	
IS 12444	Specification for Copper wire rod	ASTM B-49
IS-335	Specification for Transformer/Mineral Oil	IEC Pub 296
IS-5	Specification for colors for ready mixed paints	
IS -104	Ready mixed paint, brushing zinc chromate, priming	
IS-2099	Specification for high voltage porcelain bushing	
IS-649	Testing for steel sheets and strips and magnetic circuits	
IS- 3024	Cold rolled grain oriented electrical sheets and strips	
IS - 4257	Dimensions for clamping arrangements for bushings	
IS - 7421	Specification for Low Voltage bushings	
IS - 3347	Specification for Outdoor Bushings	DIN 42531 to 33

IS - 5484	Specification for Al Wire rods	ASTM B - 233
IS - 9335	Specification for Insulating Kraft Paper	IEC 554
IS - 1576	Specification for Insulating Press Board	IEC 641
IS - 6600	Guide for loading of oil Immersed Transformers	IEC 76

IS - 2362	Determination of water content in oil for porcelain bushing of transformer	
IS - 6162	Paper covered Aluminium conductor	
IS - 6160	Rectangular Electrical conductor for electrical machines	
IS - 5561	Electrical power connector	
IS - 6103	Testing of specific resistance of electrical insulating liquids	
IS - 6262	Method of test for power factor and dielectric constant of electrical insulating liquids	
IS - 6792	Determination of electrical strength of insulating oil	
IS - 10028	Installation and maintenance of transformers.	

#### 4 SERVICE CONDITIONS:

4.1 The Distribution Transformers to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS 2026 (Part - I).

- i) Location : At various locations in NDMC area
- ii) Maximum ambient air temperature ( $^{\circ}\text{C}$ ) : 50
- iii) Minimum ambient air temperature ( $^{\circ}\text{C}$ ) : -5
- iv) Maximum average daily ambient air temperature ( $^{\circ}\text{C}$ ): 40
- v) Maximum yearly weighted average ambient temperature( $^{\circ}\text{C}$ ) : 32

Note:

1. The climatic conditions specified above are indicative and can be changed by the user as per requirements.
2. The equipment shall generally be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth unless otherwise specified.

#### 5 PRINCIPAL PARAMETERS:

5.1 The transformers shall be suitable for three phase, 50 Hz, 11 kV system in which the neutral is effectively earthed and they should be suitable for service with fluctuations in supply voltage upto plus 12.5% to minus 12.5%.

- (i) The transformers shall conform to the following specific parameters :

Sl.No.	Item	11 kV Distribution Transformers
1	System voltage (Max.)	12 kV
2	Rated Voltage (HV)	11 kV
3	Rated Voltage (LV)	415 V
4	Frequency	50 Hz +/- 5%*
5	No. of Phases	Three
6	Connection HV	Delta
7	Connection LV	Star (Neutral brought out)
8	Vector group	Dyn-11
9	Type of cooling	ONAN

Audible sound levels (decibels) at rated voltage and frequency for liquid immersed distribution transformers shall be as below (NEMA Standards):

kVA rating	Audible sound levels (decibels)
0-50	48
51-100	51
101-300	55
301-500	56
750	57
1000	58
1500	60
2000	61
2500	62

**TECHNICAL REQUIREMENTS:**

**6.1.1 CORE MATERIAL**

**6.1.2.1** The core shall be stack / wound type of high grade Cold Rolled Grain Oriented annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation,

bolted together and to the frames firmly to prevent vibration or noise. The core shall be stress relieved by annealing under inert atmosphere if required. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer.

- 6.1.2.2 The bidder should offer the core for inspection and approval by the purchaser during manufacturing stage. CRGO steel for core shall be purchased only from the approved vendors, list of which is available at <http://apps.powergridindia.com/ims/ComponentList/Power-former%20upto%20420%20kV-CM%20List.pdf>
- 6.1.2.3 The transformers core shall be suitable for over fluxing (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and shall not get saturated. The bidder shall furnish necessary design data in support of this situation.
- 6.1.2.4 No-load current above 200kVA and upto 2500kVA shall not exceed 2% of full load current and will be measured by energising the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no-load current by 5% of full load current.
- 6.1.2.5 Please refer to "Check-list for Inspection of Prime quality CRGO for Transformers" attached at Annexure-A. It is mandatory to follow the procedure given in this Annexure.
- 6.1.2.6 Transformer manufacturer should have in house core cutting facility for distribution transformer.

## 7 WINDINGS:

### (i) Material:

- 7.1.1 HV and LV windings shall be wound from Super Enamel covered /Double Paper covered Electrolytic Copper conductor.
- 7.1.2 LV winding shall be such that neutral formation will be at top.
- 7.1.3 The winding construction of single HV coil wound over LV coil is preferable.
- 7.1.4 Inter layer insulation shall be Nomex /Epoxy dotted Kraft Paper.
- 7.1.5 Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted.
- 7.1.6 Dimensions of winding coils are very critical. Dimensional tolerances for winding coils shall be within limits as specified in Guaranteed Technical Particulars (GTP Schedule I).
- 7.1.7 The core/coil assembly shall be securely held in position to avoid any movement under short circuit conditions.
- 7.1.8 Joints in the winding shall be avoided. However, if jointing is necessary the joints shall be properly brazed and the resistance of the joints shall be less than that of parent conductor. In case of foil windings, welding of leads to foil can be done within the winding.

## 8 TAPPING RANGES AND METHODS:

- 8.1.1 The tapping shall be as per provisions of IS: 1180 Part-I (2014).

8.1.2 Tap changing shall be carried out by means of an externally operated self-position switch and when the transformer is in de-energised condition. Switch position No.1 shall correspond to the maximum plus tapping. Each tap change shall result in variation of 2.5% in voltage. Arrangement for pad locking shall be provided. Suitable aluminum anodized plate shall be fixed for tap changing switch to know the position number of tap.

**9 OIL:**

- 9.1 The insulating oil shall comply with the requirements of IS 335. Use of recycled oil is not acceptable. The specific resistance of the oil shall be as per IS 335.
- 9.2 Oil shall be filtered and tested for break down voltage (BDV) and moisture content before filling.
- 9.3 The oil shall be filled under vacuum.
- 9.4 The design and all materials and processes used in the manufacture of the transformer, shall be such as to reduce to a minimum the risk of the development of acidity in the oil.

**10 INSULATION LEVELS:**

Sl. No.	Voltage (kV)	Impulse Voltage (kV)	Power Frequency
1	0.415	-	3
2	11	75	28

**11 LOSSES:**

- 11.1 The transformer of HV voltage up to 11kV, the total losses (no-load + load losses at 75 °C) at 50% of rated load and total losses at 100% of rated load shall not exceed the maximum total loss values given in Table-6 for ratings above 200kVA of IS 1180(Part-1):2014.
- 11.2 The maximum allowable losses at rated voltage and rated frequency permitted at 75 °C for 11/0.415 kV transformers can be chosen by the utility as per Table-3 upto 200kVA and Table-6 for ratings above 200kVA as per Energy Efficiency Level-2 specified in IS 1180 (Part-1):2014 for all kVA ratings of distribution transformers.
- 11.3 The above losses are maximum allowable and there would not be any positive tolerance. Bids with higher losses than the above specified values would be treated as non-responsive. However, the manufacturer can offer losses less than above stated values. The utility can evaluate offers with losses lower than the maximum allowable losses on total owning cost basis in accordance with methodology given in Annex-I.

**12 TOLERANCES:**

- 12.1 No positive tolerance shall be allowed on the maximum losses displayed on the label for both 50% and 100% loading values.

**13 PERCENTAGE IMPEDANCE:**

The percentage impedance of transformers at 75 °C for different ratings beyond 200 kVA shall be as per Table 6 of IS 1180(Part-1):2014.

- 14 Temperature rise: The temperature rise over ambient shall not exceed the limits given below:

- 14.1 The permissible temperature rise shall be as per IS: 1180 (Part-I):2014.
- 14.2 The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bidder shall submit the calculation sheet in this regard.
- 15 PENALTY FOR NON PERFORMANCE:**
- 15.1 During testing at supplier's works if it is found that the actual measured losses are more than the values quoted by the bidder, the purchaser shall reject the transformer and he shall also have the right to reject the complete lot.
- 15.2 Purchaser shall reject the entire lot during the test at supplier's works, if the temperature rise exceeds the specified values.
- 15.3 Purchaser shall reject any transformer during the test at supplier's works, if the impedance values differ from the guaranteed values including tolerance.
- 16 INSULATION MATERIAL:**
- 16.1 Electrical grade insulation epoxy dotted Kraft Paper/Nomex and pressboard of standard make or any other superior material subject to approval of the purchaser shall be used.
- 16.2 All spacers, axial wedges / runners used in windings shall be made of pre-compressed Pressboard-solid, conforming to type B 3.1 of IEC 641-3-2. In case of cross-over coil winding of HV all spacers shall be properly sheared and dovetail punched to ensure proper locking. All axial wedges / runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, cutting, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.
- 17.1 TANK:
- Transformer tank construction shall conform in all respect to clause 15 of IS 1180(Part-1):2014.
  - The internal clearance of tank shall be such, that it shall facilitate easy lifting of core with coils from the tank without dismantling LV bushings.
  - All joints of tank and fittings shall be oil tight and no bulging should occur during service.
  - Inside of tank shall be painted with varnish/hot oil resistant paint.
  - The top cover of the tank shall be slightly sloping to drain rain water.
  - The tank plate and the lifting lugs shall be of such strength that the complete transformer filled with oil may be lifted by means of lifting shackle/Hook Type.
  - Manufacturer should carry out all welding operations as per the relevant ASME standards and submit a copy of the welding procedure and welder performance qualification certificates to the customer.
- i) PLAIN TANK:
- 17.2.1 The transformer tank shall be of robust construction rectangular/octagonal/round/ elliptical in shape and shall be built up of electrically tested welded mild steel plates of thickness of 4 mm



for the bottom and top and not less than 6 mm for the sides for distribution transformers above 100 kVA. Tolerances as per IS1852 shall be applicable.

17.2.2 In case of rectangular tanks above 100 kVA the corners shall be fully welded at the corners from inside and outside of the tank to withstand a pressure of 0.8 kg/cm<sup>2</sup> for 30 minutes.

17.2.3 Under operating conditions the pressure generated inside the tank should not exceed 0.4 kg/ sq. cm positive or negative. There must be sufficient space from the core to the top cover to take care of oil expansion. The space above oil level in the tank shall be filled with dry air or nitrogen conforming to commercial grade of IS 1747 for DT up to 63 KVA. For DT of 63 KVA and above rating, conservator shall be provided.

(i) The tank shall be reinforced by welded flats on all the outside walls on the edge of the tank.

(ii) Permanent deflection: The permanent deflection, when the tank without oil is subjected to a vacuum of 525 mm of mercury for rectangular tank and 760 mm of mercury for round tank, shall not be more than the values as given below:

(All figures are in mm)

Horizontal length of flat plate	Permanent deflection
Up to and including 750	5.0
751 to 1250	6.5
1251 to 1750	8.0
1751 to 2000	9.0

17.2.4 The tank shall further be capable of withstanding a pressure of 0.8kg/sq.cm and a vacuum of 0.7 kg/sq.cm (g) without any deformation.

17.2.5 The radiators can be tube type or fin type or pressed steel type to achieve the desired cooling to limit the specified temperature rise.

**17.3 CORRUGATED TANK:** Not acceptable

**18 CONSERVATOR:**

(i) The provision of conservator is mandatory.

(ii) When a conservator is provided, oil gauge and the plain or dehydrating breathing device shall be fitted to the conservator which shall also be provided with a drain plug and a filling hole [32 mm (1¼")] normal size thread with cover. In addition, the cover of the main tank shall be provided with an air release plug.

(iii) The dehydrating agent shall be silica gel. The moisture absorption shall be indicated by a change in the colour of the silica gel crystals which should be easily visible from a distance. Volume of breather shall be suitable for 500g of silica gel conforming to IS 3401 for transformers upto 200 kVA and 1 kg for transformers above 200 kVA .

(iv) The capacity of a conservator tank shall be designed keeping in view the total quantity of oil and its contraction and expansion due to temperature variations. The total volume of conservator

shall be such as to contain 10% quantity of the oil. Normally 3% quantity the oil shall be contained in the conservator.

- (v) The cover of main tank shall be provided with an air release plug to enable air trapped within to be released, unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank.
- (vi) The inside diameter of the pipe connecting the conservator to the main tank should be within 20 to 50 mm and it should be projected into the conservator so that its end is approximately 20 mm above the bottom of the conservator so as to create a sump for collection of impurities. The minimum oil level (corresponding to -5 °C) should be above the sump level.

**19 SURFACE PREPARATION AND PAINTING:**

(i) GENERAL

19.1.1 All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.

19.1.2 All primers shall be well marked into the surface, particularly in areas where painting is evident and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to manufacturer's recommendations. However, where ever airless spray is not possible, conventional spray be used with prior approval of purchaser.

**19.2 CLEANING AND SURFACE PREPARATION:**

a) After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.

b) Steel surfaces shall be prepared by shot blast cleaning (IS9954) to grade Sq. 2.5 of ISO 8501-1 or chemical cleaning including phosphating of the appropriate quality (IS 3618).

c) Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale. These methods shall only be used where blast cleaning is impractical. Manufacturer to clearly explain such areas in his technical offer.

**19.3 PROTECTIVE COATING:**

19.3.1 As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection.

**19.4 PAINT MATERIAL:**

i) Following are the types of paint which may be suitably used for the items to be painted at shop and supply of matching paint to site: Heat resistant paint (Hot oil proof) for inside surface

ii) For external surfaces one coat of thermo setting powder paint or one coat of epoxy primer followed by two coats of synthetic enamel/polyurethane base paint. These paints can be either air drying or stoving.

- iii) For highly polluted areas, chemical atmosphere or for places very near to the sea coast, paint as above with one coat of high build Micaceous iron oxide (MIO) as an intermediate coat may be used.

**19.5 PAINTING PROCEDURE:**

- i) All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours, whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is still warm.
- ii) Where the quality of film is impaired by excess film thickness (wrinkling, mud cracking or general softness) the supplier shall remove the unsatisfactory paint coating and apply another coating. As a general rule, dry film thickness should not exceed the specified minimum dry film thickness by more than 25%.

**19.6 DAMAGED PAINTWORK:**

- (i) Any damage occurring to any part of a painting scheme shall be made good to the same standard of corrosion protection and appearance as that was originally applied.
- (ii) Any damaged paint work shall be made good as follows:

19.6.2.1 The damaged area, together with an area extending 25 mm around its boundary, shall be cleaned down to bare metal.

19.6.2.2 A priming coat shall be immediately applied, followed by a full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original damage.

19.6.2.3 The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before and after priming.

19.6.2.4 The paint shade shall be as per Annexure-Paint which is attached herewith.

**19.7 DRY FILM THICKNESS:**

19.7.1 To the maximum extent practicable the coats shall be applied as a continuous film of uniform thickness and free of pores. Overspray, skips, runs, sags and drips should be avoided. The different coats may or may not be of the same colour.

19.7.2 Each coat of paint shall be allowed to harden before the next is applied as per manufacturer's recommendation.

19.7.3 Particular attention must be paid to full film thickness at the edges.

19.7.4 The requirements for the dry film thickness (DFT) of paint and the materials to be used shall be as given below:

Sl. No.	Paint type	Area to be painted	No. of coats	Total dry film thickness (min.) (microns)
1.	Thermo setting powder paint	inside outside	01 01	30 60
2.	Liquid paint			
	a) Epoxy (primer)	outside	01	30
	b) P.U. Paint (Finish coat)	outside	02	25 each
	c) Hot oil paint/ Varnish	inside	01	35/10

**19.8 TESTS FOR PAINTED SURFACE:**

19.8.1 The painted surface shall be tested for paint thickness.

19.8.2 The painted surface shall pass the cross hatch adhesion test and impact test as acceptance tests and Salt spray test and Hardness test as type test as per the relevant ASTM standards.

Note: Supplier shall guarantee the painting performance requirement for a period of not less than 5 years.

**20 BUSHINGS:**

20.1 The HV & LV bushing shall be side mounted and on opposite side to each other on the distribution transformer.

20.2 For 33 kV-36 kV class bushings shall be used for transformers of ratings 500 kVA and above.

20.3 Bushing can be of porcelain/epoxy material. Polymer insulator bushings conforming with relevant IEC can also be used.

20.4 Dimensions of the bushings of the voltage class shall conform to the Standards specified and dimension of clamping arrangement shall be as per IS 4257

20.5 Minimum external phase to phase and phase to earth clearances of bushing terminals shall be as follows:

Voltage	Clearance	
	Phase to phase	Phase to earth
11 kV	255mm	140mm
LV	75mm	40mm

The clearances of cable box shall be as below:

Voltage	Clearance	
	Phase to phase	Phase to earth
11 kV	130mm	80mm
LV	25mm	20mm

- 20.6 Arcing horns shall be provided on HV bushings. (Deleted)
- 20.7 Brazing of all inter connections, jumpers from winding to bushing shall have cross section larger than the winding conductor. All the Brazes shall be qualified as per ASME, section – IX.
- 20.8 The bushings shall be of reputed make supplied by those manufacturers who are having manufacturing and testing facilities for insulators.
- 20.9 The terminal arrangement shall not require a separate oil chamber not connected to oil in the main tank.

**21 TERMINAL CONNECTORS:**

- 21.1 The LV and HV bushing stems shall be provided with suitable terminal connectors as per IS 5082 so as to connect the jumper without disturbing the bushing stem. Connectors shall be with eye bolts so as to receive conductor for HV. Terminal connectors shall be type tested as per IS 5561.

**22 CABLE BOXES:**

Cable Boxes shall be provided on both HV & LV side.

- 22.1 In case HV/LV terminations are to be made through cables the transformer shall be fitted with suitable cable box on 11 kV side to terminate one 11kV/ 3 core aluminium conductor cable up to 240 sq. mm. (Size as per requirement).

The bidder shall ensure the arrangement of HT Cable box so as to prevent the ingress of moisture into the box due to rain water directly falling on the box. The cable box on HT side shall be of the split type with faces plain and machined and fitted with Neo-k-Tex or similar quality gasket and complete with brass wiping gland to be mounted on separate split type gland plate with nut-bolt arrangement and MS earthing clamp. The bushings of the cable box shall be fitted with nuts and stem to take the cable cores without bending them. The stem shall be of copper with copper nuts. The cross section of the connecting rods shall be stated and shall be adequate for carrying the rated currents. On the HV side the terminal rod shall have a diameter of not less than 12 mm. The material of connecting rod shall be copper. HT Cable support clamp should be provided to avoid tension due to cable weight.

- 22.2 The transformer shall be fitted with suitable LV cable box having non-magnetic material gland plate with appropriate sized single compression brass glands on LV side to terminate 1.1 kV/single core XLPE armoured cable at the bottom of LV cable box and provision shall be made to connect bus ducting at the top of LV cable box.

**23 TERMINAL MARKINGS:**

High voltage phase windings shall be marked both in the terminal boards inside the tank and on the outside with capital letter 1U, 1V, 1W and low voltage winding for the same phase marked by corresponding small letter 2U, 2V, 2W. The neutral point terminal shall be indicated by the letter 2N. Neutral terminal is to be brought out and connected to local grounding terminal by an earthing strip.

- 26.1 The following standard fittings shall be provided :
- i. Rating and terminal marking plates, non-detachable.
  - ii. Earthing terminals with lugs - 2 Nos.

- iii. Lifting lugs for main tank and top cover
- iv. Terminal connectors on the HV/LV bushings (For bare terminations only).
- v. Thermometer pocket with cap - 1 No.
- vi. Air release device (for non-sealed transformer)
- vii. HV bushings - 3 Nos.
- viii. LV bushings - 4 Nos.
- ix. Pulling lugs
- x. Stiffener
- xi. Radiators - No. and length may be mentioned (as per heat dissipation calculations).
- xii. Prismatic oil level gauge.
- xiii. Drain cum sampling valve.
- xiv. One filter valve on upper side of the transformer (For transformers above 200 kVA)
- xv. Oil filling hole having p. 1- ¼ " thread with plug and drain plug on the conservator.
- xvi. Silica gel breather (for non-sealed type transformer)
- xvii. 100 mmx50 mm above 100 kVA, 460 mm long with holes to make them suitable for fixing on a platform or plinth.
- xviii. 4 No. rollers for transformers of 200 kVA and above.
- xix. Pressure relief device or explosion vent (above 200 kVA)
- xx. Oil level gauge
  - A. -5 °C and 90 °C marking for non-sealed type Transformers
  - B.- 30 °C marking for sealed type transformers
- xxi. Nitrogen / air filling device/ pipe with welded cover  
 Capable of reuse (for sealed type transformers)
- xxiii. Inspection hole for transformers above 200 kVA
- xxii. Pressure gauge for sealed type transformers above 200 kVA.
- xxiii. Buchholz relay for transformers of 1000 KVA and above rating.

**27 FASTENERS:**

- 27.1 All bolts, studs, screw threads, pipe threads, bolt heads and nuts shall comply with the appropriate Indian Standards for metric threads, or the technical equivalent.
- 27.2 Bolts or studs shall not be less than 6 mm in diameter except when used for small wiring terminals.
- 27.3 All nuts and pins shall be adequately locked.
- 27.4 Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt will remain in position.

- 27.5 All bolts/nuts/washers exposed to atmosphere should be as follows.
- a) Size 12 mm or below – Stainless steel
  - b) Above 12 mm- steel with suitable finish like electro galvanized with passivation or hot dip galvanized.
- 27.6 Each bolt or stud shall project at least one thread but not more than three threads through the nut, except when otherwise approved for terminal board studs or relay stems. If bolts and nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided.
- 27.7 The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members.
- 27.8 Taper washers shall be provided where necessary.
- 27.9 Protective washers of suitable material shall be provided front and back of the securing screws.
- 28 OVERLOAD CAPACITY:**
- 28.1 The transformers shall be suitable for loading as per IS 6600.
- 29 TESTS:**
- 29.1 All the equipment offered shall be fully type tested by the bidder or his collaborator as per the relevant standards including the additional type tests. The type test must have been conducted on a transformer of same design during the last five years at the time of bidding. The bidder shall furnish four sets of type test reports along with the offer. In case, the offered transformer is not type tested, the bidder will conduct the type test as per the relevant standards including the additional type tests at his own cost in CPRI (Bangalore)/ ERDA(Baroda) in the presence of employers representative(s) without any financial liability to employer in the event of order placed on him.
- 29.2 Special tests other than type and routine tests, as agreed between purchaser and bidder shall also be carried out as per the relevant standards.
- 29.3 The requirements of site tests are also given in this clause.
- 29.4 The test certificates for all routine and type tests for the transformers and also for the bushings and transformer oil shall be submitted with the bid.
- 29.5 The procedure for testing shall be in accordance with IS1180 (Part-1) :2014 /2026 as the case may be except for temperature rise test.
- 29.6 Before dispatch each of the completely assembled transformers shall be subjected to the routine tests at the manufacturer's works.
- 30 ROUTINE TESTS:**
- 30.1 Ratio, polarity, phase sequence and vector group.
- 30.2 No Load current and losses at service voltage and normal frequency.
- 30.3 Load losses at rated current and normal frequency.
- 30.4 The test certificates for all routine and type tests for the transformers and also for the bushings and

transformer oil shall be submitted after the receipt of order.

- 30.5 Impedance voltage test.
- 30.6 Resistance of windings at each tap, cold (at or near the test bed temperature).
- 30.7 Insulation resistance.
- 30.8 Induced over voltage withstand test.
- 30.9 Separate source voltage withstand test.
- 30.10 Neutral current measurement-The value of zero sequence current in the neutral of the star winding shall not be more than 2% of the full load current.
- 30.11 Oil samples (one sample per lot) to comply with IS 1866.
- 30.12 Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 110% rated voltage.
- 30.13 Pressure and vacuum test for checking the deflection on one transformer of each type in every inspection.

**31 TYPE TESTS TO BE CONDUCTED ON ONE UNIT:**

In addition to the tests mentioned in clause 30 and 31 following tests shall be conducted:

- 31.1 Temperature rise test for determining the maximum temperature rise after continuous full load run. The ambient temperature and time of test should be stated in the test certificate.
- 31.2 Impulse voltage test: with chopped wave of IS 2026 part-III. BIL for 11 kV shall be 75 kV peak.
- 31.3 Short circuit withstand test: Thermal and dynamic ability.
- 31.4 Air Pressure Test: As per IS – 1180 (Part-1):2014.
- 31.5 Magnetic Balance Test.
- 31.6 Un-balanced current test: The value of unbalanced current indicated by the ammeter shall not be more than 2% of the full load current.
- 31.7 Noise-level measurement.
- 31.8 Measurement of zero-phase sequence impedance.
- 31.9 Measurement of Harmonics of no-load current.
- 31.10 Transformer tank shall be subjected to specified vacuum. The tank designed for vacuum shall be tested at an internal pressure of 0.35 kg per sq cm absolute (250 mm of Hg) for one hour. The permanent deflection of flat plates after the vacuum has been released shall not exceed the values specified below:



Horizontal length of flat plate (in mm)	Permanent deflection (in mm)
Upto and including 750	5.0
751 to 1250	6.5
1251 to 1750	8.0
1751 to 2000	9.0

- 31.11 Transformer tank together with its radiator and other fittings shall be subjected to pressure corresponding to twice the normal pressure or 0.35 kg / sq.cm whichever is lower, measured at the base of the tank and maintained for an hour. The permanent deflection of the flat plates after the excess pressure has been released, shall not exceed the figures for vacuum test.
- 31.12 Pressure relief device test: The pressure relief device shall be subject to increasing fluid pressure. It shall operate before reaching the test pressure as specified in the above class. The operating pressure shall be recorded. The device shall seal-off after the excess pressure has been released.
- 31.13 Short Circuit Test and Impulse Voltage Withstand Tests: The purchaser intends to procure transformers designed and successfully tested for short circuit and impulse test. In case the transformers proposed for supply against the order are not exactly as per the tested design, the supplier shall be required to carry out the short circuit test and impulse voltage withstand test at their own cost in the presence of the representative of the purchaser.
- 31.13.1 The supply shall be accepted only after such test is done successfully, as it confirms on successful withstand of short circuit and healthiness of the active parts thereafter on un-tanking after a short circuit test.
- 31.13.2 Apart from dynamic ability test, the transformers shall also be required to withstand thermal ability test or thermal withstand ability will have to be established by way of calculations.
- 31.13.3 It may also be noted that the purchaser reserves the right to conduct short circuit test and impulse voltage withstand test in accordance with the IS, afresh on each ordered rating at purchaser cost, even if the transformers of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the purchaser either at the manufacturer's works when they are offered in a lot for supply or randomly from the supplies already made to purchaser's stores. The findings and conclusions of these tests shall be binding on the supplier.

**32 ACCEPTANCE TESTS:**

- 32.1 At least 10% transformers of the offered lot (minimum of one) shall be subjected to the following routine/ acceptance test in presence of purchaser's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS:1180 (Part-1): 2014 and IS:2026.
- 32.2 Checking of weights, dimensions, fitting and accessories, tank sheet thickness, oil quality, material, finish and workmanship as per GTP and contract drawings on one transformer of each type in every inspection.
- 32.3 Physical verification of core coil assembly and measurement of flux density of one unit of each

rating, in every inspection with reference to short circuit test report.

32.4 Temperature rise test on one unit of the total ordered quantity.

**33 TESTS AT SITE:**

The purchaser will conduct the following test on receipt of transformers in their store. The utility shall arrange all equipment, tools & tackle and manpower for the testing. The bidder will depute his representative to witness the same. All such test shall be conducted by utility not later than 10 days from receipt of transformers.

- i) Megger Test
- ii) Ratio test
- iii) Magnetization test
- iv) Oil test
- v) Core balancing test

**34 INSPECTION:**

34.1 In respect of raw material such as core stampings, winding conductors, insulating paper and oil, supplier shall use materials manufactured/supplied by standard manufacturers and furnish the manufacturers' test certificate as well as the proof of purchase from these manufacturers (excise gate pass) for information of the purchaser. The bidder shall furnish following documents along with their offer in respect of the raw materials:

- i. Invoice of supplier.
- ii. Mill's certificate.
- iii. Packing list.
- iv. Bill of landing.
- v. Bill of entry certificate by custom.

Please refer to "Check-list for Inspection of Prime quality CRGO for Transformers" attached at Annexure-A. It is mandatory to follow the procedure given in this Annexure.

**35 INSPECTION AND TESTING OF TRANSFORMER OIL:**

35.1 To ascertain the quality of the transformer oil, the original manufacturer's tests report should be submitted at the time of inspection. Arrangements should also be made for testing of transformer oil as per IS: 335, after taking out the sample from the manufactured transformers and tested in the presence of purchaser's representative.

35.2 To ensure about the quality of transformers, the inspection shall be carried out by the purchaser's representative at following two stages:-

35.2.1 Anytime during receipt of raw material and manufacture/ assembly whenever the purchaser desires.

35.2.2 At finished stage i.e. transformers are fully assembled and are ready for dispatch.

35.3 The stage inspection shall be carried out in accordance with Annexure-II.

- 35.4 After the main raw-material i.e. core and coil material and tanks are arranged and transformers are taken for production on shop floor and a few assembly have been completed, the firm shall intimate the purchaser in this regard, so that an officer for carrying out such inspection could be deputed, as far as possible within seven days from the date of intimation. During the stage inspection a few assembled core shall be dismantled to ensure that the laminations used are of good quality. Further, as and when the transformers are ready for despatch, an offer intimating about the readiness of transformers, for final inspection for carrying out tests as per relevant IS shall be sent by the firm along with Routine Test Certificates. The inspection shall normally be arranged by the purchaser at the earliest after receipt of offer for pre-delivery inspection. The proforma for pre delivery inspection of Distribution transformers is placed at Annex- III.
- 35.5 In case of any defect/defective workmanship observed at any stage by the purchaser's Inspecting Officer, the same shall be pointed out to the firm in writing for taking remedial measures. Further processing should only be done after clearance from the Inspecting Officer/ purchaser.
- 35.6 All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall offer the Inspector representing the Purchaser all reasonable facilities, without charges, to satisfy him that the material is being supplied in accordance with this specification. This will include Stage Inspection during manufacturing stage as well as Active Part Inspection during Acceptance Tests.
- 35.7 The manufacturer shall provide all services to establish and maintain quality of workman ship in his works and that of his sub-contractors to ensure the mechanical /electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.
- 35.8 Purchaser shall have every right to appoint a third party inspection to carry out the inspection process.
- 35.9 The purchaser has the right to have the test carried out at his own cost by an independent agency wherever there is a dispute regarding the quality supplied. Purchaser has right to test 1% of the supply selected either from the stores or field to check the quality of the product. In case of any deviation purchaser have every right to reject the entire lot or penalize the manufacturer, which may lead to blacklisting, among other things.
- 36 QUALITY ASSURANCE PLAN:
- 36.1 The bidder shall invariably furnish following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of equipment offered.
- 36.2 Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials in the presence of bidder's representative, copies of test certificates.
- 36.3 Information and copies of test certificates as above in respect of bought out accessories.
- 36.4 List of manufacturing facilities available.
- 36.5 Level of automation achieved and list of areas where manual processing exists.
- 36.6 List of areas in manufacturing process, where stage inspections are normally carried out for

quality control and details of such tests and inspection.

- 36.7** List of testing equipment available with the bidder for final testing of equipment along with valid calibration reports. These shall be furnished with the bid. Manufacturer shall possess 0.1 accuracy class instruments for measurement of losses.
- 36.8** Quality Assurance Plan (QAP) withhold points for purchaser's inspection.
- 36.9** The successful bidder shall within 30 days of placement of order, submit following information to the purchaser :
- 36.9.1** List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
- 36.9.2** Type test certificates of the raw materials and bought out accessories.
- 36.9.3** The successful bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing.
- 36.9.4** ISI marking on the transformer is mandatory. As per Quality Control Order for Electrical Transformers- 2015, issued by Department of Heavy Industries, Government of India, the Standard / ISI marking on Distribution Transformers is mandatory and the product should be manufactured in compliance with IS 1180 Part-1: (2014).
- 37** DOCUMENTATION:
- 37.1** The bidder shall furnish along with the bid the dimensional drawings of the items offered indicating all the fittings.
- 37.2** Dimensional tolerances.
- 37.3** Weight of individual components and total weight.
- 37.4** An outline drawing front (both primary and secondary sides) and end-elevation and plan of the tank and terminal gear, wherein the principal dimensions shall be given.
- 37.5** Typical general arrangement drawings of the windings with the details of the insulation at each point and core construction of transformer.
- 37.6** Typical general arrangement drawing showing both primary and secondary sides and end-elevation and plan of the transformer.
- 38** PACKING AND FORWARDING:
- 38.1** The packing shall be done as per the manufacturer's standard practice. However, it should be ensured that the packing is such that, the material would not get damaged during transit by Rail / Road / Sea.
- 38.2** The marking on each package shall be as per the relevant IS.
- 39** GUARANTEE
- 39.1** The defect liability period shall be sixty (60) months from the date of Taking over/ completion of facilities (or any part thereof). In case the transformer fails within the guarantee period, the supplier will depute his representative within 15 days from date of intimation by utility for joint

inspection. In case, the failure is due to the reasons attributed to supplier, the transformer will be replaced/repared by the supplier within 2 months from date of joint inspection.

39.2 The outage period i.e. period from the date of failure till unit is repaired/ replaced shall not be counted for arriving at the guarantee period.

39.3 In the event of the supplier's inability to adhere to the aforesaid provisions, suitable penal action will be taken against the supplier which may inter alia include blacklisting of the firm for future business with the purchaser for a certain period.

**40 SCHEDULES:**

40.1 The bidder shall fill in the following schedule which will be part of the offer. If the schedule are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule-A : Guaranteed Technical Particulars

Schedule-B : Schedule of Deviations

**41 DEVIATIONS:**

41.1 The bidders are not allowed to deviate from the principal requirements of the Specifications. However, the bidder is required to submit with his bid in the relevant schedule a detailed list of all deviations without any ambiguity. In the absence of a deviation list in the deviation schedules, it is understood that such bid conforms to the bid specifications and no post-bid negotiations shall take place in this regard.

41.2 The discrepancies, if any, between the specification and the catalogues and / or literatures submitted as part of the offer by the bidders, shall not be considered and representations in this regard shall not be entertained.

41.3 If it is observed that there are deviations in the offer in guaranteed technical particulars other than those specified in the deviation schedules then such deviations shall be treated as deviations.

41.4 All the schedules shall be prepared by vendor and are to be enclosed with the bid.

**42. Other requirements:**

42.1 Marshaling box with WTI shall be provided. For functioning of WTI, once CT (primary) at any Phase on LV side of current 1400A for 1000kVA transformer and 2300A for 1600kVA transformer shall be provided. Secondary side of CT shall be compatible with WTI CT ratio. All the connections of WTI and Buccholz relay shall be terminated in marshaling box by providing cable connectors.

42.2 The neutral terminal of LV side shall be adjacent to R Phase terminal preferably.

Annex-I

METHODOLOGY FOR COMPUTING TOTAL OWNING COST

<b>TOC = IC + (A xWi) + (B xWc) ; Losses in KW</b>		
Where,		
TOC	=	Total Owing Cost
IC	=	Initial cost including taxes of transformer as quoted by the manufacturer
A factor	=	Cost of no load losses in Rs/KW (A = 288239)
B factor	=	Cost of load losses in Rs/KW (B = 93678)
Wi	=	No load losses quoted by the manufacturer in KW
Wc	=	Load losses quoted by the manufacturer in KW

**Note:** No (+)ve tolerance shall be allowed at any point of time on the quoted losses after the award. In case, the losses during type testing, routine testing etc are found above the quoted losses, the award shall stand cancelled. In such a case, the CPG money shall also be forfeited.

Annexure-Paint

Painting-Transformer Main tank, pipes, Conservator Tank, Radiator etc.-

	Surface Preparation	primer coat	intermediate under coat	finish coat	total DFT	Colour shade
Main tank, pipes, conservator tank, etc. (External surfaces)	Blast cleaning Sa2½	Epoxy base Zinc primer 30-40 micron	Epoxy base Zinc primer 30-40 micron	Aliphatic Polyurethane (PU Paint) (min 50 micron	Min 110 micron	541 shade of IS:5
Main tank, pipes (above 80 NB), conservator tank, etc (Internal surfaces)	Blast cleaning Sa2½	Hot oil resistant, non-corrosive varnish or paint	--	--	Min 30 micron	Glossy white for paint
Radiator (External surfaces)	Chemical / blast cleaning (Sa2½)	Epoxy base zinc primer 30-40 micron	Epoxy base Zinc primer Min 30-40 micron	Aliphatic Polyurethane(PU Paint) (min)50 micron	Min 110 micron	541 shade of IS:5
Radiator and pipes up to 80 NB (Internal surfaces)	Chemical cleaning if required	Hot oil proof low viscosity varnish or hot oil resistant non corrosive paint	--	--	--	Glossy white for paint

Annexure – II

PROFORMA FOR STAGE INSPECTION OF DISTRIBUTION TRANSFORMERS

(A) GENERAL INFORMATION:

1. Name of firm : M/s.
2. Order No. and Date :
3. Rating-wise quantity offered :
4. Details of offer
  - a) Rating
  - b) Quantity
  - c) Serial Numbers
5. Details of last stage inspected lot:
  - a) Total quantity inspected
  - b) Serial Numbers
  - c) Date of stage inspection
  - d) Quantity offered for final inspection of (a) above with date

(B) Availability of material for offered quantity :

Details to be filled in

(C) Position of manufacturing stage of the offered quantity :

- a) Complete tanked assembly
- b) Core and coil assembly ready
- c) Core assembled
- d) Coils ready for assembly
  - (i) HV Coils
  - (ii) LV Coils

Note: (i) A quantity of less than 100 Nos. shall not be entertained for stage inspection. If the awarded quantity is less than 100 Nos., then whole lot shall be offered in single lot.

(ii) The stage inspection shall be carried out in case :-

- (a) At least 25% quantity offered has been tanked and
- (b) core coil assembly of further at least 30% of the quantity offered has been completed.

(iii) Quantity offered for stage inspection should be offered for final Inspection within 15 days from the date of issuance of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.



Sl. No	Particulars	As offered	As ob	Deviation and Remarks									
(D)	<u>Inspection of Core:</u> (I) Core Material (1) Manufacturer's Characteristic Certificate in respect of grade of lamination used. (Please furnish test certificate)												
	(2) Remarks regarding Rusting and smoothness of core.												
	(3) Whether laminations used for top and bottom yoke are in one piece.												
	(II) Core Construction :												
	(1) No. of Steps												
	(2) Dimension of Steps												
	Step No.	1	2	3	4	5	6	7	8	9	10	11	12
	As offered:												
	W mm												
	T mm												
	As found:												
	W mm												
	T mm												
	(3) Core Dia (mm)												
	(4) Total cross Section area of core												
	(5) Effective cross Sectional area of core												
	(6) Clamping arrangement												
	(i) Channel Size												
	(ii) Bolt size and No.												
	(iii) Tie Rods size and No.												
	(iv) Painting												
	(a) Channels												

	(b) Tie Rods		
	(c) Bolts		
	(7) Whether top yoke is cut for LV connection.		
	(8) If yes, at 7 above, whether Reinforcement is done.		
	(9) Size of Support Channels provided for Core base and bottom yoke (Single piece of channels are only acceptable)		
	(10) Thickness of insulation provided between core base and support channel.		
	(11) core length (leg center to leg center)		
	(12) Window height		
	(13) Core height		
	(14) Core weight only (without channels etc.)		
(E)	INSPECTION OF WINDING		
	(I) Winding material		
	(1) Material used for		
	(a) HV winding		
	(b) LV winding		
	(2) Grade of material for		
	(a) HV winding		
	(b) LV winding		
	3) Test certificate of manufacturer (enclose copy) for winding material of:		
	(a) HV		
	(b) LV		

	<b>(II) CONSTRUCTIONAL DETAILS</b>			
	(1) Size of Cross Sectional area of conductor for :			
	(a) HV winding			
	(b) LV winding			
	(2) Type of insulation for conductor of :			
	a) HV winding			
	(b) LV winding			
	(3) Diameter of wire used for delta formation (mm)			
	(4) Diameter of coils in:			
	a) LV winding			
	i) Internal dia (mm)			
	ii) Outer dia (mm)			
	b) HV winding			
	i) Internal dia (mm)			
	ii) Outer dia (mm)			
	(5) Current Density of winding material used for :			
	(a) HV			
	(b) LV			
	(6) Whether neutral formation on top.			
	(7) HV Coils/ Phase			
	a) Number			
	b) Turns / coil			
	c) Total turns			
	(8) LV Coils/ Phase			
	a) Number			
	b) Turns / coil			
	c) Total turns			

	(9) Method of HV Coil Joints			
	(10) Total weight of coils of			
	a) LV winding (kg)			
	b) HV winding (kg)			
(F)	INSULATION MATERIALS :			
	(I) MATERIAL :			
	1) Craft paper			
	a) Make			
	b) Thickness (mm)			
	c) Test Certificate of manufacturer (enclose copy).			
	2) Press Board			
	a) Make			
	b) Thickness (mm)			
	c) Test Certificate of manufacturer (enclose copy).			
	3) Material used for top and bottom yoke and insulation			
	(II) Type and thickness of material used : (mm)			
	a) Between core and LV			
	b) Spacers			
	c) Inter layer			
	d) Between HV and LV winding			
	e) Between phases			
	f) End insulation			
(G)	CLEARANCES : (mm)			
	(I) Related to core and windings			

	1) LV to Core (Radial) 2) Between HV and LV (Radial)			
	3) (i) Phase to phase between HV Conductor (ii) Whether two Nos. Press Board each of minimum 1 mm thick provided to cover the tie rods.			
	4) Thickness of locking spacers between LV coils (mm)			
	5) Axial wedges between HV and LV coils / phase (Nos.)			
	6) No. of radial spacers per phase between HV coils			
	7) Size of duct between LV and HV winding (mm)			
	(II) Between core - coil assembly and tank : (mm)			
	1) Between winding and body:			
	a) Tank lengthwise			
	b) Tank Breadth wise			
	2) Clearance between top cover and top yoke upto 100 kVA and between top cover and top most live part of tap changing switch for 200 kVA and above.			
(H)	TANK : (I) Constructional details : 1) Rectangular shape 2) Thickness of side wall (mm) 3) Thickness of top and bottom plate (mm) 4) Provision of slopping top cover towards HV bushing.			

