Volume – I

Tender Notification for

Supply of 11 kV VCB Switchgear Panels for Various Grids in BRPL

CMC/BR/20-21/SV/RS/RJ/848

Due Date for Submission of Bids: 20.05.2020

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

BSES
RAJDHANI POWER LIMITED

SECTION – I

REQUEST FOR QUOTATION

Tender Notification: CMC/BR/20-21/SV/RS/RJ/848

Supply of 11 kV VCB Switchgear Panels for Various Grids in BRPL

BSES
RAJDHANI POWER LIMITED

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BSES
RAJDHANI POWER LIMITED

SECTION – I: REQUEST FOR QUOTATION

1.0 Event Information

1.01 BRPL invites sealed tenders against Supply of 11 kV VCB Switchgear Panels for Various grids in BRPL from the manufacturers. The bidder must qualify the technical requirements as specified in Clause 2.0 stated below. The sealed envelopes shall be duly superscribed as — **"BID FOR SUPPLY 11 KV VCB SWITCHGEAR PANELS FOR VARIOUS GRIDS IN BRPL, TENDER NOTICE/CMC/BR/20-21/SV/RS/RJ/848 DUE FOR SUBMISSION ON DT. 20.05.2020"**.

Sl. No.	Item Description	Specification	Requirement	Estimated Cost
			Total Qty.	
BRPL, DELHI				
1	Supply of 11 kV VCB Switchgear Panels for Various grids in BRPL	SECTION V	35 Nos	2.30 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 **28.04.2020** onwards on all working days upto **10.05.2020**. The tender documents can also be downloaded from the website "**www.bsesdelhi.com**".

In case tender papers are downloaded from the above website, then the bidder has to enclose a demand draft covering the cost of bid documents as stated above in a separate envelope with suitable superscription —"Cost of Bid Documents: Tender **Notice Ref: CMC/BR/20-21/SV/RS/RJ/848"**. This envelope should accompany the Bid Documents.

1.03 Offers will be received upto **1530 Hrs. on dt. 20.05.2020** as indicated earlier and will be opened at the address given below dt. **20.05.2020 at 1600 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.

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

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% (One percent) of the Tender value i.e. **Rs. 4,60,000/-** is not deposited in shape of Bank Draft in favour of BSES RAJDHANI POWER LTD, payable at New Delhi or 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:-

QUALIFICATION CRITERIA FOR RMU (INDOOR/OUTDOOR TYPE):-

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

1. The bidder must be a manufacturer of 11 kV or higher voltage grade Interrupter (SF6/VCB) & panel having valid type test reports carried out at CPRI/ERDA/ any other reputed International Testing Lab not more than 5 years old.

2. The bidder should have manufacturing capacity of minimum 10-15 nos. panel per month.

3. The bidder shall have servicing , repairing, testing & refurbishment facility in INDIA with necessary spares and testing equipment for providing prompt after sales service for RMU. Details of the set-up available shall be brought out in the offer, failing which the offer will be rejected. The bidder shall submit undertaking along with the bid confirming compliance to qualifying criteria for bidder.

4. The bidder should have qualified technical and dedicated QA personnel at various stages of manufacture & testing, documentary proof –Quality Mannual, Charts and Undertaking shall be furnish.

5. The bidder should have supplied at least 200 nos. panels/switchboards to any major utilities/SEB's in last 3 years out of which at least 50% should be in successful operation.

6. Bidder should have Average Annual Sales Turnover of Rs 500 Crores or more in last 3 financial Years.

7. The Bidder must posses valid ISO 9001:2015 certification.

8. The Bidder shall submit an undertaking "No Litigation" is pending for the company and in case of any running litigation details and value to be provided (as per attached format).

9. An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution including electricity utilities.

10. The bidder must have valid PAN No., GST Registration Number, in addition to other statutory compliances. The bidder must submit the copy of registrations and submit an undertaking that the bidder shall comply all the statutory compliances as per the applicable laws/rules etc. before the start of the work.

11. In case of new bidders (not enlisted in BSES) , Factory Inspection & evaluation may be carried out to ascertain bidders manufacturing capabilities and quality procedures. BRPL reserves the right to assess the capabilities /installed capacity.

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 15.05.2020 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 Unpriced items.	20.05.2020, 1530 HRS
3	Commercial Offer	Prices for RMU and Break up regarding basic price and taxes. Delivery commitment	20.05.2020, 1530 HRS
4	Opening of technical bid	As per RFQ	20.05.2020, 1600 HRS

This is a two part bid process. Bidders are to submit the bids (a) Technical Bid (b) Price Bid. Both these parts should be furnished in separate sealed covers superscribing with specification no., validity etc, with particulars as **Part-I "Technical Particulars & Commercial Terms & Conditions"** and **Part-II "Financial bid"** and these sealed envelopes should again be placed in another sealed cover which shall be submitted before the due date & time specified.

Bidders are requested to submit the bid in one original plus one copy in duplicate.

- **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 be returned unopened.**

- **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.

4.0 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 (03) 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.

5.0 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.

6.0 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.

7.0 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. Sheshadri Krishnapura Copy to Mr. Robin Sebastian	Mr. Robin Sebastian
Address	BSES RAJDHANI POWER LTD, 2nd Floor, B Block, Nehru Place, New Delhi – 110019	C&M Deptt. 1st floor, D- Block, BSES Rajhdhani Power Limited, BSES Bhawan, Nehru Place, New Delhi -110019
Email-ID	sheshadri.krishnapura@relianceada.com	Robin.sebastian@relianceada.com

SECTION – II

INSTRUCTION TO BIDDERS (ITB)

Supply of 11 kV VCB Switchgear Panels for Various Grids in BRPL

CMC/BR/20-21/SV/RS/RJ/848

A. GENERAL

1.0 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 11 kV VCB Switchgear Panels as notified earlier in this bid document.

2.0 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.

3.0 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 a rising 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).

4.0 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. Further the purchaser has the right to get sample of Panel tested by any reputed independent test lab (approved by BRPL) at the cost of bidder.

B. BIDDING DOCUMENT

5.0 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.

6.0 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

7.0 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.

8.0 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.

9.0 BID FORM

9.01 The Bidder shall complete an "Original" and another one "Copy" of 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. **4,60,000/-**. 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) 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.

b) Bank Draft in favour of BSES RAJDHANI POWER LTD, payable at New Delhi.

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.

10.0 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.

11.0 BID CURRENCIES

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

12.0 PERIOD OF VALIDITY OF BIDS

12.01 Bids shall remain valid for **120 days** post bid date.

12.02 Notwithstanding Clause12.01 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.

13.0 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.

14.0 FORMAT AND SIGNING OF BID

14.01 The original Bid Form and accompanying documents (as specified in Clause9.0),clearly marked "Original Bid", plus one copy must be received by the Purchaser at the date, time and place specified pursuant to Clauses15.0 and16.0. 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: One original & one Copy (hard copies) of all the Bid Documents shall be sealed and submitted to the Purchaser before the closing time for submission of the bid.

15.02 The Technical Documents and the EMD shall be enclosed in a sealed envelope and the said envelope shall be superscribed with **—Technical & EMD**. The Financial bid shall be inside another sealed envelope with superscription — **Financial Bid**. Both these envelopes shall be sealed inside another big envelope. All the envelopes should bear the Name and Address of the Bidder and marking for the Original and Copy. The envelopes should be superscribed with —**"Tender Notice No, Due date of submission, Tender opening date"**.

15.03 The Bidder has the option of sending the Bids in person. Bids submitted by Telex/ Telegram/ Fax 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 original Bid, together with the required copies, must be received by the Purchaser at the address specified not later than **1530 HRS on 20.05.2020**.

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause9.0, 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 either by itself, or as a partner in a Joint Venture. A Bidder who submits or participates in more than one Bid will cause all those Bids to be rejected.

18.0 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.

19.0 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

20.0 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.

21.0 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.

22.0 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

The successful Bidder shall furnish the Performance Bank Guarantee for an amount of 10% (Ten percent) of the Contract Price in accordance with the format provided. 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) at site/stores whichever is earlier plus 3 months towards claim period. Upon submission of the performance security, the EMD shall be released.

30.0 CORRUPT OR FRADULENT 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 of 11 kV VCB Switchgear Panels for Various Grids in BRPL

CMC/BR/20-21/SV/RS/RJ/848

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 Limited, 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 eight) 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.

7.0 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, incase 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 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 Supplier shall establish a performance bond in favor of BRPL in an amount not less than Ten percent (10%) of the total price of the Contract (the "Performance Bond"). 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) at site/stores whichever is earlier plus 3 months towards claim period. It shall be in accordance with one of the following terms:

a) Depositing pay order /demand draft of the relevant amount directly with BRPL at the address listed above or as otherwise specified by BRPL, either of which shall constitute the Performance Bond hereunder; or

b) 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 Bond established under Clause 10.0 shall contain a statement that it shall be automatically and unconditionally forfeited without recourse and payable against the presentation by BRPL of this Performance Bond 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 Bond 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 Bonds will be released without interest within seven (7) days from the last date up to which the Performance Bond has to be kept valid (as defined in Clause 10.0) 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 vent 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.

BSES
RAJDHANI POWER LIMITED

SECTION – IV: QUANTITY AND DELIVERY REQUIREMENT

Sl. No.	Item Description	Specification	Requirement	Delivery Schedule	Location
BRPL,DELHI					
1	Supply of 11 kV VCB Switchgear Panels for Various Grids in BRPL	SECTION V	35 Nos	2-3 months from the date of Ordering	Stores BRPL Delhi

Annexure –I

BID FORM

Supply of 11 kV VCB Switchgear Panels for Various Grids In BRPL

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 "Supply of 11 kV VCB Switchgear Panels for Various Grids In BRPL" 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

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

Annexure-IV

PRICE FORMAT

ENQUIRY NO & DATE: NIT: CMC/BR/19-20/SV/RS/RJ/846

PRICE SCHEDULE

ITEM DESCRIPTION	QTY AS PER RFQ	UOM	EX-WORKS RATE/ UNIT	CGST (%)	CGST AMT	SGST (%)	SGST AMT	IGST (%)	IGST AMT	FRT	LANDED RATE/ UNIT	TOTAL LANDED COST (INR)
MANNUAL RMU												
SUPPLY OF 11kV INCOMER PANEL	03	Nos										
SUPPLY OF 11kV OUTGOING PANEL	22	Nos										
SUPPLY OF PNL,ELEC PWR,INDR STN XMER;11KV;800A	01	No										
SUPPLY OF PNL,ELEC PWR,INDR BUS CPLR;11KV;2000A	02	Nos										
SUPPLY OF PNL,ELEC PWR,INDR BUS RISER;11KV	02	Nos										
SUPPLY OF PNL,ELEC PWR,INDR CAP FDR;11KV;1250A	03	Nos										
SUPPLY OF SWITCHGR,EARTHING TRK BUS SIDE;2000A	01	No										
SUPPLY OF SWITCHGR,EARTHING TRK CBL SIDE;2000A	01	No										

Note: 1.The prices received without break up of ex works, Freight, GST are liable for rejection
2. Pls. Indicate the exact percentage of taxes in figures and words.
3. If there is a discrepancy between the unit price and the total price THE UNIT PRICE shall prevail.
4. Bidders are requested to attach the covering letter head along with the price bid indicating reference no and date.

Bidders seal & signature

Annexure – V

Enquiry No. : CMC/BR/20-21/SV/RS/RJ/848

COMMERCIAL TERMS AND CONDITIONS

S/NO	ITEM DESCIPTION	AS PER BRPL	CONFIRMATION OF BIDDER
1	Validity of prices	120 days from date of offer	
2	Price basis	Firm, FOR Delhi store basis, Prices shall be inclusive of all taxes & duties, freight upto Delhi stores. Unloading at stores be in vendor's scope Transit insurance in BRPL scope	
3	Payment Terms	100% payment within 45 days after receipt of material at stores	
4	Delivery schedule	As per Section IV	
5	Defect Liability Period	60 months after commissioning or 66 months from the last date of supply, whichever is earlier.	
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	10% of total PO value for 24 months after commissioning or 30 months from date of supply, whichever is earlier plus 3 months towards claim period	

ANNEXURE - VI

ENQUIRY NO: CMC/BR/20-21/SV/RS/RJ/848

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 COMMERCILAL TERMS & CONDITIONS	YES/NO
7	FINANCIAL BIDS (IN SEALED ENVELOPE)	YES/NO
8	EMD IN PRESCRIBED FORMAT	YES/NO
9	DEMANT DRAFT OF RS 1180/- DRAWN IN FAVOUR OF	BSES RAJDHANI POWER LTD
10	POWER OF ATTORNEY/ AUTHORISATION LETTER FOR SIGNING THE BID	YES/NO

SECTION – V

TECHNICAL SPECIFICATIONS (TS)

Supply of 11 kV Switchgear Panel for various Grids in BRPL

CMC/BR/20-21/SV/RS/RJ/848

BSES Rajdhani Power Limited
BSES Bhawan, Nehru Place, New Delhi- 19

TECHNICAL SPECIFICATION

FOR

11KV INDOOR SWITCHGEAR

NEW GRIDS

Specification no – SP-HTSWG-01-R1

Prepared by	**Hemanshi**		**Rev: 1**
Approved by	**Vijay Panpalia**		**Date: 31st July 2014**

