

Volume – I

Tender Notification for

**SUPPLY, INSTALLATION, TESTING &
COMMISSIONING OF 1600 KVA PAD MOUNTED
PSS IN BRPL, NEW DELHI**

CMC/BR/26-27/FK/PR/RJ/1370

Due Date for Submission of Bids: 29.07.2026

**BSES RAJDHANI POWER LTD (BRPL)
BSES Bhawan, Nehru Place, New Delhi-110019
Corporate Identification Number: U74899DL2001PLC111527
Telephone Number: +91 11 3009 9999
Fax Number: +91 11 2641 9833
Website: www.bsesdelhi.com**

Section – I

REQUEST FOR QUOTATION

Tender Notification: CMC/BR/26-27/FK/PR/RJ/1370

**SUPPLY, INSTALLATION, TESTING &
COMMISSIONING OF 1600 KVA PAD MOUNTED
PSS IN BRPL, NEW DELHI**

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SECTION – I: REQUEST FOR QUOTATION**1.0 Event Information**

- 1.01** BRPL invites bids through online portal for SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF 1600 KVA PAD MOUNTED PSS IN BRPL, NEW DELHI from the manufacturers. The bidder must qualify the technical requirements as specified in clause 2.0 stated below. The tender shall be duly superscribed as — **“BID FOR SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF 1600 KVA PAD MOUNTED PSS IN BRPL, NEW DELHI, TENDER NOTICE CMC/BR/26-27/FK/PR/RJ/1370 DUE FOR SUBMISSION ON DT. 29.07.2026”**.

FOR SUBMISSION ON D.T: 23.07/2023 .				
Sl. No.	Item Description	Specification	Requirement	Estimated Cost
			Total Qty.	
BRPL, DELHI				
1	SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF 1600 KVA PAD MOUNTED PSS IN BRPL	SECTION V	05 Nos.	Rs. 4.10 Cr

Note: Quantity may vary to any extent of +/- 30% of above mentioned total quantity.

- 1.02** The schedule of specifications with detail terms & conditions can be obtained from address given below against demand draft/Pay Order of **Rs.1180/- with GST-**, drawn in favour of **BSES RAJDHANI POWER LTD**, payable at New Delhi. The sale of tender documents will be issued from **09.07.2026** onwards on all working days up to **29.07.2026**. The tender documents can also be downloaded from the website www.bsedelhi.com or <https://srmpdrportal.bsedelhi.com/irj/portal>

In case tender papers are downloaded from the above website, the bidder has to submit the demand draft covering the cost of bid documents and EMD as mentioned in tender document in a separate sealed envelope with suitable superscription - **Tender Fee & EMD** and **Tender Notice Ref: CMC/BR/26-27/FK/PR/RJ/1370, Due date of submission, Tender opening date**. This envelope should be deliver to the following address (scanned copy of Tender Fee & EMD to be uploaded on e –procurement portal):

**HEAD OF THE DEPARTMENT, 1st FLOOR, ‘C’ BLOCK,
CONTRACTS & MATERIALS DEPARTMENT, BSES RAJDHANI POWER LTD,
BSES BHAWAN, NEHRU PLACE,
NEW DELHI - 110019**

- 1.03** Offers will be received up to **1500 Hrs. on dt. 29.07.2026** as indicated earlier and will be opened at the address mentioned above dt. **29.07.2026 at 1530 Hrs.** in the presence of authorized representatives of the bidders. The schedule of specifications with detail terms & conditions are enclosed. It is the sole responsibility of the bidder to ensure that the bid documents reach this office on or before the due date.

1.04 BRPL reserves the right to accept/ reject any or all Tenders without assigning any reason thereof and alter the quantity of materials mentioned in the Tender documents at the time of placing purchase orders. Tender will be summarily rejected if:

- i) Earnest Money Deposit (EMD) @ 2% (two percent) of the Tender value i.e. **Rs. 8,20,000** /- is not deposited in shape of Bank Guarantee executed on favour of BSES RAJDHANI POWER LTD.
- ii) The offer does not contain “FOR, NEW DELHI price indicating break-up towards all taxes & duties”.
- iii) Complete Technical details are not enclosed.
- iv) Tender is received after due time due to any reason.

1.05 BRPL reserves the right to reject any or all bids or cancel/ withdraw the invitation for bids without assigning any reason whatsoever and in such case no bidder/ intending bidder shall have any claim arising out of such action time of placing purchase orders.

2.0 Qualification Criteria:-

The prospective bidder must qualify all of the following requirements to be eligible to participate in the bidding. Bidders who meet following requirements will be considered as successful bidder and management has a right to disqualify those bidders who do not meet these requirements.

S.No	Qualification Requirements	Documents to be submitted by bidder
1	The bidder must have its own established manufacturing or assembly facility in India for Package Substation/ Pad Mounted Substation with a rating of 630 kVA or higher, operational for a minimum of 7 years.	i. Manufacturing and factory incorporation certificate / Undertaking ii. The details of manufacturing units, locations and works from where supply against this tender shall be proposed to be furnished by OEM.
2	The bidder must be the manufacturer of at least one of the two major components in Package Substations/ Pad Mounted Substations, namely the 11KV RMU or the Distribution Transformer, and include that component in their bid.	Confirmation & Documentary proof on the offered equipment's

3	The Bidder should have supplied a minimum of 10 units of Package Substations with a rating of 11/0.415 kV, 630 kVA or higher within the last 7 years from the date of bid opening to any utility, SEB, PSU, or government organization. OR The Bidder should have supplied at least 3 units of Pad Mounted Substations with a rating of 11/0.415 kV, 630 kVA or higher within the last 7 years from the date of bid opening to any utility, SEB, PSU, or government organization.	i. Summary list of executed Purchase orders ii. Purchase order copies iii. Material delivery clearance certificate copy or Invoice Copies or Delivery completion/ Performance certificate
4	The Bidder must provide two performance certificates confirming the satisfactory performance of Package Substations with a rating of 11/0.415 kV, 630 kVA or higher, supplied within the last 7 years from the bid opening date, issued by any utility, SEB, PSU, or government organizations. OR The Bidder must provide one performance certificate confirming the satisfactory performance of Pad Mounted Substations with a rating of 11/0.415 kV, 630 kVA or higher, supplied within the last 7 years from the bid opening date, issued by any utility, SEB, PSU, or government organizations. If the Bidder has a prior association with BRPL/BYPL for similar products and services, the performance feedback from BRPL/ BYPL will be the sole consideration, regardless of any performance certificates issued by other organizations.	Performance Certificates
5	The bidder should have servicing, repairing, testing & refurbishment facility in INDIA with necessary spares and testing equipments for providing prompt after sales service for PTR..	Relevant Details/certificates/ Undertaking
6	The bidder must have an installed plant capacity to supply a minimum of 5 units of Package Substations/ Pad Mounted Substations per month	Installed Manufacturing Capacity
7	The Bidder must possess valid ISO 9001:2015 certification.	Valid copy of Certification
8	The Bidder must have an average annual sales turnover of ₹25 Crore or more in the last three (3) financial years (i.e., FY 2022-23, 2023-24 & 2024-25).	Balance Sheet / Copy of audited P&L C19Account / Duly certified CA certificate having UDIN to be submitted
9	The Bidder shall submit an undertaking stating that "No litigation" is pending with BRPL or its group/ associate companies as of the bid opening date.	Self-Undertaking

10	The bidder shall submit an undertaking (self-certification) confirming that they have not been blacklisted or debarred by any central or state government institution or electricity utilities as of the bid opening date.	Self-Undertaking
11	The Bidder must possess a valid PAN number and GST Registration Number, along with compliance to all other statutory requirements. The bidder shall provide copies of these registrations and submit an undertaking affirming that they will comply with all statutory regulations, laws, and rules prior to the commencement of supply/ work.	Relevant Statutory Documents Copy/ Undertaking Self

3.0 Bidding and Award Process

Bidders are requested to submit their questions regarding the RFQ or the bidding process after review of this RFQ. BRPL response to the questions raised by various bidders will be distributed to all participating bidders through website.

a. Time schedule of the bidding process

The bidders on this RFQ package should complete the following within the dates specified as under:

S.No.	Steps	Activity description	Due date
1	Technical Queries	All Queries related to RFQ	On or before 25.07.2026 1500 Hrs.
2	Technical Offer	Documentary evidence in support of qualifying criteria. Technical Literature/ GTP/ Drawings/ Type test report, if any, etc., Testing facilities, any other relevant document, acceptance to commercial terms & conditions viz. delivery Schedule/ Period, Payment terms, PBG etc. Quality assurance plan, Deviation from the specification, list of plant & machinery and testing equipments Un priced items.	29.07.2026, 1500 Hrs
3	Commercial Offer	Prices for Distribution Transformer and Break up regarding basic price and taxes. Delivery commitment	29.07.2026, 1500 Hrs
4	Opening of technical bid	As per RFQ	29.07.2026, 1530 Hrs

b. Bid submission through E-Procurement Portal

BSES will carry out E-Procurement through its e-procurement portal (<https://srmpdrportal.bsedelhi.com/irj/portal>). Interested Non-registered bidders are requested to obtain the portal user name and password (if not available) for bid submission. For

participating in e-Tenders of BRPL, please write a mail to: Mr. Satyam Singh, E-mail: satyam.singh@reliancegroupindia.com, with your details as per below:

- a) Existing Vendor Code with BRPL or its Group/Associates Companies (if available):
- b) Trade Name:
- c) Address of Principal Place of Business:
- d) Contact Person's Name:
- e) Contact Person's Designation:
- f) Contact Person's Mobile No.:
- g) Contact Person's email ID:
- h) Also, attach a valid copy of Power of Attorney in favour of mentioned Contact Person for being authorized to receive user ID and password on behalf of their organization.

The login ID details shall be sent through email to the email ID mentioned by you for the same.

Bids shall be submitted in 2 (Two) parts on the assigned folder of the e-procurement site. Please refer to the user manual available at <https://srmpdportal.bsedelhi.com/irj/portal>

This is a two part bid process. Bidders are to upload the bids (a) Technical Bid (b) Price Bid on website.

- **The Part-I (Technical Bid)** - Technical Bid should not contain any cost information whatsoever. In case of Bids where the qualification requirements, technical suitability and other requirements are found to be inadequate, Part-II "Financial Bid" will not be opened.
- **The Part-II (Financial Bid)** - Qualified bidders will be intimated after technical evaluation of all the bids is completed. The date and time of same shall be intimated in due course to the qualified bidders. Notwithstanding anything stated above, the Purchaser reserves the right to assess bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final.

Bids have to be mandatorily submitted only through the e-procurement portal of BSES Delhi. Bids submitted through any other form/ route shall not be admissible. However, documents that necessarily have to be submitted in originals like EMD or Tender Fee (in the form of BG as applicable) and any other documents mentioned in the tender documents have to be submitted at the BRPL office before the due date and time of submission. Please mention the NIT No on sealed envelope of EMD and DD and submit the documents on following address (scanned copy of EMD and Tender Fee to be uploaded on e-procurement portal):

**HEAD OF THE DEPARTMENT, 1st FLOOR,
'C' BLOCK, CONTRACTS & MATERIALS DEPARTMENT,
BSES RAJDHANI POWER LTD,
BSES BHAWAN, NEHRU PLACE,
NEW DELHI-110019.**

4.0 REVERSE AUCTION CLAUSE

Purchaser reserves the right to use the reverse auction tool through SAP – SRM as an integral part of the entire tendering process. All techno commercially qualified bidders shall participate in the reverse auction. Notwithstanding anything stated above, the Purchaser reserves the right to assess the bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final. Bidder is to submit their acceptance as per the format attached ANNEXURE-VI.

5.0 Award Decision

Purchaser intends to award the business on a lowest bid basis, so suppliers are encouraged to bid competitively. The decision to place purchase order / letter of acceptance solely depends on purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.

The purchaser reserves all the rights to award the contract to one or more bidders so as to meet the delivery requirement or nullify the award decision without any reason.

BSES reserves the right to split the tender quantity amongst techno commercially qualified bidders on account of delivery requirement in tender, quantity under procurement etc.

Splitting of tender quantity amongst more than one bidder shall be governed by below mentioned guidelines:

- If the quantity is to be split among 2 bidders, it will be done in the ratio of 70:30 on L1 price.
- If the quantity is to be split among 3 bidders, it will be done in the ratio of 60:25:15 on L1 price.
- In case quantity needs to be distributed and order splitting is required, distribution of quantity shall be maximum among three (3) bidders.

In the event of your bid being selected by purchaser (and / or its affiliates) and your subsequent DEFAULT on your bid; you will be required to pay purchaser (and / or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in RFQ.

In case any supplier is found unsatisfactory during the delivery process, the award will be cancelled and BRPL reserves the right to award other suppliers who are found fit.

Quantity Variation: The purchaser reserves the rights to vary the quantity by +/- 30% of the tender quantity.

Repeat Order: BRPL reserves the right to place repeat order at the same rates & terms and conditions as per this tender against additional requirement subject to mutual agreement between BRPL & supplier.

6.0 Market Integrity:

We have a fair and competitive marketplace. The rules for bidders are outlined in the Terms & Conditions. Bidders must agree to these rules prior to participating. In addition to other remedies available, we reserves the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the Terms & Condition. Bidders who violate the marketplace rules or engage in behavior that disrupts the fair execution of the marketplace restricts a bidder to length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

- Failure to honor prices submitted to the marketplace.
- Breach of the terms of the published in Request For Quotation.

7.0 Supplier Confidentiality

All information contained in this RFQ is confidential and may not be disclosed, published or advertised in any manner without written authorization from BRPL. This includes all bidding information submitted.

All RFQ documents remain the property of BRPL and all suppliers are required to return these documents to BRPL upon request.

Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

8.0 Contact Information

All communication as regards this RFQ shall be made (i) in English, (ii) in writing and (iii) sent by mail, facsimile to:

	Technical	Commercial
Contact Name	Mr. Anupam Kumar Copy to Ms. Deepti Sharma	Mr. Satyam Singh Copy to Mr. Pankaj Goyal & Ms. Rachna Jain
Address	CES Deptt., 1 st floor, A-Block, BSES Rajdhani Power Limited, BSES Bhawan, Nehru Place, New Delhi -110019	C&M Deptt., 1 st floor, D-Block, BSES Rajdhani Power Limited, BSES Bhawan, Nehru Place, New Delhi -110019
Email-ID	anupam.o.kumar@reliancegroupindia.com deepti.r.sharma@reliancegroupindia.com	satyam.singh@reliancegroupindia.com rachna.jain@reliancegroupindia.com pankaj.goyal@reliancegroupindia.com

SECTION – II

INSTRUCTION TO BIDDERS (ITB)

**SUPPLY, INSTALLATION, TESTING &
COMMISSIONING OF 1600 KVA PAD MOUNTED
PSS IN BRPL, NEW DELHI**

CMC/BR/26-27/FK/PR/RJ/1370

A. GENERAL

1.00 BSES Rajdhani Power Ltd, hereinafter referred to as the Purchaser are desirous of implementing the various Systems Improvement/Repair & Maintenance works at their respective licensed area in Delhi. The Purchaser has now floated this tender for procurement of Distribution Transformer as notified earlier in this bid document.

2.00 SCOPE OF WORK

The scope shall include Design, Manufacture, Testing at works conforming to the Technical Specifications enclosed along with Packing, Forwarding, Freight and Unloading and proper stacking at Purchaser's stores/ site. Scope also includes installation, testing & commissioning at Purchaser's site.

3.00 DISCLAIMER

3.01 This Document includes statements, which reflect various assumptions, which may or may not be correct. Each Bidder/ Bidding Consortium should conduct its own estimation and analysis and should check the accuracy, reliability and completeness of the information in this Document and obtain independent advice from appropriate sources in their own interest.

3.02 Neither Purchaser nor its employees will have any liability whatsoever to any Bidder or any other person under the law or contract, the principles of restitution or unjust enrichment or otherwise for any loss, expense or damage whatsoever which may arise from or be incurred or suffered in connection with anything contained in this Document, any matter deemed to form part of this Document, provision of Services and any other information supplied by or on behalf of Purchaser or its employees, or otherwise arising in any way from the selection process for the Supply.

3.03 Though adequate care has been taken while issuing the Bid document, the Bidder should satisfy itself that Documents are complete in all respects. Intimation of any discrepancy shall be given to this office immediately.

3.04 This Document and the information contained herein are Strictly Confidential and are for the use of only the person(s) to whom it is issued. It may not be copied or distributed by the recipient to third parties (other than in confidence to the recipient's professional advisors).

4.00 COST OF BIDDING

The Bidder shall bear all cost associated with the preparation and submission of its Bid and Purchaser will in no case be responsible or liable for those costs.

B BIDDING DOCUMENT

5.00 BIDDING DOCUMENTS

5.01 The Scope of Work, Bidding Procedures and Contract Terms are described in the Bidding Documents. In addition to the covering letter accompanying Bidding Documents, the Bidding Documents include:

Volume –I

- a) Request for Quotation (RFQ) - Section – I
- b) Instructions to Bidders (ITB) - Section – II
- c) General Conditions of Contract - Section - III
- d) Quantity and delivery requirement - Section –IV
- e) Technical Specifications (TS) - Section –V

Volume – II

- a) Bid Form - Annexure – I
- b) Bid Format - Annexure – II
- c) Price Schedule - Annexure – III
- d) Commercial Terms & Conditions - Annexure - IV
- e) No Deviation Sheet - Annexure - V
- f) Qualification Criterion - Annexure - VI

- 5.02 The Bidder is expected to examine the Bidding Documents, including all Instructions, Forms, Terms and specifications. Failure to furnish all information required by the Bidding documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect will may result in the rejection of the Bid.

6.00 AMENDMENT OF BIDDING DOCUMENTS

- 6.01 At any time prior to the deadline for submission of Bids, the Purchaser may for any reasons, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by Amendment.
- 6.02 The Amendment shall be part of the Bidding Documents, pursuant to Clause 5.01, and it will be notified in writing by Fax/e-mail to all the Bidders who have received the Bidding Documents and confirmed their participation to Bid, and will be binding on them.
- 6.03 In order to afford prospective Bidders reasonable time in which to take the Amendment into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids.

C PREPARATION OF BIDS

7.00 LANGUAGE OF BID

The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the Purchaser, shall be written in the English Language. Any printed literature furnished by the Bidder may be written in another Language, provided that this literature is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall govern.

8.00 DOCUMENTS COMPRISING THE BID

The Bid prepared and submitted by the Bidder shall comprise the following components:

- a) Bid Form, Price & other Schedules (STRICTLY AS PER FORMAT) and Technical Data Sheets completed in accordance with Clause 9.0, 10.0, 11.0 and Technical Specification;
- b) All the Bids must be accompanied with the required EMD as mentioned in the Section-I against each tender.
- c) Power of Attorney or Authorization letter indicating that the person(s) signing the Bid have the authority to sign the Bid and thus that the Bid is binding upon the Bidder during the full period of its validity, in accordance with clause 12.0.

9.00 BID FORM

9.01 The Bidder shall complete an the Bid Form and the appropriate Price & Other Schedules and Technical Data Sheets.

9.02 EMD

Pursuant to Clause 8.0(b) above, the bidder shall furnish, as part of its bid, a EMD amounting to 2% of the total bid value (FOR Destination) i.e. **Rs. 8,20,000/-**. The EMD is required to protect the Purchaser against the risk of Bidder's conduct which would warrant the security's forfeiture.

The EMD shall be denominated in the currency of the bid, and shall be in the following form:

A bank guarantee issued by any scheduled bank strictly as per the form at enclosed and shall be valid for a period of thirty (30) days beyond the validity of the bid.

Unsuccessful bidders' EMD will be discharged or returned as promptly as possible as but not later than thirty (30) days after the expiration of the period of bid validity.

The successful bidder's EMD will be discharged upon furnishing the performance security. The EMD may be forfeited:

- a) If the Bidder:
 - i) Withdraws its bid during the period of bid validity specified by the Bidder in the Bid Form; or
- b) in the case of a successful Bidder, if the Bidder fails:
 - i) to sign the Contract, or
 - ii) to furnish the required performance security.

10.00 BID PRICES

10.01 Bidders shall quote for the entire Scope of Supply with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance with the requirement of Bidding Documents the Bidder shall complete the appropriate Price Schedules

included herein, stating the Unit Price for each item & total Price.