5)	Tank internal dimensions (mm)			
	a) Length			
	b) Breadth			
	c) Height			
	(i) On LV side			
	(ii) On LV side			
(II)	<b>General details :</b>			
	1) Inside painted by varnish/ oil corrosion resistant paint (please specify which type of coating done).			
	2) Gasket between top cover and tank			
	i) Material			
	ii) Thickness (mm)			
	iii) Jointing over laps (mm)			
	3). Reinforcement of welded angle (specify size and No. of angle provided ) on side walls of tank.			
	4) Provision of lifting lugs:			
	b) Whether lugs of 8 mm thick MS Plate provided			
	c) Whether reinforced by welded plates edge wise below the lug upto re-enforcing angle of the tank done.			
	Pulling lug of MS Plate			
	a) Nos.			
	b) Thickness (mm)			
	c) Whether provided on breadth side or length side			
	6) Provision of air release plug			
	7) Provision of galvanized GI Nuts Bolts with 1 No. Plain and 1 No. spring washer.			
	8) Deformation of length wise side wall of tank when subject to:			
	a) Vacuum of (-) 0.7 kg/sq cm for 30 minutes.			

Sl. N	Particulars	As offered	As observed	Deviation and Remarks
	b) Pressure of 0.8 kg/sq cm for 30 minutes.			
(I)	RAIDATORS :			
	1. Fin Radiators of 1.25 mm thick sheet			
	a) Dimension of each fin (LxBxT)			
	b) Fins per radiator			
	c) Total No. of radiators			
	2. Verification of manufacturer's test certificate regarding Heat dissipation (excluding Top and Bottom) in w/sq m			
	3. Verification of position of radiator with respect to bushing.			
(J)	CONSERVATOR :			
	1. Dimensions ( L x D) (in mm)			
	2 Volume (m <sup>3</sup> )			
	3. Inside dia of Conservator tank pipe (mm)			
	4. Whether conservator outlet pipe is projected approx. 20 mm inside the conservator tank.			
	5. Whether arrangement made so that oil does not fall on the active parts.			
	6. Whether die cast metal oil level gauge indicator having three positions at ( - 5 <sup>0</sup> C, 30 <sup>0</sup> C and 98 <sup>0</sup> C) is provided .			
	7. Whether drain plug and filling hole with cover is provided.			
	8. Inner side of the conservator Tank painted with-			
(K)	BREATHER :			
	1. Whether Die cast Aluminium body breather for silica gel provided.			

	2. Make			
	3. Capacity			
Sl. No (L)	Particulars	As offered	As observed	Deviation and Remarks
	TERMINALS :			
	1. Material whether of Brass Rods/ Tinned Copper.			
	a) HV			
	b) LV			
	2. Size (dia in mm)			
	a) HV			
	b) LV			
	3. Method of Star connection formed on LV side of 6mm thick (Should use Al./Cu. Flat bolted/ brazed with crimped lugs on winding alternatively for 63 and 100 kVA ratings brazing is done covered with tubular sleeve duly crimped).  - Please state dimensions of Al/ Cu flat or tubular sleeve used. (mm)			
	4. Method of Connection of LV winding to LV Bushing (end of winding should be crimped with lugs (Al/Cu) and bolted with bushing stud).			
	5. Method of Connection of HV winding to HV bushing (Copper joint should be done by using silver brazing alloy and for Aluminium, brazing rod or with tubular connector crimped at three spots).			
	6. Whether SRB Ptube/insulated paper used for formation of Delta on HV.			
	7. Whether Empire sleeves used on the portion of HV winding joining to HV bushing.			
	8. Whether neutral formation is covered with cotton tape			



	Whether arrangement for studs for fitting of HV Bushing are in diamond shape (so that Arcing Horns are placed vertically).			
	3. Position of mounting of LV bushings.			
	4. Bushing Clearance: (mm)			
	a) LV to Earth			
	b) HV to Earth			
	c) Between LV Bushings			
	d) Between HV Bushings			
(N)	TANK BASE CHANNEL /			
	ROLLERS :			
	1. Size of channel (mm)			
	2. Whether channels welded across the length of the tank			
	3. Size and type of roller (mm)			
(O)	OIL :			
	1. Name of supplier			
	2. Break down voltage of oil: (kV)			
	i) Filled in tanked transformer			
	ii) In storage tank (to be tested by Inspecting Officer).			
	3. Supplier's test certificate(enclose copy)			
(P)	ENGRAVING :			
	1. Engraving / punching Sl. No. and name of firm on top channel / clamp or on separate plate which is firmly welded to the top channel/ clamp.			
	i) On bottom of clamping channel of core-coil assembly.			
	ii) Engraving of Sl. No. and name of firm on side wall and top cover of tank along with date of dispatch.			
(Q)	i) MS plate of size 125x125 mm welded on width side of stiffner			
	ii) Following details engraved (as per approved GTP):			
	(a) Serial Number			
	(b) Name of firm			
	(c) Order No. and Date			
	(d) Rating			
	(e) Name of Inspecting Officer			
	(f) Designation			
	(g) Date of dispatch			
(R)	NAME PLATE DETAILS :			
	Whether Name Plate is as per approved drawing			
(S)	Colour of Transformer			
	1. Tank body colour shall be as per Annexure-Paint which is attached herewith			
	2. Conservator colour shall be as per Annexure-Paint which is attached herewith .			
(T)	CHECKING OF TESTING FACILITIES:			
	(Calibration certificate also to be checked for its validity)			

	TESTS :			
	1. No Load Current			
	2. No Load Loss			
	3. % Impedance			
	4. Load Losses			
	5. Insulation Resistance Test			
	6. Vector Group Test (phase relationship)			
	7. Ratio and Polarity test relationship			
	8. Transformer Oil Test (Break Down Voltage)			
	9. Magnetic Balance			
	10. Measurement of winding resistance (HV and LV both)			
	11. Induced over voltage withstand test (Double voltage and Double frequency)			
	12. Separate source power frequency withstand test at 28 kV for HV and 3 kV for LV (one minute).			
	13. Air pressure/ Oil leakage Test			
	14. Vacuum test			
	15. Unbalanced current test			
	16. Temperature rise (Heat Run) test.			
(U)	We have specifically checked the following and found the same as per G.T.P./deviations observed as mentioned against each:			
	i) Rustlessness of CRGO laminations used			
	ii) Core steps			
	iii) Core area			
	iv) Core weight			
	v) Winding cross sectional area			
	a) LV			
	b) HV			
	vi) Weight of windings			
	vii) Clearance between winding and wall of tank (mm)			
	a) Length-wise			
	b) Breadth-wise			
	viii) Clearance between top of yoke/ top most live part of tap changer to tank cover.			
	ix) Details of Neutral formation			
	x) Connections to bushings:			
	a) LV			
	b) HV			
	xi) Slope of tank top			
	xii) Position of mounting of bushings			

Annexure - A

Check-list for Inspection of Prime quality CRGO for Transformers

During inspection of PRIME CRGO, the following points needs to be checked by the Transformer manufacturer. The manufacturer should have in-house core cutting facility. Utility's inspector shall verify all these points during inspection:-

1. PRIME CRGO cutting is at works of Transformer Manufacturer:

Review of documents:

Purchase Order (unpriced) to PRIME CRGO supplier/Authorised Agency  
 Manufacturer's test certificate

Invoice of the Supplier

Packing List

Bill of Lading

Bill of Entry Certificate by Customs Deptt.

Reconciliation Statement as per format below  
 Certificate of Origin  
 BIS Certification

Format for Reconciliation/Traceability records

Packing List No./date /Quantity of PRIME CRGO received

Name of Manufacturer

Manufacturer test certificate No./date

Serial No.	Details of package/job	Drawing Reference	Quantity Involved	Cumulative Quantity Consumed	Balance stock

- 2.1 Inspection of PRIME CRGO Coils:

PRIME CRGO-Manufacturer's Identification Slip on PRIME CRGO Coils

Visual Inspection of PRIME CRGO Coils offered as per packing list ( for verification of coil details as per Test certificate & healthiness of packaging).

Unique numbering inside of each sample of PRIME CRGO coil and verification of records to be maintained in the register for consumption of CRGO coil.

ISI logo sticker on packed mother coil and ISI logo in Material TC.

- 2.2. During inspection of PRIME CRGO, surveillance testing of sample shall be carried out for Stacking Factor, Permeability, Specific watt loss at 1.5 Tesla and/or 1.7 Tesla depending on the grade of PRIME CRGO and aging test etc. applicable as per relevant IS/ IEC standard, Tech. Spec., MQP and Transformer manufacturer plant standard.

Inspection Clearance Report would be issued after this inspection

- 3 Inspection of PRIME CRGO laminations: Transformer manufacturer will maintain records for traceability of laminations to prime CRGO coils and burr/bow on laminations shall be measured. Utility can review these records on surveillance basis.

4. Inspection at the time of core building:

Visual Inspection of PRIME CRGO laminations. In case of suspected mix-up/ rusting/decoloration, samples may be taken for testing on surveillance basis for tests mentioned in A.2.2 above.

Above tests shall be witnessed by Utility. In case testing facilities are not available at Manufacturer's work, the sample(s) sealed by Utility to be sent to approved labs for testing.

Inspection Clearance Report would be issued after this inspection

NOTE :-

Transformer Manufacturer to ensure that PRIME CRGO is procured from POWERGRID approved vendors and CRGO manufacturer should have valid BIS Certificate for respective offered Grade.

a) General

If a surveillance sample is drawn and sent to TPL (if testing facility not available with the manufacturer), the Transformer manufacturer can continue manufacturing at their own risk and cost pending TPL test report on PRIME CRGO sample drawn. Decision for acceptance of PRIME CRGO shall be based upon report of the sample drawn.

These checks shall be read in-conjunction with approved Quality Plan, specification as a whole and conditions of contract.

Sampling Plan (PRIME CRGO)

Distribution Transformers                      -1<sup>st</sup> transformer and subsequently at random 2% of

Transformers (min. 1) offered for inspection.

NOTE:- One sample for each lot of CRGO shall be drawn on surveillance basis.

CRGO has to be procured only from POWERGRID approved vendors. List of such vendors is available at the following website. Since the list is dynamic in nature, the site may be checked from time to time to see the list of approved vendors.

**Annexure –TSII**

**STANDARD**  
**TECHNICAL SPECIFICATION**  
**FOR**  
**DRY-TYPE THREE PHASE, 11 KV/415V**  
**DISTRIBUTION TRANSFORMERS (CAST RESIN)**

## **TECHNICAL SPECIFICATION FOR DRY-TYPE DISTRIBUTION TRANSFORMERS OF 11 kV/415V**

### **1.0 SCOPE:**

- 1.1.1 This specification covers, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of Dry-Type, naturally cooled 3 phase 11 kV/415V Distribution Transformers.
- 1.1.1 It is not the intent to specify completely herein all the details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee, in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered equipment shall be complete with all components necessary for their effective and trouble free operation. Such, components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.
- 1.1.2 The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of equipment.
- 1.1.3 All apparatus, including bushing insulators with their mountings, shall be designed so as to avoid pocket in which water can collect.

### **1.2 Standard Ratings:**

The Standard Ratings shall be 1000 & 1600 KVA for 11 kV Distribution transformers

### **2.0 STANDARDS:**

- 2.1 The materials shall conform in all respects to the relevant Indian/ International Standard Specification, with latest amendments thereof unless otherwise specified herein. Some of them are listed below:

Indian Standard	Title	International & Internationally recognized standard
ISS-11171	Specification for Dry-Type Power Transformers	
IS-2026 (Part I)	Power transformers – General	
IS-2026 (Part II)	Power transformers temperature rise	
IS-2026 (Part III)	Insulation levels and dielectric tests	
IS-2026 (Part IV)	Terminal markings, tappings & connections	
IS-2026 (Part V)	Transformer / Reactor Bushings - Minimum external clearances in air	
IS-12063	Degree of protection provided by enclosures	
IEC-60076-11	Power transformers dry type transformers	
IS 12444	Specification for Copper wire rod	ASTM B-49
ISS 5	Specification for colors for ready mixed paints	
ISS - 7421	Specification for Low Voltage bushings	
ISS - 5484	Specification for Al Wire rods	ASTM B - 233

Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above, would also be acceptable. In case the Bidders who wish to offer material conforming to the other standards, the bidder shall clearly bring out the salient points of difference between the standards adopted and the specific standards in relevant schedule. Four copies of such standards with authentic English translations shall be furnished along with the offer,

### 3.0 TAPS:

+5% to -5% in steps of 2.5% with off-circuit tap link system.

### 4.0 SERVICE CONDITIONS:

The Distribution Transformers to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per (IS 2026 & IS 11171) Latest Revision.

- i) Location : NDMC Area
- ii) Max ambient air Temperature (Deg. C) : 50

- iii) Min. ambient air  
Température (Deg. C) : -10
- iv) Max average daily ambient  
air Temperature (Deg. C) : 40
- v) Max. yearly weighed average  
ambient Temperature (Deg. C) : 32
- vi) Max. altitude above  
mean sea level (Meters) : For Delhi

Note: 1. The climatic conditions specified above are indicative and can be changed by the user as per requirements

2. The equipment shall generally be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth unless otherwise specified.

#### **5.0 WINDING CONNECTIONS & VECTORS:**

The primary winding shall be connected in delta and the secondary winding in Star (vector symbol Dyn 11) so as to produce a positive displacement of 30° from the primary to the secondary vector of the same phase. The neutral of the secondary winding shall be brought out to a separate insulating terminal.

#### **6.0 PRINCIPAL PARAMETERS:**

The Transformers shall be suitable for indoor installation with three phase, 50 Hz, 11 kV system in which the neutral is effectively earthed and they should be suitable for service under fluctuations in supply voltage upto plus 10% to minus 15%,

The transformer shall conform to the following specific parameters.

Sl.	Item	1
1	System voltage (max.)	12 kV
2	Rated voltage HV	11 kV
3	Rated voltage LV	415
4	Frequency	50 c/s
5	No. of Phases	Three
6	Connection HV	Delta



7	Connection LV	Star  (Neutral brought out)
8	Vector group	Dyn-11
9	Type of cooling	AN
10	Noise level at rated voltage and frequency	As per International Standard ANSI-IEC

**7.0 TECHNICAL REQUIREMENTS:**

**7.1 CORE MATERIAL - CRGO**

**7.1.1 CRGO Material**

7.1.1.1 The core shall be stack / wound-type of high grade cold rolled grain annealed steel lamination having low loss and good grain properties, coated with high temperature insulation, bolted together and to the frames firmly to prevent vibration or noise. The core shall be properly stress relieved by annealing under inert atmosphere. The complete design of core must ensure permanency of the core losses with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer.

The bidder should offer the core for inspection and approval by the purchaser during manufacturing stage. **Transformer manufacturer should have in house core cutting facility for distribution transformer.**

7.1.1.2 The transformers core shall be suitable for over fluxing (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and shall not get saturated. The Bidder shall furnish necessary design data in support of this situation.

7.1.1.3 No load current shall not exceed 3% of full load current and will be measured by energizing the transformer at 415 volts, 50 c/s on the secondary. Increase of voltage of 415 volts by 12.5% shall not increase the no load current by max 6% of full load current for all ratings.

**LOSSES** without any positive tolerance. The bidder should also guarantee the total losses at 50% and 100% load condition (50% and 100% of rated KVA rating at rated voltage and frequency and at 75 Deg. centigrade)

### Dry-Type Transformers (losses table)

Rating KVA	Max. Losses at 50% loading <sup>1</sup> (kW)	Max. Losses at 100% loading <sup>1</sup> (kW)	Total losses at 50% loading <sup>1</sup> (kW)	Total losses at rated load <sup>1</sup> (kW)
<b>11kv &amp; 22 kV class</b>			<b>33 kV class</b>	
1000	4.5	12	5.3	12.8
1600	6.32	16.8	7.5	18

#### 7.2 WINDINGS:

- 7.2.1 Material: Super enamel 'H' - Class copper / Alum / Conductor / 'C'- Class (UL Approved RTI 220 Deg. C) / Copper conductor / Strip / Foil winding. The class of insulation of the conductor must be one class higher than the class of the transformer.
- 7.2.2 LV winding shall be in even layers so that neutral formation will be at top.
- 7.2.3 The winding construction of single HV coil / sectional / disc wound over LV coil.
- 7.2.4 Inter layer insulation shall 'C' - Class (UL Approved RTI 220 Deg. C) insulating Paper or Class H Nomex Laminates.
- 7.2.5 Dimensions of winding coils are very critical. Dimensional tolerances for winding coils shall be within limits as specified in GTP.

#### 7.3 INSULATION LEVELS

Voltage	Impulse Voltage (kV Peak)	Power Frequency Voltage (kV)
415	-	3
11000	75	28

: The bidder should guarantee individual No load loss and load loss

#### 7.4.1 Tolerances:

No positive tolerance shall be allowed on the maximum losses displayed on the label for both 50% & 100% loading values.

**7.4.2 Percentage Impedance:**

The value of impedance of transformers at 75 Deg. C shall be in accordance with IS 2026. 5% for rating up to 1000kVa, 6% for rating up to 2000kVA .

**7.4.3 Temperature rise:** The temperature rise over ambient shall not exceed the limits described below

Average Winding temperature rise measured by resistance: 115° C Rise

**Bids not meeting the above limits of temperature rise will be treated as non-responsive**

7.4.3.1 The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bidder shall submit the calculation sheet.

**7.4.4 PENALTY FOR NON PERFORMANCE:**

7.4.4.1 During testing, if it is found that the actual measured losses are more than the values quoted by the bidder, the purchaser will have the right to reject the complete lot.

7.4.4.2 Purchaser shall reject any transformer during the test at supplier's works, if the temperature rise exceeds the guaranteed values.

7.4.4.3 Purchaser shall reject any transformer during the test at supplier's works, if the impedance values differ from the guaranteed values including tolerance.

**7.4.5 INSULATION MATERIAL:**

7.4.5.1 Material: Electrical grade 'H' - class insulating materials all the material other than the primary insulation. All primary insulation next to the conductor and layer insulation needs to be UL Approved Class C (RTI 220 Deg. C) material

7.4.5.2 All spacers, axial wedges / runners used in windings shall be made of 'H' - class insulating materials. In case of cross-over coil winding of HV all spacers shall be properly sheared or comb structure to ensure proper locking. All axial wedges / runners shall be properly milled. Insulation shearing, cutting, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.

**7.5 ENCLOSURE :**

The transformer shall be housed in CR steel sheet enclosure designed for IP-34 Class of protection.

- 7.5.1.1 The transformer enclosure shall be of robust construction rectangular in shape and shall be built up of cold rolled sheets.
- 7.5.1.2 The internal clearance of enclosure shall be such that, it shall facilitate easy lifting of core with coils from the enclosure without dismantling LV bushings.
- 7.5.1.3 All joints of enclosure and fittings shall be oil tight and no bulging should occur during service. The enclosure design shall be such that the core and windings can be lifted freely.
- 7.5.1.4 Manufacturer should carry out all welding operations as per the relevant ASME standards and submit a copy of the welding procedure qualifications and welder performance qualification certificates to the customer.

## **7.6 SURFACE PREPARATION & PAINTING**

### **7.6.1 General**

- 7.6.1.1 All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.
- 7.7.1.2 All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to manufacturer's recommendations. However, where ever airless spray is not possible, conventional spray be used with prior approval of purchaser.

### **7.7.2 Cleaning and Surface Preparation**

- 7.7.2.1 After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.
- 7.7.2.2 Steel surfaces shall be prepared by Shot blast cleaning or chemical cleaning by Seven Tank process including Phosphating to the appropriate quality.
- 7.7.2.4 Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale. These methods shall only be used where blast cleaning is impractical. Manufacturer to clearly explain such areas in his technical offer.

### **7.7.3 Protective Coating**

- 7.7.3.1 As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection.

### **7.7.4 Paint Material**

Followings are the types of paint that may be suitably used for the items to be painted at shop and supply of matching paint to site:

- 7.7.4.1 High temperature paint for inside surface.
- 7.7.4.2 For external surfaces one coat of Thermo Setting Powder paint or 1 coats of Zinc chromate primer followed by 2 coats of Synthetic Enamel / Power coating Polyurethane base Paint These paints can be either air drying or stoving.
- 7.7.4.3 For highly polluted areas, chemical atmosphere or for places very near to the sea coast paint as above with one coat of high build MIO (Micaceous iron oxide) as an intermediate coat may be used

#### **7.7.5 Painting Procedure**

- 7.7.5.1 All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours, whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is still warm.
- 7.7.5.2 Where the quality of film is impaired by excess film thickness (wrinkling, mud cracking or general softness) the Supplier shall remove the unsatisfactory paint coating and apply another. As a general rule, dry film thickness should not exceed the specified minimum dry film thickens by more than 25%. In all instances where two or more coats of the same paint are specified, such coatings may or may not be of contrasting colors.

#### **7.7.6 Damaged Paintwork**

- 7.7.6.1 Any damage occurring to any part of a painting scheme shall be made good to the same standard of corrosion protection and appearance as that originally employed.
- 7.7.6.2 Any damaged paint work shall be made good as follows:
  - a) The damaged area, together with an area extending 25 mm around its boundary, shall be cleaned down to bare metal.
  - b) A priming coat shall be immediately applied, followed by a full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original damage.
  - c) The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before and after priming.

#### **7.7.7 Dry Film Thickness**

- 7.7.7.1 To the maximum extent practicable the coats shall be applied as a continuous

film of uniform thickness and free of pores. Overspray, skips, runs, sags and drips should be avoided. The different coats may or may not be of the same color.

- 7.7.7.2 Each coat of paint shall be allowed to harden before the next is applied as per manufacturer's recommendation.
- 7.7.7.3 Particular attention must be paid to full film thickness at edges.
- 7.7.7.4 The requirements for the dry film thickness (DFT) of paint and the materials to be used shall be as given below.

Sl. No	Paint Type	Area to be painted	No. of coats	Total Dry film thickness (min.)
1.	High temperature paint i.e. 200°C class	inside outside	01	20 microns
			01	60 microns
2.	Liquid paint	Outside	01	30 microns
	a) Zinc chromate (primer)	outside	02	25 microns each
	b) Synthetic Enamel / Poly Urethane (Finish coat)	inside	01	35/10 microns

**7.7.8 Tests for painted surface**

- 7.7.8.1 The painted surface shall be tested for paint thickness.
- 7.7.8.2 The painted surface shall pass the Cross Hatch Adhesion test, Salt spray test and Hardness test as per the relevant ASTM standards.

NOTE: Supplier shall guarantee the painting performance requirement for a period of not less than 5 years.

**7.8 BUSHINGS:**

- 7.8.1 The bushings shall conform to the relevant standards specified and shall be indoor. The bushing rods and nuts shall be made of brass material 12 mm diameter for both HT & LT. The bushings shall be fixed to the transformers on side with straight pockets and in the same plane. The tests as per latest IS 2099 and IS7421 shall be conducted on the transformer bushings.
- 7.8.2 For 11 kV, 17.5 kV class bushings shall be used and for 0.415 kV, 1.1 kV class bushings shall be used. Bushings of plain shades as per IS-3347 shall

be mounted on the side of the Tank and not on top cover.

- 7.8.3 Dimensions of the bushings of the voltage class shall conform to the Standards specified.
- 7.8.4 A minimum phase to phase clearance of 75 mm for LV (upto 1.1 kV bushings) and 255 mm for HV bushings shall be obtained with the bushing mounted on the transformer.
- 7.8.5 The HV & LV bushings shall be side mounted and on opposite side to each other, on the distribution transformer.
- 7.8.6 Brazing of all inter connections, jumpers from winding to bushing shall have cross section larger than the winding conductor. All the Brazes shall be qualified as per ASME, Section - IX.
- 7.8.7 The bushings shall be of reputed make supplied by those manufacturers who are having manufacturing and testing facilities for manufacture of insulators.
- 7.9 Terminal connectors:** The LV bushing and HV bushing stems shall be provided with suitable terminal connectors so as to connect the jumper without disturbing the bushing stem. Connectors shall be with eye bolts so as to receive conductor for HV. Terminal connectors must have been type tested as per IS : 5561.

**7.10 Terminal markings**

High voltage phase windings shall be marked both in the terminal boards inside the enclosure and on the outside with capital letter (1U, 1V, 1W) and low voltage winding for the same phase marked by corresponding small letter 2u, 2v, 2w. The neutral point terminal shall be indicated by the letter 2n. Neutral terminal to be brought out and connected to local grounding terminal by an Earthing strip.

**7.11 FITTINGS:**

The following standard fittings shall be provided.

- a) Rating and terminal marking plates non-detachable
- b) Earthing terminals with lugs - 2 Nos.
- c) Lifting lugs for main tank & top cover
- d) Terminal connectors on the HV/LV bushings
- e) HV bushings- 3 Nos.
- f) LV bushings-4 Nos.

**7.12 FASTENERS:**

- 7.12.1 All bolts, studs, screw threads, pipe threads, bolt heads and nuts shall comply with the appropriate Indian Standards for metric threads, or the technical equivalent.
- 7.12.2 Bolts or studs shall not be less than 6 mm in diameter except when used for small wiring terminals.
- 7.12.3 All nuts and pins shall be adequately locked.
- 7.12.4 Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt will remain in position.
- 7.12.5 All ferrous bolts, nuts and washers placed in outdoor positions shall be treated to prevent corrosion, by hot dip galvanizing, except high tensile steel bolts and spring washers which shall be electro-galvanized/ plated. Appropriate precautions shall be taken to prevent electrolytic action between dissimilar metals.
- 7.12.6 Each bolt or stud shall project at least one thread but not more than three threads through the nut, except when otherwise approved for terminal board studs or relay stems. If bolts nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided.
- 7.12.7 The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members.
- 7.12.8 Taper washers shall be provided where necessary.
- 7.12.9 Protective washers of suitable material shall be provided front and back or the securing screws.

**7.13.1 Load Management Signal Light:**

A signal light shall be provided to give information about the loading condition of the transformer. It shall forewarn any overloading problem at the installation such that a change out of the existing transformer with a higher capacity transformer can be planned. The signal light mechanism shall not reset itself when the load drops from the overloaded condition. The signal light shall remain lighted once the signal light contacts close due to overload and can be turned off by manual operation. (The signal light shall not give indication for momentary overloading).

**8.0 TESTS:**

- a) All the equipment offered shall be fully type tested by the bidder or his



collaborator as per the relevant standards including the additional type tests mentioned at clause 6.2. The type test must have been conducted on a transformer of same design. The Bidder shall furnish four sets of type test reports along with the offer. Offers without type test reports will be treated as Non-responsive.

- b) Special tests other than type and routine tests, as agreed between purchaser and Bidder shall also be carried out as per the relevant standards.
- c) The requirements of site tests are also given in this clause.

The test certificates for all routine and type tests for the transformers and also for the bushings shall be submitted with the bid. The procedure for testing shall be in accordance with IS 11171/2026 as the case may be except for temperature rise.

**8.1 ROUTINE TESTS:**

1. Ratio, polarity and phase sequence.
2. No Load current and losses at service voltage and normal frequency
3. Load losses at rated current and normal frequency
4. Impedance Voltage test
5. Resistance of windings at Normal tap, cold (at or near the test bed temp.)
6. Insulation resistance
7. Induced over voltage withstand test.
8. Separate source voltage withstand test.
9. Neutral current measurement
10. Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 110% voltage.
11. Partial Discharge test: The partial discharge should be less than 10 %.

**8.2 TYPE TESTS TO BE CONDUCTED ON ONE UNIT:**

In addition to the Tests mentioned in para 6.1 following Tests shall be conducted

1. Temperature rise test for determining the maximum temperature rise as per IS-11171/1980 Cl. No. ....
2. Impulse voltage test: As per Clause No, 13 (with chopped wave of IS - 2026 part-III latest version. BIL for 11 kV shall be 75 kV Peak.
3. Short Circuit withstand test: Thermal and dynamic ability.
  1. Magnetic Balance Test
  2. Un-balanced current test: The value of unbalanced current indicated by the ammeter shall not be more than 2% of the full load current.
  3. Noise-level measurement
  4. Measurement of zero-phase sequence impedance.
  5. Measurement of Harmonics of no-load current

Type test certificates for the tests carried out on prototype of same specifications shall be submitted along with the bid. The purchaser may select the transformer for type tests randomly,

**8.3 TESTS AT SITE:** The purchaser reserves the right to conduct all tests on Transformer after arrival at site and the manufacturer shall guarantee test certificate figures under actual service conditions.

**8.4 ACCEPTANCE TESTS:** The transformers shall be subjected to the following routine/ acceptance test in presence of purchaser's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS:11171/1985 and IS:2026.

1. Checking of weights, dimensions, fitting and accessories, tank sheet thickness, material, finish and workmanship as per GTP and contract drawings.
2. Physical verification of core coil assembly and measurement of flux density of one unit of each rating, in every inspection with reference to short circuit test report
3. All tests as specified in clause

**8.5 INSPECTION:**

- 8.5.1 All tests and inspection shall be made at the place of manufacturer and unless otherwise especially agreed upon the manufacturer and the purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge to satisfy him that the material is being furnished in accordance with specification.
- 8.5.2 The manufacturer shall provide all services to establish and maintain quality of workman ship in his works and that of his sub-contractors to ensure the mechanical / electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.
- 8.5.3 Along with the bid the manufacturer shall prepare Quality Assurance Plan identifying the various stages of manufacture, quality checks performed at each stage and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of purchaser or his representative before proceeding with manufacturing. However, purchaser or his representative shall have the right to review the inspection reports, quality checks and results of manufacturer's in house inspection department which are not customer hold points and the manufacturer shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection etc. Manufacturer should submit the list of equipment for testing along with latest calibration certificates to the purchaser.
- 8.5.4 Purchaser shall have every right to appoint a third party inspection to carry out the inspection process. The purchaser has the right to have the test carried out at his own cost by an independent agency wherever the dispute regarding the quality of supply. Purchaser has right to test 1% of the supply selected either from the stores or field to check the quality of the product. In case of any deviation purchaser have every right to reject the entire lot or penalize the manufacturer, which may leads to blacklisting among other things.

## **9.0 QUALITY ASSURANCE PLAN:**

- 9.1 The Bidder shall invariably furnish following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of equipment offered.
- i. Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are

tested. List of tests normally carried out on raw materials in the presence of Bidder's representative, copies of test certificates.

- ii. Information and copies of test certificates as in (I) above in respect of bought out accessories.
- iii. List of manufacturing facilities available.
- iv. Level of automation achieved and list of areas where manual processing exists.
- v. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspection.
- vi. List of testing equipment available with the bidder for final testing of equipment along with valid calibration reports shall be furnished with the bid. Manufacturer shall possess 0.5 class instruments for measurement of losses.
- vii. Quality Assurance Plan (QAP) withhold points for purchaser's inspection as per Annexure.

9.2 The successful Bidder shall within 30 days of placement of order, submit following information to the purchaser.

- i. List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
- ii. Type test certificates of the raw materials and bought out accessories.

9.3 The successful Bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing,

**10.0 DOCUMENTATION:**

The Bidder shall furnish along with the bid the dimensional drawings of the items offered indicating all the fittings.

- i) Dimensional tolerances
- ii) Weight of individual components and total weight

**11.0 PACKING & FORWARDING:**

11.1 The packing shall be done as per the manufacturer's standard practice. However, it should be ensured that the packing is such that, the material would not get damaged during transit by Rail / Road / Sea.

11.2 The making on each package shall be as per the relevant IS. 11.0  
MANADATORY SPARES:

**12.0 GUARANTEE**

12.1 The Defect liability period shall be sixty (60) months form the date of Taking over/ completion of Facilities (or any part thereof). In case the transformer fails within the guarantee period, the supplier will depute his representative within 15 days from the date of intimation by utility for joint inspection. In case, the failure is due to the reasons attributed to supplier, the transformers will be replaced /repaired by the supplier ,within 2 months from the date of joint inspection.

12.2 The outage period i.e period from the date of failure till unit is repaired/replaced shall not be counted for arriving at the guarantee period.

12.3 in the event of the supplier's inability to adhere to the aforesaid provisions, suitable penal action will be taken against the supplier which may linter alia include blacklisting of the firm for future business with the purchaser for a certain period.

## SCHEDULE 'A'

# GUARANTEED TECHNICAL PARTICULARS OF DRY-TYPE DISTRIBUTION TRANSFORMERS

NO.	DESCRIPTION	AS PER SPECIFICATION	OFFERED
1.00.00	<b>GENERAL</b>		
1.01.00	Service	:	
1.02.00	Make & Manufactured by	:	
1.03.00	Type		
1.04.00	Specifications & Standards	:	
1.05.00	Type of cooling	:	
1.06.00	Fittings and accessories included as per specification	:	Yes / No
1.07.00	Design ambient Temperature	:	50°C
1.08.00	Class of insulation		
2.00.00	<b>RATING</b>		
2.01.00*	Rated KVA	:	
2.02.00*	Rated voltage of HV (KV)	:	
2.03.00*	Rated voltage of LV (KV)	:	
2.04.00*	Rated frequency (Hz)	:	
2.05.00	Maximum temperature rise above design ambient of winding by resistance method	:	
3.00.00	<b>WINDING</b>		
3.01.00	Vector Group	:	
3.01.01	HV winding	:	
3.01.02	LV winding	:	
3.02.00	Tappings on HV winding	:	
3.02.01	Range	:	
3.02.02	Value of each step	:	
3.03.00	<b>Current density</b>		
3.03.01	HV winding (A/mm <sup>2</sup> )	:	
3.03.02	LV winding (A/mm <sup>2</sup> )	:	
3.04.00	<b>Conductor area &amp; size</b>		
3.04.01	HV winding mm <sup>2</sup>	:	

NO.	DESCRIPTION	AS PER SPECIFICATION	OFFERED
3.04.02	HV Cond / Strip Size (mm)		
3.04.03	LV winding (mm <sup>2</sup> )	:	
3.04.04	LV Cond / Strip Size (mm)		
3.05.05	No. of LV Cond. In parallel		
3.06.01	Resistance of HV winding per Phase @20°C	:	
3.06.02	Resistance of LV winding per Phase @20°C		
4.00.00	<b>LOSSES</b>		
4.01.01	No load losses at rated frequency and Hundred (100) percent rated volts (KW)	:	
4.02.00	Copper losses at rated current, rated frequency at 75°C	:	
4.03.00	Copper losses at rated current, rated frequency at 135°C	:	
5.0.00*	<b>EFFICIENCY</b>		
	Unity Power Factor & 0.8 lag power factor	:	UPF      0.8      UPF      0.8
5.01.00	Efficiency at seventy five (75) degrees Centigrade and at (125) percent (%) full load	:	
5.01.01	Hundred (100) percent (%) full load	:	
5.01.02	Seventy Five (75) percent (%) full load	:	
5.01.03	Fifty (50) percent (%) full load	:	
5.01.04	Twenty Five (25) percent (%) full load	:	
5.02.00	Load at which maximum (KVA) efficiency occurs in (%)	:	
6.00.00	<b>CONSTRUCTION DETAILS</b>		
6.01.00	Type of construction	:	
6.02.00	Insulation between laminations	:	
6.03.00	Type of joint between core limb and yoke	:	
6.04.00	Bolt insulation test (KV) voltage one (1) minute	:	
6.05.00	Type of winding	:	
6.05.01	HV winding	:	
6.05.02	LV winding	:	
6.06.00	<b>Winding insulation</b>		
6.06.01	HV winding (KV uniform)	:	

NO.	DESCRIPTION		AS PER SPECIFICATION	OFFERED
6.06.02	LV winding (KV uniform)	:		
6.07.00	<b>Insulation material</b>			
6.07.01	HV winding turn insulation	:		
6.07.02	LV winding turn insulation	:		
6.07.03	Between HV and LV windings	:		
6.07.04	Between LV winding and core	:		
6.08.00	Type of joints in winding	:		
6.09.00	<b>Minimum clearances</b>			
6.09.01	Between phases			
6.09.02	HV (mm)	:		
6.09.03	HV to LV	:		
6.09.04	HV to earth	:		
6.09.05	LV to earth	:		
6.10.00	<b>Terminal arrangement</b>			
6.10.01	High voltage	:		
6.10.02	Low voltage	:		
7.00.00	<b>TRANSFORMER CONSTANT</b>			
7.01.01	Positive sequence percent (%) impedance at principal tap rated current, rated frequency and seventy five (75) degrees Centigrade temperature on rated KVA base	:		
7.02.00	Maximum flux density in core at rated frequency and	:		
7.02.01	Hundred (100) percent (Wb/m <sup>2</sup> ) rated volts	:		
7.02.02	Hundred ten (112½) (Wb/m <sup>2</sup> ) percent rated volts	:		
7.03.00	Noise level maximum (db)	:		
7.04.00	<b>Test Voltage</b>			
7.04.01	Impulse (1.2/50 micro second wave) withstand voltage	:		
7.04.02	HV winding (KV peak)	:		
7.04.03	LV winding (KV peak)	:		
7.04.04	One (1) minute power frequency withstand	:		
7.04.05	HV winding (KV)	:		
7.04.06	LV winding (KV)	:		



NO.	DESCRIPTION	AS PER SPECIFICATION	OFFERED
7.04.07	Short-circuit withstand time without injury with dead short-circuit at the terminal	: Sec.	
7.05.00	<b>No load current at rated frequency and</b>		
7.05.01	Hundred (100) percent (A) rated voltage	: _____ i.e. _____ % of full load	
7.05.02	Hundred ten (112½) (A) percentage rated voltage	: _____ i.e. _____ % of full load	
7.06.00	No load power factor at rated voltage and frequency	:	
7.08.00	Percentage resistance and reactance at rated current and frequency on rated MVA base	:	
7.08.01	HV to LV reactance (percent)	:	
7.08.02	Resistance of winding (%) at 75°C	:	
7.08.03	Resistance of winding (%) at 135°C	:	
7.09.00	Percentage regulation at full load, seventy five (75) degrees Centigrade and	:	
7.09.01	Unity power factor (%)	:	
7.09.02	0.8 lag power factor (%)	:	
8.00.00	<b>BUSHING</b>		
8.01.00	Type	:	
8.02.00*	Voltage class (KV)	:	
8.03.00*	Rated current (A)	:	
8.04.00*	Momentary power frequency dry withstand voltage (KV)	:	
8.05.00*	Visible discharge power frequency voltage (KV)	:	
9.00.00	<b>DETAILS OF ENCLOSURE AND MATERIALS</b>		
9.01.00	Thickness of side plates (mm)	:	
9.02.00	Thickness of bottom plates (mm)	:	
9.03.00	Thickness of Top cover plates (mm)	:	
9.04.00	Material of enclosure plates	:	
9.05.00	<b>TYPE OF ENCLOSURE</b>		

NO.	DESCRIPTION	AS PER SPECIFICATION	OFFERED
10.00.00	<b>WEIGHTS AND DIMENSIONS</b>		
10.01.00	Net weight of core (Kg)	:	
10.02.00	Net weight of copper	:	
10.02.01	HV winding (Kg)	:	
10.02.02	LV winding (Kg)	:	
10.03.00	Weight of transformer Core and coil assembly	:	
10.04.00	Total weight of transformer (Kg) with enclosure	:	
10.07.00	Overall dimensions of the transformer	:	

Bidder's Name : \_\_\_\_\_

Signature : \_\_\_\_\_

Bidder's Seal

Name : \_\_\_\_\_

Designation : \_\_\_\_\_

Date : \_\_\_\_\_

## ANNEXURE - I

### BIDDER HAS TO FURNISH BELOW DETAILS OF OFFERED DESIGN TO BE SUPPORTED BY ROUTINE TEST CERTIFICATE

SR NO	PARTICULARS	KV CLASS		
	<b>KVA</b>			
<b>1.0</b>	<b><u>CORE</u></b>			
1.1	Core circle dia. in mm.			
1.2	Gross cross-section area in sq.cm.			
1.3	Effective cross-section area in sq.cm.			
1.4	No. of Steps			
1.5	Grade & Thickness			
1.6	Wt. of C.R.G.O. in Kgs.			
<b>2.0</b>	<b><u>LOSSES GUARANTEED</u></b>			
2.1	No load loss @ rated freq. & voltage			
2.2	Percentage Magnetizing current @100% rated voltage			
2.3	Percentage magnetizing current @100% 112.5% voltage			
2.4	Load losses on normal tap at 75° degree C			
2.5	L.V. Resistance per phase @20° C			
2.6	H.V. Resistance per phase @20° C			
2.7	Percentage Resistance @75° C			
2.8	Percentage Reactance			
2.9	Percentage Impedance @75° C			
<b>3.0</b>	<b><u>LV WINDING</u></b>			
3.1	Conductors / Strips			
3.2	No. of conductor / strips in parallel			
3.3	Conductor cross-section in sq.mm.			
3.4	No. of turns / phase			
3.5	Inside dia. in mm.			
3.6	Radial thickness in mm.			
3.7	Outside dia. in mm.			
3.8	Axial height w/o E.S. in mm.			
3.9	Clearance of core to coil in mm.			
3.10	Weight of coil / phase in kgs.			
<b>4.0</b>	<b><u>H.V. WINDING</u></b>			
4.1	Conductor			
4.2	Conductor cross-section in sq.mm.			
4.3	No. of Turns / phase			
4.4	Inside dia. in mm.			
4.5	Radial thickness in mm.			
4.6	Outside dia. in mm.			