Chapter 6b. Technical Specification for 11KV Indoor Switchgear

1.0 CODES & STANDARDS:

Material, equipment and methods used in the manufacture of switchboard shall confirm to the latest edition of following standards: -

Standard Name / No	Standard's Description
Indian Electricity Rules 1956	Relevant safety regulation of CEA
Indian electricity act 1910	Latest edition
Switchgear and control gear	IEC: 60694, IEC: 60298, IEC: 62271-200, IEC: 60529. IS: 3427, IS 12729, IS 12063, IS:13947, IS: 9046
Circuit Breaker	IEC 62271-100, IS 13118, IS 2516
Isolators and earthing switches	IEC 62271-102
Current Transformers	IS:2705, IEC:60185
Voltage Transformer	IS:3156, IEC:60186
Indicating Instruments	IS:1248
Energy Meters	IS: 13010
Relays	IS 8686, IS 3231, IS 3842
Control switches and push buttons	IS 6875
HV Fuses	IS 9385
Arrangement of switchgear bus bars, main connections and auxiliary wiring	IS 375
Code of practice for phosphating iron & steel	IS 6005
Colours for ready mixed paints	IS 5
Code of practice for installation and maintenance of switchgear	IS 3072

Chapter 6b. Technical Specification for 11KV Indoor Switchgear

2.0 PANEL CONSTRUCTION

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

2.1	Enclosure Type	Free standing, indoor, Fully compartmentalized, Metal clad, Vermin Proof
2.2	Enclosure degree of protection	IP 4X for High Voltage compartment IP 5X for low voltage compartment
2.3	Enclosure Material	Pre – Galvanized CRCA steel
2.4	Load bearing members	Minimum 2.5 mm thick
2.5	Doors and covers	Minimum 2.0 mm thick
2.6	Gland Plate (detachable type)	3.0mm MS for multicore and 5.0mm Aluminum for single core cables. All gland plates should be detachable type with gasket
2.7	Height of complete Panel	Maximum 2700mm, operating height maximum 1600mm
2.8	Dimension of Instrument Chamber	Depth (500mm) (Minimum)
2.9	Extensibility	On either side
2.10	Separate compartment for	Bus bar, circuit breaker, HV incoming cable, HV outgoing cable PT, LV instruments & relays.
2.11	Transparent inspection window	For cable compartment at height of cable termination.
2.12	Bus end cable box	For direct cable feeder from bus.
2.13	Breaker compartment door	Separate, with lockable handle (Design with breaker trolley as the front cover is not acceptable). Door of one panel should not cause hindrance for opening of adjacent panel.
2.14	Inter compartmental connections	
2.14.1	Breaker to bus bar compartment	Through seal off bushings
2.14.2	Breaker to cable compartment	Through seal off bushings
2.15	Pressure relief devices	To be provided for each HV compartment.
2.16	Bus support insulator	Non hygroscopic, track-resistant, high strength, Epoxy insulators (calculation for validating dynamic force withstand capability to be submitted during detailed engineering)
2.17	Fixing arrangement	Doors – Concealed hinged, door greater than 500mm shall have minimum three sets of hinges Covers – SS bolts Gasket - Neoprene Gasket arrangement shall be Provided between panels.
2.18	Required HV cable termination height in the cable compartment	650mm (Minimum) for 11KVfrom bottom of the panel
2.19	Panel Base Frame	Steel base frame as per manufacturer's standard.
2.20	Handle	Removable bolted covers with "C" type handle for cable chamber and busbar chamber. Panel no/identification to be provided on cable box cover also.

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2.21	**Circuit Breaker**	
2.22	Type	Truck type Only.
2.23	Mounting	On withdrawable truck or trolley, with locking facility in service position.
2.24	Switching duty	a) Transformer (oil filled and dry type) b) Motor (of small and large ratings – DOL starting with starting current 6 to 8 times the full load current & with a maximum 3 starts per hour) c) Underground cable with length up to 10km.
2.25	Interrupting medium	Vacuum
2.26	Breaker operation	Three separate identical single pole units operated through the common shaft.
2.27	Operating mechanism	Re-strike free, Trip free, with electrical anti-pumping feature
		One O-C-O operation possible after failure of power supply to the spring charging motor.
		Motor wound, spring, charged, stored energy type with manual charging facility
2.28	Breaker Indications and push buttons	
2.28.1	ON/OFF/Emergency trip push button	a) Manual / mechanical b) Emergency Off push button will be provided with a protective flap. c) Mechanical ON shall have padlocking facility.
2.28.2	Mechanical ON-OFF indication	On breaker trolley front
2.28.3	Operation counter	On breaker trolley front
2.28.4	Test-service position indicator	On breaker trolley front
2.28.5	Mechanism charge/discharge indicator	On breaker trolley front
2.29	Breaker positions	Service, test and isolated
2.30	Inter changeability	Possible, only with breaker of same rating
2.31	Breaker control	On panel front only
2.32	Handle	Breaker shall be provided with handles for easy handling, rack in-out operation and manual spring charging as applicable.
2.33	Type of terminal connector at breaker limbs	Jaw Type/Finger type Contacts for breaker limb connection with bus and cable end
3.0	**Functional Requirements**	
3.1.0	Interlock and safety devices	
3.1.1	Breaker compartment door opening	Opening of door and rack out to test / isolated position should be possible with breaker in OFF position only.
3.1.2	Breaker compartment door closing	Should be possible even when breaker is in isolated position
3.1.3	Racking mechanism safety interlock	Mechanical type
3.1.4	Racking in or out of breaker inhibited	When the breaker is closed

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3.1.5	Racking in the circuit breaker inhibited	Unless the control plug is fully engaged
3.1.6	Disconnection of control plug inhibited	As long as the breaker is in service position
3.2.0	Additional Requirement	
3.2.1	Exposure to live parts	In case the breaker panel door is required to be opened during a contingency, the personnel should not be exposed to any live parts. Suitable shrouds / barriers / insulating sleeves should be provided.
3.2.3	Operation of breaker	In either service or test position
3.2.4	Closing from local	Only when local/remote selector switch is in local position
3.2.5	Closing from remote	Only when local/remote selector switch is in remote position
3.2.6	Tripping from local	Irrespective of selector switch
3.2.7	Tripping from remote	Irrespective of selector switch
3.2.8	Testing of breaker	In test or isolated position keeping control plug connected
3.3.0	Safety shutters	
3.3.1	Automatic safety shutter for female primary disconnects	To fully cover contacts when breaker is withdrawn to test. Independent operating mechanism for bus bar & cable side shutters, separately pad lockable in closed position.
3.3.2	Label for identification	For bus side and cable side shutters
3.3.3	Warning label on shutters of incoming and other connections	Clearly visible label “isolate elsewhere before earthing” be provided
3.4.0	Breaker electrical operation features	
3.4.1	No. of Trip coil	2 Nos for each breaker. Shunt Trip coil shall operate correctly for all value of voltages between 70% & 110% of rated voltage. Trip coil shall be suitable for Trip circuit supervision relay for monitoring.
3.4.2	Closing Coil	One no. for each Breaker Closing coil shall operate correctly for all value of voltages between 85% & 110% of rated voltage.
3.4.3	Trip circuit supervision	To be given for breaker close and open condition
3.4.4	Trip circuit supervision relay contact	For indication, alarm & to inhibit closing of breaker and Relay Digital Input / SCADA Monitoring.
3.4.5	Emergency Trip Push button contact	Wired directly to trip coil
3.4.6	Master trip relay contact	Wired to inhibit closing of breaker
3.4.7	DC Control supply bus in all panels	Fed by two DC Incoming source in bus coupler panel with auto changeover facility (Monitoring of both the DC source and DC Source status to be given to SCADA and to Indication lamps on CRP).
3.4.8	PT supply bus in all panels	Fed normally by Bus PT with automatic changeover facility to incomer line PT
4.0.0	**Surge suppressors**	
4.1.0	Provision	To be provided in all panels except bus coupler and BPT

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	Type	Gapless, metal oxide type
5.0.0	**Current Transformers**	
5.1.0	Type	Shall be cast resin type with insulation class of E or better.
	Rating and technical particulars	For all other feature refer technical particulars.
	CBCT	If specified, bidder shall clearly mention his proposal for mounting the same.
6.0.0	**Potential Transformer**	
6.1.0	Type	Shall be cast resin type with insulation class of E or better.
6.1.1	Mounting	It shall be mounted on a withdrawable carriage. Mounting of PT on the breaker truck is not acceptable. In case it is mounted on the panel rear top, access to the PT and the reinforcement in the panel for allowing a person to stand should be provided.
6.1.2	Neutral	The HV neutral connection to earth shall be easily accessible for disconnection during HV test.
7.0.0	**Feeder and Bus Earthing**	
7.1.0	Earthing arrangement	Through separate earthing truck for bus and feeder.
7.1.1	Short time withstand capacity of earthing truck	Equal to rating of breaker. Refer technical parameters.
7.1.2	Operation from front	Mechanically operated by separate switch.
7.1.3	Interlocks	To prevent inadvertent closing on the live circuit, with padlocking arrangement to lock truck in close or open position.
8.0.0	**Equipment Earthing**	
8.1.0	Material of earthing bus	Copper
8.2.0	Earth bus joints	All bolted joints in the bus will be made by connection of two bolts.
8.3.0	Rating	Sized for rated short circuit current for 3 seconds.
8.4.0	Enclosure and non-current carrying part of the switchboard/components	Effectively bonded to the earth bus
8.5.0	Hinged doors	Earthed through flexible copper braid
8.6.0	Circuit breaker frame / carriage	Earthed before the main circuit breaker contacts/control circuit contacts are plugged in the associated stationary contacts.
8.7.0	Metallic cases of relays, instruments and other LT panel mounted equipment	Connected to the earth bus by independent copper wires of size not less than 2.5 sq mm with green color insulation. For this purpose LT compartment should have a clear designated earth bus to which earth connections from all components are to be connected.
8.8.0	CT & PT neutral	Earthed at one place at the terminal blocks through links.
9.0.0	**Meters**	
9.1.0	Meters	Flush Mounted
9.2.0	Ammeter	Taut band, moving iron type
9.2.1	Size	96 X 96 mm

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9.2.2	Panels where to be provided	All panels except Bus PT
9.2.3	Ammeter selector switch	To be provided
9.2.4	Accuracy class	1.0
9.3.0	Voltmeter	Taut Band, moving iron type
9.3.1	Size	96 X 96 mm
9.3.2	Panels where to be provided	Incomer and bus PT panel
9.3.3	Voltmeter switch	To be provided
9.3.4	Accuracy class	1.0
9.4.0	Energy meter	To be provided alongwith complete communication arrangement. Refer Chapter 35 for technical specification.
9.4.1	Panels where to be provided	All panels except bus coupler and bus PT
9.4.2	Accuracy Class	As per BSES Requirement
9.5.0	Multi functional meter – 3Phase 4 wire Connection	Scrolling facility with LCD display for parameters like power factor, KW, KVA ampere etc. accuracy 0.5 with RS 485 port.
9.6.0	Power Quality Analyser	To be provided alongwith complete communication arrangement. Make and model no. shall be Schneider make PM 8000 Series
9.6.1	Panels where to be provided	All incomer panels
10.0.0	**Indication**	
10.1.0	Indication	Flush mounted
10.2.0	Lamps	High intensity, clustered LED type
10.2.1	Breaker ON	Red
10.2.2	Breaker Off	Green
10.2.3	Spring Charged	Blue
10.2.4	DC Control supply fail	Amber
10.2.5	AC Control supply fail	Amber
10.2.6	Auto trip	Amber
10.2.7	Service position	White
10.2.8	Test position	White
10.2.9	Heater circuit healthy	Yellow (Indication with integrated push button for checking)
10.2.10	Trip circuit healthy	White
10.2.11	PT supply as applicable	R, Y, B
10.3.0	Hooter with isolation switch	Hooter for AC and Alarm for DC supply failure
11.0.0	**Selector switches and push buttons**	
11.1.0	Selector switch	Flush mounted on LV compartment door, with shrouded terminals
11.2.0	TNC Switch with pistol grip	Lockable spring return to normal position
11.3.0	Local / SCADA selector switch	As Per BSES Requirement
11.5.0	Selector switch for ammeter	6 way 7 position
11.6.0	Selector switch for voltmeter	6way 7 position
11.7.0	Rotary ON/Off switches	For heater / illumination circuit
11.7.1	Rating	16 A
11.8.0	Push button	Flush mounted on LV compartment door, with shrouded