- 10.02 The prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during execution of the supply work, breakup of price constituents, should be there. Prices quoted by the Bidder shall be—Firm “and not subject to any price adjustment during the performance of the Contract. A Bid submitted with an adjustable price quotation will be treated as non -responsive and rejected.

11.00 BID CURRENCIES

Prices shall be quoted in **Indian Rupees (INR) only**.

12.00 PERIOD OF VALIDITY OF BIDS

- 12.01 Bids shall remain valid for **120 days** post bid date.
- 12.02 Notwithstanding Clause 12.01 above, the Purchaser may solicit the Bidder’s consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing by Fax/e-mail.

13.00 ALTERNATIVE BIDS

Bidders shall submit Bids, which comply with the Bidding Documents. Alternative Bids will not be considered. The attention of Bidders is drawn to the provisions of Clause 22.03 & 22.04 regarding the rejection of Bids, which are not substantially responsive to the requirements of the Bidding Documents.

14.00 FORMAT AND SIGNING OF BID

- 14.01 The original Bid Form and accompanying documents (as specified in Clause 9.0), clearly marked "Original Bid", plus one copy must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copies, the original shall govern.
- 14.02 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid.
- 14.03 The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

D SUBMISSION OF BIDS

15.0 SEALING AND MARKING OF BIDS

- 15.01 Bid submission: All the Bid Documents shall be uploaded on website before the closing time for submission of the bid.

15.02 The EMD and tender fee shall be enclosed in a sealed envelope and the said envelope shall be superscribed with — **Tender Fee & EMD** and “**Tender Notice no., Due date of submission, Tender opening date**”

15.03 Bids submitted by Telex/ Telegram/ Fax/ in person will not be accepted. No request from any Bidder to the Purchaser to collect the proposals from Airlines/Cargo Agents etc. shall be entertained by the Purchaser.

16.0 DEADLINE FOR SUBMISSION OF BIDS

16.01 The Bid must be submitted by the bidder not later than **1500 HRS on 29.07.2026** on SRM portal.

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause 9.0, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

17.0 ONE BID PER BIDDER

Each Bidder shall submit only one Bid. A Bidder who submits or participates in more than one Bid will cause all those Bids to be rejected.

18.00 LATE BIDS

Any Bid received by the Purchaser after the deadline for submission of Bids prescribed by the Purchaser, pursuant to Clause 16.0, will be declared "Late" and rejected and returned unopened to the Bidder.

19.00 MODIFICATIONS AND WITHDRAWAL OF BIDS

19.01 The Bidder is not allowed to modify or withdraw its Bid after the Bid's submission.

E. EVALUATION OF BID

20.00 PROCESS TO BE CONFIDENTIAL

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the Purchaser's processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

21.00 CLARIFICATION OF BIDS

To assist in the examination, evaluation and comparison of Bids, the Purchaser may, at its discretion, ask the bidder for a clarification of its Bid. All responses to requests for

clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted.

22.00 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

- 22.01 Purchaser will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order.
- 22.02 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.
- 22.03 Prior to the detailed evaluation, Purchaser will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.
- 22.04 Bid determined as not substantially responsive will be rejected by the Purchaser and/or the Purchaser and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

23.0 EVALUATION AND COMPARISON OF BIDS

- 23.01 The evaluation of Bids shall be done based on the delivered cost competitiveness basis.
- 23.02 The evaluation of the Bids shall be a stage-wise procedure. The following stages are identified for evaluation purposes: In the first stage, the Bids would be subjected to a responsiveness check. The Technical Proposals and the Conditional ties of the Bidders would be evaluated. Subsequently, the Financial Proposals along with supplementary Financial Proposals, if any, of Bidders with Techno-commercially Acceptable Bids shall be considered for final evaluation.
- 23.03 The Purchaser's evaluation of a Bid will take into account, in addition to the Bid price, the following factors, in the manner and to the extent indicated in this Clause:
- (a) Supply Schedule
 - (b) Deviations from Bidding Documents

Bidders shall base their Bid price on the terms and conditions specified in the Bidding Documents. The cost of all quantifiable deviations and omissions from the specification, terms and conditions specified in Bidding Documents shall be evaluated. The Purchaser will make its own assessment of the cost of any deviation for the purpose of ensuring fair comparison of Bids.

23.04 Any adjustment in price, which results from the above procedure, shall be added for the purposes of comparative evaluation only to arrive at an "Evaluated Bid Price". Bid Prices quoted by Bidders shall remain unaltered.

F. AWARD OF CONTRACT

24.0 CONTACTING THE PURCHASER

24.01 From the time of Bid submission to the time of contract award, if any Bidder wishes to contact the Purchaser on any matter related to the Bid, it should do so in writing.

24.02 Any effort by a Bidder to influence the Purchaser and/or in the Purchaser's decisions in respect of Bid evaluation, Bid comparison or Contract Award, will result in the rejection of the Bidder's Bid.

25.0 THE PURCHASER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

The Purchaser reserves the right to accept or reject any Bid and to annul the Bidding process and reject all Bids at anytime prior toward 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 Purchaser's action.

26.0 AWARD OF CONTRACT

The Purchaser will award the Contract to the successful Bidder whose Bid has been Determined to be the lowest-evaluated responsive Bid, provided further that the Bidder has been determined to be qualified to satisfactorily perform the Contract. Purchaser reserves the right to award order other bidders in the tender, provided it is required for progress of project & provided he agrees to come to the lowest rate.

27.0 THE PURCHASER'S RIGHT TO VARY QUANTITIES

The Purchaser reserves the right to vary the quantity i.e. increase or decrease the numbers/quantities without any change in terms and conditions during the execution of the Order.

28.0 LETTER OF INTENT/ NOTIFICATION OF AWARD

The letter of intent/ Notification of Award shall be issued to the successful Bidder whose bids have been considered responsive, techno-commercially acceptable and evaluated to be the lowest (L1). The successful Bidder shall be required to furnish a letter of acceptance within 7 days of issue of the letter of intent /Notification of Award by Purchaser.

29.0 PERFORMANCE BANK GUARANTEE

Bidder shall submit PBG on Purchase Order (PO) basis for 10% of the PO value (including GST). The Performance Bond shall be valid for a period of twenty four months (24) from the

date of the commissioning or thirty months (30) from the date of receipt of material (last consignment of PO) at site/stores whichever is earlier plus 3 months towards claim period.

30.00 CORRUPT OR FRAUDULENT PRACTICES

30.01 The Purchaser requires that the Bidders observe the highest standard of ethics during the procurement and execution of the Project. In pursuance of this policy, the Purchaser:

- (a) Defines, for the purposes of this provision, the terms set forth below as follows:
 - i) "Corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and
 - ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Purchaser, and includes collusive practice among Bidders (prior to or after Bid submission) designed to establish Bid prices at artificial non-competitive levels and to deprive the Purchaser of the benefits of free and open competition.
- (b) Will reject a proposal forward if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question ;
- (c) Will declare a firm 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 engaged in corrupt or fraudulent practices in competing for, or in executing, a contract.

30.02 Furthermore, Bidders shall be aware of the provision stated in the General Conditions of Contract.

SECTION – III

GENERAL CONDITIONS OF CONTRACT (GCC)

**SUPPLY, INSTALLATION, TESTING &
COMMISSIONING OF 1600 KVA PAD MOUNTED
PSS IN BRPL, NEW DELHI**

CMC/BR/26-27/FK/PR/RJ/1370

GENERAL TERMS AND CONDITIONS

1.0 General Instructions

- 1.01 All the Bids shall be prepared and submitted in accordance with these instructions.
- 1.02 Bidder shall bear all costs associated with the preparation and delivery of its Bid, and the Purchaser will in no case shall be responsible or liable for these costs.
- 1.03 The Bid should be submitted by the Bidder in whose name the bid document has been issued and under no circumstances it shall be transferred/ sold to the other party.
- 1.04 The Purchaser 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 the Purchaser, the data in support of RFQ requirement is incomplete.
- 1.05 The Bidder is expected to examine all instructions, forms, terms & conditions and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a Bid not substantially responsive to the Bid Documents in every respect may result in rejection of the Bid. However, the Purchaser's decision in regard to the responsiveness and rejection of bids shall be final and binding without any obligation, financial or otherwise, on the Purchaser.

2.0 Definition of Terms

- 2.01 "Purchaser" shall mean BRPL, on whose behalf this bid enquiry is issued by its authorized representative / officers.
- 2.02 "Bidder" shall mean the firm who quotes against this bid enquiry issued by the Purchaser. "Supplier" or "Supplier" shall mean the successful Bidder and/or Bidders whose bid has been accepted by the Purchaser and on whom the "Letter of Acceptance" is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assigns wherever the context so admits.
- 2.03 "Supply" shall mean the Scope of Contract as described.
- 2.04 "Specification" shall mean collectively all the terms and stipulations contained in those portions of this bid document known as RFQ, Commercial Terms & Condition, Instructions to Bidders, Technical Specifications and the Amendments, Revisions, Deletions or Additions, as may be made by the Purchaser from time to time.
- 2.05 "Letter of Acceptance" shall mean the official notice issued by the Purchaser notifying the Supplier that his proposal has been accepted and it shall include amendments thereto, if any, issued by the Purchaser. The "Letter of Acceptance" issued by the Purchaser shall be binding on the "Supplier" The date of Letter of Acceptance shall be taken as the effective date of the commencement of contract.
- 2.06 "Month" shall mean the calendar month and "Day" shall mean the calendar day.

- 2.07 “Codes and Standards” shall mean all the applicable codes and standards as indicated in the Specification.
- 2.08 “Offer Sheet” shall mean Bidder's firm offer submitted to BRPL in accordance with the specification.
- 2.09 “Contract” shall mean the “Letter of Acceptance” issued by the Purchaser.
- 2.10 “Contract Price” shall mean the price referred to in the “Letter of Acceptance”.
- 2.11 “Contract Period” shall mean the period during which the “Contract” shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.
- 2.12 “Acceptance” shall mean and deemed to include one or more of the following as will be stipulated in the specification:
- a) The written acceptance of material by the inspector at suppliers works to ship the materials.
 - b) Acceptance of material at Purchaser site stores after its receipt and due inspection/ testing and release of material acceptance voucher.
 - c) Where the scope of the contract includes supply, acceptance shall mean issue of necessary equipment / material takeover receipt after installation & commissioning and final acceptance.

3.0 Contract Documents & Priority

- 3.01 Contract Documents: The terms and conditions of the contract shall consist solely of these RFQ conditions and the offer sheet.
- 3.02 Priority: Should there be any discrepancy between any term hereof and any term of the Offer Sheet, the terms of these RFQ shall prevail.

4.0 Scope of Supply - General

- 4.01 The “Scope of Supply” shall be on the basis of Bidder’s responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.
- 4.02 Bidder shall have to quote for the Bill of quantities as listed in Section – IV of this RFQ.
- 4.03 Quantity variation and additional requirement if any shall be communicated to successful bidder during project execution.
- 4.04 All relevant drawings, data and instruction manuals.

5.0 Quality Assurance and Inspection

- 5.01 Immediately on award of contract, the bidder shall prepare detailed quality assurance plan / test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection 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 before proceeding with manufacturing. However, Purchaser shall have right to review the inspection reports, quality checks and results of suppliers in house inspection department which are not Customer hold points and the supplier shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc.
- 5.02 Witness and Hold points are critical steps in manufacturing, inspection and testing where the supplier is obliged to notify the Purchaser in advance so that it may be witnessed by the Purchaser. Final inspection is a mandatory hold point. The supplier needs to proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from BRPL.
- 5.03 The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the supplier of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.
- 5.04 On completion of manufacturing the items can be dispatched only after issue of shipping release by the Purchaser.
- 5.05 All testing and inspection shall be done without any extra cost.
- 5.06 Purchaser reserve the right to send any material out of the supply to any recognized laboratory for testing and the cost of testing shall be borne by the Purchaser. In case the material is found not in order with the technical requirement / specification, the charges along with any other penalty which may be levied is to be borne by the bidder. To avoid any complaint the supplier is advised to send his representative to the stores to see that the material sent for testing is being sealed in the presence of bidders representative.
- 5.07 Bidder has to sign quality agreement before supply of the material.

6.0 Packing, Packing List & Marking

- 6.01 Packing: Supplier shall pack or shall cause to be packed all Commodities in boxes and containers and otherwise in such a manner as shall be reasonably suitable for shipment by road or rail to BRPL without undue risk of damage in transit.
- 6.02 Packing List: The contents of each package shall be itemized on a detailed list showing the exact weight and the extreme outside dimensions (length, width and height) of each container or box. One copy of the packing list shall be enclosed in each package delivered. There shall also be enclosed in one package a master packing list identifying each individual package, which is part of the shipment. On any packaging where it is not feasible to place the packing

list inside the container, all pertinent information shall be stenciled on the outside and will thus constitute a packing list.

7.01 Prices basis for supply of materials

Bidders require quoting their prices on Landed Cost Basis and separate price for each item. For Supply to BRPL Delhi the price shall be inclusive of packing, forwarding, GST and freights. The above supply prices shall also include unloading at site stores. Transit and storage insurance will be arranged by BRPL; however bidder to furnish required details in advance for arranging the same by BRPL.

8.0 Variation in taxes, duties & levies:

- 8.01 The total order value shall be adjusted on account of any variations in Statutory Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period only. However, in case of reduction in taxes, duties and levies, the benefits of the same shall be passed on to BUYER.
- 8.02 No other Taxes, Duties & Levies other than those specified above will be payable by BUYER except in case of new Levies, Taxes & Duties imposed by the Competent Authorities by way of fresh notification(s) subsequent to the issue of PURCHASE ORDER but within the stipulated delivery period.
- 8.03 Notwithstanding what is stated above, changes in Taxes, Duties & Levies shall apply only to that portion of PURCHASE ORDER not executed on the date of notification by Competent Authority. Further, changes in Taxes, Duties & Levies after due date of Delivery shall not affect PURCHASE ORDER Terms and Value.
- 8.04 PURCHASE ORDER value shall not be subject to any variation on account of variation in Exchange rate(s).

9.0 Taxes & Duties on raw materials & bought out components:

- 9.01 Taxes & Duties on raw materials & bought out components are included in Order Value and are not subject to any escalation or variation for any reason whatsoever.
- 9.02 Taxes & Duties on raw materials & bought out components procured indigenously are included in Order Value and are not subject to any escalation or variation for any reason whatsoever.

10.0 Terms of payment and billing

10.01 For Supply of Equipments:

- 100% payment shall be made within 45 days from the date of receipt of material at store/ site against submission of 10 % performance bank guarantee. (Refer 10.01)

10.02 For Service of Equipments: 100% payment within 45 days after Installation, Testing, Commissioning of equipment and duly certified by BRPL Project-in-charge.

10.03 Bidder to submit the following documents against dispatch of each consignment:

- i) Consignee copy of LR
- ii) Supplier detailed invoice showing commodity description, quantity, unit price, total price and basis of delivery.
- iii) Original certificate issued by BRPL confirming receipt of material at site and acceptance of the same.
- iv) Dispatch clearance / inspection report in original issued by the inspection authority
- v) Packing List.
- vi) Test Reports
- vii) Guarantee Certificate.
- viii) Insurance policy to be obtained by supplier

11.0 Price Validity

11.01 All bids submitted shall remain valid, firm and subject to unconditional acceptance by BRPL Delhi for 120 days post bid-date. For awarded suppliers, the prices shall remain valid and firm till contract completion.

12.0 Performance Guarantee

12.01 Bidder shall submit PBG on Purchase Order (PO) basis for 10% of the PO value (including GST). The Performance Bond shall be valid for a period of twenty four months (24) from the date of the commissioning or thirty months (30) from the date of receipt of material (last consignment of PO) at site/stores whichever is earlier plus 3 months towards claim period. It shall be in accordance with the following terms:

- a) Bank guarantee from any nationalized bank in favour of BSES RAJDHANI POWER LTD (BRPL). The performance Bank guarantee shall be in the format as specified by BRPL.

13.0 Forfeiture

13.01 Each Performance Guarantee established under Clause 12.0 shall contain a statement that it shall be automatically and unconditionally forfeited without recourse and payable against the presentation by BRPL of this Performance Guarantee to the ICICI Bank at Mumbai, or to the relevant company/ correspondent bank referred to above, as the case may be, together with a simple statement that supplier has failed to comply with any term or condition set forth in the Contract.

13.02 Each Performance Guarantee established under will be automatically and unconditionally forfeited without recourse if BRPL in its sole discretion determines that supplier has failed to comply with any term or condition set forth in the contract.

14.0 Release

All Performance Guarantee will be released without interest within seven (7) days from the last date up to which the Performance Guarantee has to be kept valid (as defined in Clause 12.0) except for the case set forth in Clause 21.0.

15.0 Defects Liability Period

- 15.01 The bidder to guarantee the materials / items supplied against any defect of failure, which arise due to faulty materials, workmanship or design for the entire defects liability period. The Defect liability period shall be 60 months from the date of commissioning or 66 months from the date of delivery whichever is earlier. If during the defects liability period any materials / items are found to be defective, these shall be replaced or rectified by the bidder at his own cost within 30 days from the date of receipt of intimation

16.0 Return, Replacement or Substitution.

BRPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BRPL may in its discretion elect to return defective Commodities to Supplier for replacement, free of charge to BRPL, or may reject such Commodities and purchase the same or similar Commodities from any third party. In the latter case BRPL shall furnish proof to Supplier of the cost of such substitute purchase. In either case, all costs of any replacement, substitution, shipping, labour and other related expenses incurred in connection with the return and replacement or for the substitute purchase of a Commodity hereunder should be for the account of Supplier. BRPL may set off such costs against any amounts payable by BRPL to Supplier. Supplier shall reimburse BRPL for the amount, if any, by which the price of a substitute Commodity exceeds the price for such Commodity as quoted in the Bid.

17.0 Effective Date of Commencement of Contract:

- 17.01 The date of the issue of the Letter of Acceptance shall be treated as the effective date of the commencement of Contract.

18.0 Time – The Essence of Contract

- 18.01 The time and the date of completion of the “Supply” as stipulated in the Letter Of Acceptance / Purchase order issued to the Supplier shall be deemed to be the essence of the “Contract”. The Supply has to be completed not later than the aforesaid Schedule and date of completion of supply.

19.0 The Laws and Jurisdiction of Contract:

- 19.01 The laws applicable to this Contract shall be the Laws in force in India.
- 19.02 All disputes arising in connection with the present Contract shall be settled amicably by mutual consultation failing which shall be finally settled as per the rules of Arbitration and Conciliation Act, 1996 at the discretion of Purchaser. The venue of arbitration shall be at Mumbai in India

20.0 Events of Default

20.01 Events of Default. Each of the following events or occurrences shall constitute an event of default ("Event of Default") under the Contract:

- a) Supplier fails or refuses to pay any amounts due under the Contract;
- b) Supplier fails or refuses to deliver Commodities conforming to this RFQ/ specifications, or fails to deliver Commodities within the period specified in P.O. or any extension thereof
- c) Supplier becomes insolvent or unable to pay its debts when due, or commits any act of bankruptcy, such as filing any petition in any bankruptcy, winding-up or reorganization proceeding, or acknowledges in writing its insolvency or inability to pay its debts; or the Supplier's creditors file any petition relating to bankruptcy of Supplier;
- d) Supplier otherwise fails or refuses to perform or observe any term or condition of the Contract and such failure is not remediable or, if remediable, continues for a period of 30 days after receipt by the Supplier of notice of such failure from BRPL.

21.0 Consequences of Default.

- a) If an Event of Default shall occur and be continuing, BRPL may forthwith terminate the Contract by written notice.
- b) In the event of an Event of Default, BRPL may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;
 - i) present for payment to the relevant bank the Performance Bond;
 - ii) purchase the same or similar Commodities from any third party; and/or
 - iii) recover any losses and/or additional expenses BRPL may incur as a result of Supplier's default.