4.7	Axial height of section in mm.			
4.8	Clearance of L.V. to H.V. (Hi-Lo)			
4.9	Weight of coils / phase in kgs.			
4.10	Clearance between each section / Disc in form of spacers			
4.11	No. of spacers on circumferences			
5.	<b>ENCLOSURE / TANK</b>			
5.1	SHAPE – Rectangular / Oval			
5.2	Over all dimension in mm. a) Length b) Breath c) Height			
6.	Paint to be used inside / outside of enclosure			
7.	Approximately weight of core & coil in kgs.			
8.	Approximate weight of enclosure			
9.	Total weight in kgs.			
10.				
11.				

**ANNEXURE - II**

**SOURCE OF MATERIALS / PLACES OF MANUFACTURE, TESTING AND INSPECTION**

Sl. No.	Item	Source of material	Place of Manufacture	Place of testing and inspection
1.	Laminations			
2.	Copper Conductor			
3.	Insulated winding wires			
4.	Resin / Varnish			
5.	UL approved Nomex 'C' – class			
6.	Duct, Spacers & Comb etc.			
7.	MS Plates / Angles / Channels			
8.	Bushing HV / LV			
9.	Paints (Hi-Temp. paint)			

Annexure –TS-III

3. 11 kV 350MVA 1250 AMP VCB Switchgear Panels (MC VCB) - Indoor

1.1. INTRODUCTION

- 1.1.1. The section covers the specification of metal clad indoor vacuum type switchgear unit with horizontal draw out circuit breaker as per IS 13118 [1991] / IEC 62271-100 or latest amendment thereof.
- 1.1.2. All the equipments shall be suitable for satisfactory operation in tropical climates and dry dust laden atmosphere prevailing in the location where it shall be used against the Contract. The equipment shall be able to with stand a wide range of temperature variation in the required location
- 1.1.3. All the plant/apparatus/equipment supplied shall comply in all respect with the requirement of Indian Electricity Act 2003 and Indian Electricity Rule 2003/IS and latest amendment thereof during the execution of contract where-ever applicable.
- 1.1.4. 11kV HT Panel Manufacturer should also be a manufacturer of VCBs and Relays.
- 1.1.5. The panel should be SCADA compatible having two nos. IEC 61850 protocol compliant Ethernet RJ45/F.O port for communication with SCADA system through two managed Ethernet Switches operating in redundant mode. The communication shall be made in 1+1 mode between individual IED to Switch, such that failure of one set of LAN shall not affect the normal operation of SCADA. However, it shall be alarmed in SCADA. Functioning of Relay shall not hamper to fault occurring any interconnected relay. One Front port Ethernet RJ45/USB 2.0 for relay parameterization and configuration etc. with the help of PC. In case RS-232 port offered, suitable interfacing cable with one end having RS 232 port and other end USB 2.0 to be provided to connect with PC free of cost. Relay should generate GOOSE message as per IEC 61850 standard for interlocking and also ensure interoperability with third party relays.

1.2. STANDARDS.

The circuit Breaker shall confirm to the latest revision with amendment available of relevant standards, rules, and code. Some of which are listed herein for ready reference.

Sl. No.	Standard	Item
1.	IEC- 62271-100 /IS- 13118(1991)	Switchgear
2.	IS-2705 (1992)	Current Transformer
3.	IS-3156 (1992)	Voltage Transformer
4.	IS-3231 (1987)	Relays
5.	IS-1248	Ammeter & Voltmeter
6.	IS-375	Arrangement of Breakers Bus Bars main connection and auxiliary wiring.
7.	IEC-60687/CBIP REPORT NO-88 (JULY) 1996)	Tri vector meter

### 1.3. CONSTRUCTION

- 1.3.1. The switchgear shall be of CRCA steel construction with sheet not less than 3mm thickness for load bearing section and not less than 2 mm thickness for non-load bearing and shall totally dust and vermin proof. However, if vendor has standardized the thickness of enclosure other than above mentioned and it meets the performance requirements and the design has been established through type test, the same shall be accepted. The panels shall be rigid without using any external bracings. The switchboard panels should comply with relevant IS/IEC and revision thereof and shall be designed for easy operation maintenance and further extension. Bus bar, metering circuit breaker chamber, cables and cable box chamber should have proper access for maintenance, proper interlocks should be provided. All instruments shall be non-draw out type and safe guard in every respect from damages and provided with mechanical indicator of connection and disconnection position. The switchgear shall be completed with all necessary wiring fuses, auxiliary contacts terminal boards etc.
- 1.3.2. The arcing contacts and bus bar should be rated for 350 MVA for 3 seconds. Bus bars shall be capable of connecting one switchgear panel to other through proper insulated arrangement, which does not decrease the insulation strength of the bus bar at the point of connection between two panels. The panels shall be modular in design.
- 1.3.3. The breakers should be able to be drawn out in horizontal position at ground level when breaker is drawn out in horizontal position none of the live components inside the 11 KV switchgear panel should be accessible. The safety shutters shall be robust and shall automatically cover the live components when the breaker is drawn out. The switchgear shall have complete interlocking arrangements at the fully inserted and fully drawn out and test positions. Withdrawal of the breaker should not be possible in ON position, it should not be possible to close the circuit breaker in service unless the entire auxiliary and control circuit are connected.
- 1.3.4. Breaker should have three distinct positions inside the cubical; i.e. service, test and isolated.
- 1.3.5. Built-in/separate trolley mounted earthing switches for incomer and outgoing shall be provided.
- 1.3.6. All the high voltage compartments must have pressure discharge flap for the exit of gas due to internal arc to insure operator safety. All the HV compartment design ensures conformity to IEC-60298 and must be type tested for Internal Arc Test for one second.
- 1.3.7. For charging, closing mechanism and indicators of VCB, 220V AC voltage shall be used. For tripping mechanism of VCB, 30 V DC shall be used.

### 1.4. BUS BARS AND CONNECTORS

- 1.4.1. Bus bars and all other electrical connection between various components shall be made of electrolytic copper of rectangular cross sections. The bus bars section shall be ample capacity to carry the rated current of minimum 1250 Amp continuously without excessive heating and for adequately meeting the thermal and dynamic stresses in the case of short circuit in the system up to full MVA rating specified in Para 3.2 above.
- 1.4.2. All bus bars connections shall be firmly and rigidly mounted on suitable insulators to withstand short circuit stresses and vibrations.
- 1.4.3. Adequate clearance between 11 KV point and earth and between phase shall be provided to ensure safety as per provision in Indian Electricity Rule 2003 and its amendment thereof and also in accordance with the relevant Indian standard specification and the same shall be capable of withstanding the specified high voltage tests as per IS-13118/ IEC 62271-100 and amendment thereof.
- 1.4.4. Sharp edges and bends either in the bus bars or bus bar connections shall be avoided as far as possible. Wherever such bends or edges are un-avoidable, suitable compound or any other insulation shall be supplied to prevent local ionization and consequent flashover.
- 1.4.5. The current density of Bus- Bar for 11 KV panel shall not be less than 1.2 Amp per Sq. mm.

1.5. CIRCUIT BREAKER

- 1.5.1. The vacuum circuit breaker shall be draw out type suitable for installation in the switchgear cubicles (indoor). The breaker shall comply with IS-13118 (1991)/ IEC 62271-100 and latest amendment thereof. Construction of breaker shall be such that the points, which require frequent maintenance, shall be easily accessible.
- 1.5.2. The circuit breakers shall be spring operated, motor/manually charging of the spring feature, manually released. VCB shall have spring closing mechanism for 3 pole simultaneous operation. The speed of closing operation shall be independent of the speed of hand operating level. The indication device shall show the OPEN and CLOSE position of breaker visible from the front of cubical.
- 1.5.3. The breakers shall be capable of making and breaking the short time current in accordance with the requirement of IS 13118(1991)/ IEC 62271-100 and latest amendment thereof and shall have three phase rupturing capacity of 350MVA for 3 second at 11 KV. The continuous current rating of breaker shall not be less than 1250 Amp for all items. The total break/make time shall be not more than 4 cycles for break and 6 cycles for make time for all breakers.
- 1.5.4. The vacuum circuit breakers shall ensure high speed extinction and adequate control of pressure during breaking of current and also designed to limit excessive over voltages.
- 1.5.5. Comprehensive interlocking system to prevent any dangerous or inadvertent operation shall be provided. Isolation of circuit breaker from bus bar or insertion into bus bar shall only be possible when the breaker is in the open position.
- 1.5.6. Vacuum Circuit Breaker shall have completely sealed interrupting units for interruption of arc inside the vacuum. The vacuum bottle sealed for life shall be provided with contact wear indicator.
- 1.5.7. Vacuum interrupter should have an expected life of 10000 operations at rated current and should be capable for operating more than 100 times at rated short circuit current.
- 1.5.8. Vacuum interrupter technical data particularly provided by the manufacturer should also be provided with Bid.

1.6. PROTECTION RELAYS

- 1.6.1. All relays shall conform to the requirements of IS:3231/IEC-60255 or other applicable standards. Relays shall be suitable for flush or semi-flush mounting on the front with connections from the rear. The relay for entire project shall be of same type. The protective relay shall be SCADA Compatible numerical type. Composite relay unit having O/C, E/F & directional element etc. shall be preferred.
- 1.6.2. The protective relays mounted on the panels shall be of the modular type. The relays must be capable of resetting with out necessity of opening the case. The relays shall be provided with flag indicators. Each functional element of a relay shall be provided with its own flag indicator to enable the type of fault condition to the identified.
- 1.6.3. Each of the incomer/outgoing switchgear units shall be provided with 3 elements of 5 Amp Non-directional, over current relays and 1 element non-directional, earth fault relay with self/hand reset contacts. The O/C element shall have setting of 30 to 120% in seven steps and E/F element shall have setting of 10 to 40% in seven steps. However, final decision regarding selection of steps and setting of relay shall be decided during detail Engineering for proper co-ordination of protection system.
- 1.6.4. High set instantaneous element of low transient over reach not exceeding 5% should be incorporated in the O/C and Earth Fault relays for all the outgoing feeder panels capable of adjusting the setting from about 5 to 20 times normal rating in the O/C relays and 2 to 8 times in Earth Fault relays.
- 1.6.5. During detail engineering provision for shunt trip relays shall be decided by Employer for which contractor should not have any objection. Further, in this case, the series trip relays auxiliary unit contracts in the tripping circuit should be designed to handle current up to 150 Amp. and like wise trip coil voltage which appears across open contact of the series-tripping unit, be limited to 150 volts.



- 1.6.6. With CTs used and taking into account the trip coil impedance of breaker with the plunger DOWN and with plunger UP position, the VA burden of relays offered etc. should be duly coordinated, so that the protection operates without errors at fault current corresponding to the fault MVA of 350 for all the tap position of the relays and the values of the impedance of the choke and resistance which may be required should also be determined and incorporated
- 1.6.7. The protective relays shall withstand 20 times the maximum current for 3 second on any tap setting. The over shoot time on removal of current setting shall not be greater than 0.05 seconds.
- 1.6.8. Arc flash Numerical relays to be provided with integral ( no separate unit) arc flash protection system based on both current & optical input methods. Arc sensors shall be in cable chambers, bus bar chambers & circuit breaker chamber. Sensor shall cover any flash over occurring in the respective chambers.
- 1.6.9. All numerical relays shall be compatible to work with 5A as well as 1A of secondary side of CT's.
- 1.6.10. There shall be no password for resetting of numerical relays.
- 1.7. CURRENT TRANSFORMERS:
  - 1.7.1. The requirement of ratio, VA capacity, class or accuracy, limit factor etc. for resin cast CTs installed in different type of units are given in BOQ
  - 1.7.2. Short time rating of CTs shall be 18.4 KA for 3 second. CTs shall be guard core and dual ratio. Saturation factor for metering core shall not exceed 2.5.
  - 1.7.3. The designed accuracy should be available even at the lowest ratios and all CTs shall withstand fault current corresponding to 350 MVA for 3 sec.
  - 1.7.4. The secondary terminal of the current transformers shall be such that effective and firm wire terminations are possible. Shorting links of adequate capacity shall be provided at the terminal blocks for sorting of the leads from secondary terminals of current transformers. The secondary terminal of the CTs shall be earthed at one point.
  - 1.7.5. The secondary winding resistance of CTs shall be as low as possible but not greater than 0.2 ohms per 100 turns.
  - 1.7.6. CTs shall conform to IS 2705 with latest amendment, if any in all respect and will be subjected to all routine and type test specified in the IS.
- 1.8. CABLE GLANDS AND CLAMPING ARRANGMENT FOR HOLDING SUITABLE CABLE BOXES
  - 1.8.1. Two nos., brass-wiping glands for each incomer and one no. Brass wiping gland for each outgoing panel of adequate dimension for XLPE cable of 3 cores up to 400 sq. mm size shall be supplied along with panels. For bus coupler no cable glands should be provided.
  - 1.8.2. Suitable cable boxes as per requirement of cable shall be arranged by the purchaser at his end. The panel shall however provide a flat of size 50X6 mm<sup>2</sup> with suitable clamp made of 50X6 mm<sup>2</sup> flat along with Nuts Bolts and Washers for holding the cable boxes. The flat should be fitted at a suitable height with allotted arrangement for adjustment of height from 300mm to 500mm at site. The clamp and flat shall have suitable stud type arrangement for earthing cable and cable box.
  - 1.8.3. All control cable/wire entries shall be by means of suitable cable glands, such glands shall be of brass and tinned.
  - 1.8.4. Insulated boot to be provided to cover the termination thimble.

1.9. AUXILIARY/CONTROL WIRING

All the secondary wiring in the panel shall have high quality FRLS insulation and the same shall have conductor size of not less than 2.5 mm<sup>2</sup> of multi stranded copper except CT wiring which shall be done from zero halogen, 4.0 mm sq. of multi standard copper. Colours of the secondary/auxiliary wiring should conform to IS 375/1963 and latest amendment thereof if any. All wiring shall be neatly run and group of wiring shall be securely fixed by clips so that wiring can be checked without necessity of removing the clamps. Wiring between fixed and moving portion of the panel shall be run in flexible tubes and the same shall be so mounted to avoid any damage to them due to mechanical movements. Ferrules with number shall be provided on both end of the wiring. U type / Ring type thimble at the end of control cable shall be used. Isolating link type connector strip shall be used for connecting control cables.

1.10. MARKING OF PARTS

For facilitating the erection, the several parts of the plant and equipment shall be suitably marked.

1.11. NAME PLATE AND DIAGRAM PLATES

All equipment shall have weather proof and non corrosive metal plates fixed in suitable position with full particulars engraved thereon with white letters against black background.

The firm shall affix a name plate on each Switchgear panel having following information:

1. Manufacturer's name and trade mark.
2. Unique No.
3. Type of Panel.
4. CT Ratio.
5. Rated Voltage.
6. Rated Insulation Level
7. Rated Frequency
8. Rated Normal Current
9. Rated Short Circuit Breaking Current.
10. Weight
11. Specification No.
12. Order No. and Date
13. Year of supply.
14. Property of NDMC

1.12. PAINTING

All metallic surface [except enameled and bright parts] exposed to weather shall be given suitable primer coat and two coats of first quality paint of approved colour. The supplier shall also supply adequate quantities of paints, Varnish etc. for use of finished cost and for use of patching up any scratches received during transport, handling erection testing and commissioning.

Instead of above proper powder coating after proper pre treatment is acceptable and in that case earlier condition will not applicable.

1.13. DETAILED FITTING AND MOUNTING

Detailed fittings and mountings of equipments in various switchgear panel shall be as follows

1.13.1. ITEM NO. 1 – INCOMING PANELS RATING; 1250 AMP

Each unit shall have the fittings and equipments as follows:

- ❖ 1 No steel totally enclosed, fully interlocked, indoor industrial pattern, metal clad, horizontal draw out, floor mounting switch unit complete with transportation truck having integral mechanism and all necessary supports each equipped as under:

- 1 No Fabricated sheet steel housing.
- 1 No. Complete set of mechanical interlocks.
- 1 No. Set of isolating plugs and sockets [6 nos. rated for 1250 Amp. With automatic safety shutters and pad locking arrangements. Facilities shall be provided for proper opening of the safety shutter for cleaning, inspection and testing.
- 1 No. 1250 Amp triple pole VCB fitted with isolating sockets, spring operated, manually as well motor charged, manually/ electrically released spring closing mechanism with mechanical ON/OFF indicators suitable for a rupturing capacity of not less than 350 MVA at 11 kV for 3 seconds and fitted with one set of direct acting trip coils suitable for operation with AC series trip relays.
- 1 No. Auxiliary switch with minimum four normally closed and four normally opened contacts. The contact terminals shall be brought out and terminated at Terminal Board irrespective of whether terminals are used or not.
- ❖ 3 Nos. CTs of ratio mentioned in BOQ
- ❖ 1 No. Ammeter digital static ammeter suitably scaled and must suit CT ratio.
- ❖ 1 No. 3 phase resin cast, draw out type bus bar connected potential transformers of Ratio 11000/110 volts class 0.5 accuracy having minimum 50 VA output per phase to operate the A.C. static H.T. Tri-vector meter, voltmeter etc. and complete with HT fuse and LT MCB with monitoring contacts.
- ❖ 1 No. Voltmeter round flush pattern digital static suitably scaled to suit the PT ratio.
- ❖ 1 No. 3 way and off voltmeter selector switch for reading the voltage between any two phases on the voltmeter.
- 1 No. static digital Tri vector energy meter suitable for three phase 3 wire un-balanced load and CT, PT, ratio mentioned above, 0.5 accuracy class with load, survey and TOD/Tariff and MRI facility. TVM shall be as specification attached with this specification.
- ❖ 1 No. Non directional adjustable IDMT series trip O/C relay with definite minimum 3 seconds at 10 times plug setting. The relay shall be arranged for over current protection with setting from 50 to 200% of 5A on all three over current elements mounted in draw out case tropicalised with flag indicator.
- ❖ 1 No. set of indicating lamps operating at 230V AC single phase one coloured RED and other GREEN to show the closed or open position of circuit breaker.
- ❖ 2 No. 80 watts continuously rated tubular/strip type heater with manual ON/OFF switch having temperature controller working on 230 VAC single phase supply.
- ❖ 1 No. set of copper bus bars of not less than 1250 Amp. Continuous rating.
- ❖ 1 No. multi way plug box for secondary wiring between the fix and moving glands.
- ❖ 1 No. set of independently operated automatic shutters for bus bar cable and voltage transformers orifices, which shall be clearly levelled and individually pad-locked.
- ❖ 1 No. Sheet instruments panel mounted on the front of the unit with hinged access doors and totally enclosed wiring terminals mounted there.
- ❖ 1 No. Complete set of self contained inter connectors, foundation bolts, fine Wiring, wiring terminals board, sundries to complete the unit.
- ❖ Line PT shall be provided only on Incomer panels. In other panels for function of tri-vector meter, there shall be provision of wiring to connect with PT of main incomer panel.

1.13.2. ADDITIONAL FEATURE INCOMERS panel of CT ratio 1200-600/5(0.5)-5(1.0)-5 (5P10)-1(PS)-0.578(PS).

This switchgear shall be used with 10MVA or above, 33/11 KV or 66/11kV Transformer having delta in primary and grounded star in secondary, conventionally differential protections is essential for the transformer. For 11 kV side 3 nos. CTs of ratio mentioned in BOQ [Class PS and appropriate knee point voltage] and matching inter posting CTs (if required) shall be provided in this switchgear panel. The mounting inter connection and termination etc. for these additional devices/relays shall be covered in scope of supply.

1.13.3. CLARIFICATION

- CT for each phase shall be provided in each VCB panel.
- The arrangement of cable termination in panel should be parallel with respect of front facing of panel (i.e horizontal along the width of the panel).

1.13.4. ITEM NO. 2 OUTGOING FEEDER PANEL

The fittings and mountings shall be similar to item no. 1 above except the following:

- The CT ratio will be as per BOQ.
- The voltage transformers voltmeter and voltmeter selector switch shall be deleted.
- 3 nos, CT operated overload releases are to be provided.
- 1 no. non directional triple pole adjustable IDMT, combined O/C and E/F [3 no. O/C and 1 no. E/F] AC series trip relay with instantaneous high set trip feature of low transient over reach not exceeding 5% with definite minimum 3 seconds at 10 times plug setting. The relay shall be arranged for over current protection with setting 30-120 % of 5 Amp. And for earth fault protection with setting 10-40 % mounted on a draw out case tropicalised with flag indicators. High set element of O/C shall have setting range of 5 to 20 times the rated current and the E/F elements shall be 2 to 8 times of rated current.

1.13.5. BUS COUPLER PANEL

Each unit shall have the fittings and equipment as follows:

- 1 No. All steel totally enclosed fully interlocked indoor industrial pattern, metal clad horizontal draw out, floor mounting switch unit complete with transportation truck having integral circuit breaker mechanism and all necessary supports each equipped as under:
- 1 No. Fabricated sheet steel mounting.
- 1 No. Complete set of mechanical interlocks.
- 1 No. Set of isolating plug and sockets [6 nos. Rated for 1250 Amp.] with automatic safety shutters and pad locking arrangement. Facilities shall be provided for proper opening of the safety shutter for cleaning inspection and testing.
- 1 No. 1250 Amp. Triple pole VCB fitted with isolating sockets, spring operated, manually charged, and manually released spring closing mechanism with mechanical ON/OFF indicators suitable for a rupturing capacity of not less than 350 MVA at 11 kV for 3 second.
- 1 No. A set of Red and Green LED lamps for indicating opened and closed position of breaker.
- 1 No. 3 way auxiliary switch with 4 normally closed and eight normally open contacts.

- 2 No. 80 watt. 230 VAC heaters with 6 Amp. Rotary cam switch having temperature controller.
- 1 No. Bus bar chamber with 1250 A rated copper Bus Bars.
- 1 No. A set of self aligning horizontal/vertical isolation type auxiliary plug and sockets.
- 1 No. Sheet steel instrument panel mounted on the front of the unit with hinged across doors and totally enclosed wiring terminals mounted there.
- The panel shall be without any metering protection CTs, cable box, series trip coils, and relays.

The HT chambers [adopter chamber] will be gasketed to make it vermin proof. The gasket shall be as specified in Section-I(Introduction and general technical requirements).

NOTE: Separate spring charging handle shall be provided and supplied with each set of the VCB.

#### 1.14. ANNUNCIATION SYSTEM

Alarm annunciation system shall be provided in the control board by means of visual 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 or as existing DC supply system of the utility (This shall be verified by the successful bidder before submission of the drawing for approval).

Annunciation for the failure of DC supply to the annunciation system shall be provided and this annunciation shall operate on 240 Volts AC supply. Facia window shall remain steadily lighted till the supply to annunciation system is restored.

A separate voltage check relay shall be provided to monitor the failure of supply (240V 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 annunciation. This annunciation shall operate on Annunciation DC..

#### 1.15. TESTS

The design of circuit breaker shall be proven through all the routine and in accordance with IS 13118: 1991/IEC 56 and any amendment thereof. Photocopy of all the test reports must be enclosed with the tender. Type test report earlier than 7 year from the date of tender opening shall not be acceptable.

##### TYPE TESTS:

Each circuit breaker shall comply with requirements of type tests prescribed in IEC publication No.56.

- i. Short time and peak withstand current test.
- ii. Short circuit breaking capacity and making capacity.
- iii. Capacitive current switching test: Cable charging current breaking test ( $U_r$  less than or equal to 52 kV).
- iv. Dielectric test i.e., power frequency withstand and impulse withstand test
- v. Temperature rise test.
- vi. Mechanical Endurance Test at ambient temperature.
- vii. Measurement of resistance of the main circuit.
- viii. Internal arc test.

## 1.16. COMMISSIONING CHECKS/TESTS

After installation of panels, power and Control wiring and connect Contractor shall perform commissioning checks. as listed below to proper operation of switchgear/panels and correctness of all respects.

In addition the Contractor shall carry out all other checks and tests recommended by the manufacturers.

### 1.16.1. GENERAL

- i) Check name plate details according to specification.
- ii) Check for physical damage
- iii) Check tightens of all bolts, clamps and connecting terminal
- iv) Check earth connections.
- v) Check cleanliness of insulators and bushings.
- vi) Check heaters are provided.
- vii) H.V. test on complete switchboard with CT & breaker/ contractor lubricated in position.
- viii) Check all moving Parts are properly lubricated.
- ix) Check for alignment of busbars with the insulators to ensure alignment and fitness of insulators.
- x) Check for inter changeability of breakers.
- xi) Check continuity and IR value of space heater.
- xii) Check earth continuity of the complete switchgear board.

### 1.16.2. CIRCUIT BREAKER

- i) Check alignment of trucks for free movement.
- ii) Check correct operation of shutters.
- iii) Check slow closing operation (if provided).
- iv) Check control wiring for correctness of connections, continuity and IR values.
- v) Manual operation of breakers completely assembled.
- vi) Power closing/opening operation, manually and electrically at extreme condition of control supply voltage.
- vii) Closing and tripping time.
- viii) Trip free and anti-pumping operation.
- ix) IR values, resistance and minimum pick up voltage of coils.
- x) Simultaneous closing of all the three phases.
- xi) Check electrical and mechanical inter locks provided.

- xii) Checks on spring charging motor, correct operation of limit switches and time of charging.
- xiii) Check vacuum (as applicable).
- xiv) All functional checks.

#### 1.16.3. Current Transformers

- i) Megger between windings and winding terminals to body.
- ii) Polarity tests.
  - a. Ratio identification checking of all ratios on all cores by primary injection of current.
  - b. Magnetization characteristics & secondary winding resistance.
- iii) Spare CT cores, if any to be shorted and earthed.

#### 1.16.4. VOLTAGE TRANSFORMERS

- i) Insulation resistance
- ii) Ratio test on all cores.
- iii) Polarity test
- iv) Line connections as per connection diagram.

#### 1.16.5. CUBICLE WIRING

- i) Check all switch developments.
- ii) It should be ensured that the wiring is as per relevant drawings. All interconnections between panels shall similarly be checked.
- iii) All the wires shall be meggered to earth.
- iv) Functional checking of all control circuit e.g. closing, tripping, interlock, supervision and alarm circuit including proper functioning of component/ equipment .
- v) Check terminations and connections. To check wiring related to CT and PT circuits, carryout primary injection and then check for secondary value at relay and metering instrument terminals.
- vi) Wire ducting.
- vii) Gap sealing and cable bunching

#### 1.16.6. RELAYS

- i) Check internal wiring.
- ii) Megger all terminal body.
- iii) Megger AC to DC terminals
- iv) Check operating characteristics by secondary injection.
- v) Check minimum pick up voltage of DC coils.

- vi) Check operation of electrical/ mechanical targets.
- vii) Check CT connections with particular reference to their polarities for differential type relays.
- viii) Relay settings.

#### 1.16.7. METERS

- i) Megger all insulated portion.  
Check CT & VT connections with particular reference to their polarities for power type meter.



**ANNEXURE – TS-IV**

11 kV Control & Relay Panel for 11 kV Panels

1.0 Scope:

This specification covers design, manufacture, assembly, testing before supply, inspection, packing and delivery and other basic technical requirements in respect of control and relay panels for 11 kV Panels. The equipment to be supplied against this specification is required for vital installations where continuity of service is very important. The design, materials and manufacture of the equipment shall, therefore, be of the highest order to ensure continuous and trouble-free service over the years. The Manufacturer has to design the Schematics for protection and Control of all equipments including monitoring indications, visual and audible alarm, interlocking schemes among different equipment. Any other requirement which are not specifically covered here but which are necessary for successful commissioning of the Sub stations are also within the scope of the Contract.

The equipment manufactured should conform to the relevant standards and of highest quality of engineering design and workmanship. The equipment manufactured shall ensure satisfactory and reliable performance throughout the service life. The Schedule of requirement of the Panel is furnished separately in details.

2.0 Service Conditions:

2.1. System particulars:

Nominal system voltage	11 kV
Corresponding highest system voltage	12 kV
Frequency	50 Hz±3%
Number of phases	3
Neutral earthing	33 kV Grounded through Earthing Transformer 11 kV solidly earthed

2.2. Equipment supplied against the specification shall be suitable for satisfactory operation under the following tropical conditions: -

Max. ambient air temperature	60 ° C
Max. relative humidity	100 %
Max. annual rainfall	1450 mm
Max. wind pressure	150 kg/sq.m.
Max. altitude above mean sea level	1500 mtrs.
Isoceraunic level	50
Reference Ambient Temperature for temperature rise	50 deg C
Climatic Condition	Moderately hot and humid tropical climate conducive to rust and fungus growth

- 2.3. The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.
- 2.4. Auxiliary supplies available at the various sub-stations are as follows:-

3.2.1 Rating:

	A. C. Supply	230 volts, with $\pm 10\%$ variation, Frequency 50Hz with $\pm 3\%$
	D.C. Supply	30 V DC. DC system is 2(two) wire with necessary earth fault annunciation scheme. DC supply shall be normally fed from Battery charger. In case of failure of AC supply to Battery Charger, DC supply voltage will be available from Lead Acid Battery.

- 2.5. Unless otherwise specified all equipment and material shall conform to the latest IS applicable standards. Equipment complying with other internationally recognized standards will also be considered if it ensures performance equivalent or superior to Indian standards. In the event of supply of equipment conforming to any international \ internationally recognized standards other than the standard listed below.
- 2.6. The equipment provided shall also comply with the latest revisions of Indian Electricity act and Indian Electricity rules and any other applicable statutory provisions, rules and regulations.
- 2.7. All equipment provided under the specification shall generally conform to the latest issue of the following :-

a)	IS 12063/1987	Degree of Protection provided for enclosure of electrical equipment.
b)	IS 5/2004	Colour for ready mixed paints & enamels.
c)	IS 3231 / 1986 & 1987	Electrical relays for power system protection
d)	IEC 60255	Numerical biased protection relay
d)	IS 8686/1977	Static Protective Relays
e)	IS 1248/2003	Indicating instruments
f)	IS 14697/1999	HT Static Tri vector TOD Energy meter
g)	IS 6875 amended up to date	Control switches
h)	IS 4794/1968 & 1986	Push buttons
i)	IEC 337 & 337-1	Control Switches (LV Switching devices for control and auxiliary circuit)
j)	IEC:60185	Current Transformers
k)	IEC:60186	Voltage Transformer
l)	IS 375	Marking and arrangement for Switchgear Bus
m)	IS:5578/1984	Marking of insulated conductors.

- 2.8. CT, PT Ratio and Transformer Details:-

CIRCUIT	33KV CT RATIO/CLASS
11KV side CT for 16/20 MVA Transformer	1200-600/1-1-1A, 0.5/5P20/PS at phase side (Indoor Panel)
Electromagnetic PT Ratio/Class	11 kV/ 3 110V/ 3-110V/ 3 ,0.5/3P
TRANSFORMER DETAILS	33/11KV, 16 MVA/20 MVA, Dyn11

3.0 CONSTRUCTIONAL DETAILS :

3.1. CONTROL AND RELAY PANEL

The Control and Relay Panel shall be of Simplex type and the access door shall be provided at the back of each Panel where no instruments or relays shall be mounted. The indicating and signaling devices and relays etc. shall be mounted on the front side and the auxiliaries which shall be inside the Panel. The access door shall be at the back side and of double door type of height 1900 mm.

In front of Panel where relays and instruments are to be mounted shall be stretcher leveled steel plate 3 mm. thick and side panel, doors and top covers shall be of 2mm. thick steel plate. Light sections of structural steel shall be used for panel frame.

The individual panel shall be 2250 mm. in height with Channel base, 610 mm. in depth and of suitable width limited to 1000mm to accommodate the equipment at a suitable height, suitable gaps to facilitate easy workability as specified hereafter. Individual piece of Channel base of C&R Panel is to be provided to obtain the flexibility of inter-changing the Panel, if any.

The complete panel shall incorporate all necessary instruments, meters, relays, auxiliary relays, control switches, indicating lamps, mimic, annunciator, audible alarms, horizontal and vertical wiring trough, wiring supports, interior lighting system, terminal blocks , fuses and links etc.

3.2. CONSTRUCTIONAL FEATURES

- a. The Control and Relay Panel frame shall be suitable for erection of flush concrete floor and secured to it by means of evenly spaced grout bolt projecting through the base channels from members of the frame.
- b. The manufacturer shall ensure that the equipment specified and such unspecified complementary equipment required for completeness of protection/control scheme be properly accommodated in the panels without congestion and if necessary to provide panels with larger width. No price increase at a later date on this account shall be allowed.
- c. Panels shall be completely metal enclosed and shall be dust, moisture and vermin proof for tropical use. The enclosure shall provide a degree of protection not less than IP-41 in accordance with IS-2147. Type test report in this respect shall be furnished with offer.
- d. Panels shall be free standing, floor mounting type and shall comprise structural frames enclosed completely with specially selected smooth finished, cold rolled sheet steel of thickness not less than 3 mm for weight bearing members of panels such as base frame, front sheets and door frames and not less than 2mm for sides, door, top & bottom portions. There shall be sufficient reinforcement to provide level surfaces, resistance to vibration and rigidity during transportation and installation.
- e. Design, material selection and workmanship shall be such as to result in neat appearance, inside and outside with no welds, rivets or bolt head apparent front outside, with all exterior surfaces tune and smooth.
- f. All holes and extension windows in the Panel shall be blanked and access doors shall be lined with compressible liners at the edges. The EMPLOYER will shut off the bottom crevices with cream

cement, the Cable Entry holes with weak concrete and the cable trench with present R.C. Slabs or checker plate. All control and supply cables will be laid in a distribution trench running under the panel . The Cable will branch off into each cubicle through entry holes in the concrete floor opening in the bottom cubicles. Necessary Drawings for concrete floor and trench shall be supplied by the manufacturer to enable the EMPLOYER to construct the foundation floor for these panels. The drawings shall show details of the distributing trench, cable entry holes, glands and positions of grouting bolts. The EMPLOYER will prepare foundation with pocket for grouting bolts. The manufacturer shall supply channel base, suitable grouting bolts, lock nut and washers.

- g. Control Cable entries to the panel shall be from the bottom. Bottom plates of the panels shall be fitted with detachable gland plates to allow cable entries from the bottom. Gland plates shall be suitable for fixing the cable glands at an elevated height of at least 100 mm above the ground level. Terminal Connectors and Test terminal blocks for cables shall be fixed at an elevated height of at least 200 mm above the Bottom plate. Side blocks cut out to be arranged at the top of both sides of panel for inter panel bus wires. Dimensions of the cut out will be 300 mm X 50 mm , 255 mm from the top.

3.2.1 General :

- a. Materials shall be new; the best quality of their respective kinds and such as are usual and suitable for work of like character. All materials shall comply with the latest issues of the specified standard unless otherwise specified or permitted by EMPLOYER.
- b. Workmanship shall be of the highest class throughout to ensure reliable and vibrations free operations. The design, dimensions and materials of all parts shall be such that the stresses to which they may be subjected shall not cause distortion, undue wear, or damage under the most severe conditions encountered in service.
- c. All parts shall conform to the dimensions shown and shall be built in accordance with approved drawings. All joints, datum surfaces and meeting components shall be machined and all castings shall be spot faced for nuts. All machined finishes shall be shown on the drawings. All screw, bolts, studs and nuts and threads for pipe shall conform to the latest standards of the International Organization for Standardization covering these components and shall all conform to the standards for metric sizes.
- d. All materials and works that have cracks, flaws or other defects or inferior workmanship will be rejected by EMPLOYER.

3.2.2 Assembly :-

Necessary items of equipment shall be assembled in the factory prior to shipment and routine tests shall be performed by the manufacturer as per the requirements of the latest issue of IEC/IS as specified under each equipment in these specifications to demonstrate to the satisfaction of EMPLOYER that the switchgear panels comply with the requirements of the relevant IEC/IS standards.

3.2.3 Casting :-

Casting shall be true to pattern, of workmanlike finish and of uniform quality and condition, free from blowholes, porosity, hard spots, shrinkage defects, cracks or other injurious defects, shall be satisfactorily cleaned for their intended purpose.

3.2.4 Welding:-

Wherever welding is specified or permitted, a welding process, including stress relieve treatment as required if necessary, conforming to an appropriate and widely recognized professional standard shall be used. All welders and welding operators shall be fully qualified by such a standard.

4.0 Mounting

- 9.1 All equipment on and inside the panels shall be mounted and completely wired to the terminal blocks ready for external connection.

- 9.2 Equipment shall be mounted such that removal and replacement can be accomplished individually without interruption of service to adjacent devices and are readily accessible without use of special tools. Terminal marking shall be clearly visible and of permanent nature.
- 9.3 The manufacturer shall carry out cutout, mounting and wiring of the bought out items which are to be mounted in the panel in accordance with the corresponding equipment manufacturer's drawings.
- 9.4 The centre line of switches, push buttons and indicating lamps shall be not less than 750 mm from the bottom of the panel. The centre line of relays and meters and recorders shall be not less than 450 mm from the bottom of the panel.
- 9.5 The centre lines of switches, push buttons and indicating lamps shall be matched to give a neat and uniform appearance. Likewise the top of all meters, relays and recorders etc. shall be in one line.
- 9.6 The control switches for circuit breakers shall be located on the mimic diagram corresponding to their exact position of the controlled equipment in the single line drawing. The location of the switches shall be within working height from the floor level for easy and comfortable operation.
- 9.7 No equipment shall be mounted on the doors.
- 9.8 All the equipment connections and cabling shall be designed and arranged to minimise the risk of fire and damage.

The constructional details and mounting arrangement for various front mounted equipments shall be as per the enclosed drawings. The center lines of any relays, if additionally provided, shall not be less than 450 mm from ground level.

5.0 WIRING

5.1 All wiring shall be carried out with FRLS 1100 volts grade single core, multistrand flexible tinned copper wires with PVC insulation which has provided its utility in tropical region against hot and moist climate and vermin (Misc. white ant and cockroaches etc.) Rubber insulated wiring will not be accepted. Wire numberings and colour code for wiring shall be as per IS:5578/1984. The wiring should be encased in suitable width PVC casing. The wiring diagram for various schematics shall be made on thick and laminated durable white paper in permanent black ink and same should be pasted on the inside surface of the door.