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		terminals
11.8.1	Emergency trip push button	Red color with stay put
11.8.2	Accept push buttons	Black color – Trip alarm / DC fail alarm
11.8.3	Reset push buttons	Yellow color – Trip alarm / DC fail alarm
11.8.4	Test push buttons	Blue color – for heater circuit healthy
11.8.5	Rating	10 A
12.0.0	**Internal Wiring**	
12.1.0	Internal wiring	1100V grade PVC insulated (FRLS) stranded flexible copper wire.
12.2.0	Size	2.5 sq. mm for CT circuit, 1.5 sq mm for PT and 1.5 sq. mm for control circuit
12.3.0	Colour code	
12.3.1	PT	R ph – Red Y Ph – Yellow B Ph – Blue Neutral – Black
12.3.2	CT	R ph – Red Y Ph – Yellow B Ph – Blue Neutral - Black
12.3.3	Others	DC – grey, AC-black, Earth – green
12.4.0	Ferrules	At both ends of wire
12.4.1	Ferrule type	Interlocked type (one additional red color ferrule for all wires in trip circuit)
12.5.0	Lugs	Tinned copper, pre-insulated, ring type,fork type and pin type as applicable. CT circuits should use ring type lugs only.
12.6.0	Spare contacts of relays, timers etc	Wired up to the terminal blocks
12.7.0	Wiring enclosure	Plastic channels, inter panel wiring through PVC sleeves or suitable grommets.
12.7.1	Inter panel wiring	Wiring with ferrule to be terminated in the adjacent shipping section will be supplied with one end terminated and the other end bunched and coiled.
13.0.0	**Terminal Blocks (TB)**	
13.1.0	Rating and Type	1100V grade, moulded piece, stud type screw driver operated terminals complete with insulated barriers, washers, nuts and lock nuts.
13.2.0	Marking and covers	White fiber markings strip and clear plastic, slip-on/clip-on terminal covers to be provided.
	Disconnecting Facility	To be provided in CT and PT terminals.
	Shorting and Earthing Facility	To be provided in CT Terminals
13.3.0	Spare terminals	20% in each type of TB row
13.4.0	TB shrouds & separators	Moulded non-inflammable plastic material
13.5.0	Clearance	
13.5.1	Clearance between 2 sets of TB	100 mm min.
13.5.2	Clearance with cable gland plate	250 mm min
13.5.3	Clearance between AC / DC	100 mm min

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	set of TB	
13.6.0	Test Terminal blocks	Screw driver operated stud type for metering circuit
14.0.0	**Relays and protection**	
14.1.0	Technology and Functionality	Numerical, microprocessor based with provision for multifunction protection, control, metering and monitoring.
14.1.1	Mounting	Flush Mounting, IP 5X
14.1.2	Architecture	Hardware and software architecture shall be modular and disconnect able to adapt the protection and control unit to the required level of complexity as per the application.
14.1.3	Programming and configuration	Relay shall utilize a user friendly setting and operating multi-lingual software in windows environment with menus and icons for fast access to the data required. Programming software and communication cord for offered relays should be included in scope of supply.
14.1.4	SCADA Interface port	RJ45 rear port port for interfacing with SCADA on IEC 61850 protocol.
14.1.5	PC Interface port	Front port (preferably RJ45) for configuration/data download using PC. Cost of licensed software and communication cord,convertor for communication to USB/RJ45 port of PC required for programming of offered protection relays shall be included in the cost of switchgear.
14.1.6	User Interface	An alphanumeric key pad and graphical LCD display with backlight indicating measurement values and operating messages. It should be possible to access and change all settings and parameters without the use of PC.
14.1.7	Relay characteristics	Relay shall integrate all necessary protections for different applications in accordance with IS and IEC. Relay shall provide wide setting ranges and choice of all IEC, IEEE and other tripping curves through a minimum of two setting groups.
14.1.8	Event and Fault records	Relay shall have the facility of recording of various parameters during event/fault with option to set the duration of record through settable pre fault and post fault time. Relay shall store records for last 1000 events and 10 faults (minimum). It should be possible to download records locally to PC or to remote SCADA.
14.1.9	General Features of Numerical Relays	Measurement of Event Recording , Disturbance Recording, Harmonic Distortion , RMS Current values & Frequency, Peak and rolling Current Values, Max. and Average current Values, Phase and or Neutral Angles , Max. and average voltage, Power and Energy, Apparent Power and Apparent Power and Apparent Energy with Time Synchronization.
14.1.10	Self diagnosis	Relay shall be able to detect internal failures. A watchdog relay with changeover contact shall provide information about the failure.
14.1.11	Time synchronization	All relays shall be capable of being synchronized with the system clock using SCAD interface (SNTP) and PC.
14.1.12	Digital Input and Digital Output of numerical relays	No. of Digital input / Digital output of any type of relay which shall be used in control and relay panel shall be as per BSES requirement and signal list only. Refer the attached tentative signal list of all feeders (Incomer

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		, Out going, Capacitor Bank , Buscoupler, Station Transformer & Bus PT).
14.1.12	Operation Indicators	LEDs with push button for resetting.
14.1.13	Test Facility	Inbuilt with necessary test plugs for Relays and Meters.
15.1.0	**Protection Relays for 11Kv Incomer panel**	
	Relay 1	3 phase over current and Earth fault protection with IDMT. Definite time and instantaneous characteristics. Relay should offer Both Directional and Non-directional features independently.
		Synchronization
		Under voltage and overvoltage protection
		PT supervision (fuse failure monitoring)
	Relay 2	Low Impedance Restricted Earth fault protection.
	Note	Combining functions of Relay -1 and Relay-2 in single relay is not acceptable.
15.1.1	**Protection Relays for 11Kv Bus section panel**	
	Relay 1	3 phase over current and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
		Synchronization
15.1.2	**Protection Relays for 11Kv Outgoing panel**	
	Relay 1	3 phase over current and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
15.1.3	**Protection Relays for 11Kv Station Transformer panel**	
	Relay 1	3 phase over current and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
15.1.4	**Protection Relays for Capacitor panel**	
	Relay 1	3 phase over current and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
		Earth fault protection
		Under voltage and overvoltage protection
		PT supervision (fuse failure monitoring)
	Relay 2	Neutral unbalance relay (voltage based) for each step
		Timer for on time delay (minimum 300seconds)
	Note	Combining of functions of Relay -1 and Relay -2 in single relay is not acceptable.
16.1.0	Auxiliary Relay – General Features	
16.1.1	Auxiliary Relay use for Circuit supervision, trip and timer relays	Static or electromechanical type
16.1.2	Reset mechanism for auxiliary relays	Self reset contacts except for lock out relays.

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16.1.3	Reset mechanism for lockout relays	Electrical reset for all type of panel.
16.1.4	Operation Indicators	With hand-reset operation indicators (flags) or LEDs with pushbuttons for resetting.
17.1.0	Auxiliary relays – Requirement	
17.1.1	For each breaker	Anti pumping (94), lockout(86) and trip circuit supervision (74) relays
17.1.2	PT selection relays	To be provided for selection between Bus PT and Line PT of respective sections.
17.1.3	Switchgear with two incomers and bus coupler	Lockout (86) contact of each incoming breakers to be wired in series in closing circuit of other incoming breakers and bus coupler. If Differential operates, 11KV I/C 86 will operate. B/C will not close because of above interlock.
17.1.4	Auxiliary relays, coupling relays, transducers etc.	To effect interlocks and to exchange signals of status & control from remote.
17.1.5	**General Requirements for all relays/contactors**	
17.1.6	Auxiliary Supply	220VDC. All relays / contactors shall be suitable for continuous operation at 15% overvoltage.
18.1.0	**Space Heaters**	
18.1.1	Space heaters	Thermostat controlled with switch for isolation
18.1.2	Space heater location	Breaker & HV cable compartment to be mounted on a insulator. Heater position in cable compartment should be easily accessible after cable termination. Heater position in breaker chamber shall be accessible with breaker racked-in.
19.1.0	**Switch and sockets**	
19.1.1	Lamp with switch	For LV & cable chamber
19.1.2	Universal type (5/15A) socket with switch	In LV chamber
20.1.0	**Name Plates and Marking**	
	Nameplates	To be provided as per the following description
	Equipment Nameplates	a. All equipment mounted on front side as well as equipment mounted inside the panels shall be provided with individual name plates with equipment designation engraved. b. All front mounted equipment shall be also provided at the rear with individual name plate engraved with tag numbers corresponding to the one shown in the panel internal wiring to facilitate easy tracing of the wiring.
	Feeder Nameplates	a. Large and bold name plate carrying the feeder identification/numbers shall be provided on the top of each panel on front as well as rear side. On rear side, nameplate should be provided on frame. b. Rear bottom of each panel shall have a nameplate clearly indicating the following: Customer Name – Project details; PO No and date; Drawing Reference No.etc.
	Rating Plate	Following details are to be provided on Panel and CB rating plate;

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		a. Customer Name – BSES Delhi b. P.O.No. and Date – As per respective PO.
	Material	Non – rusting metal or 3 ply lamicoid. Nameplates shall be black with white engraving lettering. Stickers are not allowed.
	Fixing	All nameplates / rating plates shall be riveted to the panels at all four corners. Bolting / screw2ing is not acceptable.
	Markings	Each switch shall bear clear description identifying its function. Similar inscription shall also be provided on each device whose function is not other wise identified. If any switch or device does not bear this inscription separate nameplate giving its function shall be provided for it. Switch shall also have clear inscription for each position indicating e.g. Trip – Neutral close, ON-OFF etc.
21.1.0	**Surface treatment & painting**	
21.1.1	Surface treatment	Sand blasting or by seven tank process
21.1.2	Paint type	Powder coated. Pure polyster base grade A structure finish
21.1.3	Paint shade	RAL 7032 for external & internal surface
21.1.4	Paint thickness	Minimum 50 microns
22.1.0	**Inspection and testing**	
22.1.1	Type Tests	The product must be of type tested quality as per all tests in Indian standards
22.1.2	Type test report validity period	Last five years from date of bid submission
23.1.0	Stage and Final Inspection	All the Qty. of Panels will be inspected by BSES as per approved QAP.
23.1.1	Acceptance & routine test	As per the specification and relevant standards. Charges for these tests shall be deemed to be included in the equipment price.
		The Owner/owner reserves the right to witness all the tests.
23.1.2	Notice to Owner for conducting type tests.	At least three weeks in advance.
23.1.3	Test reports of acceptance and routine tests before dispatch for approval	To submit six copies
23.1.4	Submission Of QAP	QAP will be submitted by suppliers with submission of Schematic Drawings.
24.1.0	Deliverable	1.As Built Drawing of panel 6 Sets
		2. Maintenance Manuals – 2CD / DVD Soft Copy , 6 Set of Hard Copy
		3. Relay and equipments Catalogues & Manuals
		4. Relay Settings & Maintenance Manuals
		5. Relays software and connection/ communication cables
25.1.0	Training	Training on relays and equipment operations shall be provided to the officials of BRPL will be in the Scope of Suppliers.
26.1.0	**Approved Make of components for 11KV Switchgear Panel**	
26.1.1	Numerical Relays	ABB / SIEMENS Numerical relays used in complete switchboard should be of same make

26.1.2	Auxiliary Electromechanical Relays	ABB / Areva / Schneider
26.1.3	Contactor / Auxiliary Relays	Schneider Electric / Siemens / ABB
26.1.4	Analog Ammeter / Voltmeter	AE / Rishabh
26.1.5	Indication LEd , Lamp	Teknic/ Siemens
26.1.6	Push Button	Teknic
26.1.7	Field Terminal Block	Phoneix / Elemex / Connect well
26.1.8	MCB	Schneider / Siemens / ABB
26.1.9	Hooter	Alan
26.1.10	Panel Light	Philips / Bajaj / Surya
26.1.11	Power Socket	Anchor / Reputed make
26.1.12	Multifunction Meter	Rishab / Socomec
26.1.13	Wires for wiring	KEI / Finolex / Polycab
26.1.14	Test Terminal Block	Areva / IMP / Nelster
26.1.15	Control Switch	Areva / Switron
26.1.16	Instrument Transformers	ECS / Pragati / Kappa / Narayan power tech
26.1.17	Surge Arrestor	Oblum / Lamco / Raychem
26.1.18	Energy Meter	HPL (Grid Meter for BRPL)

3.0 DEVIATIONS

Deviation from this specification, if any, shall be clearly brought out in the offer. Unless owner explicitly accepts such deviations, it shall be considered that the offer fully complies with the specification.