22.0 Penalty for Delay

- 22.01 If supply of items / equipments is delayed beyond the supply schedule as stipulated in purchase order then the Supplier shall be liable to pay to the Purchaser as penalty for delay, a sum of 1% (one percent) of the contract price for every week delay or part thereof for undelivered quantities.
- 22.02 The total amount of penalty for delay under the contract will be subject to a maximum of ten percent (10%) of the contract price for undelivered quantities.
- 22.03 The Purchaser may, without prejudice to any method of recovery, deduct the amount for such damages from any amount due or which may become due to the Supplier or from the Performance Bond or file a claim against the supplier.

23.0 Force Majeure

- 23.01 General

An "Event of Force Majeure" shall mean any event or circumstance not within the reasonable control directly or indirectly, of the Party affected, but only if and to the extent that:

- i) Such event or circumstance materially and adversely affects the ability of the affected Party to perform its obligations under this Contract, and the affected Party has taken all reasonable precautions, due care and reasonable alternative measures in order to prevent or avoid the effect of such event on the affected party's ability to perform its obligations under this Contract and to mitigate the consequences thereof.
- ii) For the avoidance of doubt, if such event or circumstance would not have materially and adversely affected the performance of the affected party had such affected party followed good industry practice, such event or circumstance shall not constitute force majeure.
- iii) Such event is not the direct or indirect result of the failure of such Party to perform any of its obligations under this Contract.
- iv) Such Party has given the other Party prompt notice describing such events, the effect thereof and the actions being taken in order to comply with above clause.

23.02 Specific Events of Force Majeure subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements:

23.03 Mitigation of Events of Force Majeure Each Party shall:

- i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure including recourse to alternate methods of satisfying its obligations under the Contract;
- ii) Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and
- iii) Keep the other Party informed at regular intervals of the circumstances concerning the event of Force Majeure, with best estimates as to its likely continuation and what measures or contingency planning it is taking to mitigate and or terminate the Event of Force Majeure.

23.04 Burden of Proof In the event that the Parties are unable in good faith to agree that a Force Majeure event has occurred to an affected party, the parties shall resolve their dispute in accordance with the provisions of this Agreement. The burden of proof as to whether or not a force majeure event has occurred shall be upon the party claiming that the force majeure event has occurred and that it is the affected party.

23.05 Termination for Certain Events of Force Majeure. If any obligation of any Party under the Contract is or is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 3 months, the Parties shall promptly discuss in good faith how to proceed with a view to reaching a solution on mutually agreed basis. If a solution on mutually agreed basis cannot be arrived at within a period of 30 days after the expiry of the period of three months, the Contract shall be terminated after the said period of 30 days and

neither Party shall be liable to the other for any consequences arising on account of such termination.

- 23.06 Limitation of Force Majeure event. The Supplier shall not be relieved of any obligation under the Contract solely because cost of performance is increased, whether as a consequence of adverse economic consequences or otherwise.
- 23.07 Extension of Contract Period due to Force Majeure event The Contract period may be extended by mutual agreement of Parties by way of an adjustment on account of any period during which an obligation of either Party is suspended due to a Force Majeure event.
- 23.08 Effect of Events of Force Majeure. Except as otherwise provided herein or may further be agreed between the Parties, either Party shall be excused from performance and neither Party shall be construed to be in default in respect of any obligations hereunder, for so long as failure to perform such obligations shall be due to and event of Force Majeure."

24.0 Transfer And Sub-Letting

- 24.01 The Supplier shall not sublet, transfer, assign or otherwise part with the Contract or any part thereof, either directly or indirectly, without prior written permission of the Purchaser.

25.0 Recoveries

- 25.01 Whenever under this contract any money is recoverable from and payable by the bidder, the purchaser shall be entitled to recover such sum by appropriating in part or in whole by detecting any sum due to which any time thereafter may become due from the supplier in this or any other contract. Should the sum be not sufficient to cover the full amount recoverable the bidder shall pay to the purchaser on demand the remaining balance.

26.0 Waiver

- 26.01 Failure to enforce any condition herein contained shall not operate as a waiver of the condition itself or any subsequent breach thereof.

27.0 Indemnification

- 27.01 Notwithstanding contrary to anything contained in this RFQ, Supplier shall at his costs and risks make good any loss or damage to the property of the Purchaser and/or the other Supplier engaged by the Purchaser and/or the employees of the Purchaser and/or employees of the other Supplier engaged by the Purchaser whatsoever arising out of the negligence of the Supplier while performing the obligations under this contract.

SECTION – IV: QUANTITY AND DELIVERY REQUIREMENT

Sl. No.	Item Description	Specification	Requirement	Delivery Schedule	Location
BRPL,DELHI					
1	Supply of 1600 kVA pad mounted PSS	SECTION V	05 Nos.	Within 02 months from the date of drawing approval received	Stores/ site of BRPL in New Delhi
2.	Installation, testing & commissioning of 1600 kVA Pad Mounted PSS			Within 45 days from the date of intimation by Project-in-charge/ authorized representative from BRPL	At BRPL site in New Delhi

Annexure –I

BID FORM

Supply, Installation, Testing & Commissioning of 1600 kVA pad mounted PSS

To

Head of the Department Contracts & Materials BSES Rajdhani Power Ltd BSES Bhawan, Nehru Place New Delhi– 110019

Sir,

We understand that BRPL is desirous of procuring “1600 kVA pad mounted PSS” in its licensed distribution network area in Delhi. Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods in full conformity with the Drawings, Conditions of Contract and specifications for the sum of AS PER PRICE BID ENCLOSED or such other sums as may be determined in accordance with the terms and conditions of the contract .The above amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.

If our Bid is accepted, we undertake to deliver the entire goods as per delivery schedule given by you from the date of award of purchase order/letter of intent.

If our Bid is accepted, we will furnish a performance bank guarantee for an amount of 10% (Ten) percent of the total contract value for due performance of the Contract in accordance with the General Conditions of Contract.

We agree to abide by this Bid for a period of 120 days from the date fixed for bid opening under clause 9.0 of GCC, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

We declare that we have studied the provision of Indian Income Tax Law and other Indian Laws for supply of equipments/materials and the prices have been quoted accordingly.

Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

We understand that you are not bound to accept the lowest, or any bid you may receive.

There is provision for Resolution of Disputes under this Contract, in accordance with the Laws and Jurisdiction of Contract, Clause 19 of GCC .

Dated this.....day of.....20.....

Signature..... In the capacity of.....

.....duly authorized to sign for and on behalf of (IN BLOCK CAPITALS).....

Annexure -II

FORMAT FOR EMD BANK GUARANTEE

(To be issued in a Non Judicial Stamp Paper of Rs.50/-purchased in the name of the bank)

Whereas [name of the Bidder] (hereinafter called the “Bidder”) has submitted its bid dated [date of submission of bid] for the supply of [name and/or description of the goods] (hereafter called “the Bid”). KNOW ALL PEOPLE by these presents that WE [name of bank]at[Branch Name and address],having our registered office at[address of the registered office of the bank](herein after called —“the Bank”),are bound unto BSES Rajdhani Power Ltd., with its Corporate Office at BSES Bhawan Nehru Place, New Delhi -110019, (herein after called —the “Purchaser”) in the sum of_____ for which payment well and truly to be made to the said Purchaser, 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:

If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or

If the Bidder, having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity:

fails or refuses to execute the Contract Form ,if required; or
fails or refuses to furnish the performance security, In accordance with the Instructions to Bidders/GENERAL CONDITIONS.;

We undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that is its demand the purchaser will note that amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

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

(Signature of the bank)

Signature of the witness

Annexure-III

PRICE FORMAT

ENQUIRY NO & DATE: NIT: CMC/BR/26-27/FK/PR/RJ/1370

PRICE SCHEDULE

ITEM DESCRIPTION	QTY AS PER RFQ	UOM	EX-WORKS RATE/ UNIT	CGST (%)	CGST AMOUNT	SGST (%)	SGST AMOUNT	IGST (%)	IGST AMOUNT	FREIGHT	LANDED RATE/ UNIT	TOTAL LANDED COST (INR)
Supply of 1600 kVA pad mounted PSS	05	Nos.										
Installation, testing & commissioning of 1600 kVA Pad Mounted PSS	05	Nos.										
Total											Σ	Σ

Note:

1. Prices shall be Firm
2. The prices received without break up of ex works, Freight, GST are liable for rejection.
3. Please indicate the exact percentage of taxes in figures and words.
4. If there is a discrepancy between the unit price and the total price, THE UNIT PRICE shall prevail.
5. If there is a discrepancy between the uploaded price as per price format (Annexure III) & price quoted in SRM portal, quoted price as per price format (Annexure III) shall prevail.

Bidders seal & signature

Annexure – IV

Enquiry No. : CMC/BR/26-27/FK/PR/RJ/1370

COMMERCIAL TERMS AND CONDITIONS

S.NO.	ITEM DESCRIPTION	AS PER BRPL	CONFIRMATION OF BIDDER
1	Validity of prices	120 days from date of offer	
2	Price basis	Price Firm, FOR Delhi store basis, Prices shall be inclusive of all taxes & duties, freight up to Delhi stores. Unloading at stores shall be in vendor's scope. Transit insurance in BRPL scope.	
3	Payment Terms	For Supply: 100% payment within 45 days after receipt of material at stores For Service: 100% payment within 45 days after Installation, Testing, Commissioning of equipment and duly certified by BRPL Project-in-charge or their	
4	Delivery schedule	For Supply: Within 02 months from the date of approval of drawings. For Service: Within 45 days from the date of intimation by Project-in-charge/ authorized representative from BRPL	
5	Defect Liability Period	The bidder to Guarantee the materials/ items supplied against any defect of failure, which arise due to faulty materials, workmanship or design for the entire defects liability period. The Defect liability period shall be 60 months from the date of commissioning or 66 months from the date of delivery whichever is earlier. If during the defects liability period any materials / items are found to be defective, these shall be replaced or rectified by the bidder at his own cost within 30 days from the date of receipt of intimation.	
6	Penalty for delay	1% per week of delay of undelivered units or part thereof subject to maximum of 10% of total PO value of undelivered units	
7	Performance Bank Guarantee	Bidder shall submit PBG on Purchase Order (PO) basis for 10% of the PO value (including GST).The Performance Bond shall be valid for a period of twenty four months (24) from the date of the commissioning or thirty months (30) from the date of receipt of material (last consignment of PO) at site/stores whichever is earlier plus 3 months towards claim period.	

ANNEXURE - V

ENQUIRY NO: CMC/BR/26-27/FK/PR/RJ/1370

NO DEVIATION SHEET

SL NO	SL NO OF TECHNICAL SPECIFICATION	DEVIATION, IF ANY

SIGNATURE & SEAL OF BIDDER

NAME OF BIDDER

CHECK LIST

Sl No	Item Description	YES/NO
1	INDEX	YES/NO
2	COVERING LETTER	YES/NO
3	BID FORM (UNPRICED) DULY SIGNED	YES/NO
4	BILL OF MATERIAL (UNPRICED)	YES/NO
5	TECHNICAL BID	YES/NO
6	ACCEPTANCE TO COMMERCIAL TERMS & CONDITIONS	YES/NO
7	FINANCIAL BIDS	YES/NO
8	EMD IN PRESCRIBED FORMAT	YES/NO
9	DEMAND DRAFT OF RS 1180/- DRAWN IN FAVOUR OF	BSES RAJDHANI POWER LTD
10	POWER OF ATTORNEY/ AUTHORISATION LETTER FOR SIGNING THE BID	YES/NO

FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed & stamped by the bidder along-with bid)

BSES Rajdhani Power Ltd (BRPL) intends to use reverse auction through SAP-SRM tool as an integral part of entire tendering process. All bidders who are techno-commercially qualified on the basis of tender requirements shall participate in the reverse auction.

The following terms and conditions are deemed as accepted by the bidder on participation in the bid:-

1. In case of bidding through Internet medium, bidders are advised to ensure availability of all associated infrastructure as required to participate in the reverse auction event. Inability to bid due to telephone glitch, internet response issues, software & hardware hangs/failures, power failures or any other reason shall not be the responsibility of BRPL.
2. In case bidder fails to participate in the reverse auction event due to any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid submitted by them as a part of tender shall be considered as bidder's Final .No Regret offer. Any off-line price bids received from a bidder in lieu of non-participation in the reverse auction event shall be rejected by BRPL.
3. The bidder is advised to understand the auto bid process t safeguard themselves against any possibility of non-participation in the reverse auction event.
4. The bidder shall be prepared with competitive price quotes during the day of reverse auction event.
5. The prices quoted by bidder in reverse auction event shall be on FOR Landed cost BRPL Store/site basis inclusive of all relevant taxes, duties, levies, transportation charges etc.
6. The prices submitted by the bidder during reverse auction event shall be binding on the bidder.
7. The bidder agrees to non-disclosure of trade information regarding bid details e.g. purchase, identity, bid process/technology, bid documentation etc.
8. BRPL will make every effort to make the bid process transparent. However award decision of BRPL will be final and binding on the bidder.
9. The prices submitted during reverse auction event shall be binding on the bidder.
10. No request for Time extension of the reverse auction event shall be considered by BRPL.

Seal & Signature of Bidder

SECTION – V

TECHNICAL SPECIFICATIONS (TS)

1600 KVA PAD MOUNTED PSS

CMC/BR/26-27/FK/PR/RJ/1370

**The detailed technical specifications of
1600 KVA PAD MOUNTED PSS**



Technical Specification
of
11 KV Pad Mounted Substation
(Specification no – SP-PMSS-207-R0)

Rev:		0
Pages		61
Date:		21.03.2025
Prepared by	Jeena Borana	 b8b1c444-d6e3-4459-b793-d46d1e00a2fc
Reviewed by	Srinivas Gopu	 5d32525e-ed3a-4f41-b1c7-b8a5e77d1519
Approved by	Gaurav Sharma	 23dc2de2-95de-4472-99a7-dea873f472b6

TECHNICAL SPECIFICATION OF 11 KV Pad Mounted Substation**Addendum -1 (Addendum points for Pad Mounted SS)**

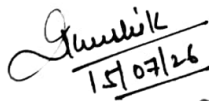
Sr. No	Cl. No.	Existing clause	Amendment	Revision
1	Clause No. 7.2.7	RMU construction 2.5mm thick Galvanized sheet with 275GSM	As per the OEM's type-tested design	R1
2	Clause no 7.4.8	Making capacity endurance of earth switch (as per IEC 62271-102)	An earth switch mechanical endurance of 5 operating cycles, as per the (as per IEC 62271-102). The offered arrangement shall meet all functional and safety requirements specified in the tender.	R1
3	Clause no. 7.2.21	- Allen head 6mm with hexagonal slot. - Seals shall be provided between the Panel and removable covers to avoid theft. The seals shall be opened / broken by using specific equipment.	Panel cover shall be fixed using Allen hex bolts or a sealing arrangement, provided it ensures adequate safety, sealing, and operational accessibility.	R1
4	Clause no. 7.6.1	Considering three core cable terminations, mounting flexibility shall be provided for CT's (in horizontal & vertical direction both). Additionally, CAUTION marking (by sticker/ paint) shall be provided to avoid CT's installation above the Screen of cable. (I.e. earth potential point.)	Considering three core cable terminations, mounting flexibility shall be provided for CT's (in vertical direction only). Additionally, CAUTION marking (by sticker/ paint) shall be provided to avoid CT's installation above the Screen of cable. (I.e. earth potential point.)	R1
5	Clause no. 7.12.6	Potential free contacts for SF6 gas pressure low shall be - 1NO +1NC	Potential-free contacts for low SF ₆ gas pressure may be 1NO + 1NC or 2NO.	R1
6	Clause no. 12.22	Modem models- Niseva/Lantronix/Phoenix	Modem models- Niseva/Lantronix/Phoenix/Nomus	R1



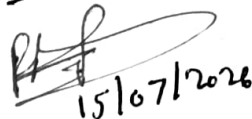
TECHNICAL SPECIFICATION OF 11 KV Pad Mounted Substation

7	Clause no. 7.2.21	Additional Requirement	The provision of 1 No. Type-3 SPD for 24 VDC FRTU supplies, 1 No. SPD for Ethernet, and 1 No. SPD for RS485 is acceptable based on past supplies..	R1
8	NA	Additional Requirement	Connection for DT meter to be tapped from LT main bus bar, same to be done through tinned copper thimbles.	R1
9	13.3.3	Temperature rise test on Transformer	Temperature Rise Test shall be conducted on each rating of transformer in in-house testing laboratory. Test shall be conducted once per purchase order.	R1
10	NA	Additional Requirement	Nut bolt arrangement at every joint shall include 2 nos. plain washers and 1 No. spring washer on all the Transformers before dispatch. Note : Nut bolt material shall be stainless steel (Except termination nut-bolts which are Brass / Tinned Copper)	R1
11	8.3.2.1	Design	N2 cushion at top filled with positive Pressure not required. The transformer should be completely filled with oil.	R1
		Oil filled with N2 cushion at top filled with positive Pressure. N2 shall be technical grade in accordance with IS:1747		
12	8.3.7	Transformer oil	Oil testing shall be conducted once per lot at CPRI/ERDA as per IS 16899 table -3. IS and its latest amendment shall be applicable.	R1
13	NA	Additional Requirement	A Winding Temperature Indicator (WTI) should be included, as this feature is not available in the DMCR.	R1

Prepared by

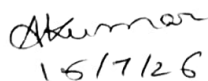

 15/07/26

Reviewed by

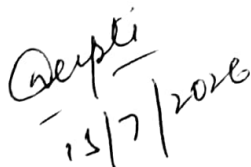

 15/07/2026


 P. Baniraj
 CES
 15/07/2026

Checked by


 15/7/26

Approved by


 15/7/2026

Technical Specification of 11 KV Pad Mounted Substation**Index**

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SP-PMSS-207-R0

Technical Specification of 11 KV Pad Mounted Substation

Record of Revision

S. No.	Revision No	Item/Clause No.	Nature of change	Approved by

Technical Specification of 11 KV Pad Mounted Substation**1.0 Scope**

- 1.1 Design, manufacture, testing at manufacturer works before dispatch, packing, and delivery of Pad Mounted Substation (PMSS) as per this specification.
- 1.2 Supply of commissioning spares and accessories for PMSS.
- 1.3 FRTU Licensed software for programming, configuration, troubleshooting and diagnosis of FRTU shall be provided.
- 1.4 Any item not specifically mentioned in scope but necessary for successful operation of substation shall be deemed to be included in bidder's scope.