5.2 The sizes of wiring in different circuit shall not be less than these specified below:

TABLE-I

Circuit	Permissible size of wire
Metering and Relaying Circuits connected Current Transformer	4.0 mm <sup>2</sup> Zero Halogen
Potential Circuits for metering and Relaying, Control, Visual Audible Alarms and Signalling Circuit	2.5 mm <sup>2</sup>

The following colour schemes shall be used for the Wiring:

TABLE – II

Circuit where used	Colour of Wire
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Red Phase of Instrument Transformer Circuits	Red
Yellow Phase of Instrument Transformer Circuits	Yellow
Blue Phase of Instrument Transformer Circuits	Blue
Neutral connection, earthed or not earthed in the instrument Transformer Circuit	Black
A.C. Control Wiring Circuits using auxiliary supply and	Black
D.C. Control Wiring Circuit using Battery Supply	Grey
Earth Connection	Green

5.3

- a) All internal wiring shall be securely supported, neatly arranged, readily accessible and connected to equipment terminals and terminal blocks. Wiring gutters & trough shall be used for this purpose.
- b) Longitudinal troughs extending throughout the full length of the panel shall be used for inter panel wiring. Inter connections to adjacent panels shall be brought out to a separate set of terminal blocks wires. All bus wiring for inter panel connection shall preferably be provided near the top of the panels running throughout the entire length of the panels.
- c) Wiring connected to the space heaters in the cubicles shall have porcelain beaded insulation over a safe length from the heater terminals.
- d) Wire termination shall be made with solder less crimping type and tinned copper lugs which firmly grip the conductor and insulation. Insulated sleeves shall be provided to all the wire terminations. Engraved core identification plastic ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wire and shall not fall off when the wire is disconnected for any purpose. Termination shall be such that no strand of a conductor shall left loose or overhanging. Conductor termination shall be secured to the holding nuts/screws, terminal blocks etc. with washers interposed between the terminals/holding nuts/screw heads. The terminals shall be so connected that no conductor ferrule code gets masked due to overlay of conductors.
- e) All spare contacts of relays shall be wired up to terminal blocks.
- f) Each wire shall be continuous from end to end and shall not have any joint within itself individually.
- g) Wires shall be connected only at the connection terminals or studs of the terminal blocks, meters, relays, instruments and other panel devices.  
  
Terminal Ends of all wires shall be provided with numbered Ferrules. At point of inter-connection where a change of number is necessary, duplicate Ferrules shall be provided with the appropriate numbers on the changing end.
- h) At the terminal connection, washers shall be interposed between terminals, wire terminals and the holding nuts. All holding nuts shall be secured by locking nuts. The connection stud shall project at least 6 mm from the lock nut surface. Wire ends shall be so connected at the terminal studs that no wire terminal numbered ferrule gets masked due to succeeding connections. All wires shall be suitable for bending to meet the terminal stud at right angles with the stud axis, and they shall not be skewed.
- i) All studs, nuts, bolts screws etc. shall be threaded according to the British Standard practice unless EMPLOYER's prior approval to any other practice of threading is obtained.

6.0 TERMINAL BLOCK CONNECTION

Terminal blocks shall be of clip-on design made out of non-trackable insulating material of 1100 V grade.

All terminals shall be stud type, with all current carrying and live parts made of tinned plated brass. The studs shall be of min 4 mm dia brass. The washers, nuts, etc. used for terminal connectors shall also be of tinned plated brass. All blocks shall be shrouded by easily removable shrouds made of transparent die-electric materials.

The terminal connector/blocks shall be disconnecting type terminal connectors for PT and same with automatic shorting of C.T. secondary terminals shall be provided in CT secondary circuit. All other terminal connectors shall be Non-disconnecting type. Terminal should be shock protected in single moulded piece. Terminal block should have screw locking design to prevent loosening of conductor. Provision shall be made on each pillar, for holding 10% extra connection (5% incoming + 5% outgoing).

At least 20% spare terminals for each type shall be provided. All terminals shall be provided with ferrules indelibly marked or numbered and identification shall correspond to the designations on the relevant wiring diagrams. The terminals shall be rated for adequate capacity which shall not be less than 10 Amps for control circuit. For power circuit it shall not be less than 15 Amps.

#### 7.0 SPACE FOR CONTROL CABLES AND CABLE GLANDS

Sufficient space for receiving the Control Cables inside the Panel at the bottom of the cubicles and mounting arrangement for the terminal cable glands shall be provided. Removable type separate cable entry plate (may be two) shall be fixed with bottom plate. The specification does not cover supply of control cables and cable glands for which the EMPLOYER will make separate arrangement.

#### 8.0 SPACE HEATERS

240 V, 50 HZ Tubular Space Heaters suitable for connection to the Single Phase A.C. Supply complete with On-Off Switches located at convenient position shall be provided at the bottom of the Panel to prevent condensation of moisture. The Watt loss per Unit surface of heater shall be low enough to keep surface temperature well below sensible heat. A thermostat control unit with variable temperature shall be installed to control the heater. The 240 V AC supply for the heater shall be controlled by a suitably rated single pole miniature circuit breaker compartment to be mounted on an insulator. One AC Ammeter with 0-1.0 Amp range shall be provided in series with the heater to monitor the current drawal of the Heater.

#### 9.0 DISTRIBUTION AND CONTROL OF AUX. POWER CIRCUIT

##### 9.1. D.C. CIRCUIT

There shall be only one 30V D.C. for the entire Control and Relay Panel fed from a D.C. Distribution Panel. A continuous D.C. Bus shall be provided in the Control and Relay Panel and D.C. supply for control, protection, indication and supervision of circuit breaker and other equipment shall be teed off from D.C. bus through a set of 20 Amp rated H.R.C. Fuse on positive and negative side. D.C. supply to be teed off shall be distributed within the Panel as below:

- (a) Control DC scheme both positive and negative side with 16 Amp fuse
- (b) Close/Trip Ckt 1 and Trip Ckt 2 without fuse; closing circuit with 10A fuse.
- (c) Indication Circuit through a set of 6 Amp. HRC Fuse both at +ve and -ve side
- (d) Protective relay circuits through 6A fuse both at +ve and -ve side
- (e) Annunciation ckt with 6Amp fuse on both at +ve and -ve side
- (f) DC Emergency Lamp with 6Amp fuse both at +ve and -ve side

Three nos. of D.C. operated no-volt auxiliary relay(self reset type) provided with hand reset type flag with inscription Main D.C. Fail, Control Dc fail & Protection DC fail with 4NO+4NC in each relay. 2 NC contact for DC fail' alarm and Indication, 1NO wired upto SCADA TB and 1NO wired upto spare TB.

One Push button having N/C Contact used in Series with the above relay for D.C. Fall Test'

purpose.

9.2. A.C. CIRCUITS

230 Volts, Single Phase A.C. Aux. Supply to the Control and Relay Panel will be fed from A.C. Distribution Panel through a 16Amp MCB provided there. One 16 Amps rated HRC Fuse shall be provided at the Control & Relay Panel for the Incoming A.C. Supply. Two A.C. operated no volt auxiliary relay (self reset type) rated for 230V shall be provided with hand reset flag with inscription A.C. Fail & DC Fail Accept with 4NO+4NC contacts for each relay. One push button having N/C Contact used in Series with above relay for A.C. Fail Test purpose.

9.3. P.T. SECONDARY CIRCUIT

Two sets of Fuse and link of suitable rating shall be provided for the Incoming P.T supplies and two sets, one for each PT of 3 nos. coloured LED indicating lamps shall be provided for supervision of the Fuse. Lamps shall be connected between respective phases and neutral. The arrangement of distribution of P.T. Secondary Circuit shall be as follows:

- (a) Potential supply to the protective relay circuit for Feeder where necessary shall be fed from selected Bus P.T. supply bus.
- (b) Potential supply to meters, Energy meters and indicating instrument of each panel shall be fed from selected Bus P.T. supply bus.
- (c) Selected P.T. secondary supply to the protective relays of each panel shall be fed through 4 poles - MCB and link in neutral in each panel where necessary with two change over contacts for annunciation.
- (d) Selected P.T. secondary supply for metering and indicating instruments of each panel shall be fed through 4 pole MCB in each phase and link in neutral in each panel of 11 KV system voltage.
- (e) Two position (PT-1/PT-2), minimum 4(four) way PT selector switch (stay put type), minimum 16A rating shall be provided in each panel for metering ckt. Additional 4 way PT selector switch is required for protection wherever applicable. The no. of way may increase during detailed engineering.

9.4. FUSE AND LINK

Fuses shall be of cartridge type. Carrier and base for the fuse and links for all D.C. and A.C. Circuits shall have imprint of rating, voltage and circuit designation.

9.5. MIMIC DIAGRAMS

a) Provision shall be made for 10 mm. wide painted and overall drawing mimic diagram by the EMPLOYER on the exterior of the front panel to represent the single line arrangement of the station equipment. Provision shall be made in such a way that centre line of the mimic bus shall be at a suitable height from the bottom of the C&R Panel.

b) Colour scheme for mimic diagram as follows:-

KV Class	C o l o u r	Shade Index as per ISS
11 KV	Air Craft blue	108
415/230 V	Black	309
Earth	White	-
110 V	Canary yellow	-

c) In C&R panels, Symbol marking for the position indication of isolators, earth switches etc, ON/OFF



indication for Circuit breaker, PT supply indication, CB spring charge, auto trip, trip ckt healthy etc. shall be mounted along the mimic diagram at appropriate location. Non-Discrepancy type control switch for the C.B. shall be mounted within the mimic, indicating the C.B. ON/OFF status.

10.0 Labeling

All front mounted as well as internally mounted items including MCBs shall be provided with individual identification labels. Labels shall be mounted directly below the respective equipment and shall clearly indicate the equipment designation. Labelling shall be on aluminium anodised plates of 1 mm thickness, letters are to be properly engraved.

11.0 Earth Bus

Each panel shall be provided with two earth bus of size 25 x 6 mm (min) each. The earth bus shall be of tinned plated copper, and all metallic cases of relays, instruments etc. shall be connected to this earth bus independently for their effective earthing. The wire used for earth connections shall have green insulation.

12.0 Circuit breaker Control Switch:

12.1 PISTOL GRIP TYPE Non- discrepancy T-N-C spring return type switch shall be provided for remote operation of circuit breaker to ensure that manual pumping of closing solenoid not possible. The switch shall be mounted in the mimic diagram itself such that the stay-put ('N') position will render the continuity of the mimic. One green LED for 'breaker open' indication and one red LED for 'breaker closed' indication shall also be provided adjacent to the T-N-C switch.

12.2 Switches should have finger touch proof terminals. For the convenience of maintenance, screw driver guide should be from top/bottom of the switch and not from the side. Terminal wire should be inserted from the side of the switch terminal.

12.3 Terminal screws must be captive to avoid misplace during maintenance.

12.4 Switch shall be with 48 mm x 48 mm escutcheon plate marked with Trip & Close.

12.5 Trip-neutral-close, with pistol grip handle must be pushed in to spring return to either trip or close position from Neutral position for safety and not just turn to trip.

12.6 One contact to close in each position of Trip and Close. Contact rating shall be 12A at 30 V DC.

12.7 One spare contact is required in off & on position.

13 Local/Remote switch:

Local/Remote switch should be 4-pole, 2 way Lockable and stay put type.

14 INDICATING LAMPS & CONTACT MULTIPLIER

i) INDICATING LAMPS

L.E.D. Type Indicating Lamps shall be provided on the Control Panel to indicate the following:

S.No.	Functions	Quantity	Colour of Lamp
1	C.B. Spring charged indication	1 No.	Blue
2	C.B. trip Coil/Circuit healthy indication	2 No.	White
3	C.B. Auto tripped indication	1 No.	Amber
4	Panel D.C. Fail indication	1 No.	Amber
5	P.T. Supply indicating Lamp	2 sets	Red/Yellow/Blue
6	C.B. ON indication	1 No.	Red

7	C.B. OFF indication	1 No.	Green
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All the lamps shall be connected to the auxiliary D.C. supply of the Sub-Station except Sl. No. (4) & Sl. No. (5) which should be connected to the auxiliary A.C. supply and P.T. Secondary supply respectively. The Lamp shall be suitable for Panel purpose and shall be Low Watt consumption. All indicators shall have bright LEDs having long life. Conventional bulbs are not acceptable. The indicating LEDs with resistors shall withstand 120% of rated voltage on a continuous basis. However, the specification of indicating lamps may likely to be changed/ modified as per requirement of EMPLOYER.

Lamps for circuit breaker "ON", "OFF", "TRIP CKT HEALTHY" and "AUTO TRIP" indications. LED indicating lamp complete with static circuits and features should be supplied with Low voltage protection circuit (LVGP) and surge suppressor circuit having LED indication. Lamp assembly should be of fire – retardant glass epoxy PCB , industrial heat resistant, fire resistant, non hygroscopic DMC material, chrome – plated corrosion resistant solid brass bezel, polycarbonate lens in desired colour shades of Red, Green , Amber, Yellow etc. the intensity of light should be minimum 100 mcd at 20 mA . Indication lamp should be suitable to operate on 30 V direct current supply source. Acceptable make are BINAY Opto Electronic Private Ltd. or equipment.

ii) Contact Multiplier

230 Volts, Single Phase, 50 hz A.C.. Supply operated Contact Multiplier to be provided, if required.

15 TERMINAL BLOCK / TTB

1. Terminal Blocks for incoming A.C and D.C. Circuit and C.T., P.T. & SCADA Circuit should be located on the left hand side and Transformer supervision, breaker control and spare in right hand side of the wall of the Panel seen from back side respectively.
2. 3-Phase, 4-Wire Link type Test Terminal Block having sealing provision shall be provided in Metering Circuit of each Panel.

16 SAFETY EARTHING

1. Earthing of metallic parts or metallic bodies of the equipment on the Panel shall be done with soft drawn single conductor bare Copper Tail connections shall have minimum area of 16 sq, mm. and the main earthing connection 60 sq.mm. These wires shall be connected by suitable terminals and clamps junction. Soldered connections shall not be employed.
2. The neutral point of star connected LV winding of instrument transformers and one corner of the open delta connected LV side of instrument transformers shall be similarly earthed by tail connected with main earth wire of Panel Earthing System. Multiple earthing of any instrument transformer circuit shall be avoided.

17 PANEL LIGHTING

1. The Panel interior shall be illuminated by CFL lamps connected to 230 Volt Single Phase A.C. The illumination of the interior shall be free from shadows and shall be planned to avoid any strain or fatigue to the wireman likely to be caused due to sub-normal or non-uniform illumination. One emergency D.C. light shall be provided for each panel with individual switch with proper identification mark.
2. A toggle switch or door operated switch shall be provided for control of A.C. lighting in each panel.
3. One combined 15 Amps. 3-Pin and 5 Amps. 2-Pin Power Socket outlet together with Plus

Pins shall be provided at convenient points in each Panel for A.C. Supply.

18 ANNUNCIATOR

A. ELECTRONIC ANNUNCIATOR

1. Suitable Multi-way Microprocessor based electronic Annunciator for the visual and audible alarm on the control panel using bright LEDs shall be provided in each panel to indicate over current and earth fault protection operated. In addition to above, each electronic annunciator of Transformer Control Panel shall have provision to indicate Transformer trouble trip/alarm function operated. Also one window of the Annunciator shall have to be used for Non-Trip A.C. Fail Alarm Indication and one window for Trip Circuit unhealthy indication. Each Electronic Annunciator shall have provision for connection with accept/reset/lamp test/mute Push buttons for proper functions. Electronic annunciator shall have provision for connection with Electronic Buzzer/Electronic Bell for Trip & Non-Trip Audio Alarm of common annunciation scheme. Electronic Annunciation shall have provision for flashing illuminating display with inscription for operation of respective Protection Relay. The Micro-Processor based Electronic Annunciator should have separate coloured windows for Trip & Non-Trip Annunciation for easy detection.
2. Annunciator fascia units shall have translucent plastic windows for each alarm point.
3. Electronic Annunciator shall have first Fault Indication Facilities & System Watch Dog
4. Annunciator fascia plate shall be engraved in black lettering with respective alarm inscription as specified. Alarm inscriptions shall be engraved on each window in not more than three lines and size of the lettering shall be about 5 mm. The inscriptions shall be visible only when the respective fascia LED will glow.
5. Annunciator fascia units shall be suitable for flush mounting on panels. Replacement of individual fascia inscription plate and LED shall be possible from front of the panel.
6. Unless otherwise specified, one alarm buzzer meant for non-trip alarms and one bell meant for trip alarms shall be provided in each control panel (mounted inside).
7. Each annunciator shall be provided with 'Accept', 'Reset' and 'Test' push buttons, in addition to external PB.
8. Special precaution shall be taken by the manufacturer to ensure that spurious alarm conditions do not appear due to influence of external magnetic fields on the annunciator wiring and switching disturbances from the neighbouring circuits within the panels.
9. In case 'RESET' push button is pressed before abnormality is cleared, the LEDs shall continue to glow steadily and shall go out only when normal condition is restored.
10. Any new annunciation appearing after the operation of 'Accept' for previous annunciation, shall provide a fresh audible alarm with accompanied visual alarm, even if the process of "acknowledging" or "resetting" of previous alarm is going on or is yet to be carried out.

B. PANEL D.C. FAIL ALARM SCHEME

Control & Relay Panel shall have a common Panel D.C. Fail Alarm Scheme operated by 230 V Single phase A.C. Aux. Supply for audible as well as visual alarm in case of failure of D.C. incoming supply to the Panel.

Another Single Element Relay without Flag and 1 no. self-reset type N/O & 1 no. N/C contact having inscription 'Panel D.C. fail' alarm accept Relay shall be provided. Besides above, 1 no. Indicating Lamp, 1 no. A.C. Operated Electric Hooter and 2 nos. Push Button, one having 1 no. N/C contact, the other having 1 no. N/O contact shall also be provided for successful operation of the scheme. All auxiliary relays required to render Annunciation System operative and shall be considered to be within the scope of the tender.

AC fail, DC fail scheme shall be operated by relay not contactor.

19 INDICATING INSTRUMENT AND METERS

- a. All instruments shall be flush mounted, back connected type and provided with dust tight cases for tropical use with dull black enamel finish. All fixing screws, nuts and threaded parts shall be designed to Indian Standards.
- b. All instruments shall be of class 0.5 type. The calibration of the instruments shall function satisfactorily when mounted on steel panels or alternatively magnetically shielded instruments shall be used.
- c. Instruments shall be capable of indicating freely when operated continuously at any temperature from 0 to 50 degree C.
- d. All circuits of instruments shall be capable of withstanding applied load of 20% greater than the rated capacity for a period of eight hours.
  - e. The instruments shall be capable of withstanding the effect of shock vibration and a di-electric test of 2000 Volts r.m.s. to ground for one minute as per relevant ISS.

19.1 Ammeters:

All ammeters shall be provided with direct reading scale. Full Scale Value of the Ammeters shall be 100% of the nominal current of maximum C.T. ratio. The ammeters shall be connected to measuring C.T. Core. Ammeters shall be suitable for R.Y.B. Phase measurements. However, the ammeters to be supplied shall be of type DIGITAL . The auxiliary power of the ammeters should be 230V AC.

19.2 Voltmeters

Volt Meter shall be provided with direct reading scale. The maximum value of the volt-scale be 15% in excess of the normal Circuit Voltage. The rated voltage of the Volt Meter shall be 110V A.C. However, the voltmeters to be supplied shall be of type DIGITAL . The auxiliary power of the voltmeters should be 230V AC.

a. Voltmeter Selector Switch:

One Voltmeter selector switch having 7 position 6 way stay-put type shall be provided.

b. PT Selector Switch:

One PT selector switch, 2 position, stayput type shall be provided.

19.3 Energy Meters

Tariff Metering Equipments

(a) Three element Tri-vector Meters shall be supplied by the CONTRACTOR, with Panel Wiring for the Meters along with Test Terminal Block and space for the Tri-vector Meters are to be provided for the Panels.

20 NAME OF IDENTITY PLATES

- a) All instruments, relays and such other similar electrical devices mounted on the control and relay panel shall be provided with name plates bearing the manufacturer's name, serial identifying number and the Electrical rating data.
- b) 3mm thick and 25mmX150mm brass or plastic plates bearing suitable identification marks shall be fixed under the terminal wiring at the test blocks, at the fuse blocks and at the cable terminals. Similar plates shall be fixed on the exterior of the panel in appropriate places to indicate function of control switches, push button etc. such as isolator control switch, breaker control switch, DC fail test, accept reset etc. Suitable identification marks shall be provided for individual casing part of the relays and other equipment. Plates should be screwed and riveted to the Panel.
- c) 50mm wide brass or plastic plate bearing suitable circuit description (which will be furnished after order is placed) etched in 30 mm size letters shall be provided for each panel and mounted on the top of both outer of the front panels. These plates shall be removable type.
- d) Schematic Diagram of CT, PT, CB circuitry & AC, DC Ckt, Indication and Annunciation Ckt along with protection circuitry giving the terminal nos. and Bus wire details shall be printed in laminated durable stickers and pasted inside the panel Door page wise of the respective panel.
- e) Each unit of control and relay panel shall be provided with a label located at the bottom on the front and shall contain the following details :
  - i) Manufacturer's name
  - ii) P.O.no. and date
  - iii) Drg. ref. no. pertaining to the panel.

21 PAINTING

Panel painting shall be done by the modern process of painting. All unfurnished surface of the steel panel and frame work shall be sand blasted or suitably cured to remove rust, scale, foreign adhering matter or grease. A suitable rust resisting primer shall be applied on the interior and exterior surface of steel, which shall be followed by application of an undercoat suitable to serve as base and binder for finishing coat.

Details of Painting:-

Surface treatment	by seven tank process
Paint type	Powder coated. Pure polyester base grade A structure finish
Paint shade	RAL 7032 for external & internal surface
Paint thickness	Minimum 80 microns

22 RELAYS:

A. GENERAL REQUIREMENT

The main protective relays SCADA Compatible Numerical Directional/Non Directional O/C & E/F Relays shall be of panel manufacturers own make. However, multinational company manufacturing panel in India may import required/desired relays from their foreign counterpart with

same brand name at their own risk, cost and responsibility without hampering the stipulated delivery schedule as stated in the tender notification.

All numerical relays shall be provided with 'Relay Failure Annunciation contact'.

**B. SCADA COMPATIBLE NUMERICAL DIRECTIONAL/NON DIRECTIONAL O/C & E/F RELAYS**

The primary requirements of the relays are to protect the respective single circuit or double circuit feeders and 33/11KV or 66/11 KV Power Transformers in the event of fault. The Directional/Non Directional E/F relays shall provide suitable sensitivity for limited earth fault current.

The relay should be suitable for substation automation, primary circuit breaker operation through SCADA from remote control room.

THE DETAILED SPECIFICATION OF Non-Directional O/C and E/F RELAY IS AS PER ANNEXURE-I OF SPECIFICATION

THE DETAILED SPECIFICATION OF Directional O/C and E/F RELAY IS AS PER ANNEXURE-II OF SPECIFICATION

**C. OTHER PROTECTIVE RELAYS**

- Differential relay shall be of numerical type
- REF relay etc. may be of static type.

**D. OTHER PARTICULARS RELATED TO ALL RELAYS**

- 1) All shall conform to the requirement of IS: 3231 / IEC 255 and shall be suitable for operation within a temperature range 0°C to 55°C and 95% relative humidity. Relays shall be suitable for flush / semi flush mounting on the panel with connections from the rear, protected with dust tight cases for tropical use and with transparent cover removable from the front.
- 2) All A.C. relays shall be suitable for operation at 50Hz. The current coils shall be rated for a continuous current of 1 amp and the voltage coil for 230V normal. The contacts of the relays shall be properly designed to prevent or minimise damage due to arcs which have to be broken successfully against 30V +/- 10% volt DC. When open, the contacts shall withstand a voltage of 115% of the normal circuit voltage. The relays shall be designed for satisfactory operation between 70% to 110% of rated D.C. voltage of the sub-station. The voltage operated relays shall have adequate thermal capacity for continuous operation.
- 3) Timers shall be of static type. Pneumatic timers are not acceptable.
- 4) The Relays shall preferably be provided with suitable Seal-in-Devices. Relays should be immune to all types of external influences like Electro static, Electromagnetic, Radio interference, shock etc.
- 5) All the numerical relay should have provision for setting all the features available in the relay and viewing those setting as well as different other parameters through both built in display unit as well as through PC. All numerical relays shall have self monitoring feature with watch dog contact. The supply of relay should be inclusive of necessary software and hardware for interfacing with a PC, to be supplied by the manufacturer.

**E. PROTECTION SCHEMES**

- E-1 A set of D.C. Voltage Operated Aux. Relays with coil cut-off arrangement and 4No and 4 NC

contacts, hand reset with flag indicator type shall be provided for each Transformer for

- (a) Buchholz Alarm
- (b) Buchholz Trip
- (c) Winding Temp. Trip & winding temp. alarm
- (d) Oil Temp trip & Oil Temp. Alarm

Each Transformer Panel shall be provided with a High Speed Tripping Relay with coil cut-off arrangement having 6 NO and 4 NC electrical reset with flag indicator type.

**E-2 AUXILIARY RELAYS, TRIP RELAYS and TRIP COIL/ CIRCUIT SUPERVISION RELAYS**

Auxiliary Relays- D.C. Voltage operated auxiliary relays provided with mechanically operated hand reset indicator and sufficient no. of hand reset contacts shall be provided for protection and supervision against transformer internal trouble/faults. No. of elements and number of relays shall be as per requirement of individual transformer.

For Trip Circuit Supervision Relays - All Panels should be provided with D.C. Voltage operated Trip Circuit Supervision Relay having provisions for pre & post close supervision of Trip Circuit with set of self-reset contacts provided for Trip Circuit Healthy Indication and Trip Circuit unhealthy indication & Alarm in respect of Trip Coil/circuits of respective Breakers.

Tripping Relays- All Panels should be provided with D.C. Voltage operated High Speed Tripping Relays having self reset contacts capable to make, carry and break trip coil current. Sets of Trip Contacts shall be provided for Inter-tripping function of corresponding 11KV Incoming Switchgear and closing blocking function of 33 KV or 66 KV & 11 KV Breakers in respect of Transformer Control Panels. Each set of trip relay shall have minimum two nos. NO and 1No. NC contact as SPARES. The operating time of master trip relay shall be less than 40 ms and electrical reset type.

**E-3 TRIP CIRCUIT/COIL SUPERVISION SCHEME :**

Trip circuit supervision scheme shall be such that testing of trip circuit healthiness is possible irrespective of whether the C. B. is in the closed or open position. The Trip Circuit Healthy LED should glow continuously in CB ON Position and on demand in C.B. OFF position. The rating of dropping resistance in series with Trip Circuit Healthy LED shall be such that the Trip Coil should not get damaged because of continuous current flowing through it.

E-4 Principal requirements of protective relays, metering equipments, auxiliary relays breaker control switches etc. are as follows:

**E-4-1 Ammeter:**

Each circuit one ammeter shall be provided with the following :

Mounting	Flush
Size	96 x 96 mm. case
Response Time	1 second
Operating Temperature	Up to 55°C
Dielectric Strength	2 kV RMS for 1 minute
Auxiliary Supply	230 volt A.C, 50 Hz
Operating Current	1 A from CT Secondary.
Type	Panel Mounting with 3 <sup>1</sup> / <sub>2</sub> Digital Display.

**E-4-2 Volt Meter :-**

Mounting	Flush
Size	96 x 96 mm. Case

Response Time	1 second
Operating Temperature	Up to 55°C
Dielectric Strength	2 kV RMS for 1 minute
Auxiliary Supply	230 V A.C., 50 Hz
Frequency	50 Hz
Operating Voltage	110 V from PT Secondary.
Type	Panel Mounting with 3 <sup>1</sup> / <sub>2</sub> Digital Display.

E-4-3 Buzzer

One DC buzzer shall be provided in the panel for non-trip alarm. One DC Bell shall be provided for Trip alarm and one AC Bell for Panel DC fail alarm.

E-4-4 High speed tripping relay electrically resettable type confirming to IS – 3231

Aux. voltage	30 V or 110 V D.C to be decided during detailed engineering stage
Coil rating	30V D.C., voltage band for satisfactory operation : 50 to 120% of rated voltage
Operating Time	40 m. seconds nominal at rated voltage
Burden of relay coil watts (Max)	Low burden 40 Watt at rated voltage
Operating temp	-10 deg C to 55 deg C.
Operational indication for each element	Mechanical red colour Flag : Electrical Reset Type
Contact Configuration	6 NO + 4 NC combination with additional hand reset coil cut of contact (Seal in contact)

Contact ratings:

Make and carry	A.C. 1250 VA with max 5 amp & 660 Volts D.C. 1250 W dc with max 5 amp & 660 Volts
Make and carry for 3 sec.	A.C. 7500 VA with max 30 amp & 660 Volts D.C. 7500 W dc with max 30 amp & 660 Volts
Break	A.C. 1250 VA with max 5 amp & 660 Volts D.C. – 100 W resistive 50 watt inductive with max 5 amp & 660 Volts
Insulation	2 KV RMS, 50Hz for 1 min. 2.5 KV/1 sec between all terminals & case as per IS 3231. 1 KV RMS, 50Hz for 1 min. across open contact
Type of mounting	Flush

E-4-5 Numerical based differential protection relay with inbuilt current amplitude & vector group compensation feature & also with differential high set element for two winding power transformer compliant to IEC 60255.

Aux. voltage	30 V or 110 V D.C to be decided during detailed engineering stage
C.T. secondary	Selectable 1 amps / 5 amps for both HV & LV sides



Online display of HV & LV phase currents & differential current	
Adjustable bias setting	10 to 50% In.
Operation based on fundamental frequency	
Programmable HV/LV CT ratio of T/F vector group	
Inbuilt REF protection	
Inbuilt HV & LV side over current & earth fault protection	
Inbuilt transformer trouble auxiliary relay	
Backlit LCD display	
Harmonic restrain feature	
Storing facility of latest 5 fault events with real time clock	
Password protection	
DC burden	Quiescent condition – approx 4 watt Under trip condition – 30 Volt - approx 4 watt, 110 Volt - approx 7 watt.
AC burden	Through current only – approx 0.15 VA for 1 amp & 0.30 VA for 5 amp (per bias circuit) Bias & differential Ckt only: 2.8 VA for 1 amp & 3.2 VA for 5 amp.
Contact arrangements	Two change over self reset tripping contacts & two annunciation contacts
Contact rating	Make & carry 7500VA for 0.2 sec. with max 30 A & 300 V AC or DC carry continuously 5 amp AC or DC break 1250 VA AC or 50 W DC resistive, 25 W L/R – 0.04 s subject to max. 5 amp & 300 Volts
Current Input	Six for differential & one for REF
Self diagnosis feature for healthiness of relay	
Flush mounted / draw out type	

23 Guarrantee:-

The panels shall be delivered to the various consignees of the EMPLOYER and shall be suitably packed to avoid damages during transit.

The Defect Liability Period shall be sixty (60) months from the date of Taking Over/Completion of Facilities (or any part thereof)

In the event of any defect in the Equipment, relay, any integral part of the Equipment arising out of faulty design, materials, workmanship within the above period, the supplier shall guarantee to replace or repair to the satisfaction of EMPLOYER.

If the supplier fails to do so, within one month of receipt of intimation, EMPLOYER reserves the right to effect repair or replacement by any other agency and recover charges for repair or replacement from the supplier.

24 TESTS: -

24.1 Type Test: -

24.1.1 The Manufacturer should submit the Type test report including functional test for all the protective relays and C&R panels carried out within five years from the due date of submission of tender from CPRI/NABL accredited Laboratory/ Govt. Recognized test house or Laboratory on the tendered Items as per relevant

Standard & Tender Specification with the purchase order failing which the lot shall be rejected. The Type tests for Numerical Relays is to be submitted as specified in Annexure-I & II of Relays specification.

24.1.2 Test at Factory:

The following Tests shall be carried out 6 copies of Test certificates shall be submitted for approval. The Equipments shall only be dispatched after approval of the test certificates.

1. Checking of wiring of circuits and the continuity.
2. One minute applied voltage test. All Equipment on panel and small wiring shall be tested for withstand voltage of 2000Volts to earth & between different voltage circuits.
3. Insulation resistance of the complete wiring, circuit by circuit with all equipments mounted on the Board before and after H.V. test mentioned under 2 above.
4. Routine tests according to relevant National standard are on the Instruments, relays & other devices.

25 INSPECTION:

25.1 Acceptance test at manufacturer's works in presence of purchaser's representatives shall be carried out. The supplier shall give at least 15 days notice of the date when the tests are to be carried out. Purchasers shall give the right to select any quantity of the item wise offered lot for testing, offered for inspection and in the event of failure in test(s), the purchaser shall have the right to reject the offered equipments.

25.2 All relays, meters & annunciators provided in the control & relay panels are to be accepted only after successful hundred percent performance testing at testing department of EMPLOYER.

25.3 The inspection may be carried out by the EMPLOYER at any stage of manufacturing. The successful Manufacturer shall grant free access to the EMPLOYER's representative/s at a reasonable notice when the work is in progress. Inspection and acceptance of any equipment under this specification by the EMPLOYER, shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

25.4 The manufacturer shall keep the EMPLOYER informed in advance, about the manufacturing programme so that arrangement can be made from stage inspection.

25.5 The EMPLOYER reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. The supplier shall keep the EMPLOYER informed, in advance, about such testing programme.

26 SPARES:

The manufacturer shall quote item-wise Unit Prices for all type of relays and other consumable spares recommended by him. Such spare shall include Fuse Holders, Fuses, Indicating Lamps, essential spare parts of Relays, Instrument, extra Control Switches etc. EMPLOYER may procure these items from the successful manufacturer.

27 DRAWING & LITERATURE

Triplicate copies of the following drawings and literature shall be submitted along with the order copy:-

(a) Principal dimension details of each unit cubicles, complete assembly of panel and proposed arrangement of the Panel in a Control Room.

(b) Front and rear views of the Panel with instrument and device positions marked.

(c) Pictorial views of the Control Switches Terminal Blocks, Indication Instruments, Test Blocks and exploded views of draw out type instructions and Fuse Blocks.

(d) Schematic Wing Diagram for Test Terminal Block.

- (e) Illustrative, descriptive literature, General Technical Data & Specification of Devices.
- f) make, type, particulars, literatures of each and every relay (protective & auxiliary), meters, annunciators, switches, lamps, TBS, TTBS etc. along with bill of material in line with specification.

28 CONTRACT DRAWINGS & LITERATURE

In the event of an order materializing, the Supplier also submit four prints of each drawing for approval of the EMPLOYER along with 2 sets of literature as mentioned in the spec.

The Contract drawings shall cover the followings:-

- (a) Details of construction and dimensions of a cubicle and of the complete Panel.
- (b) Template for foundation and details of Cable Trench and Cable Entry Holes in the Foundation Platform.
- (c) Elementary diagrams of all controls, metering, protection annunciation and other circuits. All devices shall be numbered according to ASA or international usage, which shall be separately coded.
- (d) Cabling and wiring diagram of the cubicles and inter-connections between them. Ferrule numbers, device number and grouping for cable take off shall be distinctly shown.
- (e) Dimensional outline drilling diagram and special mounting arrangement if any, of such type of various devices on the Panel.
- (f) Inter-connection diagram between Control Panel and C.B. power and instrument transformer etc.
- (g) Wiring Schedule for Control & Relay Panel.
- (h) Internal wiring diagram of all devices and elementary wiring diagram of relays where internal wiring is in triplicate. Construction details of switches, terminal blocks and test blocks etc.
- (i) After approval, 10 sets of the final contract drawing for each set of Control & Relay Panels are to be supplied by the Manufacturer. One set reproducible tracing of the above drawings in soft format shall also be supplied.

In the event of contract being awarded, 4 copies of the following literatures shall be supplied along with the drawings as mentioned:-

- (a) Literature describing construction, operation, adjustment and rating specifications of all the protective and auxiliary relays, recording instruments, metering instruments and control switches.
- (b) Literature giving rating data, details and adjustments for calibration of the indicating instruments.
- (c) Calibration instruments for the metering instruments.
- (d) List of spare parts, identification number of renewable parts of relays, instruments and switches etc. with the help of which the EMPLOYER will be able to procure spare parts from the manufacturer at any subsequent time.
- (e) It is desired that the complete schematic drawing is provided on a permanently laminated/engraved plate of suitable thickness which has to be bolted/riveted at the four corners on the inside face

of rear door. In addition, one more plate of similar type and dimension shall be provided on the outside of the rear door providing guidelines and instructions for operation. The guidelines and schematic to be provided on the plates shall be as per approved drawings.

29 DOCUMENTS TO BE SUBMITTED ALONGWITH THE OFFER:

The manufacturer shall invariably submit the following documents failing which the offers are liable for rejection:-

29.1 Bill of Material (schedule-IA/IB/IC).

29.2 Documents supporting the qualifying requirements/past performance reports schedule-III).

29.3 Undertakings from relay manufacturer regarding (Schedule-IV) : -

29.3.1 Non-phasing out of the relays for at least 10 years from the date of supply

29.3.2 For extending technical support and back-up guarantee

29.4 Detailed catalogue/technical literature in respect of all components/accessories including bought-out items.

29.5 Names of supplier of bought out item.

29.6 List of testing equipment available with the Manufacturer.

30 QUALITY ASSURANCE PLAN

30.1 The Manufacturer shall invariably furnish QAP as specified in Annexure-III along with his offer the QAP adopted by him in the process of manufacturing.

30.2 Precautions taken for ensuring usages of quality raw material and subcomponent shall be stated in QAP.

31 GUARANTEED TECHNICAL PARTICULARS:

Manufacturer shall furnish Guaranteed Technical Particulars of equipment offered mentioning thereon Make & Technical particulars of each device as per schedule specified. Performance Guarantee will be based on the Guaranteed Technical Particulars.

Schedule-II -- GTP for C&R Panel

Schedule-V—GTP for Non Directional/ Directional O/C & E/F Relay

Schedule-VI—GTP for Master Trip Relay

Schedule- VII – GTP for Differential Protection Relay

The discrepancies, if any, between the specification and the catalogs and/or literatures submitted as part of the offer by the manufacturers, the same shall not be considered and representations in this regard will not be entertained.