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ANNEXURE – B

GUARANTEED TECHNICAL PARTICULARS (DATA BY OWNER)

1.0.0	**Switchgear**	
1.1.0	Type	Metal clad, air insulated with VCB type circuit breaker
1.2.0	Service	Indoor
1.3.0	Mounting	Free standing, floor mounted
1.4.0	System voltage	11KV
1.5.0	Voltage variation	+ / - 10%
1.6.0	Frequency	50HZ + / - 5%
1.7.0	Phase	3
1.8.0	Rated voltage	12KV
1.9.0	Rated current @ 50 DEG C ambient	As per SLD
1.10.0	Short time rating for 3 sec.	26.3KA
1.10.1	Insulation level (PF rms / impulse peak)	28 / 75 KV
1.11.0	System ground	Effectively earthed
1.12.0	Enclosure degree of protection	IP – 4X for high voltage compartment and IP – 5X for metering and protection compartment
1.13.0	Bus bar – Main @ 50^0 C ambient	Rating as per SLD, Short time rating as per 1.10
1.14.0	Material	Silver plated/ tinned electrolytic copper
1.15.0	Bus Bar sleeve	Sleeved with shrouds on joints. Tape on joints is not acceptable.
1.16.0	Bus identification	Colour coded
1.17.0	Temperature rise	40DEG C for conventional joints, 55DEG C for silver plated joints
1.18.0	Auxiliary bus bar	Electrolytic grade tinned copper
1.19.0	Auxiliary DC Supply	220V DC
1.20.0	Auxiliary AC supply	240V AC 50HZ
1.21.0	Hardware	Stainless steel
1.22.0	Earth bus	Aluminum
1.23.0	Power and control cable entry	From bottom
2.0.0	**Circuit Breaker**	
2.1.0	Voltage class, insulation level, short time rating	As specified for switchgear
2.2.0	Rated current	As per SLD. Use of two breakers in parallel to meet the required current rating shall not be acceptable.
2.3.0	Duty cycle	O – 0.3sec – CO – 3min – CO
2.4.0	Short circuit rating	
2.5.1	AC sym. Short circuit current	26.3KA
2.5.2	Short circuit making current	62.5KA
2.6.0	Operating time	

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2.6.1	Break time	Not more than 4 cycles
2.6.1	Make time	Not more than 5 cycles
2.7.0	Range of auxiliary voltage	
2.7.1	Closing	85% - 110%
2.7.2	Tripping	70% - 110%
2.7.3	Spring charging	85% - 110%
2.8.0	No. of spare aux. Contacts of breaker, for owner's use	Minimum 6 NO + 6 NC
2.8.1	No. of spare contacts of service and test position limit switch	2 NO
3.0.0	**Current Transformers (Refer SLD)**	
3.1.0	Voltage class, insulation level, short time rating	As specified for switchgear
3.2.0	Type	Cast resin, window / bar primary type
3.3.0	Class of insulation	Class E or better
3.4.0	Ratio	As per SLD, secondary shall be 1 A
3.5.0	Number of secondary	3
3.6.0	Accuracy class	
3.6.1	Protection core	5P20
3.6.2	Core balance CT	PS
3.6.3	Protection Diff / REF	PS
3.6.4	Metering	0.2s
3.6.5	VA output	As per calculation
3.6.6	Excitation current of PS class CT's	30mA at Vk/4
3.6.7	Primary operating current sensitivity of CBCT's.	5A
4.0.0	**Voltage Transformers (Refer SLD)**	
4.1.0	Type	Cast resin, draw out type, single phase units
4.2.0	Rated Voltage	
4.2.1	Primary	11000/√3
4.2.2	Secondary	110/√3
4.2.3	No of phases	3
4.2.4	No. of secondary windings	2
4.2.5	Method of connection	Star/Star
4.2.6	Rated voltage factor	1.2 continuous, 1.9 for 30 seconds
4.2.7	Class of insulation	Class E or better
4.3.0	Accuracy class	
4.3.1	- Protection	3P
4.3.2	- metering	0.2
4.4.0	Primary and secondary fuses	HRC current limiting type, primary fuse replacement shall be possible with VT in withdrawn position
5.0.0	HV Fuses	
5.0.1	Voltage class	12KV
5.0.2	Rupturing capacity	50KA
5.0.3	Rated current	As per application
6.0.0	**Surge Arrestors**	

Chapter 6b. Technical Specification for 11KV Indoor Switchgear

6.0.1	Rated voltage	9kV
6.0.2	Maximum continuous operating voltage (MCOV)	7.65kV
6.0.3	Discharge current	10kA
6.0.4	Discharge Class	3

BSES Rajdhani Power Limited
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NEW GRID

TECHNICAL SPECIFICATION

FOR

SCADA INTERFACE WORK & AUTOMATION

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Volume – I Technical Specification for SCADA interface work & Automation

1.0 INTENT OF SPECIFICATION:

This specification is intended to cover the supply and execute work related to interface of all electrical equipments with RTU panel complete with all materials and accessories for efficient and trouble free operation. In the event of any discrepancy with the listed documents, the stipulation of this specification shall govern.

2.0 SCOPE OF WORK

For substation, it is proposed to lay and terminate panel wirings / control cables if any between the outdoor equipments such as CT, PT, Circuit Breaker, Isolators, 11 KV Switchgear, 66,33,11 KV Control & Relay Panels, Power Transformer & its sensors – OTI, WTI, TPI, AVR, etc, REGDA relay, Capacitor Bank,NIFPS,Smoke Detectors and Battery Charger.

The scope of work under this category would include:

- Supply of SCADA materials - Bay Control Units, Remote Terminal Units with Basic + PLC Licenses (Basic License - IEC 870-5-101,103,104, Modbus Ethernet and Serial, IEC 61850-8-1,IEC -104 Master ,IEC 104 Slave + PLC License),Panels for RTU,Data Concentrator Units,Ethernet Switches with panels,MFM,Cables- FO, CAT-6, RS485, Control Cables,Connectors and GPS for time synchronization should be in SCADA vendor's scope.
- Installation,Testing & Commissioning of SCADA equipments.
- Laying and Termination of armored Communication cables (Ethernet, Fiber Optic Patch Cards/Cable,RS 485 cables) between grid devices (Numerical Relays/BCPU, Transformer Monitoring Modules, Smoke detector, NIFPS panel, MFM, Battery Charger) to RTU/DCU/Gateway.
- Laying and termination of control cables between grid equipments (control and relay panel, NIFPS, Battery Units) to RTU for hardwired signals.
- Installation of cable trays with accessories or trench as required for the cabling work.
- Preparation of cable schedule, Wiring diagrams,Training documents according to the site configuration and Interconnection as built drawings.
- Separate earthing bus bars to be provided for RTU panel and it will be directly connected to grid earthing.Earth BAR material should be Copper.

- Seprate earth pit with connections for Electronic cards,gateway,Switches,DCU.,etc.. earthing.
- All internal wiring between BCU and C&R Panel terminals, All Numerical relays,MFM (Multifunctional meters) and other grid equipment integration should be under SCADA vendor's scope.
- Hardware & software integration of RTU, Bay Control Units along with other equipments viz. Battery Chargers, Multi Function Meters, Fire Fighting System Signals, Transformer relays (for OTI, WTI, TPI, AVR, etc.),Smoke Detector Panels, Numerical Relays, 11&33&66KV Control and Relay panel signals etc. shall be in Vendor's scope.
- FAT and Training arrangements for BSES SCADA team – Travel ,Boarding, accommodation and local conveyance etc..shall be under SCADA Vendor's Scope.

2.1 **Cables**

The following types of cables / wirings will be required for extending signals and commands. Tagging is mandatory for all types of cables. Heat shrinking ferrule sleeves with printed ferrules to be used for identifying cables & Signals.

- 2.5 mm2, multi-stranded flexible copper wire, FRLS 1.1KV HRPVC for AC & DC Supply & 1.5 mm2 multi strand cables for other internal wiring for RTU.
- Red(P)and Black(N) color cable core to be used for AC and DC wiring.
- Fiber Optic Cables (GLASS&PLASTIC Types) & Ethernet cables (CAT6) with conduit pipe for internal connections and Armored Cables for external connections.
- 2 C X 2.5 MM2 cables for external AC / DC Power Supply
- 16 C x 1.5 mm2 for DI (Digital input)
- 3P X 1.5 mm2 for DO (Digital output)
- 2P X 0.5 mm2 Screened Armored PVC cable for external (RTU to BCUs /MFM/BATT.CHG/Transformer Monitoring Devices) RS 485 connections.

The supplied cable shall be as a latest IS, also refer control cable specification.

❖ **Cable Gland**

Double Compression cable glands (PVC for RS 485 cables & Brass for Control Cables) of different sizes for cable entry into the DAU & DCU Panels

❖ **Cable Trays and NS cable Support**

Perforated / ladder type (galvanized Iron) with cover for laying the cables.

2.2 **Multifunction Meters (Accuracy – 0.5)**

To extend the current / voltage / active and reactive power, power factor, etc. to RTU, MFMs, installed in the C & R panel, should be integrated. (Make: RISHABH or Equivalent with MODBUS Protocol). The outputs of these meters **(in groups of 5)** connections should be made using twisted pair screened cable (Typically 22gauge Belden 8761 or equivalent) & two wires (A and B) connections are daisy chained together and integrated with RTUs. All hardware's or protocol converters for having Modbus Protocol output should be in Vendor's scope.

These should be installed in C & R Panel individually for each feeder/ breakers. All CT & PT wirings to MFMs and its Configuration should be in Vendor's scope.

For the protection of MFMs and RTU cards against Surges and electrical leakages, it is necessary to install Surge Protection Devices in RTU or C&R Panel and placed in between RTU & MFM serial loops. The typical diagram for this connection is mentioned in the System Architecture diagram**. (5 MFMs per loop with SPD) MFM should be powered through Grid Battery Voltage (220 Volt or 50 Volts DC).**

The following parameters of MFM must be available for communication with RTU.

- Phase Voltages (L1-N, L2-N, L3-N)
- Line Voltages (L1-L2, L2-L3, L1-L3)
- Line Currents (IL1 , IL2, IL3)
- Active Power & Reactive Power
- Maximum Demand (KW) & Frequency
- Power factor
- Active Energy
- THD mean current & THD mean Voltage
- Neutral Current.
- Phase Angles

Approved Makes – RISH 3440 and Conzerv EM 6400NG

2.3 **Numerical Relays with BCU or Bay Control Protection Units for all feeders (11,33,66KV)**

Numerical Relays & Bay Control Units should be integrated with Remote Terminal Units. All hardware's and protocol converters if required for compatibility with SCADA shall be in Vendor's scope.

The respective BCUs of individual Relays/Breakers will be connected to Data concentrator Unit/Remote Terminal Units through **IEC 61850 compatible** industrial grade switches over IEC 61850 protocol (**Dual Ports with PRP & RSTP protocols required to form a Ring or PRP Networks b/w relay to relay connections**).

The respective BCU,BCPU & Numerical Relays must have dual redundancy communication ports (Ethernet port-RJ45) with PRP & RSTP protocols for SCADA connections.

Hot Standby/Dual Power Supply Unit & Redundancy in power source for Numerical Relays,BCU & BCPU - Possibility to increase the BCU,BCPU & Numerical Relays availability by having a second power supply card in case the first one fails **, if any one Power supply card fails the other one should keep the bay control unit continuous live.**

Data Base File must be downloadable and Uploadable from BCPU and BCU.

The following signals are to be taken from Numerical Relays to the BCUs through internal hard wiring. This list is indicative and signals should not be limited to this. Additional signals can be taken based on this. – **Refer Para 2.8 for detail signals list with data format (DPI,DCO,SPI,SCO,Measured Values) types.**

- Online Currents / Voltage & Relay General trip signal
- All breaker,Isolators,Control & Relay Panel indications and commands
- Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).
- Fault Differential and Bias current in Line and Transformer Differential Relay
- Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay).
- Post fault currents (R, Y, B phase separately) **measured value** & Relay Internal Fault
- Fault distance (in case of distance relays - R, Y, B Phase separately)
- Unbalance Current (in case of neutral displacement relay of capacitor feeders).

2.4 **Transformer Signal**

OTI, WTI, TPI, AVR and Transformer auxiliary protection signals should be integrated with an RTU through Ethernet communication (RS 485 cables) via TMD (REGDA, A-EBERLE relays) having **IEC 61850 Protocol output**.

Relays must have dual redundancy communication ports (Ethernet port-RJ45) & TMM **must have the option of RSTP and PRP Protocols for SCADA Connections.**

All field installations of these sensors and its wiring/cabling and configuration along with hardware's or protocol converters, if any, should be in Contractor's scope. - **Refer Para 2.8 for detail Transformer & Transformer Monitoring Device signal's list with data types.**

2.5 Battery Charger

All signals of Battery Chargers should have MODBUS Protocol output and integrated with an RTU through serial communication (RS 485) cables.

Laying communication cables through conduit pipe and battery charger signals (Soft & Hard Signals) integration with an RTU shall be in Vendor's Scope. - **Refer Para 2.8 for detail Battery Charger signal's list with data types.**

2.6 Data Concentrator Unit/Gateway & Remote Terminal Units

For extending the signals from the grid to the Master Control Centre & Backup Control Centre, BCUs and RTUs are to be installed. BCUs needs to be initially physically integrated with Numerical relays of respective breakers to enable soft signals and commands for breakers to be configured there and respectice BCU or BCPU integrated with Remote Terminal Units through IEC – 61850 protocol. However the options for IEC-60870-103 protocol along with the MODBUS protocol option is required. BCU/BCPU BCUs can be of **ABB, Siemens,Schneider Electric, etc .,** make is depending on the type/ make of switch gears.**Remote Terminal Units need to be installed for interface between the BCUs and Control Centers (Main and Backup) through IEC – 60870 – 104 Protocol.** The size of RTU will depend on the size of the substation, no. of the feeders/ number of signals and command outputs along with sufficient spares (20%) for future requirement.

All associated equipments and Supply of accessories including software &Operating tool / multiple user licenses for RTU & BCU, MCBs for DC and AC Supply, DC to DC Converter (in case station battery voltage level is 220 volts DC), etc. should be in Vendor's scope.

Hardware & software integration of RTUs, BCU along with other equipments viz. Battery Chargers, Multi Function Meters, Fire Fighting Systems, Signals, Transformer relays (for OTI, WTI, TPI, AVR, etc.), Numerical Relays, etc. should be in Vendor's scope.

In case of more than one BCPU,RTU,DATA Concentrator than these units must be able to communicate with other units on internal local IPs (Ex – 192.168.0.1) other than LAN IP(Ex-10.125.107.1) series.

Hot redundancy is required for Main Processor cards, rack/board and Gateway for MCC & BCC Communications.Each main processor must have two Ethernet ports dedicated for communication with SCADA servers over IEC 60870-104 protocol. First card will be live and 2nd card will be hot standby. Communication switchover between either cards in case of failure.

Main Processor cards along with Rack for MCC communication should be separate from the IO cards.

Data Base File must be downloadable and Uploadable from RTU,CPU and Gateway.

Approved RTU makes – ABB and Siemens (AK3).