2.0 Codes & standards

Materials, equipment and methods used in manufacture of 11kV Pad mounted Substation shall conform to the latest edition of following:

S. No.	Standard	Title
2.1	Indian Electricity Rules	With latest amendments
2.2	Indian electricity act	IE act 2003
2.3	CBIP manual	CBIP manual on transformers
2.4	IEC 60076	Power transformers
2.5	IEC:60616	Terminal and Tapping Markings for Power Transformers
2.6	IEC: 60529	Degrees of Protection Provided by Enclosures (IP Code).
2.7	IEC 60694	Specification for high voltage switchgear
2.8	IEC 61439-1	Low voltage switchgear & control gear assemblies
2.9	IEC 60664-1	Insulation coordination for low voltage systems
2.10	IEC 62262	Degree of protection provided by enclosure against mechanical shocks
2.11	IEC 62271-202	High voltage switchgear & control gear - prefabricated substation
2.12	IEC 60044	Instrument transformers - Current & voltage transformers
2.13	IEC 60225	Electrical relays
2.14	IEC 60625	High voltage switches
2.15	IEC 60502	Power cables
2.16	IEC 60947-2	Low-voltage switchgear and control gear : Circuit-breakers
2.17	IS 1180 part 3	Outdoor type oil immersed distribution transformer

Technical Specification of 11 KV Pad Mounted Substation

S. No.	Standard	Title
		upto and including 2.5MVA, 33kV. Part 3 Natural/Synthetic Organic Ester oil Liquid Immersed
2.18	IS 2026	Power transformers
2.19	IS 2026-7	Loading of power transformers
2.20	IS 13947	Low voltage switchgear & control gear
2.21	IS 2099	Bushings for voltages above 1000V
2.22	IS 16227	Instrument transformers
2.23	IS 1554	PVC cables
2.24	IS 7098	XLPE cables
2.25	IS 2629	Recommended Practice for Hot-Dip Galvanizing of Iron and Steel
2.26	IS 4759	Hot-dip zinc coatings on structural steel and other allied products
2.27	IS 3043	Code of practice for Earthing
2.28	IS 16081/IEC 61099	Specifications for Unused Synthetic Organic Esters for Electrical purposes
2.29	IS 8130	Conductors for insulated cables
2.30	IS 5	Ready mixed paints

In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows -

- Guaranteed Technical Particulars (GTP)
- Specification including applicable codes & standards
- Approved Vendor Drawings
- Other documents

3.0 Service Conditions

The Pad mounted substation shall be designed & tested to operate satisfactorily under following conditions:

S. No.	Description	Data by purchaser
3.1	Location	Delhi
3.2	Reference design ambient temperature	40°C for Delhi
3.3	Maximum ambient temperature	50°C for Delhi

Technical Specification of 11 KV Pad Mounted Substation

S. No.	Description	Data by purchaser
3.4	Relative humidity	85% for Delhi
3.5	Seismic zone	Zone IV for Delhi

4.0 Electrical Distribution System Data

4.1	HT supply System	3 phase AC, 3 wire
4.2	Voltage	11000 volt $\pm 10\%$
4.3	Frequency	50 Hz $\pm 5\%$
4.4	Fault level	350MVA – 18.5kA
4.5	System neutral	Earthed at upstream 11kV source
4.6	LT supply system	3 phase AC, 4 wire
4.7	Rated voltage	415V $\pm 10\%$
4.8	Rated frequency	50 Hz $\pm 5\%$
4.9	Fault level	35MVA – 50kA

5.0 Configuration

S N	PMSS Type	DT Rating (kVA)	RMU	LV Panel				Recommended Dimensions – L x B x H (mm)
				Incomer ACB		Outgoing MCCB		
				Rating (A)	Qty (Nos)	Rating (A)	Qty (Nos)	
5.1	Type-1	630	3 Way	1250	1	800	3	2400 x 1800 x 2400
5.2	Type-2	1000	3 Way	2000	1	800	3	2400 x 2000 x 2400
5.3	Type-3	1000	3 Way	2000	1	800	5	3000 x 2000 x 2400
5.4	Type-4	1600	3 Way	3200	1	800	5	3000 x 2500 x 2400
5.5	Type-5	1600	3 Way	3200	1	800	6	3400 x 2500 x 2400
5.6	Type-6	2000	3 Way	3200	1	800	5	3000 x 2500 x 2400
5.7	Type-7	2000	3 Way	3200	1	800	6	3400 x 2500 x 2400

Technical Specification of 11 KV Pad Mounted Substation

Note: Dimensions are indicative and subject to optimization during detailed engineering to meet operational requirements and ensure compliance with relevant standards. Any change in dimensions is subject to BYPL approval.

6.0 Construction

6.1	Assembly	a) Substation shall be factory assembled on a common base frame. b) Transformer, RMU and LV panel should be mounted on base frame using nuts, bolts, washers and spring washers so that each equipment can be removed from base frame at site for replacement. Welding of any equipment on base frame is not acceptable. c) Base frame shall be capable of withstanding load of the complete substation with safety factor of 1.5. d) Base frame bottom support pads to be provided for fixing by bolt to foundation e) Substation should be suitable for outdoor installation. f) Analysis/Simulation for strength of complete structure through STAAD Pro software to be submitted during detailed engineering.
6.2	Layout	a) RMU and LV panel shall be coupled on same side of transformer for ease of operation and optimization of footprint. b) Please refer Layout Drawing in Annexure-A
6.3	Transformer to RMU Coupling	a) Coupling through 11kV, 3CX150 sqmm XLPE insulated armored Cable. b) Cable termination shall be done through 11 kV heat shrinkable termination kit c) Cable box to be provided on transformer HV side for coupling with RMU. The cable box shall be openable and accessible from top and side of the transformer for easily accessing transformer side cable connections. Cable box shall be IP 55 with rain canopy on all joints to completely prevent entry of rain water.
6.4	Transformer to LV Panel Coupling	a) Connection between Transformer LV terminals and LV panel busbar shall be through flexible tinned copper braid with terminal lug. b) Copper braid shall be suitable for carrying rated continuous current depending upon the incomer rating. Max. current density should be 2.5 A per sqmm. c) All connections shall be done using minimum 02 no's nut bolts, plain washer and spring washer. d) The Coupling busbar should be of aluminum with max. current density of 1 A per sqmm. e) Length of overlap for connection shall not be less than the width of Busbar f) Bimetallic strip to be provided for connection with tinned copper braid with Aluminum busbar.

Technical Specification of 11 KV Pad Mounted Substation

		g) Connection chamber should be IP 55 with rain canopy on all joints to completely prevent entry of rain water. h) Connection chamber should be openable from top and sides for access to transformer and LV panel connections.
6.5	Energy meter box	To be provided in LV Panel for DT metering
6.6	FRTU	FRTU should be mounted in LV compartment on top of LV panel or RMU based on space availability.
6.7	Lifting Arrangement	a) Cradle type Lifting Arrangement with spreader bar and metallic channels to be provided for lifting of complete assembly from bottom. b) Metallic channels should be detachable and should have provision for connection to base frame through nut and bolts when not in use. c) Lifting arrangement shall maintain the balance and prevent toppling of substation during lifting d) Lifting hooks to be provided on each equipment for individual lifting of Transformer, RMU and LV panel.

7.0 11 kV Ring Main Unit

7.1	RMU Configuration	
7.1.1	RMU Configuration	3 Way RMU with all VCB modules with three position disconnector
7.1.1.1	Ring Feeder 1	Motorized VCB with manual operation facility. FPI and CBCT
7.1.1.2	Ring Feeder 2	Motorized VCB with manual operation facility. FPI and CBCT
7.1.1.3	Transformer Feeder	Motorized VCB with manual operation facility. Dual Powered relay with protection CTs to be provided.
7.1.2	Extensibility	Non extensible type
7.1.3	Circuit breaker, disconnector & earth switch in RMU panel	All shall be non-draw out type, fixed position
7.1.4	Insulation Medium	
7.1.4.1	For panel	SF6 gas in sealed metallic tank
7.1.4.2	For Breakers	SF6 gas or Vacuum type (with disconnector & earth switch)
7.1.5	Arc interruption chamber for breaker	Arc interruption chamber of breakers shall be separate from the main insulated tank.
7.2	RMU Panel Construction	
7.2.1	Panel type	Metal enclosed, framed, Compartmentalized panel construction
7.2.2	Service Location	Outdoor, non air conditioned environment

Technical Specification of 11 KV Pad Mounted Substation

7.2.3	Mounting	Free Standing type mounted on common base channel of pad mounted substation.
7.2.4	Overall Enclosure Protection	IP54 minimum, vermin proof
7.2.5	Doors	Front access with internal anti-theft hinge arrangement with minimum opening angle of 120°, minimum three hinges (desirable)
7.2.6	Covers	a) Bolted for rear access, with handles. Support for handle shall be provided at suitable place on RMU body. b) All the accessible bolts / screws shall be vandal proof. c) One set of required Special tools per RMU (if any) shall be in the scope of supply
7.2.7	Construction	2.5mm thick Galvanized sheet with 275GSM
7.2.8	Base frame	Raised frame of 300 mm height
7.2.9	HDPE clits	Shall be provided as cable supporting clamps for each power cable (to suit the cable size from 150 to 400 sqmm XLPE cable. Exact size shall be provided during drawing approval stage.)
7.2.10	Lifting lugs	Four numbers
7.2.11	Cable Entry	Bottom
7.2.12	Gland plate	a) Separate for control cable & power cable 3mm metallic b) Removable type & split type in two parts, with 1 no,90mm diameter knockout punch/ hole in the centre
7.2.13	Cable termination	
7.2.13.1	Cable type & size	3C X150 / 300 / 400sqmm Aluminum conductor XLPE with armor & PVC outer sheath
7.2.13.2	Terminals for 11kV cable termination	With right angled cold applied boots, set of required size of Brass Nut bolt – M16 size & Bimetallic washers.
7.2.13.3	Termination type	Suitable for heat shrinkable type
7.2.13.4	Termination height	700mm minimum, from gland plate
7.2.14	Bus bar	Tinned copper with insulated sleeve (Sizing Calculation to be submitted in support of its Guaranteed S.C. rating / Capability)
7.2.14.1	Bus bar continuous rated current	630amp
7.2.14.2	Bus bar short time withstand capacity	20 kA for 3 sec
7.2.14.3	Bus bar support insulator material	SMC / DMC resin

Technical Specification of 11 KV Pad Mounted Substation

7.2.14.4	Maximum temperature rise above reference ambient	In line with Table 3 of IEC 62271-207
7.2.15	Earth bus bar	Aluminum / Tinned Copper sized for rated fault duty for 1 sec
7.2.15.1	Earth bus internal connection to all noncurrent carrying metal parts	By 2.5 sqmm copper flexible wire, Earth connection point maximum 1 meter away from cable test facility
7.2.15.2	Earth bus external connection to owners earth	Studs on both sides with holes for M10 bolt + hardware to readily receive purchaser earth connection
7.2.16	Cooling arrangement	By natural air without fan
7.2.17	Panel internal wiring	a) Multi strand flexible color coded PVC insulated Cu wire 1 sqmm (SCADA) / 2.5 sqmm(for CT's) b) 1100 V grade with ferrules at both ends. c) R phase - Red, Y phase – Yellow, B phase – Blue, AC- black, DC – grey, Earth – green d) All the internal control / auxiliary wiring shall be routed through proper conduit.
7.2.18	Hardware (Nut, bolts & handle)	Stainless steel (Except termination nut-bolts which are Brass / Tinned Copper)
7.2.19	Gasket	Neoprene rubber
7.2.20	Marshalling terminal blocks	a) 1 sqmm, Nylon 66 material, screw type + 20% spare in each row of TB. b) Disconnecting type Terminal block to be provided for CT connections.
7.2.21	Panel cover fixing bolts	a) Allen head 6mm with hexagonal slot. b) Seals shall be provided between the Panel and removable covers to avoid theft. The seals shall be opened/broken by using specific equipment.
7.2.22	Padlock facility	Required for all earth switches & all handles
7.2.23	Internal Arc classification	
7.2.23.1	Explosion vents	a) To ensure operator's safety, design should ensure that gases / flames generated during flash over / blast in any of the compartment, must not come out from the front of RMU and shall not go to adjacent cable compartment. b) Internal arc test report (for Cable compartment & other compartments) must be submitted to support above, along with RMU GA drawing indicating these vents. c) There shall not be any type of holes, gaps etc on the walls of cable termination compartment.
7.2.23.2	Internal Arc rating	20 kA for 1s
7.2.23.3	Internal arc classification	IAC AFL
7.2.24	SF6 Gas Annual Loss	< 0.1% of total mass. Pressure of SF6 gas shall be

Technical Specification of 11 KV Pad Mounted Substation

		above the operating limit throughout the life of the equipment.
7.2.25	Voltage Presence Indicator System (VPIS)	a) VPIS to be provided for all feeders. b) VPIS shall be provided conforming to IEC62271-213 standard. c) VPIS shall be provided with terminals facility for phasing purpose. d) VPIS sensor shall be installed on screened bushing. e) NO/NC Contact shall be provided with VPIS for taking the Live line indication status to remote SCADA through FRTU.
7.2.26	Push Buttons	On/Off PBS shall be shrouded/covered to prevent accidental operation.
7.3	Circuit breaker	
7.3.1	Type	Three pole, operated simultaneously by a common shaft
7.3.2	Arc interruption medium	Vacuum Bottle
7.3.3	Operating mechanism	Motorized spring charged stored energy type with facility for manual charging
7.3.4	Motor rated voltage	24V DC
7.3.5	Emergency trip / open push button	On panel front with Protective flap to prevent any accidental tripping of breaker.
7.3.6	Continuous rating	630amp
7.3.7	Short time withstand capacity	20 kA for 3 sec
7.3.8	Minimum number of operations at rated current (as per IEC 62271-100)	a) Mechanical Endurance – Class M1(2000 operations) b) Electrical Endurance – Class E2
7.3.9	Fault making capacity	50 kA peak
7.3.10	Fault breaking capacity	20 kA Minimum
7.3.11	Maximum number of operations at rated Fault current (as per IEC 62271-100)	Electrical Endurance – Class E2. To be guaranteed by manufacturer with authorized lab test reports
7.3.12	Breaker status auxiliary contact	2NO + 2NC wired to terminal block
7.4	Disconnecter with Earth switch	
7.4.1	Type	Three phase, three position suitable for a) Connecting b) Disconnecting c) Earthing
7.4.2	Dielectric medium	SF6 gas
7.4.3	Operating mechanism for close & open	Manual

Technical Specification of 11 KV Pad Mounted Substation

7.4.4	Fault making capacity	50 kA
7.4.5	Auxiliary contacts	1NO+1NC wired to terminal block
7.4.6	Location of disconnect switch	located on purchaser cable connection side of vacuum bottle
7.4.7	Minimum number of operations at no load (as per IEC 62271-102)	Mechanical Endurance – Class M0 (1000 operations)
7.4.8	Making capacity endurance of earth switch (as per IEC IEC 62271-102)	Class E2 (Min 10 operations)
7.5	For Cable Feeder circuit breaker module (Module 1&Module 2)	
7.5.1	Self-powered relay	Not required
7.5.2	Fault passage indicator (FPI)	a) To be provided on each cable feeder for RMU. FPI shall be earth fault protection type. b) Digital type and shall operate as the current exceeds the set value. c) Flash indication for identifying faults with red LED with one flash for every one sec. Test & reset button 1 NO + 1 NC potential free contact for remote indication FPI power supply unit shall use lithium battery with minimum life of 1000 blinking hours, so that FPI shall continue to function even after main feeder has tripped. d) FPI shall be powered with 24V DC
7.5.2.1	CBCT	CBCT – Split open type suitable for mounting without disconnection of cable for Earth Fault.
7.5.2.2	Connection of CBCT with FPI	Cable connection of FPI with CBCT shall be of pre moulded type on the CBCT side. Cable shall be 2.5 sqmm cu cable or fiber cable.
7.5.2.3	Earth Fault setting	
7.5.2.3.1	Sensing Current	50 to 400A
7.5.2.3.2	Sensing Time	30 to 100 ms in steps of 10ms.
7.5.2.3.3	Reset Time	0.5 -1-2-3-4 hr
7.5.2.3.4	Resetting Facility	a) Self reset after reset time b) Self reset after restoration of voltage c) Manual d) Remote resetting
7.5.2.3.5	Contact Rating	1A at 230 V
7.5.2.3.6	Degree of Protection	IP 54
7.5.2.3.7	Mounting Arrangement	Surface or Flush Mounting
7.5.3	Data by purchaser	

Technical Specification of 11 KV Pad Mounted Substation

7.5.3.1	System Fault Level	18.5 kA
7.5.3.2	Type of Grounding	Solidly Grounded
7.5.3.3	Fault clearing time	100ms
7.5.3.4	Cable Type	XLPE , 70 sqmm to 400 sqmm
7.6	For Transformer circuit breaker module (Module 3)	
7.6.1	Current transformer	a) 75-150/ 1 amp b) Resin Cast Ring type c) Considering three core cable terminations, mounting flexibility shall be provided for CT's (in horizontal & vertical direction both). Additionally, CAUTION marking (by sticker/ paint) shall be provided to avoid CT's installation above the screen of cable. (i.e. earth potential point.) d) Disconnecting type terminal block shall be provided for CT Circuit. e) Change in CT ratio shall be possible from the disconnecting type TB. Any change in CT ratio from CT secondary will not be acceptable.
7.6.2	CT accuracy class	5P10 minimum
7.6.3	CT burden	Rated CT burden should be 20% higher than the connected relay burden.
7.6.4	Protection relay	a) Dual-powered (Self powered and Auxiliary 24V DC powered), Microprocessor based Numerical relay with backlit LCD display, manual reset type, flush mounted on panel front b) IDMT over current and earth fault protection with high set element c) The relay should record atleast 10 faults on FIFO basis d) In addition to faults, relay should have event recorder e) RS-485 Port to be provided on the Relay for communication with SCADA through FRTU on Modbus RTU protocol. All relay parameters including fault records should be accessible from SCADA. Necessary internal wiring also shall be done between Relay and FRTU. f) Licensed software for programming shall be provided for Relay communication.
7.6.4.1	Protections Required	Over current, Instantaneous & earth fault
7.6.4.2	Tripping characteristic	Inverse definite minimum time characteristics for Over current and earth fault protection
7.6.4.5	Over current relay setting	10% - 250% of I_n , steps of 1%.

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7.6.4.6	Overcurrent Setting time delay	25ms – 1500ms in steps of 10 ms
7.6.4.7	Instantaneous Over current setting	100% - 2500% of In & OFF
7.6.4.8	Instantaneous over current Setting time delay	0 ms- 100 s in steps of 10 ms
7.6.4.9	Earth fault setting	5%- 250 % of In, steps of 10%
7.6.4.10	Earth fault setting time delay	25 ms – 1500 ms in steps of 10 ms
7.7	Battery	
7.7.1	Battery type	Li-ion battery
7.7.2	Rating	24V DC, 26AH
7.7.3	Location	Battery shall be kept in shielded compartment in FRTU panel and fixed with rivet and nut bolt. Individual battery terminal shall be wired upto terminal blocks mounted in FRTU cabinet.
7.8	Battery Health Monitoring Unit (BHMU)	a) BHMU will have Auto / Manual test facility. In Auto Mode it ensures battery automatic discharge at preset period with 100W discharge resister along with suitable algorithm to check the healthiness based on rate of discharge. b) In manual Mode PB to be provided for battery testing. c) Provision for Bypass mode of BHMU shall also be provided. d) Output contacts :230V/24V DC -5A • Battery Fail: 1 CO • Test in process e) Indications: • BHMU healthy • Battery Fail • Battery Low • Test On f) Remote monitoring of Battery voltage and current on Modbus RTU protocol
7.9	Battery charger	2 no's chargers with auto change over using 10A diodes.
7.9.1	Fuse at charger input & output supply	a) 2no's fuse for AC Incoming supply. b) Fuse location shall be preferably away from Battery charger location.
7.9.2	Charger temperature rise at heat sink at full load for 2 hours	Maximum 55 deg C above ambient of 40 deg C
7.9.3	Battery charger cooling method	Natural without any fans
7.9.4	Individual CBs DC control	Required with fuse
7.10	FRTU	a) FRTU shall be provided and integrated with RMU and LV compartment with completely

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		wired along with modem suitable for communicating over GSM network and also have facility to communicate with fiber network. b) Bidder shall demonstrate the data communication of FRTU modem with MCC/BCC for the proposed modem for approval of owner in the Pre Order technical evaluation stage. c) For detailed specification of FRTU, I/O requirements, refer standard specification of Annexure E.
7.11	Modem	a) Modem should be dual sim 4G and shall also have compatibility of 3G/2G network. b) For detailed technical specification of modem, please refer Annexure D.
7.12	Requirements of sealed housing live parts (RMU SF6 gas chamber)	
7.12.1	Enclosure	Stainless steel enclosure suitable for IP67
7.12.2	SF6 gas pressure low alarm	To be provided
7.12.3	Provision for SF6 gas filling	To be given (For 'sealed for life' design of RMU, this is not applicable)
7.12.4	Provision for SF6 gas pressure indication	Manometer with non-return valve
7.12.5	Arc interruption method for SF6 breaker / Load break switch	Puffer type / rotating arc type
7.12.6	Potential free contacts for SF6 gas pressure low	1NO +1NC
7.13	RMU operation interlocks	
7.13.1	Circuit breaker & respective earth switch	Only one in 'close' condition at a time
7.13.2	Prevent the removal of respective cable covers if circuit breaker is 'ON'	Electrical / Mechanical
7.13.3	Prevent the closure of circuit breaker if respective cable cover is open	Electrical / Mechanical
7.13.4	Cable test plug for CB accessible only if Earth switch connected to earth	Mechanical
7.13.5	Prevent motorized operation of CB during manual operation	a) Electrical / Mechanical b) Electrical signal shall cut-off completely during manual operation. If CB fail to operate, the supply to motor shall be disconnected after certain time period to prevent burning of motor due to continuous supply.
7.13.6	Prevent motorized operation of	Necessary feature (Electrical)

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	more than one CB at a time	
7.14	Indication & signals	Local
7.14.1	Operation counter on front / Inside the RMU LT chamber	To be provided for each Circuit breaker, with minimum four digits & non resettable type
7.14.2	Cable charge status indication for all CB	Capacitor type voltage indicators with LED on all the phases (Shall be clearly visible in day light)
7.14.3	Spring charge status indication	On front for breaker
7.14.4	Circuit breaker On/OFF indication	Green for OFF / Red for ON
7.14.5	Earth switch closed indication (For Each CB)	On front
7.14.6	Circuit breaker protection relay operated on fault	Flag
7.14.7	Fault passage indication on CB	Flag
7.14.8	Status signals to SCADA-to be wired to marshalling terminal block	2NO + 2NC
7.14.8.1	CB close / open	potential free contacts
7.14.8.2	CB Earth Switch close /open	potential free contacts
7.14.8.3	Battery charger Fail	potential free contacts
7.14.8.4	CB close / open	potential free contacts
7.14.8.5	Protection relay operated	potential free contacts
7.14.8.6	FPI operated	potential free contacts
7.14.8.7	SF6 gas pressure low	potential free contacts
7.14.8.8	Ready to close signal to control centre to indicate all interlocks are OK	a) Potential free contacts b) Signal to indicate Ready for remote operation from SCADA required for entire closing and entire tripping circuit with all interlocks accounted for.
7.14.8.9	Local / Remote Switch	a) A manual Local / Remote selector switch shall be provided for each FRTU to disable all control outputs by breaking the power supply connection to the control outputs. b) When in the "Local" position, the Local/remote switch shall allow testing of all the control outputs of FRTU without activating the control outputs to field devices. A status input indication shall be provided for the Local/ Remote switch to allow the SCADA system to monitor the position of the switch. c) The status of Local/ Remote switch should be wired and configured in FRTU.