Annexure - IV

Standard Make of Relay and Fitments

1.	Relays	Schneider, ABB, Siemens, Alstom
2.	Breaker Control Switch/ Local- Remote switch	Kaycee/Recom/Switron
3.	Ammeter/Voltmeter Selector switch	Kaycee/ Recom
4.	Static Ammeter/ voltmeter	AE/RI SHAV/Secure
5.	Push Buttons	Vaishno/Teknic/Lumen/STS
6.	Indicating Lamps with lenses	Vaishno/Teknic/Lumen/STS
7.	Panel wiring	Finolex/Havvels/ KEI/ R. R. kables
8.	Hooter/Buzzer/Bell	Vaishno/STS/JVS/Bharani
9.	Annunciator	MINILEC/ALAN/ INSTALARM/EAPL

Annexure-V

Legend of Devices associated with 11 kV C & R Panel

Symbol Reference	Description	Particulars
A1-A2-A3, Ah	Ammeter	As specified
V	Voltmeter	As specified
VS	Manual Voltmeter Selector Switch	As specified
EM	Tri-Vector Meter	As specified
CS	Control switch T-A/T-N-A/C-C spring return type	As specified
L/R	Local/Remote switch	As specified
IL-R	CB „ON“ Indication Red lamp	As specified
IL-G	CB „OFF“ Indication Green lamp	As specified
IL-W	„Trip /Close signal received from Remote Indication white lamp	As specified
IL-B	“Spring charged” Indication Blue lamp	As specified
IL-A	CB “ Auto trip” Indication Amber lamp	As specified
PB	Push Button	As specified
ANN	DC operated electric Buzzer and Microprocessor based Electronic annunciator with built in watch dog and first fault indication facility. The annunciator shall have provision for trip and non trip alarm functions and Accept/Test/Reset/Mute Push buttons	As specified
H,HS,TH	Heater, Heater Switch, Thermostat	As specified
FS	Fuse	As specified
LK	Link	As specified
MCB1	MCB 2 pole 32 A for DC supply	As specified
MCB2	MCB 2 pole 16 A for AC supply	As specified

MCB3	MCB 2 pole for spring charging motor supply	As specified
MVS	Manual PT selector switch	As specified
TC	Tripping Coil	As specified
CC	Closing Coil	As specified
86	Tripping Relay for Tripping function	As specified
52	Vacuum Circuit breaker	As specified
52a,52b	NO and NC contacts of Breaker Auxiliary switch respectively	As specified
PT	Potential Transformer	As specified
CT	Current Transformer	As specified
TTB	Test Terminal Block	As specified
51/50 R- Y-B-N	O/C and E/F protection	As specified

SCHEDULE-I A

(To be submitted, duly filled in, along with the offer) Bill of materials for 11 KV feeder C&R panels

Sr. No	Description	Quantity	Make, Type & design
1	Circuit label	1 No.	
2	Mimic section(Brilliant green paint to shade No.221 of IS 5 to be used)	1 No.	
3	T-N-C type control switch for circuit breaker.	1 No.	
4	Indicating LEDs for Spring charge indication(Blue) Trip circuit healthy indication(white) one each for Trip ckt 1 and Trip Ckt 2 Breaker 'ON' indication(Red) Breaker 'OFF' indication(Green)	1 No. 2 Nos. 1 No. 1 No.	
5	Push button for Trip circuit test Alarm Accept/Reset/Test/Mute	1 No. 4 Nos.	
6	Numerical non-directional IDMT over current and earth fault relay with high set instantaneous trip feature	1 No.	
7	High speed Master tripping relay (Electrically resettable)	1 No.	
8	12 window annunciation scheme with accept, reset and LED test push button with self resetting audible alarm.	1 Set	
9	Ammeter (96 mm x 96 mm.)	3 Nos.	
10	Voltmeter (96 mm x 96 mm.) & selector switch.	1 Set	
11	Local / Remote switch	1 Set	
Internally mounted			



1	Space heater and control switch	1 Set	
2	Cubical illumination lamp and door switch	1Set	
3	Power Plug, socket and control switch	1 set	
4	Alarm bell for trip	1 No.	
5	Alarm cancellation relay	1 No.	
6	Alarm buzzer for non trip with auto-stop feature (with variable time setting 0-60 seconds)	1 No.	
7	MCBs	As required	
8	Fuse and Links	As required	
9	Control wire	As required	

SCHEDULE - II

DETAILS OF RELAYS, METERS, EQUIPMENT & DEVICES AS OFFERED IN SCHEDULE OF 11 KV SIMPLEX TYPE CONTROL AND RELAYS PANEL – TO BE FILLED UP BY THE MANUFACTURERS ALONG WITH SUBMISSION OF SUPPORTING DOCUMENTS

Sl. No.	Description	Make And Country Of Manufacture	Type (Catalogue to be enclosed)	Brief Description, with CT/PT details, contact configuration, Input/Output details, characteristics, range, suitability etc. for clear perspective.
A	SURFACE MOUNTING DEVICES			
1	Circuit Level			
2	Mimic Diagram			
3	Circuit Breaker Control Switch Spring return lost motion type			
4	Ammeter 96 mm sq. for C.T. Secondary rated Current 1A Scale 0-			
5	Voltmeter 96 mm Sq. for P.T. Secondary 110 VAC (L/L) Scale 0-40			
6	Voltmeter Selector Switch 6 way & off position having break before make contact			
7	Test Terminal block suitable for 3 phase 4 wire system with wire rear connecting studs having provision of sealing arrangement			
8	Multi way micro processor based Electronic Annunciator with building- system watchdog first fault indications and red & yellow coloured windows with inscription for Trip & Non Trip			
9	Indicating Lamps led type 63.5 VAC for P.T. Supply indication with			

10	Indicating Lamp LED type 230 VAC for Panel D.C. Fail Common			
11	Indicating Lamp LED type 30 VDC for CB ON/OFF Auto up Spring Charge Trip Circuit Healthy Indication with RED/GREEN/ AMBER /BLUE			
12	Push Button for Panel DC fail test			
13	Push Button for including AC fail test			
14	Push Button for non trip Panel DC fail Alarm Accept			
15	Push Button for Annunciator Alarm Test / Mute/Accept/Reset			
16	3 Element normal IDMTL over current Relay with instantaneous high set unit			
17	Single Element Instantaneous sensitive Earth Fault Relay with			
18	Triple Pole Directional Voltage polarized Over Current Relay with Directional High Set Unit on all Element			
19	Single Pole Directional Voltage polarized Instantaneous sensitive E/F Relay with timer			
20	Hi balance Instantaneous Restricted Earth Fault Circulatory Current Fault Relay  (a) HV side of Power Trf. (b) LV			

21	Single Element High Speed Tripping Relay with electrically reset Contact & H/R flag/indication with			
22	Two Element 30 V DC Voltage Actuated Auxiliary Relay with HR Contacts & HR/LED Flag/indication for Transformer Internal Trouble functions			
23	Single Element 30V DC Voltage Actuated Auxiliary Relay with self Reset Contact & Reverse Flag indication for Panel DC Supply fail function			
24	Single Element 230V AC Voltage Actuated Auxiliary Relay with self Reset Contacts & Reverse Flag indication for incoming AC Supply fail function			
25	30 V DC Voltage operated Relay for Trip Circuit supervision purpose with self reset contact			
26	Single Element 230V AC Voltage Actuated Auxiliary Relay with self Reset Contacts without Flag indication for panel DC fail Alarm, Accept			
27	Additional Involvement of Single Element 30V DC Voltage Actuated			
28	Extra Involvement of Auxiliary Relay for not having sufficient contacts to achieve required functions			
29	Space & wiring for housing purchaser's projection mounting type Energy meter(not within the scope of manufacturer			
30	Common Electronic DC bell/Buzzer Trip & Non-Trip Alarm functions			

31	Common Electronic AC Ball for Panel DC fail Alarm functions			
32	Biased differential relay for 10 MVA Trf. Control & Relay Panel			
B	Inside Mounting Devices			
1	230V AC Cubicle illuminating lamp with door operated Switch/Toggle			
2	30V DC Emergency Lamp with Toggle Switch			
3	230C AC 60W space heater with thermostat & Toggle Switch			
4	15A Double V AC Combined 2/3 pin plug and socket with Switch			
5	15A Double Pole MCB for Incoming AC Supply			
6	Fuse			
7	Links			
8	Terminals			
9	Earthing Arrangement			
10	Interposing P.T. for Directional Relay if required			
11	Interposing Universal type CT for Differential Relay if required			

Note: All surface mounting devices excepting Energy meter,TTB & Bells are flush mounting type As per Schedule requirement.

Schedule-V

GTP for Numerical Feeder Protection Relay

Sl. No.	Feature and Function	Supplier's details
1.1	Make, Type, Model No and Version No and Ordering Code	
1.2	Conformance to  i. IEC255-4	
	ii. IEC 61850	
1.3	No. of CT inputs for O/C and E/F Protection	
1.4	Type test report submitted(y/n)	
1.5	Relay shall be of Numeric Design	
1.6	Relay designed for bay protection and Control	
1.7	Size of Relay LCD screen	
1.8	Relay is equipped with CB close and open key/push buttons	
1.9	Relay has following protection functions:  a. Three phase over current b. Earth fault  c. Thermal overload function  d. Broken conductor protection function e. Circuit Breaker Maintenance function	

2.	a. One time delayed element and two high set elements	
	b. Setting range and step for IDMT element for both current and Time Multiplier Setting	
	c. Selectable Current/Time Curve for IDMT element	
	d. Setting range and step for high set elements for both current and time delay	
10.	Sampling rate and frequency of analog signal	
11.	Whether remote controllable from SCADA	
12.	a. No. of Digital Inputs	
	b. Voltage rating of Digital Inputs	
	c. Provision of testing without current injection	
13.	Supervision for CB open and Closed status	
14.	No. of programmable LEDs and no. of Latched LEDs	
15.	Analog Measurement and display supported	
16.	Fault Record storage capacity	
17.	Event storage capacity	
18.	Disturbance record storage capacity	

19.	MMI with keypad and LCD provided	
20.	Rated DC Supply and tolerance	
21.	Rating of CT/PT secondary	
22.	Rated frequency	
23.	a. Operating ambient temperature & humidity	
	b. Withstanding capability of Electromagnetic Interference as per relevant part of IEC 61850	
24.	Mounting	
25.	Watchdog	
26.	a. Nominal Feeder current	
	b. CT Ratio setting	
	c. Earth fault current with time delay IEC Curves, 2 <sup>nd</sup> stage for instantaneous trip (less than 50 ms)	
	d. High set with delay	
	e. IEC Curves for all O/C and E/F have user selectable?	



27.	a. No. of Digital Output Contacts	
	b. Contact rating	
28.	Mode of Time Synchronization	
29.	Type of Lugs and terminators	
30.	MTBF	
31.	Lifespan	
32.	Compliance to Type Test	
33.	Communication Port a. Rear port- details b. Front port-details	
34.	Whether Communication Ports are native to the Relay	
35.	Protocol supported for Rear Port	
36.	Protocol supported for Front port	

37.	Start and trip output contacts are freely programmable	
38.	Cable for connection of Relay to laptop(USB port) along with converter and power supply if required for relay local setting	
39.	Basic application software for setting change, parameterisation	
40.	CD with software(licensed ) to download disturbance recorder, event log and evaluation of those records	
41.	Graphical configuration tool for I/P, O/P and functional building block for protection and control	
	Any other software required for integration with SCADA.	

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Schedule-VI

GTP for Master Trip Relay

Sl. No.	Description	Manufacturer's Response
01.	Manufacturer Name	
02.	Type and designation	
03.	Electrical reset	
04.	Mounting	
04.	High Burden relay	
05.	Operating Time	
06.	Rated DC supply and tolerance	
07.	No. of NO Contact	
08.	No. of NC Contact	

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Schedule-VII

GTP for Numerical Based Differential Relay

Description	Manufacturer's Response
<b>Manufacturer Name</b>	
<b>Type and designation</b>	
<b>Rated DC supply and tolerance</b>	
C.T. secondary current	
Adjustable bias setting	
Operation philosophy	
Whether Programmable HV/LV CT ratio of T/F vector group provided	
Inbuilt REF protection provided	
Inbuilt HV & LV side over current & earth fault protection provided	
Inbuilt transformer trouble auxiliary relay provided	
Display Type and details	
Whether Harmonic restrain feature available	
Details of Event Recording and storing facility	
Password protection	
DC burden	
AC burden	
Contact arrangements	
Contact rating	
Current Input	
Self diagnosis feature provided	
Mounting Arrangement	
Communication port Details	

Deleted

ANNEXURE-I

Technical specification for IEC 61850 compliant non- Directional O/C and E/F Relay

Sl. No.	Feature and Function	Technical requirement
1	Purpose and application	<p>It is intended to automate the Switchgears specified in the scope of supply and use Communicable Numeric relays for Protection, Control, Metering and Status monitoring. This specification is based on the understanding that an integrated Automation System along with protections shall be provided and same shall have provisions for Integration with SCADA system. All the feeders shall be remote controlled from EMPLOYER's SCADA and from the local console of the numerical relays.</p> <p>Numerical multifunctional combined Microprocessor based Feeder protection and management relay to protect the 33kV Feeder from all electrical and other faults along with reporting system, Disturbance record for fault analysis. Manufacturer should comply with any especial requirement or feature asked for retrofitting the relays. Relay should be IEC 61850 compliant. Relay should have 4 CT input for O/C and E/F protection. There should be option for derivation of E/F internally.</p>
2.	Main Protection Feature	<ol style="list-style-type: none"> <li>1. Relay should have minimum two group of setting. Setting group changeover required from digital status input.</li> <li>2. Electrical over load protection with selectable IEC curves with two stage, first stage to be used as Definite Time / IDMT and second stage to be used as high set for short circuit protection.</li> <li>3. Earth fault protection in two stages with IEC characteristics. First stage to be used as IDMT/Definite Time and second stage to be used as instantaneous elements. Earth fault element should be suitable for both CBCT and residual type CT connection.</li> <li>4. Negative phase sequence Protection with IEC Curves.</li> <li>5. CB Fail Protection &amp; time settable as per user.</li> <li>6. The relay should be immune to DC switching while carrying current i.e. no spurious trip should be generated if relay DC is made On and Off</li> <li>7. The relay should conform to the IEC255-4 or BS 142 for Inverse time characteristics.</li> <li>8. The relay should have features to monitor for broken conductor and CB opening time</li> </ol>
3.	Processor feature	<p>Relay shall be completely Numerical with protective elements having software algorithm based on sampling of Analog inputs. Sampling Rate of Analog Signal: The sampling rate should be 1000 Hz for 50 Hz signal or better for each analog channel.</p>

4.	Operational Philosophy	<p>The operation of Relay shall be possible both locally from the Switchgear and remote &amp; Local Work station. The local position shall be displayed in remote / local workstation and remote operation shall be blocked if the switch is in Local. Clear control priorities shall prevent initiation of operation of a single switch at the same time from more than one of the various control levels and there shall be interlocks among various control levels. The priority shall always be with the lowest enabled control level. Relay accuracy shall not be affected by system frequency fluctuation.</p>
5.	Status/Optical Inputs/Digital inputs	<ol style="list-style-type: none"> <li>1. Minimum 7 number status inputs are required</li> <li>2. All status inputs should be 30 V DC/110 V DC (will be mentioned during detailed Engineering as per requirement).</li> <li>3. Setting group is required to be changed with any Digital input status.</li> <li>4. Trip circuit supervision with DI status</li> <li>5. The digital inputs shall be acquired by exception with 1ms resolution. Contact bouncing in digital inputs shall not be assumed as change of state.</li> <li>6. Relay should have comprehensive self diagnostic feature with remote indication of relay failure and alarm shall be generated without tripping of circuit</li> <li>7. Provision of Testing output relays without any current injection.</li> <li>8. No. of programmable LEDs - at least 4 nos. with latching option.</li> </ol>
6.	Main measuring and reporting feature	<p>All measurements should be in primary quantities. Minimum following displays are required in alpha numeric:-</p> <ol style="list-style-type: none"> <li>1. Three phase (Positive sequence) current</li> <li>2. Neutral(zero sequence) current</li> <li>3. All the trips should have clear indication on the relay terminals</li> <li>4. Resetting should be selectable as hand reset or auto reset.</li> <li>5. The default relay LCD shall be user defined to display primary circuit loading.</li> </ol>
7.	Memory and Recording Feature	<ol style="list-style-type: none"> <li>1. The relay setting and programming should be stored in EEPROM so that during Aux. Power failure the said data is not lost.</li> <li>2. Relay should have event log, trip log and DR record. All logs should go in to history.</li> <li>3. All tripping of relay should initiate DR in auto without extra binary input. Triggering of DR with binary input should be user configurable.</li> </ol>

		<ol style="list-style-type: none"> <li>4. The last 2 fault DR records should be in flash memory and DR will not erase in case of DC supply fail for more than 2 days.</li> <li>5. Should be able to record at least 5 Oscillographic disturbances and 5 fault records and 250 event records.</li> <li>6. Minimum Four no. of latest trip log with cause of trip should be stored in memory along with date and time stamping. The memory should not be lost with the switching off of DC.</li> <li>7. The relay should have fault-recording feature with current waveform and Digital Input status. The fault waveform should consist of minimum four current waveforms of three phase current and zero sequence current and DI status. Triggering time for Pre and Post should have user selectable. This record should be in flash memory for minimum 7(seven) days even after switching off the DC supply.</li> <li>8. The fault should be date and time stamped.</li> <li>9. Communication protocol IEC 61850.</li> </ol>
8.	Auxiliary Supply	30 V or 110 VDC (will be mentioned during detailed Engineering as per requirement) to - 25% to + 10%, 2 wire unearthed system. Necessary software shall be in-built for proper shutdown and restart in case of power failure. Auxiliary supply burden will be around 20Watt.
9.	Rated CT/PT secondary	5/1 Amp(User selectable) , CTs used to be protection class
10.	Rated frequency	50 HZ +/- 5%
11.	Ambient condition	<ol style="list-style-type: none"> <li>1. Operating ambient temperature upto 55 Deg C</li> <li>2. Operating Humidity upto 100 %</li> <li>3. Relay shall meet the requirement for withstanding electromagnetic interference according to relevant parts of IEC 61850. Failure of single component within the equipment shall neither cause unwanted operation nor lead to a complete system breakdown.</li> </ol>
12.	Module and Mounting	<ol style="list-style-type: none"> <li>1. Relay should be flush mounted type</li> <li>2. If module is drawout type then it should have CT shorting facility of make before break type.</li> <li>3. Mounting in switchgears located in non AC rooms.</li> <li>4. Galvanic isolation between field connection and relay hardware should be there.</li> </ol>
13.	Watchdog and self monitoring	The relay should have facility to monitor the healthiness of its circuits and components by own monitoring system. In case of any problems, the alarm should be generated by one of the output contacts. The alarm as soft signal to be sent to SCADA system as well. Necessary support

		documentation explaining the self diagnostic feature shall be furnished Watch dog contact shall be provided in addition to required 7BI and 7 BO.
14.	Settings	<p>Approximate settings possible should be as follows:-</p> <ol style="list-style-type: none"> <li>1. Nominal Feeder current 2% to 110 %</li> <li>2. CT Ratio setting 10-1000(approx.)</li> <li>3. Earth fault current 5 to 40% with time delay IEC Curves, 2<sup>nd</sup> stage for instantaneous trip(less than 50 ms)</li> <li>4. Over current trip- 50% to 200% of 1/5 Amp with time delay as per IEC Curves.</li> <li>5. High set with delay 200% to 2000%</li> <li>6. IEC Curves for all O/C and E/F have user selectable.</li> </ol>
15.	Output Relays	<p>Minimum 7 number output relays are required out of which</p> <ol style="list-style-type: none"> <li>1. One potential free change over contact should be provided for start inhibit of relay.</li> <li>2. All o/p contact should be freely programmable.</li> <li>3. Rating of trip contacts:- <ol style="list-style-type: none"> <li>a) Contact durability&gt;10K operation</li> <li>b) 15 Amp make and carry for 3 sec for trip contact c) Make and carry for trip contacts L/R&lt;=40ms</li> </ol> </li> <li>a) 8 Amp make and carry continuously for 5 sec.</li> </ol> <p>Testing of Output relays through keypad on relay fascia and relay HMI software. Output relay dwell time shall be user programmable or fixed at 100ms.</p>
16.	Relay software and Man Machine Interface	<ol style="list-style-type: none"> <li>1. The relay should have native IEC 61850 Communication Protocol.</li> <li>2. Should have password protected key padlock.</li> <li>3. Necessary software for relay setting , retrieving DR, event log, trip log should be supplied by the Manufacturer. Necessary License is to be issued for EMPLOYER, if required.</li> <li>4. Manufacturer has to supply communication hardware for relay setting, DR downloading from front port. This device should be compatible to USB/Ethernet port.</li> <li>5. It shall be possible to transfer the data stored in the DFR to computer on IEEE/COMTRADE format. The data format shall be compatible for dynamic protection relay testing on relay test kit. COMTRADE data viewing software to be provided.</li> <li>6. Multiuser/Corporate license for installation on minimum 7 nos. of PCs.</li> </ol>



17.	Date and time	Date and Time stamping with faults and record. The clock should be powered from internal cell and should not required setting after every DC switching. The internal cell life minimum 5 years. Time synchronization by IRIG-B or SNTP. For time synchronization through SNTP is to be provided from clock signal coming from RTU. In case of IRIG-B, time synchronization will be done with GPS clock signal from GPS receiver located at substation.
18.	Lugs and terminators	All CT and PT terminals shall be provided as fixed (screwed) type terminals on the relay to avoid any hazard due to loose connection leading to CT opening or any other loose connection. Necessary amount of lugs should be supplied along with each relay for CT connection and control wiring.
19.	Manuals, Drawings and Literature	<ol style="list-style-type: none"> <li>1. The relays should be supplied with manuals with all technical and operating instructions.</li> <li>2. All the internal drawings indicating the logics and block diagram details explaining principle of operation should be given at the time of supply.</li> <li>3. Mapping details shall be submitted in IEC format.</li> </ol>
20.	Standard documentation per Relay, according to IEC 61850	<ol style="list-style-type: none"> <li>1. MICS document (model implementation conformance statement)</li> <li>2. PICS(protocol implementation conformance statement)</li> <li>3. Conformance Test certificate from KEMA/CPRI.</li> <li>4. PIXIT document</li> </ol> <p>All the above mentioned certificates shall be submitted.</p> <ol style="list-style-type: none"> <li>5. ICD file</li> <li>6. SCD file</li> </ol>
21.	Extendibility in Future	The Manufacturer shall provide all necessary software tools along with source codes to perform addition of bays in future and complete integration with SCADA by the User. These software tools shall be able to configure relay, add analog variable, alarm list, event list, modify interlocking logics etc. for additional bays/equipments which shall be added in future.
22.	Lifespan	<p>The supplier should mention following:-</p> <ol style="list-style-type: none"> <li>1. Product maturity: The Manufacturer should mention the time period for which the product is in the market</li> <li>2. Expected production life</li> <li>3. Hardware/Firmware change notification process. Upgrades to be provided free of cost within the Guarantee period/5 years whichever is later, if needed.</li> <li>4. Lifespan of standard tools and processes for relay configuration, querying and integration.</li> </ol>

23.	Standards	<p>The relay should conform to the IEC255-5 or equivalent BS / ANSI for following:-</p> <ol style="list-style-type: none"> <li>1. Overload withstand test</li> <li>2. Dielectric withstand: 2kV in common, 1 kV in differential mode</li> <li>3. Impulse Voltage: 5kV in common, 1kV in differential mode</li> <li>4. Insulation resistance&gt;100 M-ohm.</li> <li>5. Vibration: Shock and bump and Seismic</li> <li>6. Storing and transportation</li> <li>7. Radio Interference: IEC 61000 for high frequency disturbance, Transient disturbance, Electrostatic discharge</li> <li>8. KEMA Certification for the particular model offered with respect to IEC61850 Protocol.</li> </ol>
24.	Communication Port	<ol style="list-style-type: none"> <li>1. Two nos. IEC 61850 protocol compliant Ethernet RJ45/F.O port for communication with SCADA system through two managed Ethernet Switches operating in redundant mode. The communication shall be made in 1+1 mode between individual IED to Switch, such that failure of one set of LAN shall not affect the normal operation of SCADA. However, it shall be alarmed in SCADA.</li> <li>2. Functioning of Relay shall not hamper to fault occurring any interconnected relay.</li> <li>3. One Front port Ethernet RJ45/USB 2.0 for relay parameterization and configuration etc. with the help of PC. In case RS-232 port offered, suitable interfacing cable with one end having RS 232 port and other end USB 2.0 to be provided to connect with PC free of cost.</li> <li>4. Relay should generate GOOSE message as per IEC 61850 standard for interlocking and also ensure interoperability with third party relays.</li> </ol>
25.	Name Plate and marking	<p>Each IED shall be clearly marked with manufacturer's Name, type, serial no. and electrical rating data. Name plates shall be made of anodized aluminium with white engraving on black surface.</p>
26.	Performance Guarantee	<p>Relays will be guaranteed for the period of five years from the date of last dispatch. Any problem in the said period should be attended free of charge inclusive of repair/replacement of relays/ component (both H/W, S/W).</p>
27.	Type Test	<ul style="list-style-type: none"> <li>• Dielectric Withstand Test—IEC 60255-5</li> <li>• High Voltage Impulse Test, class III --- IEC 60255-5(5kV peak, 1.2/50</li> </ul>

		<p>micro Sec;3 Positive and 3 negative shots at interval of 5 Sec.)</p> <ul style="list-style-type: none"> <li>• DC Supply Interruption ---- IEC 60255-11</li> <li>• AC Ripple on DC supply ---- IEC 60255-11</li> <li>• Voltage Dips and Short Interruptions --- IEC 61000-4-11</li> <li>• High frequency Disturbance ---- IEC 60255-22-1, Class III</li> <li>• Fast Transient Disturbance ---- IEC 60255-22-4, Class-IV</li> <li>• Surge withstand capability ---- IEEE/ANSI C 37.90.1(1989)</li> <li>• Degree of Protection</li> <li>• Electromagnetic compatibility</li> <li>• Mechanical stress/vibration test</li> <li>• Temperature withstand</li> </ul> <p>Type test reports for the above tests shall be submitted for the approval of EMPLOYER along with Tender, failing which order may be rejected. Wherever the above mentioned standards and IEC 61850 overlap, the latter will prevail.</p>
28.	Training	<p>Suitable training to be imparted to employer persons on the following items:-</p> <ol style="list-style-type: none"> <li>1. Relay setting and parameterization</li> <li>2. Relay configuration with respect to I/P, O/P and functional block for protection.</li> <li>3. GOOSE configuration.</li> <li>4. Configuration and Interfacing required for third party SCADA System Integration.</li> <li>5. Diagnostic features</li> </ol> <p>The details of syllabus to be finalized with EMPLOYER.</p>
29.	Service Charge for Commissioning Engineer	<p>Firm rate shall be quoted separately for commissioning and integration of Relay with SCADA as per format. This rate shall be valid for three years from due date of submission of tender. However, the above cost will not be considered for evaluation.</p>

Inter-operability test:-

After fulfilment of the above Q.R. inter-operability test of the offered relay (other than Make & Model used in EMPLOYER) with the existing relay in EMPLOYER Network will be tested in EMPLOYER Distribution Testing Department, EMPLOYER for which due intimation for supply of sampled of offered relay will be given to the Manufacturer. The Manufacturer needs to submit the said relay to Distribution Testing Department, EMPLOYER within one week from the said intimation.

The offered relay will only be accepted after fulfilment of above Q.R. & successful inter-operability test at EMPLOYER system.

Checklist for Bill of Material for supply

Sl. No.	Material	
1.	Relay (Model No.)	Qty as per Tender
2.	Lugs suitable for current and control, wiring	Qty as per Tender X Number of TBs in relay + 20% extra
3.	Cable for connection of Relay to laptop(USB port). Along with converter and power supply if required for relay local	10 set
4.	Manual, Hard copy in good quality paper properly bounded	10 set
5.	Copy of Type Test certificate along with manual	With offer
6.	Basic application software for setting change,	10 nos.
7.	CD with software(licensed ) to download disturbance recorder, event log and evaluation of those records	10 nos.
8.	Graphical configuration tool for I/P, O/P and functional building block for protection	10 nos.
9.	Any other software required for integration with SCADA.	10 nos.

N.B All the above tools/ Software should be compatible to WINDOWS XP/WINDOWS NT/WINDOWS 7 Operating System.

ANNEXURE-II

Technical specification for IEC 61850 compliant Directional O/C and E/F Relay

Sl. No	Feature and Function	Technical requirement
1	Purpose and application	<p>It is intended to automate the Switchgears specified in the scope of supply and use Communicable Numeric relays for Protection, Control, Metering and Status monitoring. This specification is based on the understanding that an integrated Automation System along with protections shall be provided and same shall have provisions for Integration with SCADA system. All the feeders shall be remote controlled from EMPLOYER's SCADA and from the local console of the numerical relays.</p> <p>Numerical multifunctional combined Microprocessor based Feeder protection and management relay to protect the 33 kV Parallel Feeder from all electrical and other faults along with reporting system, Disturbance record for fault analysis. Manufacturer should comply with any especial requirement or feature asked for retrofitting the relays. Relay should be IEC 61850 compliant. Relay should have 4 CT input, 3 input for O/C and residual E/F protection will be derived internally. One CT input may be used for unbalanced current protection. Relay should have 4 voltage input , 3 input for VT element for directional O/C protection with internally derived residual voltage for E/F protection. Another VT input will be used for residual voltage protection. Relay should have two stage over voltage and under voltage protection.</p>
2	Main Protection Feature for directional O/C & E/F relay.	<ol style="list-style-type: none"> <li>1. Electrical over load protection with selectable IEC curves with two stage, first stage to be used as Definite Time / IDMT and second stage to be used as high set for short circuit protection.</li> <li>2. Earth fault protection in two stages with IEC characteristics. First stage to be used as IDMT/Definite Time and second stage to be used as instantaneous elements. Earth fault element should be suitable for both CBCT and residual type CT connection.</li> <li>3. Negative phase sequence Protection with IEC Curves.</li> <li>4. CB Fail Protection &amp; time settable as per user.</li> <li>5. The relay should be immune to DC switching while carrying</li> </ol>

		<p>current i.e. no spurious trip should be generated if relay DC is made On and Off</p> <p>6. The relay should conform to the IEC255-4 or BS 142 for Inverse time characteristics.</p> <p>7. VT fuse fail detection on NPS current/NPS Voltage or zero sequence current/voltage based logic and blocking of under voltage protection by VT fuse fail detection.</p> <p>8. Three phase VT fuses fail detection on current based logic.</p> <p>9. The relay should have features to monitor for broken conductor and CB opening time.</p> <p>10. The relay shall be designed for application in EMPLOYER's distribution network where the system is non-effectively earthed through earthing transformer emanating at 33kV bus of 132/33 kV substation.</p> <p>11. Relay should have minimum two group of setting. Setting group changeover required from digital status input.</p>
3.	Processor feature	<p>Relay shall be completely Numerical with protective elements having software algorithm based on sampling of analog inputs. Sampling Rate of Analog Signal: The sampling rate should be 1000 Hz for 50 Hz signal or better for each analog channel. Hardware based measurements shall not be acceptable.</p>
4.	Operational Philosophy	<p>The operation of Relay shall be possible from both locally from the Switchgear and remote and Local Work station. The local position shall be displayed in remote / local workstation and remote operation shall be blocked if the switch is in Local. Clear control priorities shall prevent initiation of operation of a single switch at the same time from more than one of the various control levels and there shall be interlocks among various control levels. The priority shall always be with the lowest enabled control level. Relay accuracy shall not be affected by system frequency fluctuation.</p>
5.	Status/Optical Inputs/Digital inputs	<ol style="list-style-type: none"> <li>1. Minimum 7 number status inputs are required</li> <li>2. All status inputs should be 30 V DC/110 V DC (will be mentioned during detailed Engineering as per requirement)</li> <li>3. Setting group is required to be changed with any Digital input status.</li> <li>4. Trip circuit supervision with DI status</li> <li>5. The digital inputs shall be acquired by exception with 1ms resolution. Contact bouncing in digital inputs shall not be assumed as change of state.</li> <li>6. Relay should have comprehensive self diagnostic feature with remote indication of relay failure and alarm shall be generated without tripping of circuit</li> <li>7. Provision of Testing output relays without any current injection.</li> <li>8. No. of programmable LEDs- at least 4 nos. with latching option.</li> </ol>

6.	Main measuring and reporting feature	<p>All measurements should be in primary quantities. Minimum following displays are required in alpha numeric:-</p> <ol style="list-style-type: none"> <li>1. Three phase (Positive sequence) current, Three phase voltage</li> <li>2. Neutral (zero sequence) current, MW, MVAR, Frequency, Pf, MVA etc.</li> <li>3. All the trips should have clear indication on the relay terminals</li> <li>4. Resetting should be selectable as hand reset or auto reset.</li> </ol>
7.	Memory and Recording Feature	<ol style="list-style-type: none"> <li>1. The relay setting and programming should be stored in EEPROM so that during Aux. Power failure the said data is not lost.</li> <li>2. Relay should have event log, trip log and DR record. All logs should go in to history.</li> <li>3. All tripping of relay should initiate DR in auto without extra binary input. Triggering of DR with binary input should be user configurable.</li> <li>4. The last 2 fault DR records should be in flash memory and DR will not erase in case of DC supply fail for more than 2 days.</li> <li>5. Should be able to record at least 5 Oscillographic disturbances and 5 fault records and 250 event records.</li> <li>6. Minimum Four no. of latest trip log with cause of trip should be stored in memory along with date and time stamping. The memory should not be lost with the switching off of DC.</li> <li>7. The relay should have fault-recording feature with current waveform and Digital Input status. The fault waveform should consist of minimum four current waveforms of three phase current and zero sequence current and DI status. Triggering time for Pre and Post should have user selectable. This record should be in flash memory for minimum 7 days even after switching off the DC supply.</li> <li>8. The fault should be date and time stamped.</li> <li>9. Communication protocol IEC 61850.</li> </ol>
8.	Auxiliary Supply	<p>30 V or 110 VDC (will be mentioned during detailed Engineering as per requirement) to - 25% to + 10%, 2 wire unearthed system. Necessary software shall be in-built for proper shutdown and restart in case of power failure. Auxiliary supply burden will be around 20Watt.</p>
9.	Rated CT/PT secondary	<p>5/1 Amp(site selectable) , CTs used to be protection class. 3PT input rated 110 Volt (L-L)</p>
10.	Rated frequency	<p>50 HZ +/- 5%</p>

11.	Ambient condition	<ol style="list-style-type: none"> <li>1. Operating ambient temperature up to 55 Deg C</li> <li>2. Operating Humidity up to 100 %</li> <li>3. Relay shall meet the requirement for withstanding electromagnetic interference according to relevant parts of IEC 61850. Failure of single component within the equipment shall neither cause unwanted operation nor lead to a complete system breakdown.</li> </ol>
12.	Module and Mounting	<ol style="list-style-type: none"> <li>1. Relay should be flush mounted type</li> <li>2. If module is draw out type then it should have CT shorting facility of make before break type.</li> <li>3. Mounting in switchgears located in non AC rooms.</li> <li>4. Galvanic isolation between field connection and relay hardware should be there.</li> </ol>
13.	Watchdog and self monitoring	<p>The relay should have facility to monitor the healthiness of its circuits and components by own monitoring system. In case of any problems, the alarm should be generated by one of the output contacts. The alarm as soft signal to be sent to SCADA system as well. Necessary support documentation explaining the self diagnostic feature shall be furnished. Watch dog contact shall be provided in addition to required 7BI and 7 BO.</p>
14.	Settings	<p>Approximate settings possible should be as follows:-</p> <ol style="list-style-type: none"> <li>1. Nominal Feeder current 2% to 110 %</li> <li>2. CT Ratio setting 10-1000(approx.)</li> <li>3. Earth fault current 5 to 40% with time delay IEC Curves, 2<sup>nd</sup> stage for instantaneous trip(less than 50 ms)</li> <li>4. Over current trip- 50% to 200% of 1/5 Amp with time delays as per IEC Curves.</li> <li>5. High set with delay 200% to 2000%</li> <li>6. IEC Curves for all O/C and E/F have user selectable.</li> <li>7. Selectable MTA for Directional features for O/C relay should cover 1<sup>st</sup> quadrant for effectively grounded system/ impedance grounded system/solid grounded system.</li> </ol>



15.	Output Relays	<p>Minimum 7 number output relays are required out of which</p> <ol style="list-style-type: none"> <li>1. One potential free change over contact should be provided for start inhibit of relay.</li> <li>2. All o/p contact should be freely programmable.</li> <li>3. Rating of trip contacts:-             <ol style="list-style-type: none"> <li>a) Contact durability &gt; 10K operation</li> <li>b) 15 Amp make and carry for 3 sec for trip contact</li> <li>c) Make and carry for trip contacts L/R &lt;= 40ms</li> <li>d) 8 Amp make and carry continuously for 5 sec.</li> </ol> </li> </ol> <p>Rating of Alarm contacts:-</p> <p>Testing of Output relays through keypad on relay fascia and relay HMI software. Output relay dwell time shall be user programmable or fixed at 100ms.</p>
16.	Relay software and Man Machine Interface	<ol style="list-style-type: none"> <li>1. The relay should have native IEC 61850 Communication Protocol.</li> <li>2. Should have password protected key padlock.</li> <li>3. Necessary software for relay setting, retrieving DR, event log, trip log, and downloading waveform should be supplied by the Manufacturer. Necessary License is to be issued for EMPLOYER, if required.</li> <li>4. Manufacturer has to supply communication hardware for relay setting, DR downloading from front port. This device should be compatible to USB/Ethernet port.</li> <li>5. It shall be possible to transfer the data stored in the DFR to computer on IEEE/COMTRADE format. The data format shall be compatible for dynamic protection relay testing on relay test kit. COMTRADE Data viewer software is to be provided.</li> <li>6. Multiuser/Corporate license for installation on minimum 7 nos. of PCs.</li> </ol>
17.	Date and time	<p>Date and Time stamping with faults and record. The clock should be powered from internal cell and should not required setting after every DC switching. The internal cell life minimum 5 years. Time synchronization by IRIG-B or SNTP. For time synchronization through SNTP is to be provided from clock signal coming from RTU. In case of IRIG-B, time synchronization will be done with GPS clock signal from GPS receiver located at substation.</p>

18.	Lugs and terminators	All CT and PT terminals shall be provided as fixed (screwed) type terminals on the relay to avoid any hazard due to loose connection leading to CT opening or any other loose connection. Necessary amount of lugs should be supplied along with each relay for CT connection and control wiring.
19.	Manuals, Drawings and Literature	<ol style="list-style-type: none"> <li>1. The relays should be supplied with manuals with all technical and operating instructions.</li> <li>2. All the internal drawings indicating the logics and block diagram details explaining principle of operation should be given at the time of supply.</li> <li>3. Mapping details shall be submitted in IEC format.</li> </ol>
20.	Standard documentation per Relay, according to IEC 61850	<ol style="list-style-type: none"> <li>1. MICS document (model implementation conformance statement)</li> <li>2. PICS(protocol implementation conformance statement)</li> <li>3. Conformance Test certificate from KEMA/CPRI.</li> <li>4. PIXIT document</li> </ol> <p style="margin-left: 20px;">All the above mentioned certificates shall be submitted along with Order copy</p> <ol style="list-style-type: none"> <li>5. ICD file</li> <li>6. SCD file</li> </ol>
21.	Extendibility in Future	The Manufacturer shall provide all necessary software tools along with source codes to perform addition of bays in future and complete integration with SCADA by the User. These software tools shall be able to configure relay, add analog variable, alarm list, event list, modify interlocking logics etc. for additional bays/ equipments which shall be added in future.
22.	Lifespan	<p>The supplier should mention following:-</p> <ol style="list-style-type: none"> <li>1. Product maturity: The Manufacturer should mention the time period for which the product is in the market</li> <li>2. Expected production life</li> <li>3. Hardware/Firmware change notification process. Upgrades to be provided free of cost within the Guarantee period/5 years whichever is later, if needed.</li> <li>4. Lifespan of standard tools and processes for relay configuration, querying and integration.</li> </ol>

23.	Standards	<p>The relay should conform to the IEC255-5 or equivalent BS / ANSI for following:-</p> <ol style="list-style-type: none"> <li>1. Overload withstand test</li> <li>2. Dielectric withstand: 2kV in common, 1 kV in differential mode</li> <li>3. Impulse Voltage: 5kV in common, 1kV in differential mode</li> <li>4. Insulation resistance &gt; 100 M ohm</li> <li>5. Vibration: Shock and bump and Seismic</li> <li>6. Storing and transportation</li> <li>7. Radio Interference: IEC 61000 for high frequency disturbance, Transient disturbance, Electrostatic discharge</li> <li>8. KEMA/CPRI Certification for the particular model offered with respect to IEC61850 Protocol</li> </ol>
24.	Communication Port	<ol style="list-style-type: none"> <li>1. Two nos. IEC 61850 protocol compliant Ethernet RJ45/F.O port for communication with SCADA system through two managed Ethernet Switches operating in redundant mode. The communication shall be made in 1+1 mode between individual IED to Switch, such that failure of one set of LAN shall not affect the normal operation of SCADA. However, it shall be alarmed in SCADA.</li> <li>2. Functioning of Relay shall not hamper to fault occurring any interconnected relay.</li> <li>3. One Front port Ethernet RJ45/USB 2.0 for relay parameterization and configuration etc. with the help of PC. In case RS-232 port offered, suitable interfacing cable with one end having RS 232 port and other end USB 2.0 to be provided to connect with PC free of cost.</li> <li>4. Relay should generate GOOSE message as per IEC 61850 standard for interlocking and also ensure interoperability with third party relays.</li> </ol>
25.	Name Plate and marking	<p>Each IED shall be clearly marked with manufacturer's Name, type, serial no. and electrical rating data. Name plates shall be made of anodized aluminium with white engraving on black surface.</p>
26.	Performance Guarantee	<p>Relays will be guaranteed for the period of five years from the date of last dispatch. Any problem in the said period should be attended free of charge inclusive of repair/replacement of relays/ component (both H/W, S/W).</p>

27.	Type Test	<ul style="list-style-type: none"> <li>• Dielectric Withstand Test—IEC 60255-5</li> <li>• High Voltage Impulse Test, class III --- IEC 60255-5(5kV peak, 1.2/50 micro Sec;3 Positive and 3 negative shots at interval of 5 Sec.)</li> <li>• DC Supply Interruption ---- IEC 60255-11</li> <li>• AC Ripple on DC supply ---- IEC 60255-11</li> <li>• Voltage Dips and Short Interruptions --- IEC 61000-4-11</li> <li>• High frequency Disturbance ---- IEC 60255-22-1, Class III</li> <li>• Fast Transient Disturbance ---- IEC 60255-22-4, Class-IV</li> <li>• Surge withstand capability ---- IEEE/ANSI C 37.90.1(1989)</li> <li>• Degree of Protection</li> <li>• Electromagnetic compatibility</li> <li>• Mechanical stress/vibration test</li> <li>• Temperature withstand</li> </ul> <p>Type test reports for the above tests shall be submitted for the approval of EMPLOYER along with Tender. Wherever the above mentioned standards and IEC 61850 overlap, the latter will prevail.</p>
28.	Training	<p>Suitable training to be imparted to employer's persons on the following items:-</p> <ol style="list-style-type: none"> <li>1. Relay setting and parameterization</li> <li>2. Relay configuration with respect to I/P, O/P and functional block for protection.</li> <li>3. GOOSE configuration.</li> <li>4. Configuration and Interfacing required for third party SCADA System Integration.</li> <li>5. Diagnostic features</li> </ol>
29.	Service Charge for Commissioning Engineer	<p>Firm rate shall be quoted separately for commissioning and integration of Relay with SCADA as per format. This rate shall be valid for three years from due date of submission of tender. However, the above cost will not be considered for evaluation.</p>

30.	Credential as pre-requisite of Tender	<p>1. Copies of performance certificate for two years successful operation as on the due date of bid opening for the offered relay in respect to implementation of IEC 61850 protocol to any SCADA/substation automation system from reputed Power Sector Utility in India shall have to be furnished along with the Bid. Copies of Purchase Orders and corresponding Delivery Challans /Stores Receipt vouchers/ Excise Duty Invoice, etc., i.e. Proof of Execution of the Purchase Orders.</p> <p>OR</p> <p>Successful testing and operation of minimum one year in EMPLOYER network..</p> <p>2. Documentary evidence for being manufacturers like registration Certificate issued by SSI/NSIC/Directorate of Industries/DGS&amp;D, etc. for Qualifying requirement.</p> <p>3. The manufacturer should have testing facilities of all functional tests or should have arrangement of all functional tests at government approved testing laboratories.</p> <p><u>Inter-operability test:-</u></p> <p>After fulfilment of the above Q.R. inter-operability test of the offered relay (other than Make &amp; Model used in EMPLOYER) with the existing relay in EMPLOYER Network will be tested in EMPLOYER Distribution Testing Department, EMPLOYER for which due intimation for supply of sampled of offered relay will be given to the Manufacturer. The Manufacturer needs to submit the said relay to Distribution Testing Department, EMPLOYER within one week from the said intimation.</p>
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Checklist for Bill of Material for supply

Sl. No.	Material	
1.	Relay (Model No.)	Qty as per Tender
2.	Lugs suitable for current and control, wiring	Qty as per Tender X Number of TBs in relay + 20% extra.
3.	Cable for connection of Relay to laptop(USB port). Along with converter and power supply if required for relay local setting	10 set
4.	Manual, Hard copy in good quality paper properly bounded	10 set
5.	Copy of Type Test certificate along with manual	With offer
6.	Basic application software for setting change,	10 nos.
7.	CD with software(licensed ) to download disturbance recorder, event log and evaluation of those records	10 nos.
8.	Graphical configuration tool for I/P, O/P and functional building block for protection	10 nos.
9.	Any other software required for integration with SCADA.	10 nos.