Note : System shall be approved if they are agree to fulfill the following terms & Conditions,

- ***AMC period should be given 3 years along with this proposal.***
- ***AMC period should be started after handovering the system to BSES.***
- ***During AMC period all the issues pertaiting to RTU/Gateway/BCU should be handled by OEM at site(this included unlimited site visit)***
- ***5 Year replacement warranty is applicable for all OEM for Electronic cards & Gateway Units…If any hardware (or) Software fails during this period will be rectified by OEM.***

RTU,Data Concentrator Unit Features & Performance capabilities

2.6.1 RTU,DCU Size and Expandability

20% Spare for RTU,DCU - Provision for 20 % (Basic IO Count +20% Spare) of the total DI / DO signals (hard/soft) as a spare should be made available for future requirement.

Spare Ports – 20% Spare ports **(Minimum – 3 to 4 No's Serial ports are essential)** for IEC 103/Mod Bus Protocol Connections

20% Spare for BCU,BCPU - Each Control and Relay panel BCU must have 20% (Basic + 20% Spare) of the particular bay DI/DO signals as a spare should be available.

Panel Size & Hardware Capacity - The RTU panel sizing should be capable of accommodating additional 50% of the basic I/O counts by way of addition of hardware such as modules, racks, panels, Terminal Blocks of basic I/O counts.

Software Capacity - The RTU software and database generation should be sized to accommodate for additional 50% of the basic I/O count without requiring software or database regeneration or License.

2.6.2 Remote database, downloading of RTU from master station/SCADA control center.

2.6.3 RTU shall have the capability of automatic start-up and initialization following restoration of power after an outage without the need for manual intervention. All restarts shall be reported to the connected master stations.

2.6.4 Act as a data concentrator on IEC60870-5-101/104/MODBUS/IEC 61850 protocols and Support for IEC 60870-5-103, IEC 60870-5-101, IEC 61850,MODBUS TCP IP and RS485 Modbus RTU protocols & ability to act as a gateway for Numerical relays.

2.6.5 **Security**

As the SCADA system will use public domain, such LAN/VSAT/GPRS/CDMA etc. therefore it is mandatory to guard the data/ equipment from intrusion/damage/breach of security & shall have SSL/VPN based security.

2.6.6 Internal battery backup to hold data in SOE buffer memory & also maintaining the time & date.

2.6.7 RTU must have the capability of time synchronization with a GPS receiver and the GPS at the control room will be used for this synchronization purpose. In case of failure of the GPS receiver, the RTUs time synchronization should be through the Master's SCADA clock.

2.6.8 **GPS for Time Synchronization** - The RTU must have inbuilt (or) external GPS with antenna & internal real time clock to synchronize the IEDs connected to it over their respective protocol. **GPS must have dual redundant LAN port for time synchronizations.**

2.6.9 **Main Processor(CPU in RTU & Gateway) HOT Retundancy for MCC & BCC communication**

Main processor (DCU) /RTU should have adequate capacity for data handling / processing and main processor/CPU must have required number of communication ports for simultaneous communication with Master Stations (MCC & BCC), /MFTs and RTU configuration & maintenance tool.**RTU main processor and Gateway must have HOT redundancy features for control center communications.**

2.6.10 **Hot Standby/Dual Power Supply Unit & Redundancy in power source for RTU and BCU/BCPU** - Possibility to increase the RTU,BCU main rack availability by having a second power supply card in case the first one fails **, if any one Power supply card fails the other one should keep the system continuous live.**

2.6.11 **CPU/RTU Soft Configuration Future (Communicate to multiple master stations simultaneously on IEC60870-5-104.)**

RTU/DAU must have multiple location (minimum 5 Locations) data transmission facility VAZ Master Control Centre, Backup Control Centre, etc.

2.6.12 **Protection Devices for RTU,BCPU –** All modules (**all Digital, Analog Input modules**) and ports (**Serial and Ethernet ports**) must have in-built or external surge protection devices and optical isolation

2.6.13 **Diagnostic Software & Multi user tool/License for RTU/(Numerical Relay) BCU** -

Diagnostic Software tool with licensed version shall be provided to continuously monitor the operation of the RTU and report RTU hardware errors to the connected master stations. The software shall check for memory, processor, and input/output ports errors and failures of other functional areas defined in the specification of the RTU**. If any system tries to connect to RTU for download/ Upload files,itshould be stored as a log in RTU.**

2.6.14 **RTU Panels**

At least 50% of the space inside each enclosure shall be unused (spare) space that shall be reserved for future use. The Contractor shall provide required panels conforming to IEC 529 for housing the RTU modules/racks, relays etc. and other required hardware. The panels shall meet the following requirements:

- Shall be free standing, floor mounted and height shall not exceed 2200 mm.
- **RTU Panel should have air conditioner and should be mounted on side wall of RTU panel with temperature/humidity control facility.** FAN with Filters shall be considered for for back up cooling.
- All doors and removable panels shall be fitted with long life rubber beading.
- All non load bearing panels/doors ,top and bottom portion, rear cover shall be fabricated from minimum 2.0 mm thickness steel sheet and all load bearing panels, frames, top & bottom panels shall be fabricated from minimum 3.0 mm thickness steel sheet.
- Shall have maintenance access to the hardware and wiring through lockable full height doors.
- Shall have the provisions for bottom cable entry.
- All panels shall be supplied with 230V AC, 50 Hz, single-phase switch and 15/5A duplex socket arrangement for the maintenance.
- All panels shall be provided with an internal maintenance lamp, space heaters and gaskets.
- All panels shall be indoor, dust-proof with rodent protection, and meet IP54 class of Ingress protection.
- There shall be no sharp corners or edges. All edges shall be rounded to prevent injury.

- Document Holder shall be provided inside the cabinet to keep test report, drawing, maintenance register etc.
- All materials used in the enclosures including cable insulation or sheathing, wire troughs, terminal blocks, and enclosure trims shall be made of flame retardant material and shall not produce toxic gases under fire conditions.

2.6.15 **RTU Grounding**

The safety ground shall be isolated from the signal ground and shall be connected to the ground network. Safety ground shall be a copper bus bar. The contractor shall connect the panel's safety ground to the grid grounding network. Separate grounding is created for communication equipments and Signal ground shall be connected to the communication equipment signal ground.

2.7 Ethernet /Fiber Switch

The Ethernet/Fiber optic switches Should be a managed switch and are intended to be installed in the control room and shall be complaint to IEC-61850 electrical substation networks and IEEE 1613 standards. Provisions for additional feeders on the Ring Configuration should be provided on the same switch.

Laying of Ethernet/Fiber cables for relay/BCU port to the RTU via switch through conduit pipe and integration with an RTU shall be in Vendor's Scope.

Switch, Standard Features

Switch design should withstand for power substation automation applications that operate in extremely harsh environments (High and medium voltage S/Stn environments) and it also **withstands vibration, electrical surges, fast transients, electrostatic discharge, and extreme temperatures and humidity.**

Switch features and configuration should be easy to user interface and it must directly integrate with any other IEC-61850 devices. Shall be managed type and **have KEMA certifications for IEC 61850.**

The FO switch shall support Multimode fiber and single mode fiber in 10/100Mbps ports on an SFP (simple form factor pluggable), for ease of functionality and maintenance.

Retundancy Ring : Dual Ring to be consider between Ethernet switches for maintaining redundancy network.

Hot Standby/Dual PSU & Redundancy in power source - Possibility to increase the switch availability by having a second power source in case the first one fails & should be available with 48VDC.Each PSU should be connected with a different power source**, if any one power source or Power supply card fails then other one should keep the switch continuous operation**.

20% Spare ports - Each switch must have 20% spare ports for future/back up requirements.

Link Failure contact alarm - Failure contact alarm shall be achieved by hardware contact that is activated when a link problem occurs.

Logs and alarms with Time Stamp - Statistics about link status alarms are to be stored with the accurate timestamp duly tracing all events.

Advanced security features - The FO switches shall support different user levels with different passwords, including the facility to work with different VLANs, following the 802.1Q standard, port security based on MAC addresses, possibility to disable unused ports, authentication protocols shall be provided.

High Speed Implementation of RSTP protocol - The FO switches shall support STP and RSTP protocols, and shall facilitate for recovery and the fault recovery times shall be within 5 -10msec per switch, always fulfilling the RST protocol.

Time Synchronization to RTU/Server and Connected IED/BCU - The FO switch shall have an internal clock and shall be synchronized from a network SNTP/NTP server, so all time stamped events shall be with a reliable time reference.

Tools with License - Diagnostics tool, other necessary tools with a multi user license to be provided along with the switch.

Mounting Options - Switch should be DIN Rail Mountable & also need to quote for Optional Wall/Rack Mountable kit.

Local USB port for emergency boot is Mandatory.

Network based distributed security by having a firewall on each port of the switch for all the standard Industrial protocol like IEC-61850 should be available.

The FO switch shall have the facility of Port mirroring and the user shall configure one port to replicate traffic flows of different ports, so the system administrator can monitor the incoming, outgoing, or all kinds of traffic that is going through the ports under study.

ITU-T G.8032 support for Ethernet Ring redundancy, ensuring fast failure detection is preferred.

They FO switches shall sustain the stringent levels in temperature range and electromagnetic immunity defined in the 61850-3, but also the advanced functional requirements defined for operation with other IEC-61850 devices. The Switch should be certified on IEC-61850, functional & Environmental specifications by KEMA.

The FO switches shall have advanced security features to be implemented to avoid unauthorized access to the system Such as RADIUS/TACACS & VPN gateway support with IP Sec & SSH.

2.8 SIGNAL LIST (11/33/66KV)

List of Abbreviations
AI - Analog Input/Analog Values
MV - Measured Value
MFM - Multi Function Meter
DCO - Double Command Output
DPI - Double Point Indication
SCO - Single Command Output
SPI - Single Point Indication
RTU - Remote Terminal Units
BCU - Bay Control Units

Signals - 11KV Out Going Feeders	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input Hard Wire to RTU	Additional signals Hard wire to RTU for backup	Signal Type	N.Relay Protocol
Breaker ON	√			√		IEC-61850 with Dual Communication Ports
Breaker OFF				√	DPI	
Trip Ckt Healthy -1 & 2	√				SPI	
Spring Charge	√				SPI	
Breaker in service	√				SPI	
Breaker in Test					SPI	
Auto Trip(86) Operated	√			√	SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				SPI	
L/R Switch in SCADA				√	SPI	
Relay Int Fault.			√		SPI	
Over Current Operated	√				SPI	
Earth Fault Operated	√				SPI	

BKR Close COMMAND		√		√		
BKR Open COMMAND					DCO	
AutoTrip(86) relay reset from Remote		√			SCO	
3Phase R,Y,B - Current & Voltage,Active Power,Reactive Power,Power Factor,Max.Demand,Neu.Current	√				AI/MV	
Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	13 DI + Analog , Measurand Values	3 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	3 DI	2 DO				

Signals - 11KV Incomers	**Digital Input/AI soft through N.Relay/BCU**	**Digital Out Put soft through N.Relay/BCU**	**Digital Input/Output Hard Wire to RTU**	**Additional signals Hard wire to RTU for backup**	**Signal Type**	**N.Relay Protocol**
Breaker ON	√			√	DPI	IEC-61850 with dual Communication Ports
Breaker OFF				√		
Trip Ckt Healthy -1 & 2	√				SPI	
Spring Charge	√				SPI	
Breaker in service	√				SPI	
Breaker in Test					SPI	
Auto Trip(86) Operated	√			√	SPI	
VT fuse Blown - Metering.	√				SPI	
VT fuse Blown - Protection	√				SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				SPI	
L/R Switch in SCADA				√	SPI	
Relay Int Fault.			√		SPI	
Over Current Operated(All stages)	√				SPI	
Earth Fault Operated (All stages)	√				SPI	
Under Voltage Prot.Operated	√				SPI	
Over Voltage Prot.Operated	√				SPI	
REF Operated	√				SPI	
BKR Close COMMAND		√		√		
BKR Open COMMAND				√	DCO	
AutoTrip(86) relay reset from Remote		√			SCO	
3Phase R,Y,B - Current & Voltage,Active Power,Reactive Power,Power Factor,Max.Demand,Neu.Current	√				AI/MV	

Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay). Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	17 DI + Analog , Measurand Values	3 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	3 DI	2 DO				

Signals - 11KV Bus Coupler	**Digital Input/AI soft through N.Relay/BCU**	**Digital Out Put soft through N.Relay/BCU**	**Digital Input/Output Hard Wire to RTU**	**Additional signals Hard wire to RTU for backup**	**Signal Type**	**N.Relay Protocol**
Breaker ON	√			√		IEC-61850 with Dual Communication Ports
Breaker OFF				√	DPI	
Trip Ckt Healthy -1 & 2	√				SPI	
Spring Charge	√				SPI	
Breaker in service	√				SPI	
Breaker in Test					SPI	
Auto Trip(86) Operated	√			√	SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				SPI	
L/R Switch in SCADA				√	SPI	
Relay Int Fault.			√		SPI	
PT MCB - Metering operated	√				SPI	
PT MCB - Protection operated	√				SPI	
Over Current Operated	√				SPI	
Earth Fault Operated	√				SPI	
BKR Close COMMAND		√		√		
BKR Open COMMAND					DCO	
Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	14DI + Analog , Measurand Values	3 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	3 DI	2 DO				