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7.14.8.10	Commands from SCADA- to be wired to marshalling terminal block	a) Cable feeder close / open b) FPI Reset c) Transformer feeder close / open
7.15	Mimic diagram, labels & finish	a) Mimic diagram (Shall not be accepted with Stickers) b) On panel front with description of function & direction of operation of handles/buttons
7.15.1	Operating Instructions	Operating instruction chart and Do's & Don'ts in Hindi / local language to be displayed on left/front side of panel enclosure on anodized Al Sheet 16SWG, duly affixed on panel.
7.15.2	Name plate on panel front	Fixing by rivet only
7.15.2.1	Material	Anodized aluminum 16SWG / SS
7.15.2.2	Background	Satin Silver
7.15.2.3	Letters, diagram & border	Black
7.15.2.4	Process	Etching
7.15.2.5	Name plate details	a) Month & year of manufacturing b) equipment type c) Input & output rating d) Purchaser name & order number e) Guarantee period
7.15.3	Labels for meters & indications	Anodized aluminum with white character on black background or 3 ply lamicaid
7.15.4	Danger plate on front & rear side	As per IS 2551
7.15.6	Pre-treatment of GI sheet of Enclosure	GI sheet shall be pre-treated before powder coating to avoid rusting and corrosion
7.15.6.1	Pre-treatment process	Seven tank process (Pre-galvanization shall remain intact)
7.15.6.2	Primer	Two coats of zinc rich primer shall be applied at welded and punched areas
7.15.6.3	Finish	Powder Coating
7.15.6.4	Painting external finish	a) Powder coated epoxy polyester base grade A b) Shade -RAL 632 c) Uniform thickness 85 micron minimum
7.15.6.5	Painting internal finish	a) Powder coated epoxy polyester base grade A b) Shade -white c) Uniform thickness 60 micron minimum

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8.0 Oil Type Hermetically Sealed Distribution Transformer

8.1	Major Design criteria	
8.1.1	Voltage variation on supply side	+/- 10 %
8.1.2	Frequency variation on supply side	+/- 5 %
8.1.3	Combined variation of voltage and frequency	- 20 % or + 10 %
8.1.4	Service Condition	Refer Table 3.0
8.1.5	Insulation level	
8.1.5.1	One minute power frequency withstand voltage	3 kV for 415V system & 28 kV for 11 kV system
8.1.5.2	Lightning impulse withstand voltage	75 kV peak for 11 kV system
8.1.6	Short Circuit withstand level	Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side for 3 sec
8.1.7	Overload capability	As per IS 2026 part 7
8.1.8	Noise level	Shall not exceed limits as per NEMA TR-1 with all accessories running measured as per IEC 551 / NEMA standard
8.1.9	Harmonic currents	Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances.
8.1.10	Partial Discharges	Transformer to be free from partial discharge up to 120% of rated voltage as the voltage is reduced from 150% of rated voltage i.e. there shall be no significant rise above background level.
8.1.11	Parallel operation with existing transformer z= 5%	Shall be designed to operate in parallel
8.2	Major Parameters	
8.2.1	Rating	630/1000/1600/2000 KVA
8.2.2	Voltage Ratio	11kV / 415 volts
8.2.3	Vector Group	Dyn11
8.2.4	Impedance at 75 deg C	4.5% for 630 kVA 5% for 1000 kVA 6.25% for 1600/2000 kVA (tolerance as per IS)
8.2.5	Losses at 75 deg C	With KNAN Cooling
8.2.5.1	Total Loss –Max in kW at 50% Load	630kVA 1000kVA 1600kVA 2000 kVA

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		1.86	2.790	4.2	5.05
8.2.5.2	Total Loss –Max in kW at 100% Load	630kVA	1000kVA	1600kVA	2000 kVA
		5.3	7.7	11.8	15
8.2.6	Temperature rise top oil	55 Deg C max over ambient 40 Deg C			
8.2.7	Temperature rise winding	60 Deg C max over ambient 40 Deg C			
8.2.8	Flux density	1.7 Tesla at 100% rated voltage 1.9 Tesla at 112.5% rated voltage			
8.2.9	Current density	3 amp / sqmm for HV & LV winding			
8.2.10	Tapping on HV winding	Off circuit + 10% to -10% in 2.5% step			
8.2.11	Design Clearances	Phase – phase		Phase – earth	
8.2.11.1	11kV system	180mm		120mm	
8.2.11.2	415V system	25mm		25mm	
8.3	Transformer construction				
8.3.1	Type	Double Copper wound, three phase, oil immersed, with KNAN cooling			
8.3.2	Tank	Type tested design			
8.3.2.1	Design	a) Hermetically sealed type with corrugated fins and without conservator b) Oil filled with N2 cushion at top filled with positive pressure. N2 shall be technical grade in accordance with IS:1747 c) With bolted top cover			
8.3.2.2	Plate / Corrugated fin / tank features	a) Adequate for meeting mechanical & electrical withstand requirements, as per applicable standard. b) The tank and its sealing (gaskets, O-rings, etc.) shall be of adequate strength to withstand positive and negative pressures built-up inside the tank while the transformer is in operation. The maximum pressure generated inside the tank should not exceed 40kPa, positive or negative. c) Corrugated fins shall be built up of CRCA sheets of minimum 1.2mm thick. d) The corrugated tank wall shall ensure sufficient cooling of the transformer and compensate for the changes in the oil volume during operation. e) The transformer shall be capable of giving continuous rated output, without exceeding the specified temperature rise. f) Internal clearance of tank shall be such that, it shall facilitate easy lifting of core with coils from the tank and HV & LV bushings mounted on Top cover. g) All joints of tank and fittings shall be oil tight. The			

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		tank design shall be such that the core and windings can be lifted freely with cover. The tank plate shall be of such strength that the complete transformers when filled with oil may be lifted bodily by means of lifting lugs. h) Tanks with corrugations & without conservator shall be tested for leakage at a pressure as per the applicable standard.
8.3.2.3	Material of Construction	Mild steel plate with low carbon
8.3.2.4	Plate Thickness	To meet the requirements of pressure and vacuum type tests as per IS 1180.
8.3.2.5	Welding features	a) All seams and joints shall be double welded b) All welding shall be stress relieved for sheet thickness greater than 35 mm c) All pipes, stiffeners, welded to the tank shall be welded externally d) All corrugated fins or expansion bellows provided shall be double welded.
8.3.2.6	Tank features	a) Bottom with stiffeners & adequate space for collection of sediments b) No external pocket in which water can lodge c) Tank bottom with welded skid base d) Strength to prevent permanent deformation during lifting, jacking, transportation with oil filled. e) Minimum disconnection of pipe work and accessories for cover lifting f) Tank to be designed for oil filling under vacuum g) Tank cover fitted with lifting lug
8.3.3	Inspection cover for bushing & Core / Wind	As per manufacturer standard
8.3.4	Fittings and accessories on main tank	As per clause 8.8
8.3.5	Core	
8.3.5.1	Material	High grade , non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel lamination
8.3.5.2	Grade	Minimum M3 or better

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8.3.5.3	Core Design Features	a) Magnetic circuit designed to avoid short circuit paths within core or to the earthed clamping structures. b) Magnetic circuit shall not produce flux components at right angles to the plane of lamination to avoid local heating. c) Least possible air gap and rigid clamping for minimum core loss and noise generation. d) Adequately braced to withstand bolted faults on secondary terminals without mechanical damage and damage/displacement during transportation and positioning. e) Percentage harmonic potential with the maximum flux density under any condition limited to avoid capacitor overloading in the system. f) All steel sections used for supporting the core shall be thoroughly sand blasted after cutting, drilling, welding. g) Provision of lifting lugs for core coil assembly. h) Supporting framework designed not to obstruct complete drainage of oil from transformer
8.3.6	Winding	
8.3.6.1	Material	Electrolytic Copper
8.3.6.2	Maximum Current Density allowed	Maximum 3 amp / sqmm
8.3.6.3	Winding Insulating material	Thermally Upgraded Paper (TUP) on winding conductor of Insulation Class B (130 Deg C)
8.3.6.4	Winding Insulation	Uniform
8.3.6.5	Design features	a) Stacks of winding to receive adequate shrinkage treatment. b) Connections braced to withstand shock during transport, switching, short circuit, or other transients. c) Minimum out of balance force in the winding at all voltage ratios. d) Conductor width on edge exceeding six times its thickness. e) Transposed at sufficient intervals. f) Coil assembly shall be suitably supported between adjacent sections by insulating spacers + barriers. g) Winding leads rigidly supported, using guide tubes if practicable. h) Winding structure & insulation not to obstruct free flow of oil through ducts. i) Delta connection shall be done using Flexible cable.
8.3.7	Transformer Oil	a) Synthetic Ester oil b) Oil should be in accordance with specification as per Annexure C of this document. c) One sample of oil drawn from every lot of

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		transformer offered for inspection should be tested at CPRI/ERDA for tests as listed in IS 16081/IEC 61099. The cost of this testing should be included within the cost of transformer.
8.3.8	HV cable Compartment for coupling with RMU	Required
8.3.8.1	Material of Construction	Sheet Steel min. 2.5 mm thick
8.3.8.2	Type of HV side bushing	Porcelain type, 12kV rated voltage
8.3.8.2.1	Minimum creepage distance of all bushings and support insulators.	31mm/kV
8.3.8.2.2	Protected creepage distance	At least 50% of total creepage distance
8.3.8.2.3	Continuous Current rating	Minimum 20% higher than the current corresponding to the minimum tap of the transformer
8.3.8.2.4	Rated thermal short time current	26.3 kA for 3 sec
8.3.8.2.5	Bushing terminal lugs in oil and air	Tinned copper
8.3.8.3	Connection on HV phase	a) 50x10 mm Tinned copper Bus bar b) 12 kV Insulated sleeve to be provided on busbar
8.3.8.4	Cable gland for HV	Nickel plated brass double compression weatherproof cable gland suitable for 3CX150 sqmm cable
8.3.8.5	Cable lug for HV	Single hole Aluminum lugs, suitable for 3CX150 sqmm cable
8.3.8.6	Support insulators inside HV cable box	Epoxy type, 12KV rated voltage
8.3.8.7	Cable entry	Bottom
8.3.8.8	Detachable Gland Plate material and thickness	3 mm MS
8.3.8.9	Termination height required for cable termination	1000mm, Minimum
8.3.8.10	Terminal Clearances	a) Phase - phase -180 mm b) Phase - earth -120 mm
8.3.8.11	Essential parts for HV cable box	a) Flange type removable top and side cover with handle for cable termination, inspection and maintenance. b) Earthing boss for the cable box c) Earthing link for the gasketed joints at two point for each joint d) Earthing provision for cable Armour/Screen e) Drain plug f) Rainhood on gasketed vertical joint

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		g) Danger / caution plate
8.3.9	LV connection compartment for coupling with LV panel	Required
8.3.9.1	Material of Construction	a) Sheet Steel min. 2.5 mm thick b) LV busbar coupling chamber/duct shall be IP55
8.3.9.2	Type of LV side bushing	a) Porcelain type, 1.1kV rated voltage b) It shall be complete with brass palm
8.3.9.2.1	Minimum creepage distance of all bushings and support insulators.	31mm/kV
8.3.9.2.2	Protected creepage distance	At least 50% of total creepage distance
8.3.9.2.3	Continuous Current rating	Minimum 20% higher than the current corresponding to the minimum tap of the transformer
8.3.9.2.4	Rated thermal short time current	26.3kA for 3 sec
8.3.9.2.5	Bushing terminal lugs in oil and air	Tinned copper.
8.3.9.3	Coupling with LV panel	a) Refer clause 9.1.2.1 b) Bus bar shall be provided with color coded insulating heat shrinkable sleeves rated for 1.1 kV
8.3.9.4	Essential provision for LV side additional neutral connection Box for Grounding	a) Additional neutral bushing of porcelain type with brass palm connector (as per IS 3347) shall be provided. b) The rating of additional neutral bushing should be same as phase bushing. c) Connection between the main neutral and additional neutral shall be provided. d) Protection box shall be provided in order to prevent ingress of water
8.3.10	Atmospheric protection for clamp and fitting of iron and steel	Hot dip galvanizing as per IS 2633
8.3.11	Off Circuit tap Switch	On HV winding
8.3.11.1	Range /Step	+ 10 % to -10% in steps of 2.5 %
8.3.11.2	Type	Rotary type, 3 pole gang operated,
8.3.11.3	Operating Voltage	11kV
8.3.11.4	Rated Current for tap Switch	100 amps for 630kVA/1000 kVA 150 amp for 1600 kVA/2000 kVA
8.3.11.5	Operating Handle	External at suitable height to be operated from ground level.
8.3.11.6	Tap position indicator	With direction changing facility, locking arrangement, caution plate metallic fixed by rivet.

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8.3.12	Pressure Relief Device	Required
8.4	Hardware	
8.4.1	External	a) Stainless Steel- for size up to 12 mm b) Hot dip galvanized- for size greater than 12 mm
8.4.2	Internal	Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design
8.5	Gasket	
8.5.1	For Transformer, surfaces interfacing with oil like inspection cover etc.	Gaskets shall be Type III as per IS 11149/Type C as per IS 4253 (Part 2) and shall be compatible with temperature thermal class of 130°C
8.5.2	For Cable boxes, Marshalling box, etc.	Neoprene rubber
8.6	Valves	
8.6.1	Material of construction	Brass / gun metal
8.6.2	Type	Both end flanged gate valve / butterfly valve depending on application
8.6.3	Size	As per manufacturer's standard
8.6.4	Essential provision	Position indicator, locking rod, padlocking facility, valve guard, cover plate.
8.7	Painting of transformer	
8.7.1	Surface preparation	By shot blasting method
8.7.2	Finish on internal surfaces of the transformer	Bright Yellow heat resistant and oil resistant paint two coats. Paint shall neither react nor dissolve in hot transformer insulating oil.
8.7.3	Finish on outer surface of the transformer-frame parts	a) Primary coat of epoxy polyester base grade A of shade RAL 632 as per IS 5 b) Final coat of Poly urethane paint of shade RAL 632 as per IS 5 c) 50 mm wide horizontal strip of paint shade green 218, as per IS 5 around DT tank in the middle of it. d) Minimum thickness 85 microns
8.8	Fittings & accessories	
8.8.1	Rating and Diagram Plate	Required
8.8.1.1	Material	Anodized aluminum 16SWG
8.8.1.2	Background	Satin Silver
8.8.1.3	Letters, diagram & border	Black
8.8.1.4	Process	Etching
8.8.1.5	Rating and Diagram Plate details	Following details shall be provided on rating and diagram plate: a) Type/kind of transformer with winding material b) IS/IEC standard to which it is manufactured c) Manufacturer's name d) Transformer serial number e) Month and year of manufacture f) Rated frequency in Hz

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		g) Rated voltages in kV h) Number of phases i) Rated power in kVA j) Type of cooling (KNAN) k) Oil type Synthetic Ester oil l) Rated currents in Amp m) Vector group connection symbol n) 1.2/50μs wave impulse voltage withstands level in KV o) Power frequency withstands voltage in KV p) Impedance voltage at rated current and frequency in percentage at principal, minimum and maximum tap q) Load loss at rated current. r) No-load loss at rated voltage and frequency s) Continuous ambient temperature at which ratings apply in deg c t) Top oil and winding temperature rise at rated load in deg c u) Winding connection diagram with taps and table of tapping voltage, current and power v) Transport weight of transformer w) Weight of core and windings x) Total weight y) Volume of oil z) Weight of oil - aa) Name of the purchaser - bb) PO no and date - cc) Guarantee period
8.8.2	Terminal marking Plate for Bushing	Anodized aluminum black lettering on satin silver background, both inside cable boxes near termination and on cable box cover (all fixed by rivet)
8.8.3	Company Monogram Plate fixed by rivet	Required
8.8.4	Lifting Lug to lift complete transformer with oil	Required
8.8.5	Lifting lug for top cover	Required
8.8.6	Lashing Lug	Required
8.8.7	Jacking Pad with Haulage hole to raise or lower complete transformer with oil	Required
8.8.8	Detachable Bidirectional flat roller Assembly	Required
8.8.9	Pockets for ordinary thermometer on tank cover with metallic identification plate fixed by rivet.	Required
8.8.10	Drain valve (gate valve) for the main tank with cork	As per manufacturer design

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	above ground by 150mm minimum with padlocking and valve guard with metallic identification plate fixed by rivet.	
8.8.11	Filter valve (gate valve) at top with padlocking and valve guard with metallic identification plate fixed by rivet.	As per manufacturer design
8.8.12	Air Release Plug on tank cover with metallic identification plate fixed by rivet.	As per manufacturer design
8.8.13	Oil level indicator with low level switch	As per manufacturer design
8.8.14	Earthing pad on tank for transformer earthing complete with non-ferrous nut bolt, washers, spring washers etc. with metallic identification plate fixed by rivet	Required
8.8.15	Rain hood for vertical gasket joints	Required
8.8.16	Earthing bridge by copper strip jumpers on all gasket joints at at least two points for electrical continuity	Required
8.8.17	Skid base welded type with haulage hole	Required
8.8.18	Core Frame to tank Earthing	Required
8.8.19	Danger plate on Transformer, cable boxes (all fixed by rivet)	Required , as per IS 2551
8.8.20	Caution plate for Off Circuit tap changer fixed by rivet.	Required
8.8.21	Pressure Relief Device	Required
8.8.22	Protection relay for internal parameters that is pressure, temperature, liquid level and gas detection	Required
8.8.23	Oil filling hole having (1-1/4" nominal size thread) with cover	Required
8.8.24	An extended pipe connection on upper end with welded cover. Pipe shall be suitably threaded over a sufficient	Required

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	length to enable use of refilling /siphon connection after removing the welded connection or any other similar arrangement capable of reuse.	
8.8.25	User manual for Hermetically Sealed Transformers must be provided for review as a part of the technical proposal. The manual must be provided with, but not limited to, maintenance schedule, frequency & method of oil-sampling, procedures for oil-filling & oil-filtration, etc.	Required

9.0 Low Voltage Panel

9.1	Low voltage system configuration	Configuration shall be as per the clause 5.0
9.1.1	General construction	a) It shall be dust-tight and vermin-proof sheet steel cabinet suitable for Outdoor installation. b) Panel shall be of modular construction with separate metal enclosed compartment for the following: • Each Incomer - Switchgear • Busbar • Each Outgoing - Switchgear • Each Outgoing - Cable Termination • Energy meter • FRTU based on space availability c) Each compartment shall be such that the fault in one compartment does not impact the functioning of adjacent compartments.
9.1.1.1	Incomer- Switchgear Compartment	a) It should be provided on the front of the panel. b) Withdrawable type ACB to be provided for easy replacement at site. c) ACB shall be operable from front of the panel. d) Front cover shall be provided over each compartment such that it is possible to operate the ACB with front cover in place. e) Switchgear operating handles shall be totally flushed with the compartment cover. ACB shall have rotary type handles for ON/OFF positions. Mechanical interlocking to be provided such that switchgear door cover shall not open unless ACB is in 'OFF' position. f) All indications and instruments shall be mounted on the front cover and fully wired through terminal

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		blocks of appropriate size. g) Operation height for switchgear and instruments shall not be more than 1600 mm. d) Each compartment shall have adequate space for carrying out the required operation and maintenance work.
9.1.1.2	Outgoing- Switchgear Compartment	a) Outgoing compartment should be provided on the front of the panel. b) MCCB shall be mounted on the base plate in such a manner that they can be easily replaced at site. c) MCCB shall be operable from front of the panel. d) Bakelite/FRP sheet to be provided for segregation between phase to phase, phase to neutral, phase to panel body and neutral to panel body. e) MCCB shall have rotary type handles for ON/OFF positions. Mechanical interlocking to be provided such that switchgear door cover shall not open unless MCCB is in 'OFF' position. f) All indications and instruments shall be mounted on the front cover and fully wired through terminal blocks of appropriate size. g) Operation height for switchgear and instruments shall not be more than 1600 mm. h) Compartment shall have adequate space for carrying out the required operation and maintenance work.
9.1.1.3	Outgoing Cable Termination Compartment	a) Cable Termination should be provided on front side of the panel b) Cable entry should be from bottom c) Detachable 3mm MS gland plate with appropriate arrangement for sealing unused cable entries d) Bakelite/FRP sheet to be provided for segregation between phase to phase, phase to neutral, phase to panel body and neutral to panel body e) Front Cover shall be provided on the compartment f) Cable termination shall be suitable for 2R x 4C x 400 sqmm cable. Back to back cable termination on one busbar dropper is not acceptable. Two separate busbar dropper shall be provided in each phase and neutral for cable termination. Busbar Droppers shall be of 100 mm (minimum) in length. Busbar droppers shall be staggered such that the bottom dropper shall be atleast 100mm longer than the top dropper. Appropriate clearances shall be maintained between droppers for ease of cable termination. Please refer annexure B for details. g) Appropriate clamping arrangement shall be provided in base frame for all outgoing cables to avoid any stress on the switchgear assembly. Shape of cable clamps shall be such that clamping should not damage the outer sheath of cable.

