The Tata Power Company Ltd	TATA POWER	*OPEN TENDER NOTIFICATION*
Tender Reference: ***CC25VJS010***		*Document Date:* ***7th May 2024***

The Tata Power Company Limited Invites Tender through E-Tender Two-Part Bidding Process from interested bidders for the following package: -

A. Summary of the tendered package:

Sr. No.	Description	Tender Reference no.	Bid Guarantee Fee / EMD (Rs.)	Tender Fee (Rs.)	Last Date and Time for payment of Tender Participation fee
For the following package please send mail to Mr. Vinayak Shinde (vinayak.shinde@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com)					
1.	Corrigendum to Tender issued vide advertisement published dtd. 27th Apr 2024 – 1 Year OLA for Supply of 33 /22 kV Switchgears for Mumbai Distribution	CC25VJS010	2,00,000/-	2,000 /-	8th May 2024

B. Procedure to Participate in Tender.

Following steps to be done before "Last date and time for Payment of Tender Participation Fee" as mentioned above

1. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of

Direct deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference number –

Beneficiary Name – The Tata Power Co. Ltd.

Bank Name – HDFC Bank Ltd.

Branch Name – Fort Branch, Mumbai

Address – Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400023.

Branch Code – 60

Bank & Branch Code – 400240015

Account No – 00600110000763

Account type – CC

IFSC Code – HDFC0000060

2. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letterhead indicating

Tender Enquiry number

Name of authorized person

Contact number

e-mail id

Details of submission of Tender Participation Fee

E-mail with necessary attachment of 1 and 2 above to be send to vinayak.shinde@tatapower.com with copy to pnramesh@tatapower.combefore "Last date and time for Payment of Tender Participation Fee"

Interested bidders to submit Tender Participation Fee and Authorization Letter before Last date and time as indicated above after which link from Tata Power E-Tender system (Ariba) will be shared for further communication and bid submission.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc. will happen only through Tata Power E-Tender system (Ariba).

No e-mail or verbal correspondence will be responded. All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Also it may be strictly noted that once date of "Last date and time for Payment of Tender Participation Fee" is lapsed no Bidder will be sent link from Tata Power E-Tender System (Ariba). Without this link vendor will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

Any payment of Tender Participation Fee by Bidder who have not done the pre-requisite will not be refunded.

Also all future corrigendum's to the said tender will be informed on Tender section on website https://www.tatapower.com only.

Summary of Changes

1 Date extension of submission of Expression of Interest till 8th May 2024

The original tender document is reproduced below.

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The Tata Power Company Ltd	TATA POWER	*OPEN TENDER NOTIFICATION*
Tender Reference: ***CC25VJS010***		*Document Date:* ***27th Apr 2024***

The Tata Power Company Limited Invites Tender through E-Tender Two-Part Bidding Process from interested bidders for the following package: -

A. Summary of the tendered package:

Sr. No.	Description	Tender Reference no.	Bid Guarantee Fee / EMD (Rs.)	Tender Fee (Rs.)	Last Date and Time for payment of Tender Participation fee
For the following package please send mail to Mr Vinayak Shinde (vinayak.shinde@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com).					
1.	1 Year OLA for Supply of 33 /22 kV Switchgears for Mumbai Distribution	CC25VJS010	2,00,000/-	2,000 /-	6th May 2024

B. Procedure to Participate in Tender.

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1. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of

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Details of submission of Tender Participation Fee

E-mail with necessary attachment of 1 and 2 above to be send to vinayak.shinde@tatapower.com with copy to pnramesh@tatapower.com before "Last date and time for Payment of Tender Participation Fee"

Interested bidders to submit Tender Participation Fee and Authorization Letter before Last date and time as indicated above after which link from Tata Power E-Tender system (Ariba) will be shared for further communication and bid submission.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc. will happen only through Tata Power E-Tender system (Ariba).

No e-mail or verbal correspondence will be responded. All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Also it may be strictly noted that once date of "Last date and time for Payment of Tender Participation Fee" is lapsed no Bidder will be sent link from Tata Power E-Tender System (Ariba). Without this link vendor will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

Any payment of Tender Participation Fee by Bidder who have not done the pre-requisite will not be refunded.

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OPEN TENDER NOTIFICATION

FOR

1 Year OLA for Supply of 33 /22 kV Switchgears for Mumbai Distribution

The Tata Power Company Limited (Tata Power)
Smart Center of Procurement Excellence,2nd Floor,
Sahar Receiving Station, Near Hotel Leela,
Sahar Airport Road, Andheri East, Mumbai-400059

Section A : Tender Notice including Instruction to Bidders

1. Tender Details

1.1 Key Tender Specific Details

Reference Number	**CC25VJS010**
Description	1 Year OLA for Supply of 33 /22 kV Switchgears for Mumbai Distribution
Type of Tender	**Outline Agreement**
Estimated Period	**1 year**
Tender Fee	**Rs 2000/-**
Earnest Money Deposit (EMD)	**Rs 2,00,000/-** **Rs. Two Lakhs Only**
Price Basis	**With Price Variation**
Executive Handling this Tender*	Name: Mr. Vinayak Shinde E-Mail ID: vinayak.shinde@tatapower.com
Technical Query *	Name: Mr. A V Potdar E-Mail ID: avpotdar@tatapower.com

*You may contact the above personnel from Monday to Friday during office hours only.