N.B All the above tools/ Software should be compatible to WINDOWS XP/WINDOWS NT/WINDOWS 7 Operating System.

QUALITY ASSURANCE PLAN (Annexure-III)

The manufacturer shall invariably furnish following information along with his offer.

(1) Statement giving list of important raw materials including but not limited to

- (a) Contact material
- (b) Insulation
- (c) Sealing material
- (d) Contactor, limit switches, etc. in control cabinet.

Name of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials in presence of Manufacturer's representative, copies of test certificates.

2) Information and copies of test certificates as in (i) above in respect of bought out accessories.

3) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

4) Special features provided in the equipment to make it maintenance free.

5) List of testing equipment available with the Manufacturer for final testing and associated combinations vis-à-vis, the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the relevant schedule i.e. schedule of deviations from specified test requirements. The supplier shall, within 15 days from the date of receipt of Purchase Order submit following information to the EMPLOYER :-

- i) List of raw materials as well bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
- ii) Necessary test certificates of the raw material and bought out accessories.
- iii) Quality Assurance Plan (QAP) with hold points for EMPLOYER's inspection. The quality assurance plan and hold points shall be discussed between the EMPLOYER and supplier before the QAP is finalized.
- iv) The supplier shall submit the routine test certificates of bought out items and raw material, at the time of routine testing of the fully assembled Panel.

**Annexure-TS-V**

**LT ACB Panels in two tier conforming to relevant IS/ IEC with upto date amendments.**

1. LT ACB Panels incoming as well as outgoing panels in double tier system are required to be installed in 11/0.433 KV substations, having 1600 KVA/ 1500 KVA/ 1000 KVA transformers. The double tier shall be arranged in such a way that workman can independently work on each breaker without making board or the other tier dead. All these panels shall be suitable for further extension on either side. The operating handles of the circuit breakers shall be at a height convenient for operating by a normal man standing on the floor.
2. These panels shall have ON load isolating/coupling arrangement for coupling with similar panels and boards provided on the respective incomer panels with operation from the front of the switchboard. The couplers shall be same as incoming ACB, but without Ammeter, voltmeter, and connected accessories and without protection release. A locking device shall be provided on the coupler, so that the same cannot be operated (Even by mistake).
3. The system shall be such that coupler below the incomer panel shall energize the bus-bar of adjoining board on either side and there would be no interconnection between the incoming ACB and coupler ACB in the cubicle. The incomer or outgoing panels shall be suitable for further extension on either side.
4. The droppers from main bus bar to coupler shall be of suitable ratings and necessary fish suitable plates etc. shall be provided, for coupling.
5. The LT panel shall be total type test assembly (TTA)
6. The Main bus bar arrangements shall be provided at the top of LT panel. The main bus-bar arrangement in middle of the LT panel shall not be accepted.
7. **THE OTHER REQUIREMENTS ARE AS UNDER: -**
  - 7.1 The Air circuit breakers shall be suitable for following system conditions and shall conform to the requirements of relevant ISS/IEC and their latest amendments and shall be type tested & certified for compliance to standards from CPRI / ERDA / International Test House of repute. Manufacturer shall submit type test report for the combined sequence test.
    - a) Rupturing capacity 35 MVA at 415 Volts RMS i.e. 50 KA (rated service short circuit breaking capacity - Ics)
    - b) Rated Operational Voltage (V)/ Frequency: 415 Volts, 3 phase, 50Hz, 4-wire grounded neutral.
    - c) Rated insulation voltage (Ui): 1000 volts AC
    - d) Ambient temperature: 50 degree Celsius without de-rating.
    - e) Humidity: 80% maximum
    - f) Rated impulse voltage 12 KV for Main circuit
    - g) AUX and power circuit should have double insulation between them.



- h)** Utilization Category: B
- i)** Rated short time with stand current (I<sub>cw</sub>): Minimum 50KA for 1 sec for ACBs(Coupler without marking).

The circuit breakers shall be 3 pole draw out type manually operated stored energy design with modular construction, quick make/break, trip free type. All current carrying parts shall be silver-plated and suitable arcing contacts with proper arc chutes shall be provided to protect the main contacts. Arc-chutes shall be suitable for lifting out for inspection of main and arcing contacts and it should be possible to remove Arc Chutes without using any special tools. Circuit breakers shall be designed to ‘close’ and ‘trip’ without opening the circuit breaker compartment door.

ACB shall be of moulded housing flush front and shall be provided with a trip free manual operating mechanism with mechanical "ON" "OFF" "TRIP" indications. Panels & breaker as supplied should meet at least IP 42 protection. Further, inbuilt CT's for protection are acceptable as they are part of LT ACB.

**7.2 CRADLE**

The cradle shall be so designed and constructed as to permit smooth withdrawal and insertion of the breaker into it. The movements shall be free from jerks, easy to operate and shall be on steel balls/rollers and not on flat surfaces. The ACB shall have distinct and separate Service Position, Test Position and Isolated Position w.r.t. cradle.

**7.3 PROTECTIONS:**

The breaker should be equipped with in built micro-processor based protection release to offer accurate and versatile protections against Over Load, Short Circuit, Instantaneous and Ground faults including External Neutral CTs for Earth Fault sensing in case 3 pole ACBs. The protection release shall have following features and settings:

- 1) The release shall sense true RMS values of current to avoid nuisance tripping during starting of heavy loads.
- 2) Separate fault indication by LED/ LEDs for each type of fault like Overload, Short Circuit, Instantaneous and Earth fault without using any auxiliary supply or battery resulting in faster fault diagnosis and reduced system down time. The release should provide indication of actual %age or absolute value of loading at any instant by LEDs or in case microprocessor, release should have absolute value of fault current. No external LED lamps are to be provided on panels.
- 3) The release shall be self powered and draw its power from the main breaker CTs and shall require no external power supply for its operation. Release should have LCD/ LED Display for current metering.
- 4) The release shall trip the breaker directly without any intermediately coil or with intermediate coil. The release shall also display all electrical parameters.
- 5) The numerical relay shall have 3 over current and earth fault protection.
- 6) Circuit breaker trip unit shall have a display for measurements of current and voltage. It shall have a provision to view last 5 trip cause on trip unit.

**7.4 SAFETY FEATURES**

- I. The safety shutter shall prevent inadvertent contact with isolating contacts when breaker is withdrawn from the Cradle. An automatically operated safety shutter shall be provided inside the breaker, which shall conceal live contacts of ACB housing, when basic ACB unit is withdrawn from SERVICE position on draw out mechanism.

- II. It shall not be possible to interchange two circuit breakers of two different thermal ratings. For Draw-out breakers, an arrangement shall be provided to prevent rating mismatch between breaker and cradle.
- III. For safety of users, interlock should be provided.
- IV. Draw-out breakers should not close unless in distinct Service/Test/Isolated positions.

7.5 Constructions of panels: The panels shall be of robust and compact design to eliminate fire risk and shall comply with the requirements of ISS: 8623/1993 with up to date amendments. It shall be of cubicle design, free standing type and dead front, fully inter locked and easily extensible at site on either sides. The base of panel shall be made out of M.S. channel of suitable size. Adequate provision shall be made for escape of hot gases by providing louvers on the panels. The louvers shall be covered with perforated M.S. sheets and shall be located as to direct the hot gases away from operating personal. The door in front of all ACB's shall be separately provided and these shall not form an integral part of the drawn out portion of the ACB, so that entry of rats and vermins into the panels is not possible, even when the circuit breaker is drawn out. Sheet thickness should be minimum 2mm and powder coating thickness should be minimum 60-70 microns.

- 7.6 Interlocking and Other Arrangements: - Sequence type strain free interlock shall be provided so that:
- i) The ACB shall trip automatically, when it is withdrawn from SERVICE to TEST or TEST to ISOLATED position, if it is in ON position.
  - ii) It shall not be possible for the breaker to be switched ON until it is either in fully INSERTED position or in TEST position or it is in fully ISOLATED position. A positive indication of breaker position shall be provided to be visible, even if the panel door is in CLOSED position.
  - iii) A safety latch shall be provided to ensure that the movement of circuit breakers, as it is withdrawn, is checked before it is completely out of cubicle, thus preventing its accidental fall due to its weight.
  - iv) ACB should preferably have facilities for carrying out maintenance without physically removing the breaker from panels.
  - v) It shall be possible to bring the ACB to SERVICE/TEST/ISOLATED position while panel door is closed.

8. **BUSBAR: -**

Bus bar shall be made of EC grade Aluminium of relevant ISS and of uniform rectangular cross-section throughout the lengths with a suitable current carrying capacity for phase and neutral. Bus bar shall be designed with a suitable current density to take into account temperature rise and magnetic stresses within limits of relevant standards, but in no case it should be more than 1 ampere/square mm.

The size of main busbar should be 2000 Amp and 3000 Amp capacity and control wiring must be fire retardant.

Similarly, the designed rupturing capacity of the bus bars and its chamber shall not be less than 50 kA, (35 MVA minimum 1 sec). The bus bar and other current carrying parts shall be properly supported with DMC/SMC and insulated with shrinkable special grade sleeving and suitable color coded at regular intervals. The bus bar shall be provided in the upper portion of panel.

9. **FISH PLATES:** - The fish plates complete with bolts and nuts (7 no. per panel per cubicle) and nut retaining washer and extension leads of secondary wiring shall be provided to couple with adjacent cubicles on either side. The overlapping of plates on bus shall not less than the width and shall be fixed by 4 Bolts of suitable size on either side with washers. A thin slit near the joint should be provided.
  
10. **AUXILLARY WIRING:** - The auxiliary wiring shall be of copper stranded FRLS with a cross section of not less than 2.5 sq. mm. size with a standard color coding. All out going cables shall be fitted with identification ferrules at each end. Not more than two connections shall be tapped of on any one terminal. All cables shall be neatly bunched and secured to wiring cradles. Separate terminal blocks with sealing arrangements shall be provided for metering, CT & KWH meter. A terminal block with spare capacity shall be provided for wiring.
  
11. **SELECTOR SWITCH:** - 4 way selector switch shall be provided for Ammeters and 6/7 way selector switch for Voltmeter to indicate the current of all three phases and voltage of phases and lines and OFF position, respectively.
  
12. **INSTRUMENTS:** - All Ammeters and voltmeters should be square in shape, flush mounting types of 96x96mm. They shall be accommodated so as to be easily accessible for testing and maintenance without any damage or accidental contact with any live parts of the circuit breaker or bus bar connectors. Protection MCBs shall be provided for all instruments.
  
13. **INDICATING LAMPS:** - LED Indicating lamps Red and Green shall be provided for ON-OFF indication of ACB, LED indicating lamps, 250 volts having sufficient glow to be identified in day light shall be provided for overload and short circuit trip indications, Suitable Mechanical indication for SERVICE, TEST, ISOLATED POSITION shall also be provided for visual indication, even when the ACB door is in closed position.
  
14. **EARTHING:** - Aluminium flat of 50x6mm size with suitable fishplates, nuts & bolts and suitable provision for incoming panels shall be provided for connecting to substation earth. The flat shall run through the entire length of each panel.

#### OTHER SPECIFICATIONS AND QUANTITIES

- 1) Specifications for incoming panel of 2500 Amps 3 Pole ACB with coupler of 2500 Amps and outgoing panel of 800 Amp. 3 pole ACB, with protection release in top and bottom tiers having Bus Bar rating 3000 Amps.
  - a) Incoming Panel (Top tier)-ACB with protection release.
    - i) Rating 2500 amp
    - ii) CT for metering and instruments: 2500/5 amp, or near capacity as per relevant ISS.
    - iii) No. of CTs. 3 no. for protection and 3 no. for metering.

- iv) Instrument: Ammeter and Voltmeter
  - v) Provision for Bus connection: Suitable for connection to bus ducts from the top.
  - vi) Arrangement and burden of CTs: As per manufactures design for Protection and Metering.
  - b) Bus coupler on load (On bottom tier). ACB without protection release.**
    - i) Rating 2500 amp
  - c) Outgoing panel (Top & Bottom tier) -
    - i) Rating 800 amperes
    - ii) CT for metering and instruments: 800/5 amperes or near capacity as per relevant ISS.
    - iii) No. of CTs. 3 no. for protection and 3 no. for metering.
    - iv) Instruments: Ammeter
    - v) Cable termination along with 8 no. Aluminium lugs and Brass glands 2 no.: Suitable for 2 no. XLPE cables of 400 sq.mm/3.5 cores.
    - vi) Arrangement and burden of CTs: As per manufacturers design for Protection and Metering.
    - vii) Provision shall be made for rising mains.
- 2) Specifications for incoming panel of 1600 Amps 3 Pole ACB with coupler of 1600 Amps and outgoing panel of 800 Amp. 3 pole ACB, with protection release in top and bottom tiers having Bus Bar rating 2000 Amps.
- a) Incoming Panel (Top tier)-ACB with protection release.**
    - i) Rating 1600amp
    - ii) CT for metering and instruments: 1600/5 amp or near capacity as per relevant ISS.
    - iii) No. of CTs. 3 no. for protection and 3 no. for metering.
    - iv) Instrument: Ammeter and Voltmeter
    - v) Provision for Bus connection: Suitable for connection to bus ducts from the top.
    - vi) Arrangement and burden of CTs: As per manufactures design for Protection and Metering.
  - b) Bus coupler on load (On bottom tier). ACB without protection release.**
    - i) Rating 1600 amp
  - c) Outgoing panel (Top & Bottom tier)
    - i) Rating 800 amperes
    - ii) CT for metering and instruments: 800/5 amperes or near capacity as per relevant ISS.
    - iii) No. of CTs. 3 no. for protection and 3 no. for metering.
    - iv) Instruments: Ammeter
    - v) Cable termination along with 8 no. Aluminium lugs and Brass glands 2 no.: Suitable for 2 no. XLPE cables of 400 sq.mm/3.5 cores.
    - vi) Arrangement and burden of CTs: As per manufacturers design for Protection and Metering.
    - vii) Provision shall be made for rising mains.

Other specifications and conditions

1. There should be a single line diagram with red colored tape on the front of panel.
2. The bus coupler ACB used with the panel should be suitable for ON-LOAD operation.
3. In off position the doors of panel of all ACBs should remain closed.
4. Suitable inscription plates shall be provided.
5. Space for connecting cable in incoming and outgoing panels should be adequate.
6. Suitable Aluminium (crimp able) lugs of 400mm sq. cable shall be provided with the outgoing panels.
7. 2 set of detailed drawings showing dimensions, wiring diagram and constructional details for each type of panel along with bill of material to be enclosed along with offer.
8. The Aluminium bus bars in LT ACB panels should be on top and in vertical formation.
9. S.No. and Year of manufacturer of panel should be indicated on the panel.
10. Suitable holes with Rag bolts should be provided for grouting the panel.
11. Panel to panel, there should be proper segregation to avoid traveling of smoke/ Carbon particles during the fault conditions.
12. Suitable arrangement should be provided for fixing the body of one panel to other while coupling.
13. Superior quality NEOPRINE gaskets should be used for each kind of opening of panels and the gaskets provided should be with proper and secure fixing arrangement.
14. Any extra cost of part/ component should be invariably mentioned in the price bids and not in the technical specifications. Also, the successful bidder should have to provide list of spare along with prices.
15. Arrangement for fixing the energy meter i.e. wiring, cubicles terminal block and window shall be made on incoming panels and outgoing panels.
16. The makes of CT's meters, selector switches, protection fuses, indicating lamps and cable lug shall be as per makes of the manufacturer of ACB or from the following.

CT (resin cast) for metering	:	AE, Kappa, Meltak, Matrix or of the same make as ACB
Digital Meter	:	AE, Rishab, Schneider, Secure or of the same make as ACB
Selector switch	:	Kaycee, Salzer, Vaishno ,Schneider or of the same make as ACB
Protection MCBs	:	Standard, Havells, Siemens, Control & switchgear, Schneider, ABB , L&T or of the same make as ACB
Cable lugs	:	Dowels, Ismail, Jainson or of the same make as ACB

17. The panels should be electro statically powder coated with light Grey shade No. 631.
18. The top cover of each panel should be detachable type for easy accessibility to bus bars and the same should be fixed properly with superior quality Neoprine gasket and welded nuts.
19. Switching ON/OFF operation of ACB mechanism should be possible from front even if the panel door is in closed position.
20. The top opening in incoming panels should be of size, so that BUS DUCTING box of 600x300mm size can be connected easily on them.
21. Lifting hooks may be provided at the top of panel for loading and unloading the panel.

22. 40-80% or 20-60% earth fault protection should be provided in each O/G panel. However all protection like Overload, Short circuit & Earth Fault may be adjustable type having adjustable time delay settings.
23. The resin cast CTs for earth fault should be of the same make as ACB.
24. The height of bus bar chamber, spacing between bus bars, sequencing of bus bar phases etc should be as per NDMC drawings enclosed.
25. The drawings submitted by the L-I bidder should be authenticated by the respective OEM of ACB.
26. The defect liability period shall be sixty (60) months from the date of Taking Over /completion of Facilities (or any part thereof) along with back to back guarantee of same period for LT ACBs from OEM of ACBs.
27. Terminal adapter should be provided on input and output.
28. The bidders should provide 10 years periodic maintenance schedule.

**Annexure-TS-VI**

**12.65 KV, 7.2 MVAR (11 KV, 5.45MVAR) AUTO SWITCHED CAPACITOR BANK CUBICLE TYPE**

**1.1 SCOPE OF SUPPLY**

- a. This specification covers the design, manufacturing, testing, supply, erection & commissioning of 7.2 MVAR, 12.65 KV three phase indoor Auto Switched Capacitor Bank with bus bar arrangement at site for outdoor/indoor installation on panel including but not limited to 0.2% series reactors, capacitor switch/contactors, Isolator cum earth switch, LA, HT fuses, RVT, Automatic power factor controller and vacuum contactors and all necessary equipment for auto switching.
- b. This specification shall be used in conjunction with all specifications, data sheets, single line diagrams, and other drawings attached to the tender.

**2.0 CODES & STANDARDS**

Indian Electricity Rules	
Indian electricity act	
CBIP manual	
IS 13925 part 1,2 & 3	Shunt capacitors above rated voltage 1000v
IS 11298 part 3	Plastic films for capacitors
IS 9921-1985	Isolator
IS 5553	Series reactor
IS 2099	Bushings for voltages above 1000v
IS 12672	Internal fuses & disconnectors for shunt capacitors
IS 2705	Current transformers
IS 13067	Impregnant for power capacitors
IS5	Color of mixed paints
IS 15086	Surge arrester
IS 3070 (Pt 3)	Surge arrester
IS 2629	Recommended practice for Hot dip galvanizing of steel
IS 4759	Hot dip Zinc coating on Steel structures and other allied products
IEC 60871	Shunt capacitors for AC power Systems

IEC 61000	Automatic Power Factor Controller
IS 9920-2002	Vacuum Contactors/Capacitor Switch

### 3.0 SERVICE CONDITIONS

3.1	Max Ambient Temperature	50 deg C
3.2	Max Daily average ambient temp	40 deg C
3.3	Min Ambient Temp	0 deg C
3.4	Maximum Humidity	95%
3.5	Minimum Humidity	10%
3.6	Maximum annual rainfall	750 mm
3.7	Average no of rainy days per annum	60
3.8	Rainy months	June to Oct
3.9	Altitude above MSL	300 M
3.10	Seismic Zone	IV

### 4.0 CAPACITOR BANK

4.1	Capacitor Scheme	3 Phase, 7.2MVAR @ 12.65 KV, Single star connected.
4.2	Switching	Auto switched in Four steps of 1.8 MVAR. Auto switching will be controlled by APFC relay panel.
4.3	Service location	Suitable for Indoor / Outdoor use
4.4	Connection	Single Star with solid connection
4.5	Residual Voltage transformer (RVT)	Placed into each step
4.6	HT capacitor bank assembly	a. Individual single phase capacitor units mounted on steel stand / rack & connected externally by sleeved flexible copper connectors to form Single star. b. Sleeves to be Red, Yellow, Blue, & Black in colour.
4.7	Interchangeability	Between various single phase capacitor units without disturbing other units
4.8	Enclosure size	To be provided by vendor
4.9	External hardware for HT capacitor bank enclosure (nuts/bolts/handles)	Stainless steel



4.10	Series Reactor	Each Capacitor bank shall be provided with 0.2% series air cored reactor.
4.11	Rated current	The reactor shall be rated for 130% continuous current. The short time rating shall be 16 times the normal current for 2 sec.
4.13	GA drawing	Manufacturer shall submit the G.A. Drawings for Capacitor Bank with mounting of series reactor inside the bank.

## 5.0 COMPLETE ENCLOSURE FOR CAPACITOR BANK

5.1	<b>For Indoor Panel Installation</b>	All the equipments shall be enclosed in the Cubical panel. Panel shall have IP55 Canopy shall be provided over all the panels. Thickness of panel shall be 2.5mm
5.2		There shall be one incomer panel for Isolator and LA. All other panels shall be each of 1.8Mvar. Total 7.2Mvar.
5.3	Bus bar material	Tinned copper
5.4	Bus bar arrangement	Suitable for outdoor termination of HT cable size up to 3C x 400sqmm for each phase
5.5	Indications on panel Front door	
5.6		Breaker ON
5.7		Breaker Off
5.8		Breaker Trip
5.9		Capacitor Bank ON
5.10		Capacitor Bank OFF

## 6.0 SINGLE PHASE CAPACITOR UNIT

6.1	Single phase capacitor unit	Totally enclosed, leak proof, dust proof suitable for outdoor application, comprising individual capacitor elements connected in series & parallel groups. Continuous operating current shall be minimum 1.43 times to max. 1.65 times as per clause 6.2 of IS 13925.
6.2	Capacitor unit size	Preferred size is 300kVAR, however higher unit sizes may be considered if the space availability at site is scarce
6.3	Capacitor element	Developed from alternate layers of conducting metal foil & dielectric film

6.4	Conducting layer material	Aluminum foil
6.5	Dielectric material	Hazy Poly Propylene (APP), Double layer minimum
6.6	Cooling	Natural air
6.7	Impregnating liquid	Non PCB(Poly chlorinated Biphenyl), less toxic, with low bio-accumulation and bio-degradable liquid filled under vacuum
6.8	Capacitor unit enclosure	Fabricated from sheet metal CRCA steel of thickness 2mm minimum, hermetically sealed & hydraulically tested
6.9	Discharge device	For each single phase capacitor unit

6.10	External fuse	<p>Each capacitor element shall be protected by External HRC fuse of suitable rating and interruption capacity so that a faulty capacitor element shall be disconnected by fuse. The fuse shall satisfactorily operate under ambient conditions. The following requirements shall be considered while selecting the right size of fuse.</p> <p>a. Ability to withstand the maximum discharge current from healthy capacitor element.</p> <p>b. Capability of handing fault current so as to</p>
6.11	Surge arrestor	Gap less metal oxide type
6.12	Rated voltage	9kV
6.13	Maximum continuous operating voltage	7.65kV
6.14	Discharge current	5kA

## 7.0 RESIDUAL VOLTAGE TRANSFORMER

7.1	Residual Voltage Transformer	For Indoor application, Dry Type (Cast Resin)
7.2	Voltage class	Suitable for system rated voltage
7.3	Ratio	11 KV /R3/110/R3-190/3V
7.4	Accuracy class	0.5 & 3P
7.5	Burden	15VA / 15VA
7.6	Material	Cast resin

7.7	Mounting	near capacitor unit steel stand
7.8	Terminal marking	To be provided on RVT enclosure

## 8.0 LIGHTNING ARRESTER

8.1	Installation	Outddoor/Indoor
8.2	Type	Metal Oxide
8.3	Arrestor Rating	9kV (rms)
8.4	Maximum continuous operating voltage	7.65kV (rms)
8.5	Nominal Discharge current	10kA
8.6	Class	Station Class III

## 9.0 VACUUM CONTACTOR/SWITCH FOR AUTO SWITCHING

9.1	Rated Voltages	11 KV
9.2	Rated Continuous Current	200 Amp.
9.3	Rated Capacitor Switching Current	100 Amp.
9.4	Frequency	50 Hz
9.5	Control supply	230 V Single phase AC supply
9.6	Type	Vacuum
9.7	Installation	Outdoor / Indoor
9.8	Mechanical Endurance	10,000 operations (minimum)

## 10.0 SERIES REACTOR

10.1	Series Reactor	Parallel switching of one Capacitor Step with another two Capacitor Step in service
10.2	Series reactor continuous rating	0.2% of each 1.8 Mvar step
10.3	Series reactor rated voltage	Same as capacitor bank rated voltage
10.4	Series reactor rated frequency	50Hz

10.5	Series reactor single phase unit connections	Connected between single phase capacitor units and neutral star point
10.6	Series reactor type	Dry type with air natural cooling
10.7	Series reactor power frequency withstand voltage	28 KV
10.8	Series reactor lightening impulse withstand voltage	75 KV
10.9	Series reactor short time withstand current rating for 3 seconds	16 times capacitor rated current at 130% rated voltage

**11.0 AUTOMATIC CONTROL UNIT**

11.1	<b>General Construction Requirements of Automatic Control Unit</b>	<p>The Automatic control unit shall be provided inside the control room to continuously monitor power factor on secondary side of the transformer and shall automatically switch ON or switch OFF the capacitor banks through the operation of 12Kv Capacitor switch. Overriding provision shall also be made for electrical switching ON &amp; OFF of the capacitor switch by the operator from the ACU control box.</p> <p>The switching ON operation will take place after period of 10 minutes. The switching OFF operation of relevant steps will be instantaneous.</p>
11.2		<p>The ACU shall instantly switch OFF the incomer VCB of capacitor bank in the following contingencies occurring in any of the phases.</p>
		<ul style="list-style-type: none"> <li>a) Voltage increased by 10% above the rated voltage of 11Kv.</li> <li>b) Power transformer current impedance between any of the two phases exceeding 20% of the lowest.</li> <li>c) Current increase in any capacitor unit by 30% above the rated current ( only relevant capacitor switch will open)</li> <li>d) Current between any of the two phases of the capacitor bank differs</li> </ul>

11.3		<p>A suitable display should be provided to indicate the capacitor current in each phases of the complete capacitor bank on the ACU panel inside the control room. Indications shall be provided to indicate ON &amp; OFF status of each capacitor bank.</p> <p>ACU Should be SCADA Compatible.</p> <p>The DC control Voltage for operation of the ACU shall be taken from substation DCDB. The required control voltage shall be either 50VDC or 220VDC.</p>
11.4		<p>Besides in-built protection against lines surges and transient over voltages, suitable fuses/MCB shall be provided for protection against overcurrent. The ACU shall remain fully functional during and after line surges and transient over voltage.</p> <p>Except for the terminal, the ACU shall be enclosed in a suitable casing so as to avoid ingress of dust and should be IP54.</p>

## 12.0 ISOLATOR

12.1	Installation	Mounted in Capacitor Panel
12.2	Rated Voltage	11 KV
12.3	Type	off load type with earth switch. Mechanical interlock should be provided between isolator and earth switch.
12.4	Operation Type	Manual
12.5	Creepage Distance	31mm/kV

## 13.0 PERFORMANCE

13.1	Over voltage operation	as per IS 13925 part1
13.2	Over current operation	as per IS 13925 part1
13.3	Operating temperature category	+5/C as per IS 13925 part1

13.4	Discharge characteristic as per IS 13925 part1	a. Each capacitor single phase unit residual voltage after disconnection from mains supply shall be 50V (maximum) within 10 minutes b. Capacitor bank residual voltage after disconnection from mains supply shall be
13.5	Power loss and tangent of Loss angle (tan )	To be specified by manufacturer as per IS 13925 part1

## 14.0 LABELS & FINISH

14.1	Rating plate for HT Capacitor bank	
	Material	Anodized aluminum 16SWG
14.2	Background	Satin silver
14.3	Letters, diagram & border	Black
14.4	Process	etching
14.5	Bank Name plate details	Mfg name, Mfg Sr. No., Month & year of Mfg, equipment type, total output rating, Bank Capacitance in $\mu$ F, Bank watt losses, Owner name & order number, Temp. category, connection diagram, Guarantee period.
14.6	Unit Name plate details	Mfg name, Mfg Sr. No., Month & year of Mfg, equipment type, total output rating, unit Capacitance in $\mu$ F, unit watt losses, Temp. category, Discharge device rating, connection diagram, Owner name & order number, Guarantee period, unit wt. in kG,
14.7	Danger plate on front & rear side of wired mesh enclosure	Anodized aluminum with white letters on red background
14.8	Painting - Capacitor single phase unit	
14.9	Surface preparation	Shot blasting or chemical 7 tank process
14.10	External finish	Powder coated pure-polyester base Mat finish, shade– Siemens Gray RAL 7032, uniform thickness 50 microns minimum

## 15.0 INSPECTION & TESTING

15.1	Type test	All Equipments of type tested quality only, type test certificate to be submitted along with offer. Test Report not be before 5 years.
15.2	Routine test	As per relevant Indian standard

15.3	Acceptance test as per IS	To be performed in presence of Owner at manufacturer works, as per relevant Indian standard along with BOM.
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## 18.0 GUARANTEED TECHNICAL PARTICULARS

S.No.	Description	Compliance
1	Manufacturer equipment type/make	
2	Conformance to design standards as per specification Yes/No	
	- Capacitor Unit	
	- Series Reactor	
	- LA	
	- Isolator	
	- RVT	
3	Conformance to capacitor design requirements as per specification clause no.3.0 to 7.0 - Yes/No	
4	Submission of deviation sheet for each specification clause no. -Yes/No	
5	APP type capacitors offered?	
6	Capacitor bank arrangement / scheme conforming to specification?	
7	Capacitor bank ( 3 phase system)	
7.1	Capacitor bank ( Rated capacitance at 50Hz)	
7.2	Capacitor bank rated voltage – 12.65Kv	
7.3	Capacitor bank KVAR at 11kV	
7.4	Capacitor bank KVAR at 12.65kV	
7.5	Capacitor bank line current at rated voltage, continuous operation	
7.6	Designed short circuit withstand capacity for 3sec	
7.7.1	Capacitor bank insulation level at 50Hz	
7.7.2	Capacitor bank impulse voltage withstand	
7.8	One spare single phase capacitor unit offered?	

<b>8</b>	<b>Capacitor single phase unit</b>	
8.1	Capacitor single unit capacitance at 50Hz	
8.2	Capacitor single unit rated operating voltage	
8.3	Capacitor KVAR ( at rated voltage )	
8.4	Capacitor single unit continuous operating rated current	
8.5	Designed short circuit withstand capacity of single capacitor unit for 3sec	
8.6	Capacitor unit temperature category ( required +5/ C)	
<b>9</b>	<b>Single capacitor unit construction</b>	
9.1	Enclosure sheet metal CRCA	
9.2	Enclosure sheet metal thickness in mm	
9.3	Hermetic sealing method (pressure welding/gas welding/sealant/ if any other pl. specify)	
9.4	Dimensions of a single capacitor unit	
	Height	
	Length	
	Width	
9.5	Weight of a single capacitor unit	
9.6	Single capacitor unit bushings	
	Type of insulator	
	Creepage distance	
	Clearance between two terminals	
9.7	No. of series group/unit	
9.8	No. of parallel elements/ series group	
9.9	No. of APP layers -double/triple	
9.10	Thickness of APP film	
9.11	Width of APP film	

9.12	Thickness of Al foil	
9.13	Width of Al foil	
9.14	Active width of Al foil	
9.15	Maximum voltage stress per APP layer	
9.16	Element connection method	
9.17	Discharge device	
10	Capacitor bank maximum permissible over voltage	
11	Capacitor power loss at rated voltage	
12	Capacitor tan delta ( Tangent of power loss angle) at maximum operating conditions	
13	Guaranteed temperature rise of capacitor above ambient temperature	
14.1	Type of discharge device – internal resistor	
14.2	Discharge device material	
14.3	Value of discharge device	
14.4	Discharge time required to attain residual voltage equal to 50 volts	
15	Capacitor bank overall dimensions	
	Height x Length x Width	
16	Capacitor bank total weight	
17	Capacitor bank clearances	
	i)Phase to Phase	
	ii)Phase to neutral	
	iii)Phase to earth	
18	Tinned copper Bus bar cross-section in sq. mm	
19	Tinned copper Bus bar continuous rating	
20	Bus bar short time withstand capacity in kA for 3sec	
21	Flexible tinned copper connector rating	

22.1	Bus bar support insulator make & type	
22.2	Bus bar support insulator voltage class	
23	Bus bar provided with insulating sleeve and phase barriers?	
<b>24</b>	<b>Residual Voltage transformer</b>	
24.1	Residual Voltage transformer make	
24.2	Residual Voltage transformer type	
24.3	Cast resin type RVT offered?	
24.4	Residual Voltage transformer ratio	
24.5	Residual Voltage transformer accuracy	
24.6	Residual Voltage transformer rating( 10 & 15VA)	
<b>25</b>	<b>Series Reactor</b>	
25.1	Series reactor make	
25.2	Continuous current rating of series reactor	
25.3	Series reactor kVAr rating per phase per star	
25.4	Series reactor rated voltage	
25.5	Type –dry air cooled	
25.6	Short time withstand current capacity for 3sec ( min 16 times capacitor rated current at 130% rated voltage )	
25.7	Series reactor single phase unit connected between single phase capacitor units and neural star pint	
25.8	Series reactor power frequency withstand voltage 28Kv MIN	
25.9	Series reactor lightening impulse withstand voltage 75kv min	
<b>26</b>	<b>Lightning Arrestor</b>	
26.1	Name of manufacturer	
26.2	Type – Gapless ZnO	

26.3	Rated voltage	
26.4	Nominal Discharge Current	
26.5	Class - III	
26.6	Insulation withstand voltage	
26.7	Creepage distance	
<b>27</b>	<b>Vacuum Contactor / switch for Auto Switching</b>	
27.1	Rated Voltages	
27.2	Rated Continuous Current	
27.3	Rated Capacitor Switching Current	
27.4	Frequency	
27.5	Control supply	
27.6	Type	
27.8	Installation	
27.9	Mechanical Endurance	
<b>28</b>	<b>Isolator</b>	
28.1	Name of manufacturer	
28.2	Isolator ratings	
28.3	Type of operation	
28.4	Type	
28.5	Operating mechanism	
28.6	Voltage rating	
28.7	Rated current	
28.8	No.of poles	
28.9	Rated short time current	
28.10	Type of mounting	

28.11	Construction	
28.12	Earth switch provided	
28.13	Auxiliary contacts provided	
28.14	Electrical interlocks	
28.15	Mechanical interlocks	
28.16	Creepage distance	
28.17	Insulation level - Power frequency withstand Voltage - Impulse withstand voltage	
28.18		
	Terminal arrangement  a) Incoming suitable for b) Outgoing suitable for	
28.19	Overload capacity	
28.20	Control voltage	
29	Name plate and labels as per specification?	
30	Painting of capacitor and mesh enclosure	
30.1	Shade RAL 7032	
30.2	Material – Pure polyester grade A	
30.3	Minimum thickness ( 80 microns )	
<b>31</b>	<b>Automatic Control Unit</b>	
31.1	Installation	
31.2	Ambient Temp.	
31.3	No. of Steps	
31.4	Power Frequency Voltage	
31.5	Control Mode	
31.6	Protection	
31.7	Ingress Protection	

**Annexure-TS-VII****LOW VOLTAGE BUS DUCT****1.0 SCOPE**

Supply, Laying, Testing, and Commissioning of Metal enclosed non-segregated phase bus duct assemblies to be used for incoming connection from the transformers to the L.T Switchboard . The enclosure shall be made of minimum 3mm thick Aluminium alloy. The section of the bus ducts shall be of adequate strength to withstand the internal or external forces resulting from the various operating conditions.

Adopter chamber shall be provided both at switchgear and transformer end. The ducts shall have 3 and ½ bus-bars of 2000 Amps/3000 Amps painted with matt black paint for efficient heat dissipation. The complete arrangement is from the 1,000 kVA/1600 kVA transformers and shall be used for connecting the secondary side of the Station transformers to the incoming ends of the 1600 Amps/2,500 Amps Air Circuit Breaker of the LT Switchboards to be connected from the top. The bus ducts shall be suitable for 433 Volt 3 phase 4 wire system.

- 1.0 The jointing and terminations are included. The bus ducts shall be complete with expansion joints, bends and earthing with 2 runs of aluminium strips etc. as required, conforming to the CPWD specification internal 1994.
- 1.2. Bus duct enclosure in the indoor-portion shall have a degree of protection not less than IP- 52 and that in the outdoor portion shall have degree of protection not less than IP-55 in accordance with IS2147. The top surface of the bus duct enclosure shall be suitably sloped in the horizontal run to prevent retention of water for both indoor and outdoor portion of bus duct.
- 1.3. Temperature rises shall be within the limits specified as per relevant standards. Under normal operating conditions the hot spot temperature of the enclosure shall not exceed the temperature limit desired.
- 1.4. Flange Joint : All enclosure sections shall be joined together by end flanged joint Dust and weather tightness shall be maintained at the joints end by using neoprene / synthetic rubber gaskets. All outdoor joints of the bus duct shall have reliable

arrangement for keeping the bus duct weather proof. The flanges shall be provided with gaskets, nuts, bolts etc.