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		h) Material of Cable Clamps shall be Nylon/HDPE. i) Cable termination height should be 450 mm from gland plate of the compartment j) Aluminum lugs suitable for 2R x 4Cx400 Sqmm cable to be provided for each MCCB connection. 10% lugs shall be provided as spare. k) Termination Nut, bolt, plain washer and spring washer shall be provided for two hole lug.
9.1.1.4	Busbar compartment	a) Busbars shall be housed in totally enclosed busbar chambers. b) Incoming connections from the busbar to various feeders shall be designed so as not to disturb cable connections. c) Busbar arrangement should ensure safety of the operation/maintenance personnel and facilitate working on any outgoing module without the need for switching off infeed to the adjacent modules, as far as possible.
9.1.1.5	Doors	a) Doors shall be provided on front of the panel. This is in addition to the cover provided on individual compartments. Switchgear should be accessible for operation only after opening the front door of the panel. b) Width of each door shall not exceed 600 mm. c) All panel doors shall open by 120 degrees. d) The doors shall be fitted with double lipped gaskets. e) Doors shall be lockable with 3 pin locking arrangement. Two L Drop shall be provided for padlocking of each door. f) All doors shall have antitheft hinges such that it is not possible to remove the door from outside in closed position
9.1.1.6	Energy Meter Compartment	To be provided for installation of DT Energy meter
9.1.1.6.1	Energy meter box Size	650 mm height x 450 mm width x 275 mm depth.
9.1.1.6.2	Cover	Bolted cover with transparent glass window shall be provided.
9.1.1.6.3	Fixing of energy meter within box	On slotted horizontal channel 40 x 12 mm size, channel shall be movable on vertical slotted angle 40 x 40 mm size at two ends.
9.1.1.6.4	Meter reading window	Front door shall be with acrylic sheet for viewing the energy meter.
9.1.1.6.5	Sealing arrangement	02 no's sealing arrangement shall be provided on meter box's door.
9.1.1.6.6	Data downloading port	Slot shall be provided on door of meter box for fixing 9 pin DB connector.
9.1.1.6.7	Test Terminal Block	No Test terminal block shall be provided.
9.1.1.6.8	Cables and wires	PVC insulated, extruded PVC inner sheathed, armored, extruded PVC outer sheathed 1100 V

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		grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sqmm for PT and 4 sqmm for CT with multi strand copper conductor.
9.1.1.6.9	Cable Glands	Nickel plated brass double compression weatherproof cable gland.
9.1.1.6.10	Wiring diagram	To be fixed on the back of door along with CT spec. etched on Anodised Aluminum plate fixed by rivet.
9.1.1.6.11	CT Secondary/VT wires	All CT secondary wire and VT wires shall be routed through metallic conduit. All secondary wires shall be bunched and kept for termination without any terminal/ TTB in between.
9.1.2	Busbar and Inter connection	
9.1.2.1	ACB to Main busbar Connection	a) Flexible tinned copper braid / flexible strips with terminal lug to be provided for connection of ACB terminal with aluminum dropper/riser of main busbar. b) Copper braid shall be suitable for carrying rated continuous current depending upon the incomer rating. Max. current density should be 2.5 A per sqmm. c) Current density for aluminum dropper/riser from main busbar should be 1A/sqmm. d) All connections shall be done using minimum 02 no's nut bolts, plain washer and spring washer. e) Bimetallic strip to be provided for connection with tinned copper braid with Aluminum busbar
9.1.2.2	Main Bus bar	a) High conductivity electrolytic grade aluminum b) Suitable for carrying rated continuous current depending upon the incomer rating. c) Current density should be 1A per sqmm d) Busbars shall be continuous throughout the panel - Size of neutral busbar should be same as phase busbar
9.1.2.3	Vertical/Dropper Busbar for MCCB	a) High conductivity electrolytic grade aluminum b) Busbar rating should be same as the rating of MCCB, Current density should be 1A per sqmm. c) Size of neutral busbar should be same as phase busbar d) Bus bars shall be color coded with heat resistant color tapes
9.1.2.4	Busbar Joints	a) Bimetallic connectors shall be provided for connection between copper and Aluminum joints b) Length of overlap of joint shall not be less than the width of Busbar c) All connections should be done using two nuts, bolts, washers and spring washers. Copper braids should be used where appropriate connection using busbars is not possible.

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9.1.2.5	Temperature Rise	As per Table 6 - Temperature-rise limits of IS 61439
9.1.2.6	Insulation	a) Bus bar shall be provided with color coded insulating heat shrinkable sleeves rated for 1.1 kV b) Insulating shroud should be provided on all joints.
9.1.2.7	Insulator	a) Non-hygroscopic, Flame retardant, Track resistant, high creepage (25mm/kV), epoxy resin insulators to be provided for adequate bus bar support b) Support insulators have to be provided for all busbars including main busbars, tee offs, termination busbars etc.
9.1.2.8	Phase sequence shall be RYB	a) Left to Right, when viewing from Front b) Top to bottom c) Front to rear
9.1.3	Ingress Protection	a) Complete panel shall be IP54 b) Louvers may be provided subject to compliance with IP requirement c) Canopy of appropriate size shall be provided at both front and rear of the panel.
9.1.4	Enclosure Sheet material and thickness	a) Minimum 3 mm GI sheet (120 GSM minimum) for load bearing members b) Minimum 2.5 mm GI sheet (120 GSM minimum) for doors and covers c) Minimum 2.5 mm GI sheet (120 GSM minimum) for compartment walls. d) No welds, rivets, hinges or bolts shall be visible from outside.
9.1.5	Minimum clearances	25mm between phases and phase to earth for the entire run of horizontal and vertical bus bars
9.1.6	Earthing and Earth Busbar	a) The earth bus of 50X6 mm Aluminum shall run throughout the length of the panel. b) All non-current carrying metal work of the distribution board shall be effectively bonded to the earth bus. c) Hinged doors shall be earthed through flexible earthing braid. d) Two earthing terminals shall be provided on the panel for connection with substation earthing. One terminal should be provided on each side of the panel. e) Provision for connection of earthing braids of all incoming and outgoing cables shall be made.
9.1.7	Temperature Rise of Panel	As per Table-6 (Temperature rise limits) of IS 61439
9.1.8	Lifting hooks	a) Suitable lifting hooks and pads shall be provided on each panel for ease of lifting of panel. b) All lifting hooks shall be of heavy duty only. c) Lifting hooks shall be so placed that there shall be no damage to powder coating during transportation. Wherever lifting hooks are provided and welded with the sheet, the sheet shall have plates welded

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		to prevent any wrapping.
9.2	Air Circuit Breaker	
9.2.1	Rated Current	Rating of ACB as per configuration table 4.0. No De-rating upto 50 deg C
9.2.2	General Features	
9.2.2.1	Number of Phases	Three Phase & neutral
9.2.2.2	No. of Poles	4 pole ACB
9.2.2.3	ACB mounting	Withdrawable type
9.2.2.4	Line-Load Reversibility	Required
9.2.2.5	Terminals	Suitable for connection with aluminum busbars with phase barriers & shrouds
9.2.2.6	Operating mechanism	Manual spring charging, stored energy type
9.2.2.7	Operation counter	4 digit minimum, non-reversible
9.2.2.8	Operating handle	Required for manual spring charging
9.2.2.9	Local control	ON / OFF push buttons or lever with transparent shutter & locking facility
9.2.2.10	Closing coil	Continuous rated Closing coil shall operate correctly at all values of voltage between 85% & 110% of the rated voltage.
9.2.2.11	Tripping coil	Continuous Shunt trip coil shall operate correctly at all values of supply voltage between 70% & 110% of rated voltage.
9.2.2.12	ACB auxiliary contacts	6 NO + 6 NC minimum
9.2.2.13	ACB operating knob sealing	Possible in OFF condition
9.2.2.14	CT Requirement	All phase and neutral
9.2.2.15	Access to releases, coils & add on type replaceable parts to ACB	From front only
9.2.2.16	ACB indications	a) Separate ON / OFF / TRIP b) Spring charge status
9.2.2.17	ACB ingress protection (without enclosure)	IP2X minimum
9.2.2.18	Pollution degree as per IS 60947/IEC 60664-1	Degree 4: The pollution generates persistent conductivity caused
9.2.2.19	ACB temperature rise limits	As per table 2 & 3 of IS/IEC 60947-1
9.2.3	Operation Features	
9.2.3.1	Rated Operational Voltage(V)	415V
9.2.3.2	Rated Insulation Voltage (V)	1000V
9.2.3.3	Rated Impulse Voltage	8 kV for main circuit
9.2.3.4	Category of utilization	B
9.2.3.5	Rated Ultimate breaking capacity at rated voltage	a) Icu = 50kA minimum (up to 2000A rating ACB) b) Icu = 65kA minimum (above 2000A rating ACB)
9.2.3.6	Rated Service breaking capacity at rated voltage Ics	Ics =100% Icu
9.2.3.7	Rated short term withstand	Icw = 100% Icu

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	current for 1 sec at rated voltage - I _{cw}	
9.2.3.8	Rated making current capacity - I _{cm}	I _{cm} = 220% I _{cu}
9.2.3.9	Number of operating cycles at rated current (open + close) without changing arcing contact	Min 5000
9.2.3.10	Number of mechanical operating cycles (open + close)	Min 20000
9.2.3.11	Product Information marking on ACB	As per clause 5 of IS/IEC 60947 Part-I. In addition name of purchaser shall be marked on front of device
9.2.4	Measurement and Protection Requirement	
9.2.4.1	Microprocessor release	a) Microprocessor based release with true RMS based sensing. b) Selfpowered, tapped from incoming side of supply, setting panel with locking arrangement
9.2.4.2	Protections Required	Overload, short-circuit, Instantaneous & earth fault
9.2.4.3	Tripping characteristic	Inverse definite minimum time characteristics for Short circuit and earth fault protection
9.2.4.4	Overload setting	40% - 100% I _n , steps of 10%.
9.2.4.5	Overload setting time delay	2.5 s to 40 s minimum three settings
9.2.4.6	Short Circuit Setting	50% - 800% of I _n , steps of 10%.
9.2.4.7	Short Circuit Setting time delay	50 ms - 400 ms in steps of 50ms
9.2.4.8	Instantaneous setting	200% - 1500% of I _n & OFF
9.2.4.9	Earth fault setting	20- 100 % of I _n , steps of 10%
9.2.4.10	Earth fault setting time delay	50ms - 400ms in steps of 50ms
9.2.4.11	Neutral unbalance	Earth fault function should not operate during neutral unbalance. Same will be verified during inspection.
9.2.4.12	Measurements required in release	a) Phase wise current and neutral current b) Phase wise voltage c) Frequency d) Power factor e) Instantaneous Power: Active, Reactive and apparent power f) Energy: Active, Reactive and apparent Energy g) Maximum current demand with date and time (configurable in 5/15/30 minutes duration) h) Max Power Demand (configurable in 5/15/30 minutes duration) i) Fault record
9.2.4.13	Metering measurement accuracy	a) 1.5% for current b) 0.5% for voltage c) 2% for Power and energy
9.2.4.14	Other release requirements	a) Release should have digital LCD display.

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		b) Release should be plug-in type and easily replaceable in field. c) Separate fault indication shall be provided for each protection stage i.e. overload, short circuit and earth fault and internal fault d) Release should store 10 fault records on FIFO basis with date and time stamp. e) Release should have 2 Digital Inputs. CB On and Off status shall be wired to DIs through auxiliary switch. f) Release should have Modbus communication as per communication architecture given in Annexure E. All digital, analog and fault record parameters monitored by the release shall be communicable to SCADA through FRTU. g) Remote time synchronization through SCADA should be possible.
9.3	Moulded Case Circuit Breaker (MCCB)	
9.3.1	Rated Current	Rating of MCCB as per configuration table 5.0. No De-rating upto 50 deg C
9.3.2	General Features	
9.3.2.1	Construction	All the parts shall be enclosed in a moulded insulating material housing
9.3.2.2	Poles	4 pole
9.3.2.3	Type	The MCCBs shall be trip free type with quick make and double-break type
9.3.2.4	Terminals	Suitable for connection with aluminum busbars with phase barriers & shrouds
9.3.2.5	MCCB auxiliary contacts	2 N/O + 2 N/C minimum
9.3.2.6	Access to releases, coils & add on type replaceable parts to MCCB	From front only
9.3.2.7	Indications	MCCBs shall be provided with mechanical position indicator with shrouded terminals. MCCB's shall have ON/OFF/trip indications.
9.3.2.8	Operating handle	Extended rotary type
9.3.2.9	MCCB ingress protection (without enclosure)	IP2X minimum
9.3.2.10	Pollution degree as per IS 60947/IEC 60664-1	Degree 4 : The pollution generates persistent conductivity caused
9.3.2.11	MCCB temperature rise limits	As per table 2 & 3 of IS/IEC 60947-1
9.3.3	Operation Features	
9.3.3.1	Number of phases	Three phase & neutral
9.3.3.2	Rated Operational Voltage(V)	415V
9.3.3.3	Rated Insulation Voltage (V)	1000V
9.3.3.4	Rated Impulse Voltage	8 kV for main circuit

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9.3.3.5	Category of utilization	B
9.3.3.6	Rated Ultimate breaking capacity at rated voltage	Icu = 50kA minimum
9.3.3.7	Rated Service breaking capacity at rated voltage Ics	Ics =100% Icu
9.3.3.8	Rated short term withstand current for 1 sec at rated voltage – Icw	Icw = 100% Icu
9.3.3.9	Rated making current capacity –Icm	Icm = 220% Icu
9.3.3.10	Number of operating cycles at rated current (open + close) without changing arcing contact	5000
9.3.3.11	Number of mechanical operating cycles (open + close)	20000
9.3.3.12	Product Information marking on MCCB	As per clause 5 of IS: 13947 Part-I. In addition name of purchaser shall be marked on front of device
9.3.4	Measurement and Protection Requirement	
9.3.4.1	Microprocessor release	a) Microprocessor based release with true RMS based sensing. b) Self powered, tapped from incoming side of supply, setting panel with locking arrangement
9.3.4.2	Protection	Overload, short-circuit, Instantaneous & earth fault
9.3.4.3	Tripping characteristic	Inverse definite minimum time characteristics for Short circuit and earth fault protection
9.3.4.4	Overload setting	40% -100% In, steps of 10%.
9.3.4.5	Overload setting time delay	2.5 s to 40 s minimum three settings
9.3.4.6	Short Circuit Setting	50% - 800% of In, steps of 10%.
9.3.4.7	Short Circuit Setting time delay	50 ms - 400 ms in steps of 50ms
9.3.4.8	Instantaneous setting	200% - 1500% of In & OFF
9.3.4.9	Earth fault setting	20- 100 % of In, steps of 10%
9.3.4.10	Earth fault setting time delay	50ms - 400 ms in steps of 50ms
9.3.4.11	Neutral unbalance	Earth fault function should not operate during neutral unbalance. Same will be verified during inspection.
9.3.4.12	Measurements required in release and available on communication	a) Phase wise current b) Phase wise voltage c) Power factor d) Frequency e) Maximum current with date and time (configurable in 5/15/30 minutes duration) f) Max Power Demand (configurable in 5/15/30 minutes duration) g) Instantaneous Power: Active, Reactive and

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		apparent power h) Energy: Active, Reactive and apparent Energy i) Fault record
9.3.4.13	Metering accuracy measurement	a) 1.5% for current b) 0.5% for voltage c) 2% for Power and energy
9.3.4.14	Other release requirements	a) Release should have digital LCD display. b) Release should be plug-in type and easily replaceable in field. c) Separate fault indication shall be provided for each protection stage i.e. overload, short circuit and earth fault on release display. d) Release should store 10 fault records on FIFO basis with date and time stamp. e) Release should have 2DIs for MCCB On and Off status shall be wired to DIs through auxiliary switch. f) Release should have Modbus communication as per communication architecture given in Annexure E. All digital, analog and fault record parameters monitored by the release shall be communicable to SCADA through FRTU. g) Remote time synchronization through SCADA should be possible
9.4	Metering Current Transformers	
9.4.1	Type	Cast-resin type, Class-E insulation, rated for 120% current continuous
9.4.2	Provision	Shall be provided in Incomer ACB for DT metering
9.4.3	ISF	10
9.4.4	Metering CT Class	0.5s
9.4.5	Burden	5 VA
9.4.6	CT ratio (For all phases and neutral)	a) 630 kVA- 1000/5 amp b) 1000kVA -1600/5 amp c) 1600kVA -2500/5 amp d) 2000kVA -3000/5 amp
9.5	LV compartment illumination	By 36w CFL fixture controlled through SPMCB & door limit switch
9.6	Finishing of Enclosure	
9.6.1	Pre-treatment of GI sheet of Enclosure	GI sheet shall be pre-treated before powder coating to avoid rusting and corrosion
9.6.2	Pre-treatment process	Seven tank process (Pre-galvanization shall remain intact)
9.6.3	Primer	Two coats of zinc rich primer shall be applied at welded and punched areas
9.6.4	Finish	Powder Coating

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9.6.5	Painting external finish	a) Powder coated epoxy polyester base grade A b) Shade -RAL 632 c) Uniform thickness 85 micron minimum
9.6.6	Painting internal finish	a) Powder coated epoxy polyester base grade A b) Shade –white c) Uniform thickness 60 micron minimum

10.0 Earthing & Grounding Provision

10.1	Earth Bus	a) Common Earth bus should be provided for whole assembly. b) Four Earthing pads should be provided on earth bus, one on each corner for substation earthing. All earthing pads shall be easily accessible for inspection and maintenance purposes. c) Size of earth bus should be 75 x 10mm.
10.2	Grounding	a) Neutral should be connected to earth bus at two separate points b) Connections shall be accessible for inspection and maintenance purposes. c) Provision for connecting neutral directly with earth mesh laid in ground shall also be given. d) Size of each connection should be 50 x 10mm.
10.3	Equipment Earthing	a) Each equipment including RMU, transformer and LV panel should have two separate earthing pads. These earthing pads shall be connected to common earth bus at two separate points. b) All earth connections shall be accessible for inspection and maintenance purposes. c) Size of each connection should be 50 x 10mm
10.4	Earth connection of all covers, doors & structural parts	By braided copper flexible connection to earth bus
10.5	Earth bus identification	Shown by letter 'E'

11.0 Labels

11.1	Name plate on enclosure	Fixing by rivet only
11.1.1	Material	Anodized aluminum 16SWG / Stainless Steel (SS)
11.1.2	Background	Satin Silver
11.1.3	Letters, diagram & border	Black
11.1.4	Process	Etching

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11.1.4	Name plate details	a) Month & year of manufacture b) Transformer rating c) RMU details d) LT panel details e) Purchaser name f) Purchase order number and date g) Guarantee period h) Manufacturer contact details i) Ref. IS / IEC No.
11.2	Labels for meters & indications	Anodized aluminum with white character on black background OR 3 ply Lamicoid
11.3	Danger plate on doors of RMU compartment, LV panel and Transformer HT and LT side	As per IS 2551
11.4	BSES Logo	a) 01 no's b) LV panel c) Shall be etched on anodized aluminum 16SWG / SS plate. d) Details shall be finalized during drawing approval.