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Signals - 11KV Capacitors	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input/Output Hard Wire to RTU	Additional signals Hard wire to RTU for backup	Signal Type	N.Relay Protocol
Breaker ON	√			√		IEC-61850 with Dual Communication Ports
Breaker OFF				√	DPI	
Bank ISO ON	√					
Bank ISO OFF					DPI	
Trip Ckt Healthy -1 & 2	√				SPI	
Spring Charge	√				SPI	
Breaker in service	√				SPI	
Breaker in Test					SPI	
Master Trip(86) Operated	√			√	SPI	
Bus PT fuse Blown - Metering.	√				SPI	
Bus PT fuse Blown - Protection	√				SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				SPI	
L/R Switch in SCADA	√			√	SPI	
Over Current Operated	√				SPI	
Earth Fault Operated	√				SPI	
Under Voltage Prot.Operated	√				SPI	
Over Voltage Prot.Operated	√				SPI	
Neg.Phase.sequence Operated	√				SPI	
Timer Relay operated/Normal	√				DPI	
Relay Int Fault.			√		SPI	
BKR Close COMMAND		√		√		
BKR Open COMMAND					DCO	
BANK ISO OPN		√				
BANK ISO CLS					DCO	
Master trip (86)reset from remote		√			SCO	
3Phase R,Y,B - Current&Voltage,Reactive Power,Neu.Current	√				AI/MV	
Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay). Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	19 DI + Analog , Measurand Values	5 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	3 DI	2 DO				

Signals - 33 & 66KV Incomers/Out Going	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input/Output Hard Wire to RTU	Additional Spare signals (Hard wire to RTU for backup)	Signal Type	Protocol
Breaker ON	√			√	DPI	Dual Comm
Breaker OFF				√		

Front Bus (89A) ISO ON(In-Case of O/D)	√				DPI	
Front Bus (89A) ISO OFF (In-Case of O/D)						
Rear Bus (89B) ISO ON (In-Case of O/D)	√				DPI	
Rear Bus (89B) ISO OFF (In-Case of O/D)						
LINE ISO (89L) ON (In-Case of O/D)	√				DPI	
LINE ISO (89L) OFF (In-Case of O/D)						
Earth Switch (89LE) -1 ON (In-Case of O/D)	√				DPI	
Earth Switch (89LE) -1 OFF (In-Case of O/D)						
Earth Switch (89LE) - 2 ON (In-Case of O/D)	√				DPI	
Earth Switch (89LE) - 2 OFF (In-Case of O/D)						
Breaker in service (In-case of I/D BKR)	√				SPI	
Breaker in Test (In-case of I/D BKR)	√				SPI	
Trip coil Ckt Healthy - 1 & 2	√				SPI	
Spring Charge	√				SPI	
Master trip(86) Operated	√			√	SPI	
SF6 Pressure Low & SF6 Lock Out	√				SPI	
VT fuse Fail	√				SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				DPI	
L/R Switch in Remote	√			√		
LBB Operated	√				SPI	
Relay Int Fault.			√		SPI	
Over Current Operated (All stages)	√				SPI	
Earth Fault Operated (All stages)	√				SPI	
DIFF.Prot Operated	√				SPI	
DIST.Ptot Operated	√				SPI	
BKR CLS COMMAND		√		√	DCO	
BKR OPN COMMAND				√		
Front Bus (89A) ISO OPNCOMMAND (In-Case of O/D)		√			DCO	
Front Bus (89A) ISO CLS COMMAND (In-Case of O/D)						
Rear Bus (89B) ISO CLS COMMAND (In-Case of O/D)		√			DCO	
Rear Bus (89B) ISO OPN COMMAND (In-Case of O/D)						
LINE ISO (89L) OPN COMMAND (In-Case of O/D)		√			DCO	
LINE ISO (89L) CLS COMMAND (In-Case of O/D)						
Master Trip(86) relay reset from Remote		√			SCO	
3Phase R,Y,B -Current&Voltage,Active&Reactive Power,PowerFactor,Max.Demand,Neu.Current etc	√				AI/MV	

Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay). Fault Differential and Bias current in Line and Transformer Differential Relay ,Fault distance (in Distance Relay) ,Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	29 DI + Analog , Measurand Values	9 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	6 DI	3 DO				

Signals - 33 & 66KV Transformer	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input/Output Hard Wire to RTU	Additional signals Hard wire to RTU for backup	Signal Type	Protocol
Breaker ON	√			√	DPI	IEC-61850 with dual Communication Ports
Breaker OFF				√		
Front Bus (89A) ISO ON(In-Case of O/D)	√				DPI	
Front Bus (89A) ISO OFF (In-Case of O/D)						
Rear Bus (89B) ISO ON (In-Case of O/D)	√				DPI	
Rear Bus (89B) ISO OFF (In-Case of O/D)						
TRF ISO (89T) ON (In-Case of O/D)	√				DPI	
TRF ISO (89T) OFF (In-Case of O/D)						
Earth Switch (89LE) -1 ON (In-Case of O/D)	√				DPI	
Earth Switch (89LE) -1 OFF (In-Case of O/D)						
Earth Switch (89LE) - 2 ON (In-Case of O/D)	√				DPI	
Earth Switch (89LE) - 2 OFF (In-Case of O/D)						
Breaker in service (In-case of I/D BKR)	√				DPI	
Breaker in Test (In-case of I/D BKR)						
Trip coil Ckt Healthy - 1 & 2	√				SPI	
Spring Charge	√				SPI	
Auto Trip(86) Operated	√			√	SPI	
Differential Operated	√				SPI	
LBB Operated	√				SPI	
REF/SEF Prot Operated	√				SPI	
SF6 Pressure Low & SF6 Lock Out	√				SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				DPI	
L/R Switch in Remote	√			√		
Relay Int Fault.			√		SPI	
Over Current Operated	√				SPI	
Earth Fault Operated	√				SPI	
BKR CLS COMMAND		√		√	DCO	
BKR OPN COMMAND				√		
Front Bus (89A) ISO OPNCOMMAND (In-Case of O/D)		√			DCO	
Front Bus (89A) ISO CLS COMMAND (In-Case of O/D)						

Rear Bus (89B) ISO CLS COMMAND (In-Case of O/D)		√			DCO	
Rear Bus (89B) ISO OPN COMMAND (In-Case of O/D)						
Trf ISO (89T) OPN COMMAND (In-Case of O/D)		√			DCO	
Trf ISO (89T) CLS COMMAND (In-Case of O/D)						
Mastertrip (86) relay reset from Remote		√			SCO	
3Phase R,Y,B -Current&Voltage,Active&Reactive Power,PowerFactor,Max.Demand,Neu.Current	√				AI/MV	
Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay). Fault Differential and Bias current in Line and Transformer Differential Relay ,Fault distance (in Distance Relay) ,Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	28 DI + Analog , Measurand Values	9 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	6 DI	3 DO				

Transformer - RTCC/A-Eberle Signals	Digital Input/AI soft through TMM	Digital Out Put soft through TMM	Digital Input/Output Hard Wire to RTU	Analog Input soft through TMM	Signal Type	Protocol
A-Eberle Unit Faulty/DC Fail			√		SPI	IEC-61850 with Dual Communication Ports
Oil Temp Alarm	√				SPI	
Oil Temp trip	√				SPI	
Winding Temp Alarm	√				SPI	
Winding Temp Trip	√				SPI	
Buchholz Alarm	√				SPI	
Buchholz Trip	√				SPI	
PRV TRIP	√				SPI	
OLTC OSR	√				SPI	
MOG/LOW Oil level Alarm	√				SPI	
SPR Trip	√				SPI	
OSR Main Tank	√				SPI	
L/R Switch in Local	√				DPI	
L/R Switch in Remote	√					
Auto Mode	√				DPI	
Manual Mode	√					
Fan Fail	√				SPI	
Tap Changer Fail	√				SPI	
OLTC Out of Step/Stuck Up/Motor trip	√				SPI	
Tap Rise/Tap Low Command		√			DCO/RCO	
Tap Rise/Tap Low Command		√				
Oil Temp				√	AI	

Winding Temp				√	AI	
Tap Position				√	AI	
Total Signals - BCPU & RTU	19 DI	2 Command	1 DI	3 Analog , Measurand Values		
Essential inbuilt Spare in BCPU,BCU	2 DI	1 DO				

Signals - 33 & 66KV BusCoupler	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input/Output Hard Wire to RTU	Additional signals Hard wire to RTU for backup	Signal Type	Protocol
Breaker ON	√			√	DPI	IEC-61850 with Dual Communication Ports
Breaker OFF				√		
Front Bus (89A) ISO ON(In-Case of O/D)	√				DPI	
Front Bus (89A) ISO OFF (In-Case of O/D)						
Rear Bus (89B) ISO ON (In-Case of O/D)	√				DPI	
Rear Bus (89B) ISO OFF (In-Case of O/D)						
Earth Switch (89AE-1) - ON (In-Case of O/D)	√				DPI	
Earth Switch (89AE-1) - OFF (In-Case of O/D)						
Earth Switch (89AE-2) - ON (In-Case of O/D)					DPI	
Earth Switch (89AE-2) - OFF (In-Case of O/D)						
Earth Switch(89BE-3) - ON (In-Case of O/D)	√				DPI	
Earth Switch(89BE-3) - OFF (In-Case of O/D)						
Earth Switch(89BE-4) - ON (In-Case of O/D)					DPI	
Earth Switch(89BE-4) - OFF (In-Case of O/D)						
Breaker in service (In-case of I/D BKR)	√				DPI	
Breaker in Test (In-case of I/D BKR)						
Trip coil Ckt Healthy - 1 & 2	√				SPI	
Spring Charge	√				SPI	
Auto Trip(86) Operated	√			√	SPI	
SF6 Pressure Low	√				SPI	
SF6 Lock Out	√				SPI	
VT fuse-1 Blown	√				SPI	
VT fuse-2 Blown	√				SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local	√				DPI	
L/R Switch in Remote	√			√		
LBB Operated	√				SPI	
Relay Int Fault.			√		SPI	
Over Current Operated (All stages)	√				SPI	
Earth Fault Operated(All stages)	√				SPI	
BKR CLS COMMAND		√		√	DCO	
BKR OPN COMMAND				√		
Front Bus (89A) ISO OPNCOMMAND (In-Case of O/D)		√			DCO	
Front Bus (89A) ISO CLS COMMAND (In-Case of O/D)						
Rear Bus (89B) ISO CLS COMMAND (In-Case of O/D)		√			DCO	
Rear Bus (89B) ISO OPN COMMAND (In-Case of O/D)						

AutoTrip(86) relay reset from Remote		√			SCO	
3Phase R,Y,B - Current ,BUS PT-01 & BUS PT02 3Phase votages.	√				AI/MV	
Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay). Fault Differential and Bias current in Line and Transformer Differential Relay ,Fault distance (in Distance Relay) ,Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	31 DI + Analog , Measurand Values	9 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	6 DI	3 DO				

Signals - 33 & 66KV CAP Bank	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input/Output Hard Wire to RTU	Additional signals Hard wire to RTU for backup	Signal Type	Protocol
Breaker ON	√			√	DPI	IEC-61850 With Dual Communication Ports
Breaker OFF				√		
Front Bus (89A) ISO ON(In-Case of O/D)	√				DPI	
Front Bus (89A) ISO OFF (In-Case of O/D)						
Rear Bus (89B) ISO ON (In-Case of O/D)	√				DPI	
Rear Bus (89B) ISO OFF (In-Case of O/D)						
CAP Bank ISO ON (In-Case of O/D)	√				DPI	
CAP Bank ISO OFF (In-Case of O/D)						
Earth Switch ON (In-Case of O/D)	√				DPI	
Earth Switch OFF (In-Case of O/D)						
Trip coil Ckt Healthy - 1 & 2	√				SPI	
Spring Charge	√				SPI	
Auto Trip(86) Operated	√			√	SPI	
SF6 Pressure Low & SF6 Lock Out of all chambers	√				SPI	
VT fuse Blown	√				SPI	
Cap Discharge Time	√				SPI	
Netural Displacement	√				SPI	
Panel DC Fail			√		SPI	
L/R Switch in Local/Remote	√			√	DPI	
LBB Operated	√				SPI	
Relay Int Fault.			√		SPI	
Over Current Operated	√				SPI	
Earth Fault Operated	√				SPI	
Under Voltage Prot.Operated	√				SPI	
Over Voltage Prot.Operated	√				SPI	
BKR CLS COMMAND		√		√	DCO	
BKR OPN COMMAND				√		

Front Bus (89A) ISO OPNCOMMAND (In-Case of O/D)		√			DCO	
Front Bus (89A) ISO CLS COMMAND (In-Case of O/D)						
Rear Bus (89B) ISO CLS COMMAND (In-Case of O/D)		√			DCO	
Rear Bus (89B) ISO OPN COMMAND (In-Case of O/D)						
CAP Bank ISO OPN COMMAND (In-case of O/D)		√			DCO	
CAP Bank ISO CLS COMMAND (In-case of O/D)						
3Phase R,Y,B - Current&Voltage,Reactive Power,Neu.Current	√				AI/MV	
Fault current and phase indication of faulty phase viz. R,Y,B, Earth, Unbalance(O/C & E/F Relay).Fault voltage and phase indication of faulty phase viz. R,Y,B (Voltage Protection Relay). Fault Differential and Bias current in Line and Transformer Differential Relay ,Fault distance (in Distance Relay) ,Disturbance Records, Fault Graphs for Remote diagnosis purpose	√				AI	
Total Signals - BCPU & RTU	26 DI + Analog , Measurand Values	9 DO	2DI	5DI + 2 DO		
Essential inbuilt Spare in BCPU,BCU	6 DI	3 DO				