- 1.5. Provision shall be made for the expansion and contraction of the bus duct due to temperature changes and faults by providing expansion joints for the enclosure/ Busbars.
- 1.6. **Design** shall incorporate features like expansion joints of conductors, disconnection links, provision of wall/floor frame assemblies and seal off plates wherever required.
- 1.7. In lengthy bus duct runs, filter type drain lugs shall be installed at low points along the run of the bus duct to drain out manually any moisture condensing within the bus enclosure.
- 1.8. The bus duct shall not have any through bolts. All nuts and bolts shall be mild steel cadmium plated or zinc passivated. Mild steel spring washers shall be provided for making satisfactory joints. Clamps splice plates etc..shall be provided wherever necessary.
- 1.9. Provision shall be made for periodic inspection of Bus bar supports by means of inspection covers. The inspection covers shall be provided with suitable hardware and shall have gaskets.
- 1.10. An earth bus running along the length of the bus duct and connecting to each bus duct section shall be provided. Necessary earthing arrangement for connecting the earth bus to owner's station earthing bus shall be provided. All accessories and hardware required for earthing arrangement shall be provided by the vendor .Bus enclosure material is made out of 3mm thick Al. alloy sheet conforming to IS-737.
- 1.12. Bus conductor material shall be electrolytic grade of aluminum alloy conforming to relevant Indian standards IS 5082. The section of the bus conductor shall be rectangular. Copper laminated flexible at transformer side and aluminum laminated flexible at switchboard shall be provided.
- 1.13 **Clearances** between phases and phase to earth shall be not less than 25mm.
- 1.14 The bus conductors and insulated support shall withstand the stresses consistent with the specified momentary short circuit current without permanent



deformation, deterioration of conductor material and reduction in the BIL value of the bus duct

- 1.15** The bus conductor shall be designed to carry the rated current under normal site operating conditions without exceeding a hot spot temperature specified elsewhere in the specification. Adjacent sections of the bus conductors shall be bolted to provide efficient, electrically continuous and mechanically strong connections.
- 1.16** The bus conductor shall be given a coat of matt black paint to facilitate heat dissipation.
- 1.17** One no. Silica gel breather assembly on indoor as well as outdoor bus duct shall be provided. Phase cross over chambers shall be provided as per the requirement.
- 1.18** All internal wiring shall be done with 650V/1100V grade FRLS PVC insulated stranded copper cable of at least 2.5 Sq.mm.
- 1.19** Each shipping section shall be identified with a unique tag so as to facilitate correct assembly at site. The same shall be reflected in erection & key diagram to be submitted to purchaser.
- 1.20** Materials of name plate shall be plastic/lamiciod, 3mm thick using white letters on black background.

## **2.0 Painting**

All metal surfaces shall be thoroughly cleaned and degreased to remove mill scale, rust, grease & dirt. The under surface shall be prepared by applying coat of etching primer followed by two coats of synthetic enamel paint of suitable shade as per IS 5. The minimum dry film thickness of the paint on the enclosure exterior surface shall not be less than 40 microns.

Busbars shall be painted with matt black paint for better heat dissipation except at contact surfaces.

## **3.0 Bus support insulators**

The insulators shall be made of FRP/DMC/SMC. The insulators shall

possess sufficient mechanical strength to withstand the forces due to momentary short circuit. The spacing of the bus insulators shall be decided giving due factor of safety. The insulators shall have a high creepage distance and a withstand voltage rating sufficient to provide specified insulation under *highly* humid condition. Wall ceiling shall include FRP seal off plate.

#### **4.0 Bus duct supports**

The supporting structure shall be fabricated from standard steel sections and shall be hot dip galvanized after fabrication to attain required thickness. Supporting structure shall be pre treated as per IS 6005. The supporting structures shall be designed to withstand the dead weight of the bus duct, short circuit forces under maximum fault conditions, wind load and forces due to seismic accelerations. The supporting structures shall include supporting members, brackets, hangers, longitudinal beams, channels, nuts, insulating washers, and all other hardware which are necessary for the erection and support of the entire bus duct installation. All the accessories and hardware of ferrous material shall be hot dip galvanized. Each supporting structure shall be securely connected at two points to the earthing bus. All necessary hardware such as clamps, connectors, etc. required for this purpose shall be furnished by the vendor

#### **5.0 Inspection & Testing**

- a) Below routine & acceptance test shall be carried out at manufacturer works
  - i. Visual / dimensional/general workmanship.
  - ii. I R valve measurement before and after HV test.
  - iii. Power frequency voltage withstand test.

##### **b) Type tests**

Valid type test certificates have to be submitted for review. In case any valid test certificates are not available these tests shall be conducted.

- i. Short time current tests

- ii. Air tightness tests
- iii. Water tightness tests

**Annexure-TS- VIII**

## Battery Charger Unit

### A) Charger

#### 1. SCOPE

This specification cover the design, Manufacturing, assembly, testing at manufacturer's works and supply of battery charger unit and battery bank comprising 15 Nos. 2.0 volt, 100 AH VRLA battery (maintenance free) for providing reliable control supply for HT Switch gear and control system installed in 11 KV/ 415 volt sub- station in NDMC area.

#### 2. STANDARDS

Unless otherwise specified, the equipment shall conform to the latest applicable Indian standards and in particular to the following standards:-

1	IS: 3895	Specification for Rectifier equipment's in general
2	IS: 13947(Part II)	Specification for MCB
3	IS: 1248	Indication instruments
4	IS: 2147	Degree of protection for cubicles
5	IS: 375	Specification for wiring
6	IS: 4540	Mono crystalline semiconductor rectifiers assemblies & equipment
7	IS: 6619	Safety code for semiconductor rectifier equipment
8	IS: 2026	Transformers
9	IS: 4237	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts
10	IS: 4064	Air Break switches and fuse combination units
11	IS: 6005	Code of practice for phosphating of Iron & Steel
12	IS: 5	Colour for ready mix paints

13	IS: 5921	Printed circuit Board
14	IS: 249	Printed circuit Board
15	IS: 5578	Guide for making insulated conductor

The agency shall clearly state the standards to which the equipment offered by him conforms.

3. DRAWING AND LITERATURE

The bidder shall furnish all such drawings, instruction manuals, descriptive literature etc., as may be necessary for the proper understanding of the functioning of the charger.

The write-up should include the following:-

1. Technical specification of the charger.
2. Detailed circuit description of the charger. It should also include the functions of various components, protection circuits/cards, and relays along with their individual brief write-ups/leaflets.
3. List of the main components of the charger.
4. Following details are to be clearly indicated in the circuit diagram:-
  - a. Make and Rating of components used
  - b. All the fuses should be numbered and individual rating should be indicated.

4. GENERAL DESCRIPTION

The Charger shall be of simple design so as to ensure its reliable functioning and ease in maintenance/repairing. Complicated circuitry shall be avoided, as far as possible. The bidder shall indicate, as to how reliable functioning of the charger is achieved. He shall also indicate the quality control adopted for the reliable product.

The battery charging equipment shall comprise of a selenium/solid state silicon rectifier suitable for operation on 230/250 Volt Single Phase AC system. Associated transformer, regulatory resistance, switches etc. shall be accommodated in a sheet steel cubicle arranged for continuous load of 3 Amps. Adjustable from 0 to 3 Amps trickle charge of the battery and manual provision to operate at a higher voltage to recharge the battery of 100 AH capacity quickly at 10 Amp rate.

The equipment shall comprise of:-

1. AC mains switch/MCB 230/250 Volt Single Phase with fuses/MCB
2. Pilot lamp/LED type to indicate AC supply ON.
3. Ballast choke
4. Single Phase Double Wound Transformer for rectifiers
5. Main transformer single phase variac with rough and fine control to charge battery in steps of 6-12, 12-18, 18-24, 24-30, 30-36, 36-42 volts.
6. Full wave bridge connected plate/solid state silicon rectifier
7. Fuses for rectifier output
8. Moving Coil Ammeter 96-mm sq. flush mounting type (0-15 Amps.)
9. Moving Coil Voltmeter 96 mm sq flush mounting type (0-50 Volts)
10. Voltmeter fuses
11. DC ON/OFF switches with fuses.

The sheet steel cubicle of the rectifier unit shall also accommodate the switches for charge rate selection, incoming from battery and various apparatus for battery control.

The chargers should have in-built automatic input voltage stabilizer in the range of 180 volt to 275 volt to facilitate steady output voltage and current from the charger.

#### 5. CABINET

The Cabinet shall be made of sheet steel of not less than 1.5 mm thickness and should be suitable for mounting on a plane surface/floor with ventilation louvers on two sides and finish painted with synthetic enamel paint of white on inside and opeline green on outside. Two coat of zinc primer shall be applied before finishing synthetic enamel paint. The cabinet shall have vermin proof construction. The cabinet legs shall be of adequate height and strength and should provide minimum clearance of 100 mm from ground.

#### 6. FRONT PANEL MOUNTINGS

The following provisions conforming to relevant ISS shall be made on the front panel:

1. Voltmeter to indicate battery/charger DC voltage
2. Voltmeter to indicate incoming AC voltage
3. Ammeter to indicate charging/load current
4. Indicating LEDs to indicate:-
  - a. Supply of power;
  - b. Charger on;
  - c. Input voltage less than 180 Volt
5. Audio/Visual alarm to indicate:-
  - a. Power failure;
  - b. Charger failure;
  - c. Battery disconnection/failure;
  - d. Battery reverse; and
  - e. DC under/Over voltage.

In case of failure of charger on fault, it should give buzzer as well as LED indication. However, the buzzer alarm should be provided with a reset switch. The indicating instruments shall be of class 1.0 accuracy

#### 7. TRANSFORMER

The power transformer rectifier unit of the battery charger shall be designed for adequate VA rating but in any case it should not be less than 700 VA and should be rated for 300 V at factor of safety of 3. The heat dissipation and power control system should be designed with a factor of safety of 8. Rating of silicon diode should not be less than 15 A.

Please note, necessary documentary evidence, showing transformer rating of 700 VA along with test certificate from manufacturer, if bought-out, shall be enclosed, for approval of the owner.

#### 8. PROTECTION

The charger should have built-in reverse polarity protection with indication lamp so as to protect the battery from high drains. The charger should also have MCB in the output circuit for protection from short circuits.

1. LIGHT EMITTING DIODES

For the purpose of indication LED indicators shall be provided.

2. SWITCHES AND FUSES

Control and instruments switches shall be of toggle type. All fuses shall be of HRC type and of English Electric/L&T make only.

3. LABELS

All front panel mounted equipment as well as the equipment mounted inside the cabinet shall be provided with individual labels with equipment designation engraved on aluminium plate (stickers are not acceptable).

4. WIRING

The charger shall be supplied completely wired ready for external connections at the terminal blocks. All the wiring shall be carried out with 1100 V Grade PVC insulated standard copper conductor of 2.5 Sq.mm. Colour coded wires should be used to facilitate easy tracing, as under :-

A. Single Phase AC Circuit:-

1. Red for Phase
2. Green for Earthling
3. Black for Neutral

B. D.C. Circuit:-

1. Red for Positive
2. Black for Negative

C. Control Wiring:- Gray for annunciation and other control circuits.

5. FERRULES

Engraved core identification ferules, marked to correspond with the wiring diagram shall be fitted at both ends of each wire.

6. EARTHING TERMINALS

The battery charger cabinet shall be provided with two separate suitable earthing terminals of good quality and adequate size.

7. TESTING

The manufacturers on each battery charger shall carry out the following tests and copy of the tests certificate for each charger shall be submitted:-

1. Checking of wiring and continuity of circuits and visual inspection
2. High voltage test on the equipment with accessories. (All equipment and wiring should be tested for with-standing the power frequency voltage of 2 KV r.m.s. for 20 seconds.)
3. Checking of charging current and load currents.

4. Checking of relays operation, alarm circuit operation, lamp indication, charger failure, mains failure, load fuse failure and annunciation (manufacturer's test certificate for the instruments shall also be furnished).
5. Regulation and Ripple tests. (Ripple voltage shall be less than 3% r.m.s without battery connected.)
6. Efficiency test.
7. Burn-out/Heat-run test (for 10 Hrs.)

8. CIRCUIT DIAGRAM AND WRITE-UP

It is desired that the complete schematic of the charger is provided on a permanently laminated/engraved plate of suitable thickness, which has to be bolted/riveted at the four corners on the inside face of rear door. In addition, one more plate of similar type and dimension shall be provided on the outside of the rear door providing guidelines and instructions for operation of the charger. The guidelines and schematic to be provided on the plates shall be as per our approval for which separate drawings shall furnish, after award of contract.

9. TERMINALS

Separate terminals shall be provided for connecting load and battery leads to the charger. All terminals shall be of M12 size. Suitable copper lugs for connecting the load wiring are to be provided.

It would be the bidder responsibility to prove the adequacy of its design by submitting all technical particulars and relevant graphs to show suitability of charger for supplying load on continuous basis.

10. PRINTED CIRCUIT BOARD

The printed circuit boards should be made out of glass fiber re-in forced epoxy boards and should be coated with suitable protective coating for protection against humidity and corrosion.

11. POLARITY MARKING

The polarity marking of the terminals shall be marked for identification. The positive terminal may be identified by "P" or (+) sign or red colour mark and the negative terminal may be identified by "N" or (-) or blue colour. Terminal marking shall be permanent and non-deteriorating.

12. MANUAL OF INSTRUCTIONS

The manufacturer shall supply a copy of the Instruction Manual for commissioning and initial testing of the charger and maintenance during service with every charger supplied.

13. PACKING The charger shall be securely packed in wooden crates suitable for handling during transit by rail/road so as to avoid any loss or damage during transit.

B) Battery Bank:

Battery bank shall comprising 15 Nos. 2.0 volt, 100 AH VRLA battery (maintenance free) along with suitable corrosion resistant battery racks and cable supports shall be provided. Metallic racks shall be properly earthed. The bottom tier of stand shall gave a ground clearance of 150 mm minimum above the floor. Racks shall be made of alkali resistant powder coated steel or stainless steel or FRP to the ensure corrosion resistance.



**Annexure-TS- IX**

1.1 kV grade LT XLPE insulated cable for all sizes

1.0 SCOPE:

1.1 The scope of this specification covers the design, manufacture inspection and testing the finished ISI marked 1100 volts, stranded, compact aluminum conductor, with XLPE insulated, PVC inner sheathed, galvanized steel strip armored/unarmoured and overall PVC sheathed Black colour cable conforming to IS:7098 /88 with latest amendments and as per specification detailed.

2.0 RATED VOLTAGE:

- 2.1 The rated voltage of the cable shall be 1100 Volts AC with the highest system voltage of 1100 Volts between phases of the effectively earthed three-phase transmission system.
- 2.2 The cables shall be capable of operating continuously under the system frequency variation of  $\pm 3$  Hz, voltage variation of  $\pm 10\%$  and a combined frequency – voltage variation of  $\pm 10\%$ .

3.0 APPLICABLE STANDARDS:

- i) Unless otherwise stipulated in the specifications, the latest version of the following Standards shall be applicable:  
 IS 7098 (Part 2)-Cross-linked Polyethylene insulation for Cables.  
 IS 8130-Conductors for insulated electrical cables and flexible cords.  
 IS 10810(series)-Methods of tests for cables.  
 IS 10418-Drums for electric cables.  
 IS 3975-Specification for mild steel wires, strips and tapes for armouring of cables.  
 IS 5831-Specification for PVC insulation sheath for electric cables.  
 IS 10462-Fictitious calculation method for determination of dimensions of protective coverings of cables Part 1 - Elastomeric and thermoplastic insulated cables.
- ii) The cables manufactured to any other International Standards like BSS, IEC or equivalent standards not less stringent than Indian Standards are also acceptable. In such cases the Manufacturer shall enclose a copy of the equivalent international standard, in English language.

4.0 CONSTRUCTION:

- 1.1 Conductor: - The cable conductor shall be made from stranded aluminum to form compact sector shaped conductor having resistance within the limits specified in IS:8130/1984 and any amendment thereof. The wires shall be laid up together with a suitable right hand lay. Stranded Class 2 – as per the IS:8 130 / IEC 60228/ BS 6360 standards.
- 4.2 Insulation: - The insulation shall be cross linked polyethylene applied by extrusion and shall be steam (wet) cured as per IS:7098(1)1988 and curing in hot water tank/bath is not accepted.:

Sl.No.	Properties	Requirements
1.	Tensile Strength	12.5N/mm <sup>2</sup> , Min.
2.	Elongation to break	200 percent, Min
3.	Aging in air oven:	

	a) Treatment: Temperature: Duration:	135±3°C 7 days
	b) Tensile Strength variation:	±25 percent, Max
	c) Elongation variation:	±25 percent, Max
4.	Hot set: a) Treatment: Temperature: Time under load Mechanical stress	200±3°C 15 min 20N/cm <sup>2</sup>
	b) Elongation under load	175 percent, Max
	c) Permanent elongation (set) after cooling	15 percent, Max
5.	Shrinkage: a) Treatment: Temperature Duration	130±3°C 1 hour
	b) Shrinkage	4 percent, Max
6.	Water absorption (Gravimetric): a) Treatment: Temperature: Duration	85±2°C 14 days
	b) Water absorbed	1 mg/cm <sup>2</sup> , Max
7.	Volume Resistivity a) at 27°C	1x10 <sup>14</sup> ohm-cm, Min
	b) at 70°C	1x10 <sup>13</sup> ohm-cm, Min
8	Thermal Resistivity	350 degrees C cm/W
9	Power factor at maximum conductor temperature	0.008
10	Dielectric strength	22 kV/mm

- 4.3.1 The XLPE insulation should be suitable for specified 1.1 KV system voltage.
- 4.3.2 The manufacturing process shall ensure that insulations shall be free from voids.
- 4.3.3 The insulation shall withstand mechanical and thermal stresses under steady state and transient operating conditions.
- 4.3.4 The insulation of the cable shall be high stranded quality, specified in IS:7098 (Part-II/1985). Withstand continuous conductor temperature of 90 deg C, which means higher continuous rated current carrying capacity.
- 4.3.5 The cables can operate even at conductor temperature of 130 deg C continuously and 250 deg C during a Short Circuit condition
- 4.4 **SHEATH :**  
The sheath shall be suitable to withstand the site conditions and the desired temperature. It should be of adequate thickness, consistent quality and free from all defects. The PVC sheath shall be extruded as per IS:7098 (Part – I/1988). IEC:60502 Part– I,BS:6622, LSOH to BS:7835.
- 4.5 **ARMOUR :**  
Armoring shall be applied over the inner sheath with single galvanized steel complying with the requirements of IS:3975/1979. The dimensions of the galvanized strip shall be as specified in table 4 of the IS:7098/Part-I/1988. The armour wire shall be applied as closely as practicable. The direction of the lay of the armour shall be left hand. The joints in armour wire shall be made by brazing or welding and the surface irregularities shall be removed. A joint in any wire shall be atleast 300mm from the nearest joint in any other armour wire in the complete cable and shall be as per IS:7098 Part 1, IS: 3975.
- The cable without armoring shall also be accepted of type detailed in price schedule.
- 4.6 **OUTER SHEATH :** Extruded PVC ST2, outer sheath as per IS:5831/1984, IS:7098

Part 1, IEC:60502 Part – 1, BS:6622, LSOH to BS:78 35. shall be applied over armoring with suitable additives to prevent attack by rodents and termites. Outer sheathing shall be designed to offer high degree of mechanical protection and shall also be heat, oils, chemicals, abrasion and weather resistant. Common acids, alkalis, saline solutions etc., shall not have adverse effects on the PVC sheathing material used. All cable shall be flame retarded, low smoke (FRLS type)

- 4.7 The cables should be suitable for use in solidly earthed system.
- 4.8 The power cables shall be manufactured to the highest quality, best workmanship with scientific material management and quality control. The Manufacturer shall furnish the quality plan, giving in detail the quality control procedure / management system.
- 4.9 The cable shall be suitable for laying in covered trenches and/or buried underground to meet the outdoor application purposes.
- 4.10 The parameters of the LT power cables to be supplied shall be as specified below

Nom. cross sectional area (Sq.mm)	Nom. Thickness of XLPE Insulation mm main core	Armoured			Max.DC Conductor Resistance at 20°C (ohm/km)	AC current rating	
		Nom. Steel Armour size (mm)	Approx. Overall dia. (mm)	Approx. Weight (kg/km)		In air (amps)	In Grpund (amps)
25	0.90	4 X 0.8	22.8	821.0	1.200	95	97
35	0.90	4 X 0.8	24.9	961.0	0.868	117	116
50	1.00	4 X 0.8	28.1	1195.0	0.641	140	134
70	1.10	4 X 0.8	33.0	1569.0	0.443	176	167
95	1.10	4 X 0.8	35.8	1903.0	0.320	221	199
120	1.20	4 X 0.8	39.0	2303.0	0.253	258	227
150	1.40	4 X 0.8	42.9	2720.0	0.206	294	255
185	1.60	4 X 0.8	47.5	3276.0	0.164	339	287
240	1.70	4 X 0.8	52.7	4048.0	0.125	402	333
300	1.80	4 X 0.8	58.4	4872.0	0.100	461	375
400	2.00	4 X 0.8	65.6	6101.0	0.0778	542	426

- 4.11 The short circuit current of the LT cable to be as specified below

q.mm of LT Cable	Short Circuit Current(KA)
25	2.420
35	3.370
50	4.790
70	6.680
95	9.030
120	11.400
150	14.200
185	17.500
240	22.600
300	28.200
400	37.600

5.0 SYSTEM DETAILS:

General Technical particulars

Nominal system voltage (rms) (U)	0.44KV
Highest system voltage (rms) (U <sub>m</sub> )	1.1 KV
Number of Phase	3
Frequency	50Hz
Variation in Frequency	+/- 3%
Type of Earthing	Solidly Earthed
Total relay & circuit breaker Operating time	15 – 20 cycles

6.0 CLIMATIC CONDITIONS:

(a) Maximum ambient air temperature (in shade)	45 <sup>0</sup>	C
(b) Maximum ambient air temperature (under sun)	50 <sup>0</sup>	C
(c) Maximum daily average ambient air temperature	35 <sup>0</sup>	C
(d) Maximum yearly average ambient air temperature	30 <sup>0</sup>	C
(e) Maximum humidity	100%	
(f) Altitude above M.S.L.	Up to 1000M	
(g) Average No. of thunder storm days per annum	50	
(h) Average No. of dust storm days per annum	Occasional	
(i) Average No. of rainy days / annum	90	
(j) Average Annual Rain fall	925mm	
(k) Normal tropical monsoon period	4 months	
(l) Maximum wind pressure	150 kg/Sq.M	

7.0 DESIGN CRITERIA:

- i. The cables that are covered in these specifications are intended for use outdoor , under the climatic conditions and installation conditions described in the technical specification.
- ii. For continuous operation of the cables, at specified rating, the maximum conductor temperature shall be limited to the permissible value as per the relevant standard, generally not exceeding 90°C under normal operation and 250°C under short – circuit conditions.
- iii. The cables in service will be subject to daily load cycles, of two peaks during a day; morning peak and evening peak, with around 25% to 50% loading during the nights.
- iv. The materials used for outer sheaths shall be resistant to oils, acids and alkalis.
- v. The cables shall have the mechanical strength required, during handling and laying.
- vi. The cables shall be designed to withstand the thermo-mechanical forces and electrical stresses during normal operation and transient conditions.
- vii. The cables shall be designed to have a minimum useful life span of Thirty-five years.
- viii. The detailed design drawings shall be submitted along with Purchase order.

8.0 MANUFACTURE PROCESS:

Cross-linking of the insulation materials (pre compounded polyethylene) shall be conforming to IS: 7098 (Part – II) and the proof of purchase of the above insulating material shall be submitted and is to be offered for stage inspection..

9.0 MATERIALS:

9.1 Conductor: -The conductor shall be of stranded construction. The material for conductor shall consist of the plain aluminum of H2 or H4 grade as per clause – 3 of IS 8130/ 1984.

9.2 The minimum number of wires shall be 53 for circular compacted 400 sq. mm aluminum conductor as per table – 2 of IS 8130/ 1984.

10.0 CORE IDENTIFICATION:

10.1. The core identification for 31/2 core cables shall be provided, by suitable means, like, by application of individual colour or colored stripes, or by numerals or by printing on the cores as per clause 13 of IS: 7098 - Part 2

10.2. For identification of different coloring of XLPE Insulation, or by using colored strips, red, yellow and blue colors respectively shall be used to identify the phase conductors.

11.0 LAYING UP OF CORES:

The cores shall be laid together with a suitable right hand lay. The interstices at the center shall be filled with a non- hygroscopic material.

12.0 INNER SHEATH (COMMON COVERING):

12.1 The laid up cores shall be provided with inner sheath applied either by extrusion. It shall be ensured that the shape is as circular as possible. The inner sheath shall be so applied that it fits closely on the laid up cores and it shall be possible to remove it without damage to the insulation.

12.2 The thickness of the inner sheath (common covering) shall be given as follows:

CALCULATED DIAMETER IN MM OVER LAID UP CORES [REF IS 10462 (PART 1)]		THICKNESS OF INNER SHEATH (Min) mm
Over	Up to and including	
–	25	0.3
25	35	0.4
35	45	0.5
45	55	0.6
55	–	0.7

12.3 When one or more layers of binder tapes are applied over the laid up cores, the thickness of such tapes shall not be construed as a part of inner sheath.

13.0 ARMOURING:

13.1 Armouring shall be single strip steel wire applied over the inner sheath as closely as practicable. The direction of the lay of the armour shall be left hand.

13.2 The armour shall consist of galvanized strip steel The dimensions of the galvanized steel wires shall be 4 X 0.8 mm (Nominal)

13.3 The joints in the armour strip shall be made by brazing or welding and the surface irregularities shall be removed. A joint in the wire shall be at least 300-mm from the nearest joint in any other wire in the complete cable.

13.4 Manufacturers shall furnish the calculation / data sheet for the short circuit carrying capability of the Armour.

14.0 OUTER SHEATH:

- 14.1 The outer sheath shall be applied by extrusion. It shall be applied over the armouring shall consist of poly-vinyl chloride (PVC) compound, conforming to the requirements of type ST-2 of IS 5831. Suitable additives shall be added to give anti termite protection.
- 14.2 The minimum thickness of the PVC outer sheath shall be as per IS:10462 and as detailed.

Calculated diameter under the outer sheath [IS 10462 Part 1] – mm		Nominal thickness of the outer sheath (ts) - mm
Over	Up to and including	
–	15	1.24
15	25	1.40
25	35	1.56
35	40	1.72
40	45	1.88
45	50	2.04
50	55	2.20
55	60	2.36
60	65	2.52
65	70	2.68
70	75	2.84
75	–	3.0

14.3 IDENTIFICATION:

The outer sheath shall have the following information embossed or indented on it; ISI marking, the manufacturer's name or trade mark, the voltage grade, the year of manufacture and the letters "DDUGJY, Name of Employer" The identification shall repeat every 300/350mm along the length of the cable. Outer sheath of cable shall be black in permanent colour.

15.0 INSPECTION AND QUALITY CONTROL:

The Manufacturer shall furnish a complete and detailed quality plan for the manufacturing process of the cable. All raw materials shall conform to relevant applicable standards and tested for compliance to quality and requirement. During the manufacturing process, at all stages, inspections shall be made to check the physical and dimensional parameters, for verification to compliance to the standards. The Manufacturer shall arrange, for inspection by the purchaser, during manufacture with one month advance notice for verifying the various stage inspections as specified in the quality assurance plan enclosed to verify the quality control process of the Manufacturer.

16.0 TYPE TESTS:

Type test certificates from Accredited NABL Testing Laboratories for 1.1 kV XLPE, shall be submitted along with Purchase order. The Type Tests should have been conducted not later than 5 years as on the date of supply.

- 16.1 Stage wise Inspection: The Manufacturer shall offer the stage wise inspection as detailed in the in the quality assurance plan
- 16.2 All acceptance tests shall be conducted in the presence of the Employer's representative.
- 16.3 The supplier shall give 10 days advance notice for inspections, and witnessing of tests by the Employer representative.
- 16.4 The following type tests shall be conducted on the cable.

Sl. No.	Test	Requirement	Test method Ref Part no of IS: 10810
a)	Tests on conductor		
	i) Tensile test	IS:8130	2
	ii) Wrapping test	IS:8130	3
	iii) Resistance test	IS:8130	4
b)	Tests for armoured wires and strips	Clause 15.2 & IS:3975	36 to 42
c)	Test for thickness of insulation and sheath	Clause 4.3, 14.2 & 16.2	6
d)	Physical tests for insulation:	Clause 4.2	
	i) Tensile strength and elongation at break		7
	ii) Aging in air oven		11
	iii) Hot test		30
	iv) Shrinkage test		12
	v) Water absorption (gravimetric)		33
e)	Physical tests for outer sheath	IS: 5831	
	i) Tensile strength and elongation at break		7
	ii) Aging in air oven		11
	iii) Shrinkage test		12
	iv) Hot deformation		15
f)	High voltage test	Clause 22.7	45
g)	Flammability test	Clause 22.8	53

17.0 ACCEPTANCE TEST:

17.1 The sampling plan for acceptance test shall be as per IS 7098 part -II, Appendix 'A'.

17.2 The following shall constitute the acceptance test.

- a. Tensile test for aluminum.
- b. Wrapping test for aluminum.
- c. Conductor resistance test.
- d. Test for thickness of insulation.
  - (i) Test for thickness of inner and outer sheath.
  - (ii) Hot-set test for insulation.
  - (iii) Tensile strength and elongation at break test for insulation and outer sheath.
  - (iv) High voltage test.
  - (v) Insulation resistance (volume resistivity) test.

18.0 ROUTINE TEST:

The following shall constitute routine tests:

- o Conductor resistance test.
- o High voltage test.

19.0 DETAILS OF TESTS:

19.1 Unless otherwise mentioned in this specification, the tests shall be carried out in accordance with appropriate part of IS: 10810.

19.2 High Voltage Test at room temperature:

The cables shall withstand a voltage of 3KV AC (rms) at a frequency of 40 to 60 Hz or an AC voltage of

7.2kV , between conductors and between conductors and ECC ( if any) for a period of 5 minutes each test connection.

- 19.3 Flammability test: Period of burning after removal of the flame shall not exceed 60 seconds and the unaffected (uncharred) portion from the lower edge of the top clamp shall be at least 50-mm.

Employer reserves the right to select a random sample of 1.1 kV UG cable from the Manufacturer's end which are ready to dispatch and also ongoing cable laying works and the same samples will be sent to any testing laboratory as desired by Employer. If the testing results are found to be not satisfactory Employer reserves the right to reject the entire batch of cable received and insists for replacement of material free of cost. The decision of Employer in this regard is final.

20.0 PACKING:

- 20.1 The cables, as per specified delivery lengths, shall be securely wound /packed in non-returnable wooden drums, capable of withstanding rough handling during transport by Rail, Road, etc. The packing should withstand storage conditions in open yards. The cable drums shall conform to IS 10418-1982 or equivalent standard. The dimensional drawings of wooden drums shall be furnished with the Purchase order. The drum shall be provided with circumferential lagging of strong wooden planks. The end of the cable shall be sealed with good quality heat shrink sealing caps. The sufficiently required additional sealing caps shall be supplied for use of testing during laying and jointing at site and to seal spare lengths of cable. The packing should be able to withstand the rigorous of transport. The following information in bold letters in English shall be painted on the flanges.

- a. Name & Address of the manufacturer, Trade name/Trade mark/Brand
- b. ISI Marking
- c. Size of cable (Cross section) rated voltage, standard, insulation, cable code, drum No., and year of manufacture.
- d. Length of cables (Meters)
- e. Direction of rolling
- i) Net weight (in Kg)
- ii) Gross weight (in Kg)
- iii) Owners purchase order reference.

21.0 SEALING OF CABLE ENDS ON DRUMS:

- 21.1 The cable ends shall be sealed properly so that ingress of moisture is completely prevented. The individual core endings shall be sealed effectively with water resistant compound applied over the core and provided with a heat shrinkable or push-on or Tapex or cold shrinkable type cap of sufficient length with adequate cushion space so that the conductor does not puncture the cap in case of movement of the core during unwinding or laying. Before sealing, the semi conducting layer on the cores may be removed for about 2 mm at each end, to facilitate checking the insulation resistance from one end, without removing the sealing cap at the other end.

- 21.2 The three cores should have an overall heat shrinkable or push-on or Tapex or cold shrinkable type cap with adequate end clearance, and sufficient cushioning to prevent puncturing of the overall sealing cap due to stretching of the cores. The sealing cap shall have sufficient mechanical strength and shall prevent ingress of moisture into the cable. The ends of single core cables shall also be sealed on the same lines to prevent entry of moisture.

22.0 CABLE LENGTHS:

The cables shall be supplied in continuous lengths of 500 m or more with 5% tolerance and cable shall on the wooden drums only.

23.0 QUANTITY TOLERANCE:

A +3% tolerance shall be allowed on the ordered quantity including 300-m cable as spare.

24.0 MARKING:

- 24.1 The packed cable drum shall carry the following information, clearly painted or stenciled.



- a. Name of Employer
- b. Reference to Standard and ISI mark.
- c. Manufacturer's Name or trade mark.
- d. Type of cable & voltage grade.
- e. Number of cores.
- f. Nominal cross- sectional area of conductor.
- g. Cable code.
- h. Length of cable on the drum.
- i. Direction of rotation.
- j. Gross weight.
- k. Country of Manufacture.
- l. Year of Manufacture.
- m. Purchase order and date.
- n. Address of consignee.

24.2 The cable shall be marked with size , "XLPE NDMC – 2017" and with sequential marking at every meter

25.0 GUARANTEED TECHNICAL PARTICULARS:

The manufacturer, shall furnish the guaranteed technical particulars of the cable offered in the GTP format provided.

26.0 DRAWING & LITERATURE:

- (i) The following shall be furnished along with the tender
  - Cross sectional drawings of the cables, giving dimensional details.
  - An illustrated literature on the cable, giving technical information, on current ratings, cable constants, short circuit ratings, de rating factors for different types of installation, packing date, weights and other relevant information.

27.0 **GUARANTEE:** The cable manufactured shall be guaranteed for the period of 18 months from the date of receipt at stores.

28.0 The Manufacturer shall furnish a copy of valid BIS licence for ISI marking without which the cable shall not be accepted.

**GUARANTEED TECHNICAL PARTICULARS FOR 1.1 KV**

	Manufacturer's Name		
	Class of Power Cable		
1	Name of the Manufacturer and country of origin		
2	Country of Manufacture		
3	Type of cable / cable code		
4	Applicable standard		
5	Voltage		
	a. Rated Nominal voltage		
	b) Rated Maximum voltage		
6	Suitability for :		
	a. Earthed system		
7	Conductor		
	a) Nominal cross section (sq.mm)		
	b) Material		

	c) Shape		
	d) Diameter of conductor (mm)		
	e) Number of wires per conductor (Nos.)		
	f) Nominal diameter of wire in conductor (mm)		
8	Insulation XLPE		
	a) Curing process (furnish details separately)		
	b) Material/Composition		
	c) Dia over insulation		
	i. Nominal (mm)		
	ii. Average (mm)		
	iii. Minimum (mm)		
9	Inner sheath		
	a) Type / composition		
	b) Material		
	d) Tolerance on thickness		
	e) Diameter of cable over sheath (mm)		
10	Armouring		
	a) Material		
	b) Dia of wire		
	Nom. (mm) Min. (mm)		
11	Outer sheath		
	a) Type / composition		
	b) Material		
	c) Nominal thickness		
	d) Tolerance on thickness		
	e) Diameter of cable over sheath (mm)		
12	Anti-thermite treatment to outer sheath		
	a) Material		
	External overall dia of cable Short circuit rating of conductor 90 deg. C operating temperature for 1 Sec.		
13	Minimum cable bending radius (in terms of cable diameter)		
14	Permissible maximum tension		
15	Continuous current rating under specified insulation conditions at conductor temperature of 65 deg. C and 90 deg. C.		
16	Ground Temperature 30 deg. C		
17	Thermal resistivity of soil 150 deg. C CM/W		
18	Depth of laying 200 mm		

19	Ambient Air temperature 40 deg. C		
20	No. of circuits 1 OR 2		
21	Spacing between two circuits		
22	Formation		
23	Maximum permissible conductor temperature for continuous operation under specified installation conditions (deg. C)		
24	Conductor temperature at rated current (deg. C)		
25	Basic impulse level at conductor temperature of 90 deg. C (KV)		
26	Impulse wave shape		
27	Power frequency with stand voltage (KV)		
28	Tan Delta at 50 Hz (at U.KV and 90 (-5/+10) deg. C		
29	Sheath voltage at max. load		
30	Withstand voltage of sheath on spark test		
31	Permissible short circuit current ratings of conductor		
	i) 0.1 Sec KA		
	ii) 0.2 Sec KA		
	iii) 0.5 Sec KA		
32	iv) 1.0 Sec KA		
	Conductor resistance DC & AC		
	a) at 20 deg. C (d.c)/A.C. ohm/KM		
	b) at 90 deg. C (d.c)/A.C. ohm/KM		
33	c) at 105 deg. C (d.c)/A.C. ohm/KM over load temp) a.c. (ohm)		
	Equivalent star resistance at 50 Hz of 3 phase current		
	a) at 20 deg. C (d.c)/A.C. ohm/KM		
	b) at 90 deg. C (d.c)/A.C. ohm/KM		
34	c) at 10% continuous overload temperature (ohm/KM)		
	Star reactance at 50 hz (ohm/KM)		
	Approximate impedance at 50 hz per KM		
	a. at 20 deg. C ohm/KM		
35	b. at 90 deg. C ohm/KM		
	c. at 10% continuous overload temperature (ohm/KM)		
	Self-electrostatic capacitance per phase (Micro farad/KM)		
36	Maximum power factor at charging KVA of cables when laid direct in ground at normal voltage & frequency		
	a) at ambient Temperature		

	b) at Maximum conductor Temperature		
37	Impedance		
	a) Positive and negative sequence impedance 37 (ohm/KM)		
	b) Zero sequence impedance (ohm/KM)		
	c) Zero sequence data		
38	Series reactance / Resistance		
	a) Series resistance (ohm/KM)		
	Series reactance (ohm/KM)		
	Shunt capacitive reactance (ohm/KM)		
39	Sheath resistance at 20 deg. C ohm/KM		
40	Surge impedance of cable (ohm/KM)		
41	IR value at ambient temperature per KM		
	Maximum magnitude of partial discharge at 1.5 U.o		
	At Ambient Temperature (Po)		
	At High Temperature (Po)		
	Losses per Km.		
	NOTE : (i) Cable Conductor size 400 sq. mm		
	a) Total 3 phase dielectric loss		
	i. One circuit alive Kw/KM		
	ii. Both circuits alive KW/KM on each circuit		
	b) Total 3 phase resistive loss		
	i. One circuit alive Kw/KM		
	ii. Both circuits alive KW/KM on each circuit		
	c) Total 3 phase sheath / screen loss		
	i. One circuit alive Kw/KM		
ii. Both circuits alive load KW/KM on each circuit			
42	d) Other losses due to reinforcement		
43	One circuit alive KW/KM		
44	Both circuits alive KW/KM on each circuit		
	Total losses		
	i. One circuit alive KW/KM		
	ii. Both circuits alive KW/KM		
	Charging current at rated voltage per Km (Amps)		
45	Short circuit capacity of conductor for one second at 90 deg. C prior to short circuit and 250 deg. C during short circuit		

	(KA)		
46	Screening factor of cable for calculating interference on control and communication cables :		
	Approximate value of attenuation of carrier current signals operating over a frequency range		
	i. 50 KC/s- dB/KM		
	ii. 100 KC/s- dB/KM		
	iii. 150 KC/s- dB/KM		
47	iv. 200 KC/s- dB/KM		
	Shipping weight and size of cable drum		
	a) Size of Drum		
	i. Dia of Drum (M)		
	ii. Width of Drum (M)		
	iii. Gross Weight (Kgs)		
iv. Length of cable per Drum(M)			
v. Weight of Cable (Kg/M)			

Current Rating Factor

Particulars	Single Point Bonded		Both End Bonded	
	65 deg. C Amps	90 deg C Amps.	65 deg. C Amps	90 deg. C Amps
Current Rating conductor size 400 Sq. mm				
a) In Ground				
i. Of each circuits (when both the circuits alive)				
b) In Duct				
i. Of each circuits (when both the circuits alive)				
ii. Of one circuits (when other circuit is isolated)				
c) In pipe, one cable per pipe.				
i. Of each circuits (when both the circuits alive)				
ii. Of one circuits (when other circuit is isolated)				
d) In Air				
i. Of each circuits (when both the circuits alive)				
ii. Of one circuits (when other circuit is isolated)				

Derating Factors

1. VARIATION IN GROUND TEMPERATURE :							
Ground Temperature (deg. C) :	15	20	25	30	35	40	45
Rating Factor							

2. VARIATION IN DEPTH OF LAYING :							
Depth of Laying (Meters):	0.7	0.9	1.0	1.2	1.3	1.5	
Rating Factor							
3. VARIATION IN THERMAL RESISTIVITY OF SOIL							
Thermal Resistivity of Soil : (deg. C cm/watt)	100	120	150.0	200	250		
Rating Factor							
4. VARIATION IN AIR TEMPERATURE :							
Air Temperature (deg. C) :	25	30	35	40	45	50	55
Rating Factor							
5. VARIATION DISTANCE (MM) :							
Axial Distance (mm) Between circuits :	100	200	300.0	400	600	800	
Rating Factor							

**Annexure-TS-X**

11 kV Grade H.T XLPE Insulated Cables for all size

1.0 SCOPE:

This section covers the standard technical requirements of design, manufacturing, testing, packing and dispatching of 11 kV XLPE HT Power Cable.