12.0 Approved makes

12.1	RMU	ABB/Schneider/Siemens/Lucy Electric/Eaton
12.2	Oil type transformer	Schneider/Danish/MEI
12.3	ACB	Siemens/ ABB/Schneider/Lauritz-Knudsen
12.4	MCCB	Siemens/ ABB/Schneider/Lauritz-Knudsen
12.5	FPI	EMG/Schneider/Siemens
12.6	Protection Relay	Ashida / Schneider/Siemens/ABB
12.7	Pressure relief valve	Sukrut / VIAT
12.8	Bushings make	Baroda bushing / CJI / Jaipur glass
12.9	Winding Temperature Indicator	Precimeasure/ Pecon
12.10	Winding Insulating material	3M/DUPont/Delfort
12.11	Switch	ABB/Schneider/Siemens
12.12	AC Contactors	ABB/Schneider/Siemens
12.13	Push buttons / Actuator	Teknic/Siemens
12.14	Indicating Lamps	Vaishno/Binay/Teknic/Siemens/Mimic/C&S
12.15	Terminal Blocks	Connectwell/Elmex/Phoenix
12.16	Termination kits	3M/ Raychem/ Denson
12.17	Insulating Sleeve	3M/ Raychem/ Denson

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12.18	Cold applied cable boots	3M/ Raychem/KD Joshi
12.19	Synthetic Ester oil	Cargil/Midel
12.20	FRTU	ABB/Schneider/Siemens
12.21	Meters	Rishabh/Schneider/Secure
12.22	Modem	Niseva/Lantronix/Phoenix
12.23	GI Sheet	TATA/SAIL/JINDAL
12.24	Battery Charger	Allan/Gogate
12.25	Battery Health Monitoring Unit	Allan/Gogate
12.26	Protection relay for transformer internal parameters	VIAT/IDEF Systems

Note – Any other make of component offered by the bidder is subject to BYPL approval.

13.0 Quality assurance, Inspection and Testing

13.1	Type test as per IS / IEC	a) Only type tested equipment shall be offered. b) Type test certificates from CPRI/ERDA shall be submitted along with offer for scrutiny. c) The test report should not be more than 10years old.
13.1.1	11kV RMU	Complete type test for RMU as per relevant IS/ IEC 62271-200to be submitted.
13.1.2	Transformer	Complete type and special test for transformer as per IS 1180 part 3 to be submitted.
13.1.3	LV Panel	Complete type test for LV Panel as per IS/IEC 61439 to be submitted.
13.1.4	Complete Pad Mounted Substation Assembly	In event of order, following type tests have to be conducted on one complete Pad Mounted Substation of highest rating from CPRI/ERDA as per IS/IEC 62271-202 a) Lightning Impulse Voltage Test b) Short time withstand current test c) Temperature Rise Test
13.2	Routine tests	
13.2.1	Routine tests of PMSS	As per IS/IEC 62271-202
13.2.2	Routine tests of transformer, RMU, LT panel	As per relevant IS/ IEC mentioned in 13.1.
13.3	Inspection and acceptance testing	a) Purchaser reserves the right to inspect /witness all tests on the Pad mounted substation at

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		manufacture's works at any time, prior to dispatch, to verify compliance with the specification/standards. b) Manufacturer should have all the facilities/equipment to conduct all the acceptance tests during inspection. All the testing equipment should be calibrated. c) Stage and final inspection call intimation shall be given at least 15 days in advance to the purchaser.
13.3.1	Stage inspection of transformer	Purchaser shall inspect transformers at the core and coil assembly stage at the manufacturer's premises.
13.3.2	Final inspection of transformers	The sequence of testing shall be as follows: a) Visual and dimension check for completely assembled transformer. b) Measurements of voltage ratio. c) Measurements of winding resistance at principal tap and two extreme taps. d) Vector Group and polarity test. e) *Measurements of insulation resistance and polarization index. f) Separate sources voltage withstand test. g) Measurement of iron losses and exciting current at rated frequency and 90%, 100% and 110% rated voltage. h) Induced voltage withstand test. i) Load losses measurement. j) Impedance measurement of principal tap (HV and LV) of the transformer. k) Measurement of Iron loss (to be repeated if type test are conducted). l) Measurement of capacitance and Tan Delta for HV and LV bushings and Tan Delta for transformer oil (for all transformers). m) Oil leakage test on assembled transformer n) Magnetic balance test. o) Power frequency voltage withstand test on all auxiliary circuits p) Measure of zero seq. impedance q) Measurement of acoustic noise level r) Measurement of harmonic level on no load current. *Insulation resistance measurement shall be carried out at 5kV for HV and 1kV for LV. Value of IR should not be less than 1000 Mohms. Polarization Index (PI = IR10min/IR1min) should not be less than 1.5
13.3.3	Temperature rise test on Transformer	Temperature rise test shall be carried out on 01 no transformer of each rating randomly selected from the offered lot.

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13.3.4	Acceptance Test of RMU	a) Physical inspection, BOM & wiring checks b) Insulation Resistance test c) HV Test for one minute d) Operation & Interlock check e) Measurement of resistance of main circuit f) Voltage indication check of VPI g) Functional testing of FPI for alarm h) Primary current injection test for circuit breaker feeder on both ratios of all CT's with relay i) Breaker closing and opening time measurement
13.3.5	Acceptance Test of LT Panel	a) Visual, dimension, wiring & BOM check b) Operational check c) IR Test d) HV Test
13.3.6	Final Inspection after complete assembly of PMSS	As per IEC 62271-202 and relevant IS/IEC of equipment. a) Visual check b) Dimensional and sheet thickness check c) Verification of Wiring & BOM d) Paint thickness inside and outside of enclosure. e) Functional test • Operation of switchgear and control gear • Mechanical operation and alignments of doors • Fixing of insulating barriers • Voltage indication check • Checking of temperature and liquid level of the transformer • Fitting of earthing devices • Cable testing • Replacement of LTCT • Operation of transformer tap changer • Operation of illumination system • Trip function of HV switchgear f) IR test g) HV test on power circuit h) HV test on auxiliary circuits i) Operational and interlocks check
13.4	Vendor quality plan	To be submitted for purchaser approval. For transformer, RMU & LV panel sub vendor quality plan to be submitted.
13.5	Field quality plan	Bidder to submit field quality plan along with the bid
13.6	Maintenance manual	Bidder to submit maintenance manual along with the bid
13.7	Right to waive off tests	Reserved by Purchaser

Technical Specification of 11 KV Pad Mounted Substation**14.0 Shipping, Handling and Site support**

14.1	Packing Protection	Against corrosion, dampness, heavy rains, breakage and vibration
14.2	Packing for accessories and spares	Robust wooden non-returnable packing case with all the above protection & identification Label
14.3	Packing Identification Label (Anodized Aluminum Plate)	On each packing case, following details are required: a) Individual serial number b) Purchaser's name c) PO number (along with SAP item code, if any) & date d) Equipment Tag no. (if any) e) Destination f) Manufacturer / Supplier's name g) Address of Manufacturer / Supplier / it's agent h) Description of PMSS i) Country of origin j) Month & year of Manufacturing k) Case measurements l) Gross and net weights in kilograms m) All necessary slinging and stacking instructions
14.4	Shipping	The seller shall be responsible for all transit damage due to improper packing
14.5	Handling and Storage	a) Manufacturer instruction shall be followed b) Detail handling & storage instruction sheet/ manual to be furnished before commencement of supply.

15.0 Training and Demonstration

15.1	In event of order, Supplier shall arrange training for 2 batches of BSES team at BSES site or training centre for erection, commissioning, maintenance troubleshooting of complete PMSS including Transformer, RMU, FRTU and LV Panel.
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16.0 Deviations

16.1	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.
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Technical Specification of 11 KV Pad Mounted Substation**17.0 Document Submission Matrix**

Document submission shall be as per the matrix given below. All documents/drawing shall be provided in soft copy. Language of the documents shall be English only. Deficient/improper drawing submission may liable for rejection.

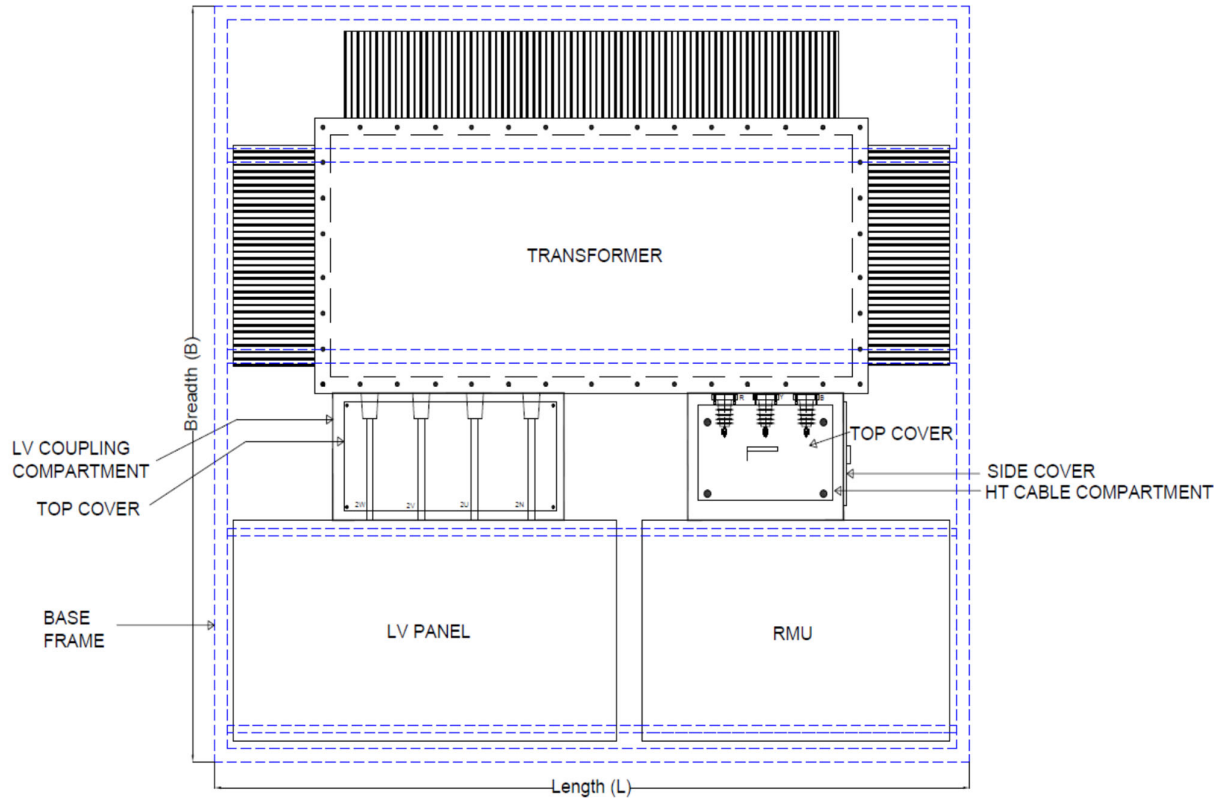
S. No.	Description	Bid	For Approval	Pre Dispatch
17.1	Copy of specification along with company seal & signature on each page.	Required		
17.2	Reference list of clients/suppliers list for last 7 years	Required		
17.3	Performance certificates of orders executed in last 7 years	Required		
17.4	Complete Type test reports for the type, size & rating of product /equipment offered	Required	Required	
17.5	Deviation Sheet (if any)	Required	Required	
17.6	Transformer BIS license	Required	Required	
17.7	Communication architecture			
17.8	Duly filled GTP as per BSES specification	Required	Required	
17.9	Complete PMSS Assembly			
17.9.1	GA drawing (Complete assembly including RMU, transformer, LV panel + other items)	Required	Required	
17.9.2	PMSS Foundation drawing	Required	Required	
17.9.3	Coupling and interconnection drawing of between RMU and transformer	Required	Required	
17.9.4	Coupling and interconnection drawing of between LT Panel transformer	Required	Required	
17.9.5	BOM of Pad mounted substation	Required	Required	
17.9.6	Overall SLD	Required	Required	
17.9.7	PMSS rating plate		Required	
17.10	RMU			
17.10.1	RMU GA and sectional view drawing	Required	Required	

Technical Specification of 11 KV Pad Mounted Substation

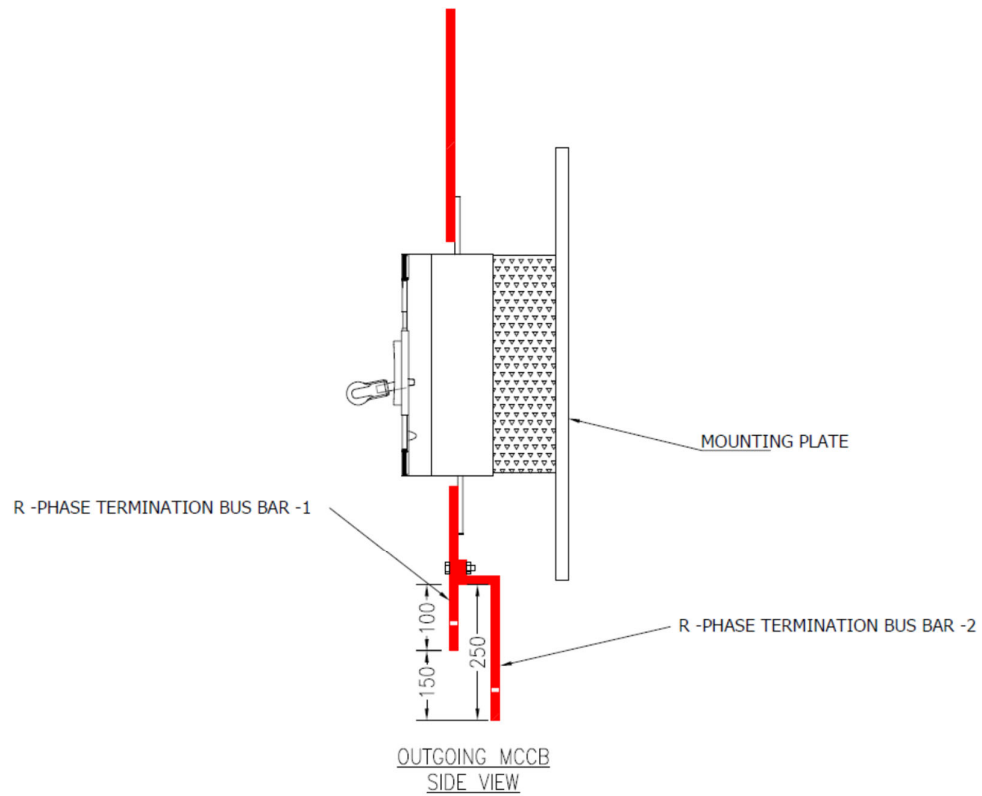
S. No.	Description	Bid	For Approval	Pre Dispatch
17.10.2	RMU component list	Required	Required	
17.10.3	RMU SLD	Required	Required	
17.10.4	Mimic drawing indicating all component	Required	Required	
17.10.5	Schematic wiring diagram	Required	Required	
17.10.6	RMU rating plate drawing		Required	
17.10.7	RMU cable box with termination arrangement	Required	Required	
17.10.8	RMU BOM		Required	
17.10.9	FRTU GA drawing	Required	Required	
17.10.10	Schematic wiring drawing FRTU	Required	Required	
17.10.11	DI/DO/AI/Modbus List	Required	Required	
17.11	Transformer			
17.11.1	Transformer GA drawing	Required	Required	
17.11.2	Transformer component list	Required	Required	
17.11.3	Foundation plan		Required	
17.11.4	Transformer rating plate		Required	
17.11.5	Transformer Calculations		Required	
17.12	LV panel			
17.12.1	LV Panel GA and sectional view drawing	Required	Required	
17.12.2	LV panel component list	Required	Required	
17.12.3	LV panel SLD	Required	Required	
17.12.4	LV panel Incoming termination arrangement	Required	Required	
17.12.5	LV Panel Outgoing termination arrangement	Required	Required	
17.12.6	Sizing Calculation of busbar in support of its Guaranteed S.C. rating / Capability	Required		
17.13	Catalogues & manuals for RMU + Transformer + LV switchgear items		Required	Required
17.14	User manual for Hermetically Sealed Transformers. The manual must be provided			Required

Technical Specification of 11 KV Pad Mounted Substation

S. No.	Description	Bid	For Approval	Pre Dispatch
	with, but not limited to, maintenance schedule frequency & method of oil-sampling, procedures for oil-filling & oil-filtration, etc.			
17.15	Quality plan for pad mounted substation	Required	Required	
17.16	Installation, commissioning manual for all items in PMSS		Required	Required
17.17	Operation & maintenance manual for all items in PMSS			Required
17.18	Transport / Shipping dimensions with weights, wheel base details, un-tanking height		Required	
17.19	Recommended spare parts and consumable items for five years of operation and spare parts catalogue with price list	Required	Required	
17.20	Inspection and test reports carried out in manufacturers works			Required
17.21	Test certificates of all bought out items.			Required
17.22	As Built Drawing			Required

Technical Specification of 11 KV Pad Mounted Substation**Annexure A: Reference layout of Pad mounted substation**

Note: Layout is for reference only and subject to change during detailed engineering to ensure compliance with standard, Tender specification and site requirement.

Annexure B: MCCB Termination Details

Technical Specification of 11 KV Pad Mounted Substation**Annexure C: Technical Specification for transformer oil**

The Synthetic Ester Oil shall be certified as K Class as per IS 16081/IEC 61099.