Signals - BUS PT-1&2	Digital Input/AI soft through N.Relay/BCU	Digital Out Put soft through N.Relay/BCU	Digital Input/Output Hard Wire to RTU	Additional signals Hard wire to RTU for backup	Signal Type	Protocol
BUS A (89A) ON	√				DPI	IEC-61850 with Dual Communication Ports
BUS A (89A) OFF						
BUS B (89B) ON	√				DPI	
BUS B (89B) OFF						
Earth Switch (89LE) - 1 ON	√				DPI	
Earth Switch (89LE) - 1 OFF						
Earth Switch (89LE) - 2 ON	√				DPI	
Earth Switch (89LE) - 2 OFF						
BUS-A ISO OPN COMMAND		√			DCO	
BUS-A ISO CLS COMMAND						
BUS-B ISO OPN COMMAND		√			DCO	
BUS-B ISO CLS COMMAND						
Total Signals - BCPU & RTU	8 DI	4 DO				
Essential Spare in BCPU,BCU	2 DI	1 DO				

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Signals - Smoke Detector - ALL Sensors,Manual Call Points Integration with RTU over MODBUS TCPIP Protocol.	Soft Signals	Signal Type	Protocol
All Sensors Alarm operated Signals (10 to 20 Sensors)	√	SPI	MODBUS TCP/IP Protocol with Dual Communication Ports
All Manual Call Points - MCP-1,MCP-2.etc…	√	SPI	

Signals - Battery Charger	Digital Input/AI soft through RTU	AI from Transducer(4 to 20MA) /AI Hard wire signal to RTU	Signal Type	Protocol
CHG A AC M/F CUM AC U/V	√		SPI	Modbus Protocol with Dual ports
CHG A AC OVER VOLTAGE	√		SPI	
CHG A RECTIFIER FUSE BLOWN	√		SPI	
CHG A FILTER FUSE BLOWN	√		SPI	
CHG A DC MCB TRIP/OFF	√		SPI	
CHG A DC UNDER VOLTAGE	√		SPI	
CHG A DC OVER VOLTAGE	√		SPI	
CHG A FLOAT	√		SPI	
CHG A BOOST	√		SPI	
CHG A DC FAIL	√		SPI	
CHG B AC M/F CUM AC U/V	√		SPI	
CHG B AC OVER VOLTAGE	√		SPI	
CHG B RECTIFIER FUSE BLOWN	√		SPI	
CHG B FILTER FUSE BLOWN	√		SPI	
CHG B DC MCB TRIP/OFF	√		SPI	
CHG B DC UNDER VOLTAGE	√		SPI	
CHG B DC OVER VOLTAGE	√		SPI	
CHG B FLOAT	√		SPI	
CHG B BOOST	√		SPI	
CHG B DC FAIL	√		SPI	
BATTERY MCCB TRIP/OFF	√		SPI	
DC system Earth	√		SPI	
Insulation fault	√		SPI	
Charger A AC INPUT CURRENT	√		AI	
Charger A AC INPUT VOLTAGE	√		AI	
Charger A DC OUTPUT CURRENT	√		AI	
Charger A DC OUTPUT VOLTAGE	√		AI	
Charger B AC INPUT CURRENT	√		AI	
Charger B AC INPUT VOLTAGE	√		AI	
Charger B DC OUTPUT CURRENT	√		AI	
Charger B DC OUTPUT VOLTAGE	√		AI	
Battery Current	√		AI	
Battery Load Voltage	√		AI	
Battery Voltage from Transducer		√	AI	4 to 20 MA O/P
Battery Current from Transducer		√	AI	

Signals - LT Board	Digital Input Hard Wire to RTU	MFM data through Modbus protocol	Signal Type & Meter OP – Modbus with Dual Ports.
LT AC Fail	√		SPI
R,Y,B Phase Current		√	AI

Signals - Fire Fighting(All Transformers)	Digital Input Hard Wire to RTU	Signal Type
SYSTEM OPERATED	√	SPI
SYSTEM OUT OF SERVICE	√	SPI
TCIV CLOSED	√	SPI
FIRE DETECTOR TRIP	√	SPI
N2 CYLINDER PRESSURE LOW	√	SPI
FIRE SYSTEM ALARM	√	SPI
DC SUPPLY FAIL	√	SPI

MFM - BUS PT -1 ,2 Signals (Front & Rear BUS)	Data Type	Protocol
R-Phase Current	MV/MFI	Modbus
Y-Phase Current	MV/MFI	
B-Phase Current	MV/MFI	
Neutral Current	MV/MFI	
R-Y Phase Voltage	MV/MFI	
Y-B Phase Voltage	MV/MFI	
B-R Phase Voltage	MV/MFI	

MFM - Signals - All Feeders (Including Bus Section/Coupler OF 11/33/66 KV)	Data Type	Protocol
R-Phase Current	MV/MFI	Modbus
Y-Phase Current	MV/MFI	
B-Phase Current	MV/MFI	
Neutral Current	MV/MFI	
R-Y Phase Voltage	MV/MFI	
Y-B Phase Voltage	MV/MFI	
B-R Phase Voltage	MV/MFI	
Active Power	MV/MFI	
Active Energy	MV/MFI	
Reactive Power	MV/MFI	
Power Factor	MV/MFI	
Maximum Demand	MV/MFI	
Phase angle 1	MV/MFI	
Phase angle 2	MV/MFI	
Phase angle 3	MV/MFI	

THD Mean Current	MV/MFI	
THD Mean Voltage	MV/MFI	

Note1 : Suitable Heavy Duty Relay /Contactor's with free Wheeling Diode to be placed in between RTU- DO card & Trip/Close Coil circuits of respective breakers for all breaker /Isolator open & Close circuits..It should be placed either at RTU (or) Breaker panel end.Its Potential free contact will be connected in the Closing/Tripping Coil Circuits.

Note 2: SF6 Low/Lockout of all chamber signal to be wired up to RTU.

2.8.1.Comments -

Analog signals (Fault Current levels,Disturbance records, Fault graphs for remote diagnosis, etc,) from Numerical relays needs to be confirmed by vendor before finalize the tender documents.

All the above mentioned signals(Refer Signal List -2.8) including Notifier /Smoke Detector Signal are compulsory and additional signal (10%) will be considered during detailed engineering.

Following indications data format should be configured as a DPS (Double point Status) in Relay(BCPU).

- All Feeders Circuit Breaker ON & Circuit Breaker OFF
- All Feeders BUS Isolators (89A,89B,89L,89T) - ON & OFF
- All Earth Switches ON & OFF

Following command data format should be configured as a DPC (Double point control) in Relay(BCPU).

- All Feeders Circuit Breaker - Open & Close
- All Feeders BUS Isolators (89A,89B,89L,89T) - Open & Close
- All Earth Switches – Open & Close.

3.0 Key Points -

1 All SCADA equipments viz DAU / DCU, MFM, Battery Charger, A-Eberle relays, etc. Should be powered through auxiliary supply of 48 V (or) 220 Volt DC.

2 Space for Energy Meter – Only Space (**Length - 185 mm & Height - 256 mm with CT, PT, Auxiliary Supply terminals & wiring**) without cut out is required to install energy meters.

3 Power Supply for Routers/ Gateway (IT Equipments) through an existing battery bank via DC to DC Converters (Input: 48 VDC/220 VDC, Output: 12 Volt DC) or as per the requirements of Routers.

Converter 01 Speifications : Input 220 Volt DC & Output 48 Volt DC

Converter 02 Specifications:Input 220 Volt DC (or) 48 Volt DC & OutPut 12 Volt DC

4 Any other wiring / cabling if required due to non availability of serial communication /MODBUS/IEC 61850 protocols (with justified reason) should be hardwired and that is in Contractor's scope.

5 Suitable transducers with an output of 4-20 mA have to be installed in the RTCC /Battery charger if required and the outputs of these transducers should be extended to terminal for further extension to the RTU.

6 STATION BUS : Topology

- **Dual Homing (or) Redundant Ring with Ehernet/Copper Cable – From BCPU,BCU to Switch**
- **Redundant Ring with Fiber Optic Cable – From Switch to RTU/Gateway.**
- **Note : Dual Homing (or) Redunt Ring Network topology will be decided during the detail engineering stage.**

7 The C & R ,RTCC,Battery Charger Panel should have additional spare contacts (potential free) for all SCADA signals – **Refer Signal List 2.8**

8 Data Base File must be downloadable and Uploadable from RTU,CPU,BCPU,BCU and Gateway.

9 Warranty (5 Years) for SCADA products - All Supplied SCADA material should cover warranty for the duration of 5 years & Warranty period will start after successful commissioning of the SCADA equipments at site. If any SCADA materials found faulty during warranty period should be replaced within two weeks.

10 **Training** should be provided on configuration, installation, commissioning aspects of RTU,DCU,BCU and Numerical Relay - BCPU at your training/work center to the BSES SCADA team (**4 to 5 persons**) & **Training Expenses** (Air & Local Travel, boarding and Lodging for 4 to 5 persons) at factory/training center(4 days) comes under Vendor's scope.

Training documents to be submitted for approval & Documents should contain all the necessary installations,connections and Data Base development procedure & further trouble shooting procedure,etc..shall also be provided in the manual.

11 Antivirus/Cyber Security solution for Gateway/RTU unit need to be considered.

12 **FAT expenses** for BSES SCADA team (2 Persons) – Air & Local Travels, boarding and Lodging to be arranged by vendor during FAT inspections.Complete expenditure (Air & Local Travel, boarding and Lodging) comes under vendor scope.

13 **Loose Spares (10%) -** loose Spare Materials for following items with below mentioned quantity to be supplied for emergency back up/maintenance purpose.

- **CPU (Main Processor) Card in DCU,RTU – 1 No**
- **CPU(Main Processor Module in BCPU) – 1 No**
- **Gateway / Gateway CPU– 1 No**
- **RTU Rack – 1 No**
- **BCPU Rack – 1 No**
- **Serial Server if any – 1 No**
- **Communication Module for IEC-103 & Modbus Communications – 1 No**
- **CPU in Bay Control Units – 10% of supplied qty.**
- **Communication Extended Module/Serial Ports for Modbus & IEC-103 protocols– 10%**
- **DO Contactots – 10% of supplied qty.**
- **DI/DO/AI/ Cards – 10% of the total IO signals**
- **PSU Cards in RTU – 1 No**
- **PSU Cards in BCPU – 1 No**
- **PSU Cards in Switches – 5% of supplied qty.**
- **Ethernet Switches (9 ,16 & 24 Ports) – 1 No's**
- **Ethernet Switches (16 & 24 Ports) – 2 No's**
- **LIU Unit – 1 No**
- **Fiber Optic Patch Cards with Connectors - 20% of total installed cables.**
- **MFM – 5% of Supplied Qty.**
- **DC to DC converters if any for RTU Supply – 2 No.**

14 **Protection devices for all SCADA Equipmentes –**

- Surge Protection devices installation between RTU & MFM Serial loops.
- SPD for Main DC Source.
- HDR/Inter Posing Relay for all Digital Output Signal's.
- All modules (**All Digital, Analog Input modules in BCPU and RTU**) and ports (**Serial and Ethernet ports**) must have in-built or external surge protection devices and optical isolation.

15 Local HMI shoid be consider along with RTU :

- Human machine interface (HMI) with control software package, which shall contain an extensive range of system monitoring and data acquisition (SCADA) functions.
- Incase of failure of communication equipments then DR shall be extracted from HMI for further diagonosis purpose only.So,It will not be used as a Gateway for control center data process.

16 All the above features are indicative only and detailed engineering and deviation will be analyzed just before actual procurement and with discussion through a supplier/ vendor.

4.0 System Architecture Diagram

The Tentative System Architecture diagram is enclosed for reference. It will be revised during the approval stage of drawings..

5.0 DEVIATIONS

Deviation from this specification, if any, shall be clearly brought out in the offer. Unless the owner explicitly accepts such deviations, it shall be considered that the offer fully complies with the specification.No deviations will be acceptable post order.