2.0 APPLICABLE STANDARDS

The materials shall conform to the latest editions of the following Indian/International Standards :

IS 7098 Part 2 : 1985 XLPE insulated PVC sheathed cables For working voltages from 3.3 kV up to and including 33 kV

IS 5831 : 1984 PVC Insulation and Sheath of electric Cables

IS 8130:1984 Conductors for insulated electric cables and flexible cords. IS 613:1984 Copper rods and bars for electrical purposes.

IS 3975:1988 Mild steel wires, formed and tapes for armouring of cable. IS 10810:1984 Method of tests for cables.

IEEE-383:1974 Standard for type test of class IE electric cables, field splices, and connections for nuclear power generating stations.

ASTM-D2843,1993 Standard test method for density of smoke from burning or decomposition of plastics.

ASTM-D2863, 1991 Standard test method for measuring minimum oxygen concentration to support candle - like combustion of plastics (oxygen index).

NEMA-WC5,1992 Thermoplastic Insulated Wire and cable for the transmission and distribution of Electrical Energy.

IEC:754 Test on gases evolved during combustion of electric cables -

(Part-1):1994 Determination of the amount of halogen acid gas evolved during combustion of polymeric materials taken from cables.

IEC:332 Test on electric cables under fire conditions

(Part I):1993 Test on a single vertical insulated wire or cable. IS 3961 Recommended current rating for cables -

(Part II):1967 PVC insulated and PVC sheathed heavy duty cables.

IS 10418:1982 Drums for electric cables.

3.0 GENERAL REQUIREMENTS

All cables shall be suitable for high ambient, high humid tropical Indian Climatic conditions. Cables shall be designed to withstand the mechanical, electrical and thermal stresses under the unforeseen steady state and transient conditions and shall be suitable for proposed method of installation.

Conductor shall be of uniform, of good quality, free from defects Aluminium.

Insulation shall be Cross Linked Polyethylene (XLPE) .

For 11 kV cables, conductor screen and insulation screen shall both be extruded, semi-conducting compound and shall be applied along-with XLPE insulation in a single operation by triple extrusion process. Method of curing for 11 kV cables shall be "Dry curing/ gas curing / Steam curing".

Extruded Semi-conducting screening and metallic screening of copper tape shall be generally as per IS 7098 (Part-II) with latest amendments. The semi conducting compound shall be suitable for the operating temperature of the cable and compatible with the insulating material.

The insulation screen shall be an extruded layer of black semi-conducting compound and continuously covers the whole area of insulation. The semi-conducting screens should be effectively cross linked to achieve 90 ° C cable rating. The contact surface between insulation and insulation screen shall be smooth and free from protrusion and irregularities.

The interface between insulation and insulation screen shall be free of any voids. Insulation screen shall be strippable type.

The metallic screen shall consist of a layer of copper cable applied in helical form.

Inner sheath - All armoured and multi-core un-armoured cables shall have distinct extruded inner PVC sheath of black colour.

Armouring - Material for armour for Single Core Cable shall be Aluminum wire. For Multicore cable it shall be GS wire / flat. Armouring shall be as per relevant IS and it shall have minimum 90% coverage.

Breaking Load of the joints shall be minimum 95% of the normal armour.

Outer Sheath – It shall be of black colour PVC (type ST2 as per IS 5831) with Cable size and Voltage grade embossed on it.

Sequential marking shall be at every 1 (one) Meter distance. Word "FRLS" shall also be embossed on it at every 5 (Five) meter distance. Word "XLPE NDMC-2017" shall also embossed on it at every 1(one) m distance

FRLS Properties - All cable shall be Flame Retardant, Low Smoke (FRLS) type. Outer sheath shall have the following properties –

Acid Gas Generation – Max 20% ( as per IEC 754-1)

Smoke density rating: 60% (As per ASTM D 2843)

Flammability test - As per Swedish chimney test F3 as per SEN 4241475

As per IEC 332 part-3 (Category B)

Minimum bending radius shall be 10 D

Repaired cables shall not be acceptable.

#### 4.0 CURRENT RATING OF CABLES

- 1) Normal current rating shall not be less than that covered by IS 3961. Vendor shall submit data in respect of all cables in the prescribed format.
- 2) Tables given de-rating factors for various conditions of cable installation including the following, for all types of cables shall be furnished.
  - Variation in ambient air temperature. - Variation in ground temperature.
  - Depth of laying.
  - Cables laid in the ground - Cables laid in trench
  - Cables laid in ducts - Soil resistivity.
  - Grouping of cables.



- 3) The value of short circuit withstand current ratings of all cables shall be indicated for a short circuit for 1 second duration and should also specify the maximum temperature during short circuit.
- 4) The following factors shall also be accounted for, while specifying the maximum short circuit withstand of the cables.
- 5) Deformation of the insulation, due to thermo-mechanical forces produced by the short circuit conditions, can reduce the effective thickness of insulation.
- 6) Conductor and core screens can be adversely affected with loss of screening effect. Likewise the thermal properties of the outer sheath material can be the limitation.
- 7) It is essential that the accessories which are used in the cable system with mechanical and/or soldered connections are suitable for the temperature adopted for the cables.
- 8) Formula for calculating short circuit current for different duration or curve showing short time current v/s time for different sizes of cables shall be furnished by vendor.

## 5.0 CABLE DRUMS

5.1 Cables shall be supplied in non-returnable wooden or steel drums of heavy construction and drum shall be properly seasoned, sound and free from defects. Wood preservative shall be applied to the entire drum.

5.2 All Power Cables shall be supplied in drum length of 1000 m. Each drum shall contain one continuous length of cable. Owner shall have the option of rejecting cable drums with shorter lengths. The cable length per drum is allowed a tolerance of  $\pm 5\%$ . The tolerance allowed on total quantity of each size is as given below.

3.150 meters for cable length upto 10 kms.

3.2100 meters for cable length more than 10 kms. and up to 20 kms.

3.3150 meters for cable length more than 20 kms.

Where the ordered quantity is not multiple of 250 m and the incremental quantity is very small, the same may be included in one of the drums. Otherwise, an additional length for the incremental quantity will be supplied.

5.3 A layer of water proof paper shall be applied to the surface of the drums and over the outer most cable layer.

5.4 A clear space of at least 40mm shall be left between the cables and the logging.

5.5 Each drum shall carry manufacturer's name, purchaser's name, address and contract number, item number and type, size and length of the cable, net and gross weight stenciled on both sides of drum. A tag containing the same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wordings shall be marked on one end of the reel indicating the direction in which it should be rolled.

5.6 Packing shall be sturdy and adequate to protect the cables, from any injury due to mishandling or other conditions encountered during transportation, handling and storage. Both cable ends shall be sealed with PVC/Rubber caps so as to eliminate ingress of water during transportation and erection.

5.7 The cable shall be marked with size , "XLPE NDMC – 2017" and with sequential marking at every meter

## 6.0 TESTS

### 6.1 Type Tests

The following shall constitute type tests:

- i) Tests on conductor
  - a. Annealing test (for copper)

- b. Tensile tests (for aluminium)
  - c. Wrapping tests (for aluminium)
  - d. Resistance test
- ii) Tests for armouring wires/strips
- iii) Test for thickness of insulation and sheath
- iv) Physical tests for insulation
  - a. Tensile strength and elongation at break
  - b. Ageing in air oven
  - c. Hot test
  - d. Shrinkage test
  - e. Water absorption (gravimetric)
- v) Physical tests for out sheath
  - a. Tensile strength and elongation at break
  - b. Ageing in air oven
  - c. Hot test
  - d. Shrinkage test
- vi) Bleeding and blooming tests (for outer sheath)
- vii) Partial discharge test
- viii) Bending test
- ix) Dielectric power factor test
  - a. As a function of voltage
  - b. As a function of temperature
- x) Insulation resistance (volume receptivity) tests
- xi) Heating cycle test
- xii) Impulse withstand test
- xiii) High voltage test
- xiv) Flammability test

## 6.2 Acceptance tests

The following shall constitute acceptance tests:

- a. Annealing test (for copper)
- b. Tensile test (for aluminium)
- c. Wrapping tests (for aluminium)
- d. Conductor resistance test,
- e. Test for thickness of insulation
- f. Hot set test for insulation,
- g. Tensile strength and elongation at break test for insulation and sheath

- h. Partial discharge test (for screened cables only)
- i. High voltage test and
- j. Insulation resistance (volume resistivity) test

6.3 Routine test

The following shall constitute routine tests:

- i) Conductor resistance test
- ii) Partial discharge test (for screened cables only) and
- iii) High voltage tests.

6.4 Optional tests

Cold impact tests for outer sheath (IS:5831-1984) shall constitute the optional tests.

## SECTION II

### SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES.

#### 1.0 SCOPE

This section of the specification covers project information, site condition, desired Technical parameters and quantity of XLPE Cable.

#### 1.1 Project Information

- a. Customer :
- b. Engineer/Consultant :
- c. Project Location :
- d. Transport facilities
  - i) Nearest Railway station : /Gauge
  - ii) Distance from site :
- e. Access Roads :

#### 1.2 SITE CONDITIONS

- (i) Ambient air temp. (max.) °C :
- (ii) Ambient air temp. (min.) °C :
- (iii) Design ambient temp. °C :

1.2.1 Relative humidity for design : purposes

1.2.2 Height above mean sea level in : meters

1.2.3 Earth quake data

- i) Seismic zone : IS:1893-84
- ii) Seismic acceleration : As per IS 2.2.4

#### 1.2.4 Wind data

Site Wind Pressure Kgf/m<sup>2</sup> : As per IS 2.3

#### 1.3 System Particulars

a.	Line Voltage (kV)	11
b.	Highest System Voltage (kV)	12
c.	Number of Circuits	1
d.	Frequency	50 Hz
e.	Neutral	effectively earthed
f.	Short circuit level (KA)	18.4 kA

#### 1.4 SPECIFIC TECHNICAL REQUIREMENTS

Technical Parameters of the cable shall be as follows:

S. No.	PARTICULAR	Unit	DATA
1	Rated Voltage	kV	11
2	Type of Insulation	-	XLPE
3	Single core/ Multi core	-	Single/Three core

4	Armoured / Unarmoured	-	Armoured
5	Material of Conductor	-	Aluminium
6	System	-	11 kV Earthed
7	Highest System Voltage	kV	12
8	Conductor size	sq. mm	400
9	Material		Stranded Aluminium
10	Shape of Conductor		Circular
11	Short Circuit Current	kA	18.35 for 3 secs.
12	Power Frequency Withstand Voltage	KV rms	28
13	Lightning Impulse Withstand Voltage	kVp	75
14	Continuous Withstand Temperature	Deg C	90
15	Short Circuit withstand Temperature	Deg C	250
16	Oxygen Index		Min 29 (as per ASTM D 2863)
17	Acid Gas Generation		Max 20% ( as per IEC 754-1)
18	Smoke Density Generation		60% (As per ASTM D 2843)
19	Flammability Test		As per Swedish Chimney test

SECTION-III  
GUARANTEED TECHNICAL PARTICULARS

Sl. No.	Item Particulars	Unit
1	Manufacturers Name & Address	
2	Country of manufacturer	
3	Type of cable	
4	Applicable standards for manufacturing	
5	Applicable standards for testing	
6	Rated voltage	kV
7	Maximum service voltage	kV
8	Maximum continuous current carrying capacity per cable when lain in air at an ambient air temperature of 50 deg. (single core cables solid bonded)	A
9	Maximum continuous current carrying capacity per cable when lain in ground at a depth of 1.0 m (ground temp. 40 deg. C and soil thermal resistivity of 150 deg.c/watt/cm max. Conductor temp. 90 deg. C) (single core cables solid bonded)	A
10	Maximum continuous current carrying capacity per cable when drawing into duct./pipes (single core cables solid bonded)	A
11	Maximum continuous current carrying capacity per cable when lain in covered RCC trenches at an ambient temperature of 50 Deg. C laying conditions to be specified (Single core cables solid bonded)	A
12	Short circuit withstand capacities for 1 second of (With a conductor temperature of 90 Deg. C at the commencement	
i)	Conductor	KA
ii)	Screen	KA
iii)	Armour	KA
13	Conductor	
i)	Material & Grade	
ii)	Nominal cross – sectional area	sq.mm
iii)	No. of strands	
iv)	Diameter of each strand (Nominal)	mm
v)	Max. DC resistance of conductor at 20 Deg. C	ohm/km

vi)	Max. AC resistance of conductor at 90 Deg. C	ohm/km
14	Reactance of cable at normal frequency (Approx)	ohm/km
15	Electrostatic capacitance at normal frequency	microrfarads per km
16	Charging current	
17	Loss tangent at normal frequency at U <sub>o</sub>	
18	Conductor screen	
i)	Material	
ii)	Nominal thickness	mm
19	XLPE Insulation	
i)	Composition	
ii)	Type of curing	
iii)	Thickness of insulation (nominal)	mm
iv)	Tolerance on thickness	mm
v)	Dielectric constant at normal frequency	
vi)	Specific insulation resistance at 20 deg. C	ohm/km
vii)	Min. Volume resistivity at 20 deg. C	
viii)	Min. volume resistivity at 90 deg. C	
ix)	Min. Tensile strength	kg/sq.cm
x)	Min. Elongation percentage at rupture	%
xi)	Identification of cores	
20	1.2/50 microsecond impulse wave withstand voltage	kVp
21	5 min. power frequency withstand voltage	kV
22	Max. Dielectric stress at the conductor	kV/cm
23	Max. Dielectric stress at the conductor screen	kV/cm
24	Insulation screen	
i)	Material	
ii)	Extruded/wrapped	
iii)	Nominal thickness	mm
iv)	Colour	
25	Metallic screen	
i)	Material / composition	
ii)	Nominal radial thickness / dia	
26	Nominal diameter over metallic screen	mm
27	Nominal radial clearance allowed under metal sheath	mm
28	Type and material of filler	
29	Armour	
i)	Material and type	
ii)	Dia	





**Annexure –TS-XI**

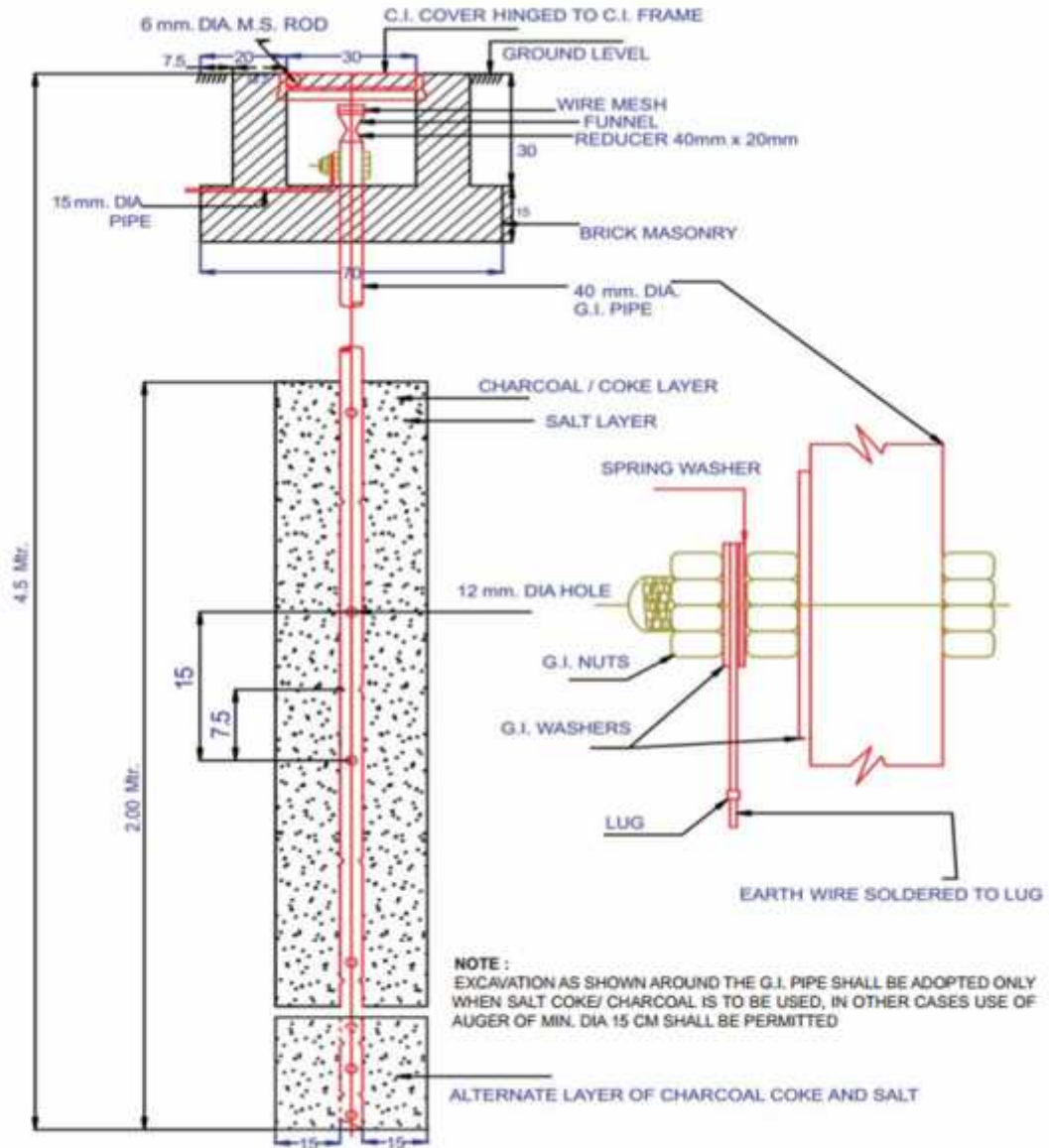
Heat Shrinkable Cable Terminations and Joints Suitable for XLPE/ PILCA Cables.

- 1) GENERAL: The term heat shrink refers to extruded or moulded polymeric materials which are cross linked to develop elastic memory and supplied in expanded or deformed size or shape.
- 2) QUALIFYING EXPERIENCE: The kits should have satisfactory performance record in India in excess of 5 years supported with proof of customers having had satisfactory use of these kits in excess of 5 years.
- 3) TYPE TEST REPORTS: The Joints and terminations should have been type tested and type test reports made available.
- 4) KITS CONTENTS : The Kits should generally consist of:
  - (a) Heat shrinkable clear insulating tubes
  - (b) stress control tubing where necessary,
  - (c) Ferrule insulating tubing for joints,
  - (d) Conductive cable break outs for terminations, non tracking, erosion and weather resistant tubing both outer / inner
  - (e) non tracking erosions and weather resistant outdoor sheds in case of terminations
  - (f) high permittivity mastic wedge
  - (g) Insulating mastic.
  - (h) Aluminum crimping lugs of ISI specification.
  - (i) Tinned copper braids
  - (j) Wrap around mechanical protection for joints.
  - (k) Cleaning solvents, abrasive strips.
  - (l) Plumbing metal.
  - (m) Binding wire etc. adequate in quantity and dimensions to meet the service and test conditions.
  - (n) Any other material essentially required to complete the cable termination/ joints, but not included the list shall be deemed the part of the list.

The kit shall have installation instructions and shall be properly packed with shelf life of over 3 years.

**Annexure-TS-XII**

Drawing for G.I Pipe Earthing



ALL DIMENSIONS ARE IN CM (OTHER DIMENSIONS SHOWN)

**CPWD**

Note :- Quantity of Charcoal / coke and salt shall be used as per CPWD DSR 2016.

**Annexure –TS- XIII****Maintenance Free earthing system**

**Scope:** These specifications are for maintenance free and water less earth electrodes. Details of the components to be used and the procedure to be followed for construction of earth pits are described here. The main purpose of using this new technology is to enhance the life of the earth electrode and maintain a consistent low earth resistance value over the years without any maintenance, watering or any recharge/replacement.

The earthing system to be adopted for ESS equipments should be able to save the system components which are more susceptible to damage due to surges, transients and over voltage encountered due to various reasons.

The maintenance free earthing system shall consist of metal conductor, earth enhancing compound and other allied items and this work contract will cover mainly:-

- a) Digging of bore holes of suitable size in normal soil or voids of 1m length x 1m width x 3m deep in rocky soil and replace the broken rocks with fresh soils to make an earth pit in the centre.
- b) Laying of connecting strips at shortest possible route between earth pit/ grid and individual equipment.
- c) Connection of strip with equipment
- d) Parallel jointing of connecting strip by exothermic welding.

**Importance of Earthing:** The installation of an effective low resistance earthing system is essential for dissipation of heavy fault currents and electrical surges, both in magnitude and duration efficiently to protect the equipment damages and minimize the down time, service interruption and replacement cost etc.

**Characteristics of good Earthing system:**

- a) Excellent electrical conductivity.
- b) Low resistance and electrical impedance.
- c) Conductors of sufficient dimensions capable of withstanding high fault currents with no evidence of mechanical deterioration.
- d) Dissipation of energy into the ground in the safest possible manner.
- e) Lower the earth circuit impedance, the more likely that high frequency lightning impulses will flow through the ground electrode path, in preference to any other path.
- f) Resistance to corrosion.
- g) The suitable choice of quality material for grounding conductors, electrodes and connections etc. shall be done because it is vital as most of the grounding system will be buried in the earth mass for many years.
- h) Mechanically robust and reliable.

**Acceptable Earth Resistance Value:** The acceptable earth resistance shall be not exceed than 2 ohms of each grid.

**Fault current conditions:** Earth electrode/grid should be able to withstand the fault current upto 25 kA (peak) for 1.0 second or better.

**References:** IS 3043 Code of practice for earthing

**Installation of Earth Electrode/Grid:**

- a) Appropriate length and dia MS conductor, molecularly bounded by 99.99% pure high conductivity copper on the outer surface of thickness not less than 250 micron shall be driven in the centre of the bore hole and voids surrounding it shall be filled with the slurry of electrically conductive earth enhancing compound i.e. Conductive Concrete up to its depth from the ground surface level and leave it to set.
- b) In case of very high soil resistivity/rocky soils where deeper bore hole is not possible then, a grid of multiple earth electrodes of suitable size shall be installed in parallel and interconnected horizontally at 500 mm below the surface level and by embedding it in earth enhancing compound to obtain the required earth resistance not exceed than 2 ohms.
- c) The number of electrodes required in parallel shall be provided until the required earth resistance is achieved. A separation of not less than 3 m shall be maintained between the two adjacent electrodes from all sides. Horizontal interconnection between two earth electrodes shall be done by copper bounded strip.

**Connection with equipment and Jointing:**

- a) Copper bounded strip of size 50 mm X 6 mm for connection with equipment shall be used and fixed on wall, if required, on plastic/Fibre Glass/Insulating material saddles with SS exothermic welding.
- b) Fixing of connecting strips with equipment shall be done by polishing it's surface at the end up to 150 mm and surface of equipment and tight it with exothermic welding for tight grip.
- c) Jointing in running lengths should be done by polishing the surfaces of both the strips end at least up to 150 mm and joint by exothermic welding.
- d) All joints below the surfaces shall be embedded in Earth enhancing compound to save the conductor from corrosion.

**Earth Enhancing materials:** Earth enhancement material improves the earthing effectiveness, especially in areas of poor conductivity like rocky ground, areas of high moisture variation, sandy soils etc. It improves conductivity of the earth electrode and ground contact area. It shall have following characteristic. EEM shall have following specifications:

- a) Shall have ultra low resistivity of < 0.02 ohm-meter (as per IEEE-80)
- b) Shall be inert/pH value in neutral range
- c) Shall be environment friendly.
- d) Shall be remaining effective in dry/rocky/sandy soils without the need of any watering, periodic recharge/replacement or maintenance for life.
- e) Shall not corrode the embedded metal conductor of the electrode.
- f) Shall have constant earth resistance for life.
- g) Shall not dissolve, de-compose or leach/wash out in soil with time under changing season conditions.
- g) Shall have high electrical conductivity and capacity to absorb high surges.
- i) Shall be suitable for installation in dry form or in slurry form.
- j) Shall not depend on the presence of water in surrounding area to maintain its conductivity.
- k) Shall be thermally stable between (-) 10...C to (+) 60. C ambient temperature.
- l) Shall not pollute the soil or underground water table.
- m) Shall not be explosive.

**MS conductor (Round):**

- i) Shall be made of high tensile low carbon steel
- ii) Shall have a appropriate length.
- iii) Shall have a appropriate diameter.
- iv) Shall have copper bonding of minimum 250 micron.

**Connecting conductor - 500 mm below the surface:** Connecting conductor between the earth pits and equipment shall be of size 50mm x 6mm copper bounded strip and parallel jointing by exothermic welding or it should be joint less and embedded in earth enhancing compound.

**Connecting Conductor - Surface level and walls:** Connecting conductor from surface level to equipment/application shall be Copper bounded strip of following sizes:-

- a) Transformer: Star connection 2 No. strip of size - 50 mm x 6 mm
- b) Transformer: Body connection 2 No. strip of size - 50 mm x 6 mm
- c) Panels: 2 No. strip of size 50 mm x 6 mm

**Inspection Chamber:** A 300 mm x 300 mm (outside dimension) cement concrete frame & cover shall be fixed on brick chamber of suitable size. The top of the frame shall be in flush with the ground surface. The connecting cable/strip from earth electrode/grid to equipment room shall run through the side wall or below it.

**Tests:**

**Earth electrodes:** should have been tested for following tests at any of the Government approved laboratory and test reports attached with the bid:-

- a) Fault current 25kA for 1.0 second or better.

**Earth Enhancing Material:** should have been tested for following tests and necessary test report certificate from National/International lab attached with the bid:-

- a) Resistivity test
- b) Strength test by making a 10 cm<sup>3</sup> cube of the material or better
- c) ROH's (Chemical) tests.

**Warranty:** The supplier shall be responsible for complete supply, installation & commissioning of the earthing system. The warranty of these systems shall be of 12 months from date of commissioning. During this period, if any failure of earthing system occurs due to improper materials and/or bad workmanship then the same shall be attended to within 24 hours of intimation by the supplier for rectification of the same without any charges to NDMC.

# BIDDING DOCUMENT

FOR

## IMPLEMENTATION OF SMART GRID INFRASTRUCTURE INCLUDING ENHANCING OF EXISTING NETWORK IN NDMC POWER DISTRIBUTION AREA

**SUB HEAD: - STRENGTHENING OF SUB-TRANSMISSION AND  
DISTRIBUTION NETWORK UNDER INTEGRATED  
POWER DEVELOPMENT SCHEME (IPDS) OF MINISTRY  
OF POWER, GOVERNMENT OF INDIA.**

### VOLUME-IV

**Section-I: Details of substation**

**NIT NO.:- NDMC/SMART GRID/2016-17/02**



**CONSULTANT: WAPCOS LIMITED**



**NEW DELHI MUNICIPAL COUNCIL**









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30	30	120	320	30	30	30	250	180	60	120	90	30	30	60	30	150	30	30	150	80	200	210	30	60	320	90	30	200	200	140	200	90	30	30	120	40	30	150	150							
5	4	0	16	13	2	4	30	12	21	3	31	7	2	26	2	4	5	2	2	8	4	4	4	5	12	2	8	9	8	8	8	8	2	5	8	5	8	1	5	6						



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2	2		2	2	2	2	2	2	5	2		2	2	1	3		2	3	2	2	2	1	2	2	5	1	1	2		2		1	
	4	2	2		4		2	2		2		2	2	2	3	1	2		2	2					5	1	2	2		2			
4				4	4	4	4	4	10	4	4	4	4	2	6	2	4	6	4	4	6	2	4	4	10	2	2	4		4		2	
1	1	1	1													1		0												1		1	
150	30	30	30	120	160	120	120	100	200	120	120	120	120	60	200	90	120	180	120	120	180	60	160	160	400	60	80	120	30	160	30	60	
5	5	5	6	0	4											4														5		4	

PART - 1 (System Strengthening work) For South Division		This is only tentative information for bidder. Actual quantity shall be ascertain by the contractor before starting of work																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
S.No.	Description of Item	Ashok Hotel	Austria Embassy	Andoman Nicobar	American School	American Embassy	Bhutan Embassy	Buddha jayanti park	Buddha jayanti pump	Bapu dham	Chanakaya puri	D-I Vinay marg	D-II Vinay marg (Pump house)	Egypt Embassy	Finland embassy	Fire Brigade	Ghana Embassy	Gujrat bhawan	Italy embassy	J & k House	Kaventer Lane	Karnataka bhawan (old)	Maitrya college	Naval qtr.	Nehru park	Nigeria embassy	Polish Embassy	Railway computer centre	Railway Colony
1	SITC of 11/0.415 KV voltage level, oil type distribution transformer having energy efficiency of Level 2 according to IS-1180 (Part 1) and as per Technical specifications at annexure -TS-I including refurbishing of Plinth of following rating:-																												
(a)	1000 KVA	0	1	0	0	0	0	1	1	0	1	0	1	0	0	0	1	0	0	2	0	0	2	0		2			
(b)	1600 KVA	0	0	0	0	0	1		0	0	0	0	0	2	2	0	0	0	2	0	1	0	0	0		0			
2	SITC of 11/0.415 KV voltage level, Dry type distribution transformer as per Technical specifications at annexure -TS- II including refurbishing of Plinth of following rating:-																												
(a)	1000 KVA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
(b)	1600 KVA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0		0	2		
3	SITC of 11 KV 350 MVA 1250 Amp. VCB switch gear panels ( MC VCB) - Indoor, as per Technical specifications at annexure -TS- III including refurbishing of cable duct and floor beneath the Panel of following rating:-																												
(a)	VCB Panel for Incoming feeder with CT ratio 1200 -600/5(0.5)- 5(1.0) - 5(5P 10) 1(PS) - 0.578 (PS) Amp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
(b)	VCB Panel for Incoming feeder with CT ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp.	5	1	1	2	2	1	1	1		3	2	1	2	1	2	1	1	4	1	3	1	1	2	0	1	1	3	1
(c)	VCB Panel for Outgoing feeder with CT ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp	17	1	1	2	6	1	0	0		21	5	2	8	1	3	1	2	4	1	3	0	1	1	25	1	1	7	1
(d)	VCB Panel for Outgoing feeder with CT ratio 200 -100/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp	1	1	1	0	0	1	1	1		1	1	2	2	2	1	2	2	2	2	2	1	2	2	2	2	2	2	1
(e)	VCB Panel for Capacitor bank with Provision of Undervoltage/ OverVoltage relay with C.T ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp.	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
(g)	VCB Panel for Bus couplar with bus riser.	2	0	0	0	1	0	0	0		3	1	0	1	0	0	0	0	1	0	2	0	0	0	2	0	0	1	0
4	SITC of 11 KV- 1250 Amp. VCB switch gear panel (Annexure TS-III) board for 66/11 KV and 33/11 KV Electric Substation comprising of 15 panels including their C&R panels (Annexure TS - IV) including refurbishing of cable duct and floor beneath the Panel and other accessories of following rating.																												
(i)	VCB Panel for Incomer transformer with CT ratio 1200 -600/5(0.5)- 5(1.0) - 5(5P 10) - 1(PS) - 0.578 (PS) Amp. - 1 No.	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
(ii)	VCB Panel for Outgoing feeder with CT ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp. -11 Nos.																												
(iii)	VCB Panel for Outgoing feeder with CT ratio 200 -100/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp. -1 No.																												
(iv)	VCB Panel for Capacitor bank with Provision of Undervoltage/ OverVoltage relay of ratio 800 -400/5 (0.5) - 5 (0.5) - 5 (0.5) - 1 (PS) Amp. -1 No.																												
(v)	VCB Panel for Bus couplar with bus riser - 1 No.																												
5	SITC of 415 V, 35 MVA, 2000 A main bus bar arrangement at top , two tier LT ACB panels, as per Technical specifications enclosed at annexure -TS-V including refurbishing of cable duct and floor beneath the panel, in following configuration																												
(a)	I/C+O/G (1600 A/800A)	1	1	1	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	1	0				
(b)	I/C+B/C (1600 A/1600A)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0				
(c)	O/G+O/G (800 A/800A)	1	1	1	0	0	0	0	1	0	1	0	2	0	0	0	1	0	0	0	0	0	0	2	0				
6	SITC of 415 V, 35 MVA 3000 A main bus bar arrangement at top, Two tier LT ACB panels, as per Technical specifications enclosed at annexure-TS- V including refurbishing of cable duct and floor beneath the panel, in following configuration.																												
(a)	I/C+O/G (2500 A/800A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0					
(b)	I/C+B/G (2500 A/2500A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0					
(c)	O/G+O/G (800 A/800A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	0	0	0					
7	SITC of cubicle type 7.2 Mvar, 12.65 kV (Design) 5.43 Mvar, 11 kV (working) four steps, including all control cable required for independent functioning of each steps, auto switch capacitor bank with isolator with cubicle or separate isolator in cubicle as per space available at site and technical specification enclosed at Annexure - TS- VI	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0			
8	SITC of Bus ducting suitable for 1600 A, 415 V, A/C, 50 Hz rating in convenient sections complete with three runs for 2 No. x 1000x 10 mm aluminium bus bar for three phase and one run of 1 No. x 100 x 10mm aluminium bus bar for neutral including jointing at sections, joint expansion on bends and 2 Nos. flexible set fabricated with copper leaf for connecting the ends of bus ducting, 2 Nos. run of 1 x 32x 5mm size aluminium bus bar shall be fixed on the surface of bus ducting for earthing purpose and shall be connected to main earthing at both end, complete as per Technical specification at annexure-TS- VII.	0	15	8	0	0	0	10	0	0	10	0	30	0	0	0	30	7	0	0	0	15	35	0		20			
9	SITC of Bus ducting suitable for 2500 Amp, 415 V, A/C, 50 Hz rating in convenient sections complete with three runs of 2 Nos. 150 x 10 mm aluminium bus bar for three phase and one run of 1 No. 150 x 10 mm aluminium bus bar for neutral including jointing at sections, joint expansions on bends. 2 Nos. runs of appropriate size aluminium bus bar shall be fixed on the surface of bus ducting for earthing purpose and shall be connected to main earthing at both ends, complete in all respect as required at site as per Technical specifications at Annexure - TS- VII	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	41	0	10	0	0	0		0			
10	SITC of 30V, 100 AH VRLA battery unit complete with maintenance free battery cell and battery charger for trickle/ boost charging along with DCDB as per Technical specification at annexure - TS - VIII	1	0	0	0	0	0	0	0	2	2	0	0	1	0	0	0	0	1	0	0	0	0	0		0		1	
		0	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	1	1	1	1		1	1		1
11	Supply of 1.1 kV grade unarmoured L.T XLPE Cable of Size 1000 Sqmm / SC as per Technical specification at Annexure- TS- IX and laying in existing masonry/open duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0			
12	Supply and laying of 11 kV grade H.T XLPE Cable of Size 150 Sqmm / 3 C as per Technical specifications at Annexure- TS - X	0	15	18	0	0	10	16	14	0	20	0	35	50	35	0	30	0	32	20	32	10	26	30		20	51		
13	a) Supply and making Heat Shrink cable end termination for 1.1 kV grade L.T PVC/XLPE cable of size 1000 sq.mm/ SC .	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0			

	b)	Making of end terminations including all material of 1.1 kV grade L.T cable of size 400 Sqmm, 3.5 C & 300 Sqmm, 3.5 C	3	3	3	0	0	0	0	1	0	3	0	5	0	0	0	2	0	5	7	9	0	5	0		0				
14		SITC of 1.1 KV grade, ISI marked XLPE insulated, armoured, sheathed stranded copper conductor control cable of following Size																													
	a)	2.5 Sq.mm x 12 core	25	15	18	0	0	15	15	0	0	15	0	40	50	35	0	30	20	32	20	32	10	26	0		40	51			
	b)	2.5 Sq.mm x 24 core	0	0	0	0	0	0	0	0	750	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0				
15 & 16		SITC of 11 KV HT , H.S type end termination indoor type as per Technical Specification At annexure - TS- XI for HT XLPE/ Pilca cable of following size.																													
	a)	1000 Sq.mm/Sc	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0				
	b)	400 Sq.mm/Sc	1	0	0	0	1	0	0	0	6	4	2	1	0	0	1	0	0	0	0	0	0	0	0		0				
	c)	300 Sq.mm/Sc	19	0	0	3	2	2	0	0	18	5	4	1	5	0	4	1	2	4	3	5	1	2	3		1		5		
	d)	150 Sq.mm/Sc	4	4	4	1	4	2	3	3	5	12	2	4	7	6	1	4	3	4	4	3	2	4	2		5	6	7	3	
	e)	70 Sq.mm/Sc	0	0	0	0	1	0	0	0	0	4	0	0	2	0	0	0	0	3	0	1	0	0	0		0				
17		SITC of three element relay, 30 volts DC for winding temperature/ oil temprature, Alarming/ tripping and transformer door open trip on existing out going HT panel for local transformer including cutting of M.S. Sheet of HT panel for making cut out according to size of relay, control wiring with tripping circuit of HT panel and marshalling box of D.T, complete in all respect as required as site.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0				
18		Modification in the Existing Bus Trunking/Bus Bars, upto 1 mtr length at the end of bus trunking connected at Transformer end/ L.T Panel end to make capable to connect with replaced distribution transformer/ L.T Panel by extension/modification in Aluminium bus bar/bus trunking.	0	0	0	0	0	0	1	0	0	0	0	0	2	2		0	0	0	4	1	0	0	0		0	2			
19		Providing maintenance free & water less Earth Grid to deliver earth result not exceed more than two ohm for substations equipment i.e distribution transformer body and neutral, HT panel board and LT panel board by providing & fixing copper bonded, MS earth electrodes of appropriate size and length in Convenient pieces and embedded vertically in ground after making a bore of appropriate diameter and filling the bore with an earth enhancing compound. Interconnecting the multiple earth electrodes with 50 x6 mm copper bonded MS strip below 500 mm surface level. Filling the surrounding of bore with fresh soil, complete in all respect including connecting test link at two places and providing masonry enclosure with RCC frame & cover.Two connections point with test link from earth electrode shall be taken up to surface level for connecting conductor to the equipment. All earthing connections should be exothermically welded. Annexure TS-XIII		2	2	0	0	2	2	2	0	2	0	4	4	4	0	4	0	4	4	2	0	4	0		4	4			
			3	2	2	1	1	1	1	2	2	3	1	2	1	1	1	2	1	2	2	2	1	2	1	2	1	1	1	1	1
20		Providing and fixing 50x6 mm copper bonded MS strip with exothermic welding on running joints by way of fixing on wall by providing saddle & screws or any other way, complete in all respect to connect from equipment to earth grid for transformers ,HT and LT panel board in substation.	90	120	120	30	30	90	90	120	90	150	30	180	150	150	50	180	110	180	180	120	60	180	90	60	150	150	50	120	
21		Feeder pillar earthing with GI earth pipe 4.5 meter. long, 40mm dai including accessories, and providing masonry enclosure with RCC frame & cover and watering pipe etc. with charcoal/coke and salt as per CPWD specification and connect the earthing with feeder pillar by supplying and laying 25mmx 5mm GI strip at 0.50 meter below ground as strip earth electrode, including connection/ terminating with GI nut, bolt, spring, washer etc. as required. (Jointing shall be done by overlapping and with 2 sets of GI. Nut bolt & spring washer spaced at 50 mm). Annexure TS-XII	<b>Details to be Provided during Execution of work</b>																												
22		Supplying including Fixing of Synthetic insulated mats 2.5 mm in thickness and one meter in width (ISI Marked ) conforming to IS 15652/2006 in front of H.T/L.T Panel board	14	4	4	3	6	2	2	4	13	15	6	4	2	2	2	6	4	9	7	10	1	6	4	12	3	3	9	2	