S. No.	Item description	Specification requirement
1.0	Physical property	
1.1	Colour	Max. 200 Hazen
1.2	Appearance	Clear, free from sediments and suspended matter.
1.3	Density at 20°C, Max	1000 kg/ dm ³
1.4	Kinematic Viscosity	
1.4.1	At 40° C, Max	35 mm ² /sec
1.4.2	At -20°C, , Max	3000 mm ² /sec
1.5	Fire point, Min	300° C
1.6	Flash point, Min	250°C
1.7	Pour point , Max	-45° C
2.0	Chemical property	
2.1	Water content, Max	200 mg/kg
2.2	Acidity, Max	0.03 mg KOH/g
2.3	Oxidation stability test duration 164 hour	Manufacturer to specify
2.4	Total Acidity, Max	0.3 mg KOH/g
2.5	Total sludge, % mass	0.01
3.0	Electrical property	
3.1	Dielectric breakdown voltage (2.5 mm gap), Min	65kV
3.2	Dielectric Dissipation factor (Tanδ) at 90° C and 50Hz Max	0.03
3.3	DC resistivity at 90° C, Min	2 GΩ-m
4.0	Biodegradation	Readily biodegradable

Technical Specification of 11 KV Pad Mounted Substation**Annexure D: Specification of 4G Ethernet Modem for FRTU**

S. No.	Modem Configuration	
1.0	Module	4G Dual SIM with compatible 3G /GSM GPRS: a) FDD LTE: B1 (1920-1980/2110-2170)/B3 (1710-1785/1805-1880) / B8 (880-915/925-960) / B20 (800) MHz b) TDD LTE: B38 (2570-2620) / B39 (1880-1920) / B40 (2300-2400) / B41 (2496-2690) c) HSPA / UMTS: B1 (2100) / B8 (900)/800/850/1900 MHz d) GSM: 900/1800/ MHz Class 10
2.0	WAN Protocol	PPP/PCP over Asynchronous HDLC with PAP/CHAP Authentication.
3.0	Compatibility	with IPv4 & IPv6 scheme
4.0	Console Interface	RS232 on RJ45 connector
5.0	LAN Interface	10/100 Base-T complying to IEEE 802.3 / ANSI 8802-3 on RJ45 connector.
6.0	Network Protocols	PPP, IPCP, PAP, CHAP, ARP, IP, ICMP, TCP, UDP, IPSEC, SNTP, TFTP.
7.0	Management	Serial, HTTP, HTTPS, Telnet & via SMS, Port Mapping, Event Log & Upload. Firmware Upgrade
8.0	Status Monitoring	ICMP to 4 destinations for Keep Alive & Self Heal. Signal Strength & LEDs.
9.0	Features	a) Support for SCADA Protocols in transparent pass through mode b) Support for NAT and Port forwarding c) Modem shall have self healing capability to recover from dead lock situation
10.0	SIM Interface	External with locking provision
11.0	AT Commands Interface	Supporting AT commands for dialing from FRTU through RS-232 serial port to modem
12.0	Communication Interface	Remote management features like telnet & remote download facility
13.0	LED Indications	Power ON, Network-Signal strength, SIM availability, Ethernet link
14.0	Connectors	RJ45 Ethernet Port, SIM Card Holder, DC power connector, SMA Antenna connector
15.0	Power Supply	24V DC (with reverse current protection) with 2 numbers Terminal Block without adapter. Modem functionality shall not affect during DC voltage supply range of 18 to 30V DC.
16.0	Enclosure	Metallic Extrusion

Technical Specification of 11 KV Pad Mounted Substation

S. No.	Modem Configuration	
17.0	Mounting	DIN Rail Mounting
18.0	Temperature	Operating (-10 to 70 Degree Centigrade), 95% Humidity
19.0	Antenna	a) 2 Nos to be provided b) 12dB High Gain Antenna with SMA connector and 15mtr wire length c) 7dB High Gain Antenna with SMA connector and 5mtr wire length d) It shall be ensured that the male pin SMA Connector of Antenna is of copper at the Antenna base and also at the point of modem connection.
20.0	Accessories	a) 1 Meter cable for connecting to external DC power source (24 V) b) 1 Meter Standard Ethernet (Straight) data cable with metallic connector (SS/MS) c) Standard Console cable for diagnostic port of Modem d) 1 Meter serial cable for dialing modem from FRTU
21.0	Certification	
21.1	Conducted Immunity: IEC61000-4-6	a) Measure emission of the device (referenced to earth) on power mains and to compare them with specified limits to ascertain that the device will not disturb other equipment b) Frequency: 0.15MHz to 80MHz c) Modulation: 80% AM at 1 KHz d) Test Voltage: 3V
21.2	Electrostatic Discharge (ESD): IEC61000-4-2	a) Check immunity against discharge of static electricity that may occur when a charged operator touches the device b) Contact Discharge: 4KV c) Air Discharge: 8KV d) No. of Discharge: 10 at pre-selected spots e) Positive & Negative Polarity
21.3	EN55022 CLASS B	a) Immunity characteristics of the device when subjected to continuous conducted noise b) Conducted Emission: Frequency - 150 KHz - 30 MHz c) Radiation Emission: Frequency – 30 MHz - 1000 MHz

Technical Specification of 11 KV Pad Mounted Substation**Annexure E: Specification for Feeder Remote Terminal Unit for RMU****1.0 FRTU Technical requirement**

1.1	FRTU Functionalities	a) It should be capable of handling minimum 250 DP (data point) respectively. b) FRTU shall have serial port, configurable RS485/RS232 for MODBUS serial and IEC 103 protocol communication. c) FRTU shall have TCP/IP port for Modbus TCP/IP and IEC 61850 communication. d) Ethernet ports for interfacing with IEC 60870-5-104 protocol to communicate with MCC and BCC. e) Ethernet port should be configured for IEC 60870-5-104 protocol as a slave. f) Built in optical couplers to isolate the field signals and field communication channels. g) FRTU shall support event storage capacity as measured events (500), system events (50), alarms (50) and normal events (250). Events should be stored on the basis of FIFO. h) Local viewing of all events shall be possible. i) FRTU DI/ DO communication channel capacity should be such that it can fulfill automation of complete substation system. j) FRTU shall support web based monitoring from remote as well as local. k) All DI/ DO communication channels should have individual LED indications. l) FRTU shall support feature of remote configuration as well as diagnosis. m) FRTU system shall support communication with 4 Nos. master stations simultaneously. n) All DI/DO communication card installed in FRTU shall support HOT swap feature. o) As the SCADA/ DMS system will use public domain such as RF/ GPRS etc., therefore it is mandatory to guard the data/ equipment from intrusion/ damage/ breach of security & shall have SSL
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Technical Specification of 11 KV Pad Mounted Substation

		VPN based security. p) FRTU shall support SNMP (Simple Network Management Protocol). q) Capability of time synchronization with GPS receiver and SCADA MCC/ BCC. r) FRTU system should be modular and expandable. s) FRTU should be capable to store the configuration program in detachable flash memory card. t) FRTU shall have console port with console cable.
1.2	CPU Module	a) 32bit ARM core CPU, operating @ minimum 450 MHz. b) Internal memory minimum 128MB and RAM 64MB, suitable for handling the RMU data acquisition and controlling the RMU, DT monitoring, ACB, LT panel and APFC used in substation. c) Real Time Clock (RTC) d) Display to show the error code and status of the processor.
1.3	Communication Ports	a) Each Serial port should be capable of handling minimum 10 Nos. devices on the network with same communication settings. b) The settings of Ethernet and serial ports should be programmable. c) System should have the capability to increase TCP/ IP Ethernet and serial ports for communication by addition of communication modules. d) Refer Table 2 of Annexure E for details
1.4	MCC/ BCC Communication Protocol	a) FRTU system shall be configured to communicate with MCC/ BCC simultaneously on IEC 60870-5-104 protocol. b) In addition to IEC 104 protocol, FRTU shall also able to communicate all data over secure MQTT with latest version. c) FRTU shall support periodic reporting of analog data that shall be configurable upto 1 hour polling delay. d) Digital status data shall have higher priorities as compared to the analog data. e) Dead band for reporting analog values shall be programmable for the full scale value.

Technical Specification of 11 KV Pad Mounted Substation

1.5	Communication between FRTU, MFMs and Protection Relays	a) FRTU can acquire analog values from MFMs/FPIs and protection relay through RS485 serial communication port using MODBUS and IEC 103 protocol respectively. b) Communication of ACB/MCCBs on Modbus TCP/IP / IEC 61850 protocol. c) MFM/FPI and protection relay will act as slaves to the FRTU. The FRTU shall transmit these analog values to master station by using IEC 60870-5-104 protocol. d) To protect the serial communication port(s), optical isolation is required which is mandatory to avoid damage to FRTU channels
1.6	Digital Input Module	a) FRTU shall be capable of accepting isolated potential free contact status inputs. b) FRTU shall provide necessary sensing voltage, current, optical isolation for each status input. c) FRTU shall be capable to configure re-bounce filtering for each input. d) The sensing voltage of input module should be 24V DC. e) The FRTU shall accept two types of status input: Single point and double point. f) Single point status input represented by 1 Bit in the protocol message whereas double point status input represented by 2 Bits in the protocol message. g) FRTU configuration software shall have the capability to invert the DI signal value required in the configuration. h) There shall be channel wise visual indication on all DI module installed in the FRTU panel for troubleshooting problems. i) Digital Input module should have hot swap compliance

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1.7	Digital Output Module	a) FRTU shall provide the capability for master station to select and change the state of Digital output points. b) These control outputs shall be used to control power system devices such as circuit breakers, isolators and other two state devices which shall be supported by FRTU. c) FRTU should also support single command output to reset FPI operation. d) The output contact shall be rated to operate RMU motor, ACB, LT MCCB, APFC and other signals used in substation. e) Incase control output module of FRTU does not provide potential free control output of required rating then separate control output relays shall be provided. f) There shall be channel wise visual indication of DOs available in FRTU panel and command issued for any digital channel for troubleshooting the problem. g) DO modules should have the capability to configure for a single as well as double command output. h) Digital Output module should have hot swap compliance
1.8	Interfacing of FRTU system with RMU	a) RMU signal connections should be terminated in RMU bay wise and extension of the signals from the each equipment TB (Terminal Block) to FRTU TB through cable connectors, bay wise. b) Separate multi-core cable for Interconnection of FRTU with RMU with suitable size and length. c) Male and female connector with cable for interconnection should be provided in FRTU panel. d) Minimum 2.5/ 4 sqmm multi-strand copper wire/ cable of suitable length for connecting the battery bank and battery charger placed in FRTU cabinet. e) Supply and dressing of inter-connecting cables through suitable size PVC duct are in the supplier scope. f) Interconnections should have proper lugs, ferrules etc. g) 1 Meter Standard Ethernet (Straight) data cable with metallic connector

Technical Specification of 11 KV Pad Mounted Substation

		(SS/MS) to be provided for connection between FRTU and Ethernet SPD
1.9	Troubleshooting	a) FRTU should be configurable using web based configuration and maintenance tool. b) FRTU shall have proper diagnosis tool for troubleshooting the failures related to the following from remotely as well as locally. Supplier shall consider all required configuration and diagnosis cable and software with each supplied FRTU with license if any. c) Communication of FRTU with master d) Communication of MFM with FRTU e) Communication of DI/ DO f) Communication with Protection Relay
1.10	Programmable Logic Control (PLC)	a) FRTU shall be provided with the PLC license. b) FRTU should have the functionality of logic development and perform the task using its own CPU. c) FRTU should have the capability to run more than one PLC tasks at a time.
1.11	Cyber Security	The FRTU shall comply to IEC62351- 3 for cyber security in communication between FRTU and master station and IEC62443-4-2 for cyber security for product including testing requirement as per MoP order no 12/34/2020-T&R dtd 08.06.21 & CEA /PLG/R&D/MII/2021 dtd 11.6.21 and any amendment from time to time. All the eligible equipment should complied to requirement of Mandatory Testing and Certification of Telecom Equipment (MTCTE) vide MoP order No. 14/02/2021-UR&SI-II-Part(1) (E-258136). FRTU should have following features: a) User level configuration b) User wise authentication like system admin, configuration admin, control, operator. c) Disabling the DNS d) Disabling, enabling & configuration of TCP/ IP and UDP ports. e) Door lock alarm integration with FRTU.
1.12	General Construction of Enclosure	a) FRTU enclosure should be 2.0 mm thick GI sheet. b) IP 54 protection suitable for outdoor applications.

Technical Specification of 11 KV Pad Mounted Substation

		c) The cabinet shall have adequate space for installation of other hardware's like modem, battery charger and battery as well as shall have at least 10% spare space. d) The component and accessories to be mounted on mounting plate of FRTU. e) Enclosure should have proper illumination, universal type socket and laptop stand and Drawing pocket.
1.13	FRTU Power Supply	a) Power supply for FRTU shall be on 24V DC system which would be made wired from Battery Charger/batteries housed in FRTU cabinet. b) The main DC circuits shall be protected by incoming circuit breakers. Each circuit shall be tapped through single pole fuse so as to provide an individual DC feed to each of the I/O modules, modems and protocol converters. Contractor shall provide maximum power consumption data of each of the type of FRTU. To protect from the theft the batteries should be enclosed in a protected box with anti-theft shear head type nut and bolts. Battery enclosure should be concealed and not visible. c) Power supply system should have redundant battery charger to provide the supply to FRTU system as well as to charge the battery. d) Type 3 Pluggable Surge Protection Device in accordance with IEC 61643 with KEMA & UL approval must be installed at the incoming power supply of FRTU. DIN Rail Mounted Suitable Surge Protection must be installed on all communication lines (i.e. on Ethernet/RS 485 lines)
1.14	Software / Firmware	The term software is used in this Technical Specification to mean software or software implemented through firmware. All software shall be implemented according to the Contractor's latest established design and coding standards. Complete and comprehensive documentation shall be provided for all software. Contractor should provide windows based software as it is preferred for its user friendliness.

Technical Specification of 11 KV Pad Mounted Substation

1.14.1	General	a) A real-time non-proprietary operating system that is capable of managing the FRTU applications shall be provided. b) This software shall provide automatic restart of the FRTU upon power restoration, memory parity errors, hardware failures, and manual request. The software shall initialize the FRTU and begin execution of the FRTU functions without intervention by the SCADA/DMS master station. All restarts shall be reported to the SCADA/DMS. c) The software shall be prepared in a high level language and shall be documented in detail. No separate licensing charges or agreements shall attach to the FRTU software or its underlying operating system. d) In order to easily support the system under continuously changing site conditions all protocol, configuration, and application data must be contained in easily programmable non-volatile memory such as Flash EPROM. e) The FRTU design shall be independent of any communication protocol that would impose restrictions on the flexibility or functionality of the FRTU. Protocol changes shall be accomplished by software/firmware changes only.
1.14.2	Diagnostic Software	a) Software shall be provided to continuously monitor operation of the FRTU and report FRTU hardware errors to the SCADA/DMS. The software shall check for memory, processor, and input/output errors and failures. It is desirable that internal diagnostics be sufficiently detailed to detect malfunctions to the level of the smallest replaceable component. b) The FRTU shall facilitate isolation and correction of all failures and shall include features that promote rapid fault isolation and component replacement. All functional module nodes shall be designed with integrated on-line diagnostic functions. The results of these diagnostics shall

Technical Specification of 11 KV Pad Mounted Substation

		be reported to the central processing module. The central module shall store this information and report it to the SCADA/DMS as permitted by the protocol. FRTU shall be able to access from remote (BCC/MCC) for downloading configuration.
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2.0 Communication Ports details

S. No.	Communication With	Communication Protocol	Physical Layer		Connecting Cable	Required Physical Port Qty.
			Interface	Port		
2.1	Master station(s)	IEC 60870-5-104	Ethernet	RJ45	CAT VI	1
2.2	Local Configuration	–	RS232	USB/DB9	Console Cable	1
2.3	Protection relays/FPI/VPI	MODBUS	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
2.4	MFM/ LV panel/Transformer	MODBUS	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
	Total					4

3.0 FRTU DI/DO/AI list

FRTU configuration DI/ DO Channel requirement is indicated in the Table given below

3.1	FRTU configuration	DI-64 no's DO-16 no's
3.2	Digital Inputs	
3.2.1	Cable feeder VCB module 1 & 2	CB ON
		CB OFF
		Disconnecter ON position
		Disconnecter OFF position
		Earth position ON position
		Earth position OFF position
		Fault Passage Indicator ON Status
		Fault Passage Indicator OFF Status
		L/R switch in local(Common all VCBs modules)
		L/R switch in remote (Common all VCBs modules)
		Control circuit Healthy

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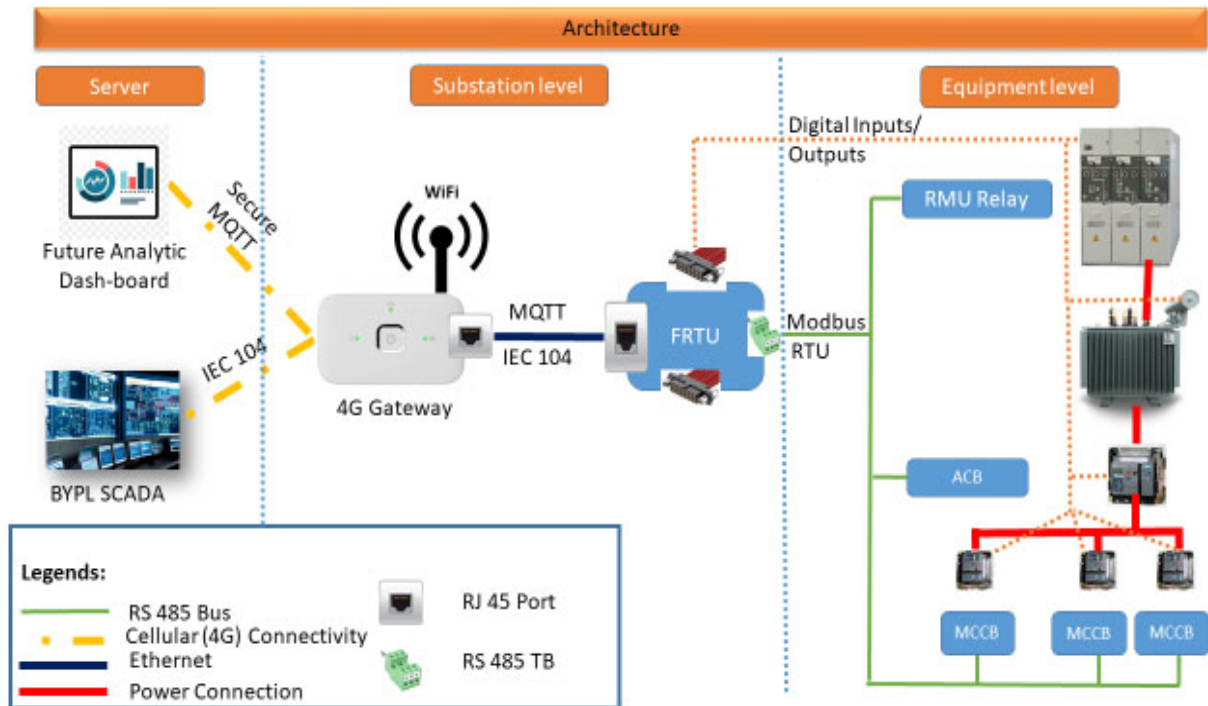
3.2.2	Transformer VCB	CB ON
		CB OFF
		Disconnecter ON position
		Disconnecter OFF position
		Earth position ON position
		Earth position OFF position
		Auto Trip
		Control circuit Healthy
3.2.3	Common Signals	SF6 Low
		Battery Charger 1 Fail
		Battery Charger 2 Fail
		Battery low(BHMu & Charger)
		Battery Unhealthy/fail
		Battery Test in progress
		Command Acknowledgement
		Door Open/Close
3.2.4	Transformer signals	Transformer Oil level low
		OTI Alarm from field
		WTI Alarm from field
		WTI trip
		Transformer pressure relay operated
3.2.5	LT ACB (through microprocessor release)	LT ACB ON
		LT ACB OFF
		LTACB Trip
		L/R switch in remote
		Control supply healthy
3.2.5	Outgoing MCCB (through microprocessor release)	LT Outgoing MCCB ON
		LT Outgoing MCCB OFF
		L/R switch in remote
		Control supply healthy
3.3	Digital Outputs (Commands)	
3.3.1	Cable feeder VCB module 1 & 2	CB ON
		CB OFF
		FPI Reset
3.3.2	Transformer VCB module 3	CB ON
		CB OFF
3.3.3	LT ACB (through microprocessor release)	LT ACB ON
		LT ACB OFF
3.4	Measuring inputs	
3.4.1	Energy Meter (energy meter in purchaser scope)	IR
		IY
		IB
		VAR
		W
		VA
		PF
		VRY
		VYB

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		VBR
		VRN
		VYN
		VCN
		IN
3.4.2	ACB release	IR
		IY
		IB
		W
		VA
		VAR
		PF
3.4.3	MCCB release	IR
		IY
		IB
		W
		VA
		VAR
		PF
3.4.4	WTI Scanner	Oil temperature
		Winding temperature
3.4.5	Self Powered relay	IR
		IY
		IB
		R phase Fault current
		Y phase Fault current
		B phase Fault current
		Earth Fault current
		Fault Record
3.4.6	Battery monitoring	Battery Voltage
		Battery current

Technical Specification of 11 KV Pad Mounted Substation

4.0 Communication Architecture



Annexure F: Recommended spares (Data by supplier)

List of recommended spares as following:

S. No.	Description of spare part	Unit	Quantity
1		No	
2		No	
3			
4			
5			