SCHEDULE – C1

11KV INDOOR SWITCHGEAR

Sr. No.	Description	Incomer	Bus coupler	Outgoing	Capacitor	Transformer
1	**Switchgear assembly**					
1.1	Make					
1.2	Type					
1.3	Reference standard					
1.4	Voltage (normal / Max. KV)					
1.5	Frequency (HZ)					
1.6	Short circuit rating					
1.7	Short time current and duration					
A	Impulse withstand (KV peak)					
B	1min. Power freq. withstand test(KV rms)					
2	**Construction**					
2.1	Metal clad construction (Yes / No)					
2.2	Degree of Portion					
2.3	Minimum thickness of sheet metal used (mm)					
2.4	Draw out feature provided for					
A	Breaker with service, test & isolated position - Yes /No					
B	Voltage Transformer- Yes / No					
C	Protection relays -Yes /No					
2.5	Breaker cubicle					
A	Cubical door can be closed with breaker in test and isolated position -Yes / No					
B	Working zone units from floor level (mm)					
2.6	All meters, switchgear & relays flush mounted type -Yes /No					
2.7	Minimum clear space required					
A	Front for breaker withdrawal (mm)					

B	Rear (mm)					
2.8	Typical vertical section					
A	Overall dimensions					
	i. Length (mm)					
	ii. Breath (mm)					
	iii. Height (mm)					
B	Weight (Kg)					
3	**Bus Bar**					
3.1	Make					
3.2	Material & grade					
3.3	Reference standard					
3.4	Cross section area (mm2)					
3.5	Bus connection (joints)					
A	Silver plated -Yes /No					
B	Conventional made with anti oxide grease -Yes /No					
3.6	Rated continuous current amps					
3.7	Maximum temp. rise at rated continuous current DFG C					
3.8	Short time current and duration KA … secs					
3.9	DC resistance at 85 DEG C (Ω/m/Ø)					
3.10	Minimum clearance of bus bar and connection					
A	Phase to phase (mm)					
B	Phase to earth (mm)					
3.11	Bus bar provided with					
A	Insulation sleeve					
B	Phase barriers					
C	Cast resin shrouds for joint					
3.12	Bus bar supported spacing (mm)					
3.13	Bus bar insulators					
A	Make					
B	Type					
C	Reference standard					
D	Voltage class (KV)					
E	Min. creepage distance (mm)					
F	Cantilever strength Kg/mm2					
G	Net weight (Kg)					

4	**Circuit Breaker**					
4.1	Make					
4.2	Type					
4.3	Reference standard					
4.4	Related Voltage					
4.5	Related frequency					
4.6	Related current and its reference ambient temp					
A	Continuous current to limit the max. temp. rise to 55DEG C for silver plated connections and 40DEG C for conventional connections					
4.7	Related operating duty					
4.8	Symmetrical breaking capacity at rated voltage & operating duty KA rms.					
4.9	Rated making current (Kap)					
4.10	Short time current and duration KA … secs					
4.11	Insulation level					
A	Impulse voltage withstand on 1/50 full wave					
A	1min. Power freq. withstand test(KV rms)					
4.12	Maximum overvoltage factor while switching off					
A	Un loaded transformer					
B	Loaded transformer					
C	Un loaded CABLES					
D	Capacitor					
E	Motors					
4.13	Opening time max. No load condition (ms)					
4.14	Number of permissible breaker operation under vacuum loss					
4.15	At 100% breaking capacity					
A	Opening time Max. (ms)					
B	Arcing time max (ms)					
C	Total break time (ms)					
4.16						
A	Make time (Max) (ms)					
B	Total closing time (ms)					

4.17	Total length of contact travel (mm)					
4.18	No. of breaker operation permission without requiring inspection, replacement of contacts and other main parts.					
A	At 100% rated current					
B	At 100% rated breaking current					
4.19	Types of contents					
4.20	Maximum clearance in air (mm) from live part					
4.21	Between phases					
A	Between live parts and ground					
B	Type of arc control device provided					
4.22	Operating mechanism closing					
4.23	Type					
A	No. of breaker operations stored					
B	Trip free or fixed trip					
C	Anti pumping features provided					
4.24	Operating mechanism tripping					
A	Type					
B	No. of breaker operations stored					
C	Trip free or fixed trip					
D	Anti pumping features provided					
4.25	Spring charging motor					
A	Rating					
B	Make					
C	Voltage and permissible variation(%)					
4.26	Closing coil					
A	Voltage (V)					
B	Permissible voltage variation (%)					
C	Closing current at rated voltage (A)					
D	Power at rated voltage (w)					
4.27	Trapping Coil					

A	Voltage (V)					
B	Permissible voltage variation (%)					
C	Tripping current rated voltage (A)					
D	Power at rated voltage (w)					
4.28	Breaker / Accessories Accessories such as control switch indication lamps etc. furnished as specified. (Please attach separate sheet giving details of all Accessories, inter locks and safety shutters)					
A	Mechanical safety interlock					
B	Automatic safety interlock					
C	Operational interlock					
D	Emergency manual trip					
E	Operation counter					
F	Change / discharge indicator					
G	Manual spring charging facility					
H	Auxiliary switch with 6 No + 6 NC for owner's use					
I	Contacts wear indicator					
4.29	Auxiliary Switch					
A	Switch contacts type					
B	Contacts rating at					
	1) Make & Continuous (Amps)					
	2) Break (Inductive) (Amps)					
4.30	Net weighting of the breaker (Kg)					
4.31	Impact load foundation design (to include dead load plus impact value on opening at maximum interrupting rating) (Kg)					
4.32	On vacuum loss (Amps)					
A	Possible load current breaker (Amps)					
B	Possible fault current breaker (Amps)					
4.33	Overall dimensions					

A	Length (mm)					
B	Breath (mm)					
C	Height (mm)					
4.34	Type test report omidentical breaker furnished					
5	**Control & Indications**					
5.1	Push Button Make					
A	Type & Catalog No.					
B	Contact rating at 110V/220V.D.C					
C	Make & continuous (Amps)					
5.2	LED lamps: Make:					
A	Type & Catalog No.					
B	Watts /Voltage					
C	Lamps & lens replaceable from front with glass cover					
5.3	Selector switch: Make:					
A	Type & Catalog No.					
B	Contact rating					
C	Make & continuous (Amps)					
D	Break (Inductive)(Amps)					
6	**Current Transformer**					
6.1	Make					
6.2	Types & Voltage Level					
6.3	Reference standard					
6.4	C.T ratio as specified					
6.5	Short circuit withstand short time current for 1 sec. - KA rms Dynamic current -KA peak					
6.6	Class of insulation					
6.7	Temperature rise					
6.8	Basic insulation level					
6.9	For metering & protection					
A	CT ratio					
B	Class of accuracy					
C	Rated burden VA					
D	Knee point voltage V					
E	Excitation current at V_K / 4					
F	Rated saturating current Amp					
6.10	For differential & restricted earth fault protection					

A	CT ratio					
B	Class of accuracy					
C	Rated burden VA					
D	Knee point voltage V					
E	Excitation current at V_K / 4					
F	Rated saturating current Amp					
6.11	For restricted earth fault protection					
A	CT ratio					
B	Class of accuracy					
C	Rated burden VA					
D	Knee point voltage V					
E	Excitation current at V_K / 4					
F	Rated saturating current Amp					
G	Secondary resistance (Ω)					
6.12	For stand by earth fault protection					
A	CT ratio					
B	Class of accuracy					
C	Rated burden VA					
D	Knee point voltage V					
E	Excitation current at V_K / 4					
F	Rated saturating current Amp					
G	Over current rating continuous % over load (%)					
6.13	For sensitive by earth fault protection (CBCT)					
A	CT ratio					
B	Class of accuracy					
C	Rated burden VA					
D	Knee point voltage V					
E	Excitation current at V_K / 4					
F	Rated saturating current Amp					
G	Over current rating continuous % over load (%)					
7	**Potential Transformer**					
7.1	Make					
7.2	Types & Voltage Level					
7.3	Reference standard					

7.4	Voltage ratio					
7.5	Accuracy					
A	Corer-1					
B	Corer-2					
7.6	Rated burden					
A	Corer-1					
B	Corer-2					
7.7	Over voltage factor					
A	Continuous					
B	30 Seconds					
7.8	Class of insulation					
7.9	Temperature rise over ambient (^{0} C)					
7.10	Basic impulse level (KV peak)					
7.11	Winding connection					
A	Primary					
B	Secondary					
7.12	Fuses					
A	Continuous rating HV / LV (Amp)					
B	Symmetrical fault rating HV /LV KA rms					
C	Make					
7.13	Maximum ratio error at					
A	90% to 100% of rated voltage and 25% to 100% of rated secondary burden at unity power factor					
B	90% to 106% of rated voltage and 10% to 50% of rated secondary burden at 0.2 p.f.					
7.14	Maximum Phase difference at					
A	90% to 106% of rated voltage and 10% to 50% of rated secondary burden at 0.2 p.f.					
B	90% to 106% of rated voltage and 10% to 50% of rated secondary burden at 0.2 p.f.					
7.15	E=Weight (Kg)					
8	**Relay**					
8.1	Manufacture					
8.2	Model Type					

8.3	Draw out type with built in test facilities. Yes/ No					
8.4	Built in test facility Yes /No					
8.5	Type of mounting					
8.6	Reference standard					
8.7	All relays furnished as per drawing and specification					
8.8	All relevant relay leaflets and catalogue furnished					
8.9	Communication port type					
8.10	Auxiliary Supply					
8.11	Measurement and data acquisition feature					
8.12	Control and supervision					
A	IEC protocol					
B	Open protocol feature					
C	Programming facility					
D	Separate output for individual element					
E	Event recording facility number of events					
F	Required software offered					
8.13	C.T.secondary current					
8.14	Self diagnostic feature					
8.15	Modular design					
8.16	Relay details					
8.16.1	Over current					
A	Make					
B	Type					
C	Characteristic available					
D	Range of setting i. Current ii. Time					
E	Range of setting i. Current ii. Time					
F	Rated burden					
8.16.2	Synchronizing check relay					
A	Make					
B	Type					
C	Setting range					
8.16.3	Earth fault					
A	Make					
B	Type					
C	Characteristic available					

D	Range of setting i. Current ii. Time					
E	Rated burden					
8.16.4	Over current (Directional)					
A	Make					
B	Type					
C	Characteristic available					
D	Range of setting i. Current ii. Time					
E	Rated burden					
8.16.5	Earth fault (Directional) if applicable					
A	Make					
B	Type					
C	Characteristic available					
D	Range of setting i. Current ii. Time					
E	Rated burden					
8.16.6	Neutral unbalance relay					
A	Make					
B	Type					
C	Characteristic available					
D	Range of setting i. Current ii. Time					
E	Rated burden					
8.16.7	Under voltage relay					
A	Make					
B	Type					
C	Range of setting i. Current ii. Time					
D	Rated burden					
8.16.8	Over voltage relay					
A	Make					
B	Type					
C	Range of setting i. Current ii. Time					
D	Rated burden					
8.16.9	Busbar differential relay					
A	Make					

B	Type					
C	High impedance / low impedance					
D	Facility of CT radio adjustment possible through software. Yes / No					
E	CT supervision facility available. Yes /No					
8.16.10	Transformer differential relay					
A	Make					
B	Type					
C	High impedance / low impedance					
D	Facility of CT radio adjustment possible through software. Yes / No					
E	Facility of transformer vector group adjustment possible through software. Yes/ No					
F	Setting range					
G	Rated burden					
8.16.11	Restricted earth fault relay					
A	Make					
B	Type					
C	Combined with differential relay. Yes / No					
D	Setting range					
E	Rated burden					
8.16.12	Stand by earth fault relay					
A	Make					
B	Type					
C	Characteristics					
D	Setting range					
E	Rated burden					
9	**Meters**					
9.1	ammeter					
A	Make					
B	Type					
C	Reference standard					
D	Size					
E	Scale					
F	Accuracy class					
9.2	Voltmeter					
A	Make					

B	Type					
C	Reference standard					
D	Size					
E	Scale					
F	Accuracy class					
9.3	Energy Meter					
A	Make					
B	Type					
C	Reference standard					
D	Size					
E	Scale					
F	Accuracy class					
G	Measurement					
H	kWh					
I	kVARh					
J	kVAH					
K	Any Other					
L	Data stored capability					
M	Pulse output facility					
N	Data down loading facility					
10	**Secondary Wiring**					
10.1	Type of insulation					
10.2	Voltage grade					
10.3	Conductor material					
10.4	Conductor Size (minimum) and insulation wiring					
A	Potential circuit					
B	Control & current circuit					
11	**Terminal Block**					
11.1	Make					
11.2	Type					
11.3	Catalog No.					
11.4	20% spare terminal furnished					
12	**Cable Termination**					
12.1	Clearance for power cable termination					
12.2	Removable gland plate					
A	Material for multicore cable					
B	Material for single core cable					
C	Thickness of plate					
13	**Name Plate**					
13.1	Material					

13.2	Thickness					
13.3	Size for					
A	Breaker cubicle					
B	Instrument / devices					
14	**Space heater / plug socket**					
14.1	Cubicle heater					
A	Thermostat controlled					
B	Wattage					
C	Voltage					
D	Resistance (ohms)					
E	Thermostat range					
14.2	Plug Socket					
A	Type					
B	Rating					
14.3	Cubical heater & plug socket circuit provided with MCB's					
15	**A.C. /D.C. Supply**					
15.1	Isolated switches for incoming supply					
A	A.C. Type & rating					
B	D.C. Type & rating					
15.2	Isolated switches at each cubicle					
A	A.C. Supply type & rating					
B	D.C. Supply type & rating					
16	**Tropical Protection**					
16.1	Any Special treatment for tropical protection					
17	**Painting**					
17.1	Finish of switchgear					
A	Inside					
B	Outside					
18	**No. of Accessories furnished**					
A	Breaker lifting & handling trolley					
B	Any other					
19	**Tests**					
19.1	Reference standard					
19.2	Routine test to be performed on switchgear					
19.3	Type test certificates submitted					
20	**Drawing / Data**					

20.1	General arrangement for panel board					
20.2	Foundation Panel					
20.3	Bill of material					
20.4	Cross sectional drawing for every type of switchgear (Add sheets if necessary)					

Bidders Name : _____

Signature : _____

Name : _____

Designation : _____

Seal of Company Date : _____