1.2 Calendar of Events

(a)	Payment of Tender Fee and Submission of letter nominating authorized person by Interested Bidder indicating their intent to Buy Tender	Till 6th May 2024
(b)	Access to Tender Documents through E-Tender system to authorized person of Interested Bidder	6th May 2024
(c)	Last Date of receipt of pre-bid queries, if any.	10th May 2024, 1500 Hrs.
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	14th May 2024
(e)	Last date and time of receipt of Bids	27th May 2024

Note:- * These date and time are as planned and tentative. In case of change the same shall be intimated to Authorized Person of Interested Bidder through E-Tender System.

Please note post submission of Bids relevant communication will be done with Authorized Person of Interested Bidder through E-Tender System

1.3 Mandatory documents required along with the Bid

1.3.1 Bid Guarantee Fee (EMD) of requisite value and validity. PLEASE NOTE THAT BID GUARANTEE ONLY IN FORM OF BANK GUARANTEE WILL BE ACCEPTED.

1.3.2 Requisite Documents to ascertain fulfilling of Technical and Commercial Pre-Qualification Requirement as detailed in Tender Enquiry.

1.3.3 Technical Submission including Drawings, Type Test details etc as detailed in Technical Specification.

1.3.4 Required Commercial Submission as detailed in Tender Document

1.3.5 Technical and Commercial Clarification and Deviations as per the format attached in the Tender Enquiry

1.3.6 Proper authorization letter to sign the tender and participate in Tata Power E-Tender system on the behalf of bidder.

1.3.7 **For vendor not registered with Tata Power, Duly filled Vendor Registration form with all supporting documents is mandatory to participate in the Tender**.

Please note that in absence of any of the above documents, the bid submitted by a bidder shall be liable for rejection.

Also please note that whenever editable format are shared it is requested that data be filled in relevant cells. No formatting or addition / deletion of rows / columns to be done. Wherever editable Excel submission are requested the file should be free from references, macros etc.

Checklist of Document Submission

Stage of Tendering	Document	Type of Format	Mode of submission
Before last date of Pre-Bid Query	Query / Clarification / Deviation (QCD) Format. (F1) Technical and Commercial	Editable Excel Format	Through message in E-tender system
Bid Submission Envelope 1 (First Part)	**Earnest Money Deposit**	**Original Bank Guarantee**	**In Sealed Envelope**
Bid Submission Envelope 2 (Second Part)	**Documents to be uploaded in Ariba only.** In case of multiple files, a zipped folder can be attached for the same (size limit of 100MB per zipped file)		
To be submitted Under Tab 2.1 in Ariba	Duly filled PQR and supporting documents		
	Duly filled PQR format	Editable Excel Format	E-Tender System
	Backup documents for Technical and Commercial PQR	Signed and Scanned documents	E-Tender System
To be submitted under Tab 2.2 in Ariba	Technical Submission and Supporting Documents		
	Duly filled Unpriced Bid Format. Signed copy of Technical Specifications indicating your acceptance of the same	Signed and scanned copy of document	E-Tender System
To be submitted under Tab 2.3 in Ariba	Commercial Submission and supporting document		

	Letter of Undertaking (FOR VENDORS NOT REGISTERED WITH TATA POWER)	Scanned Copy of letter of undertaking duly filled, stamped and signed	E-Tender System
	E-auction Undertaking form	Scanned Copy of letter of undertaking duly filled, stamped and signed	E-Tender System
Bid Submission Envelope 3 (Third Part)	**Duly filled Priced Bid Format**	Hard copy in original duly signed and stamped	**Sealed Envelope**
	Duly filled Priced Bid Format	To be entered in E-Tender System	E-Tender System

1.4 Deviation from Tender

Normally, the deviations to tender terms are not admissible and the bids with deviation are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the Query / Clarification / Deviation (QCD) Format. Deviations have to be mandatorily submitted in editable Excel sheet.

Technical or Commercial Deviation should be mentioned in Deviation Format only. Deviation in any other document or Format will not be considered.

1.5 Right of Acceptance/Rejection

1.5.1 Bids are liable for rejection in absence of following:-
1.5.2 Mandatory Documents as listed in 1.3 above
1.5.3 Price Bid as per the Price Schedule mentioned in Tender Document
1.5.4 Receipt of Bid and Response to queries within the due date and time

Tata Power reserves the right to accept/reject any or all the bids without assigning any reason thereof.

1.6 Qualification Criteria

S.No.	Description	Qualifying Criteria	Evaluation Documents Required
1	Infrastructure	Bidder must be an OEM of Equipment with manufacturing facility / assembly in India. The bidder must have in-house routine and acceptance testing facilities for acceptance as per relevant IS/IEC	Self-undertaking to be submitted in this regard. TATA Power reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter.
2	Supply and Experience	The bidder must have supplied for same or higher size and voltage a) A minimum of 12 nos switchgear panels during last 3 years or b) A single order of 6 nos or c) Two orders of 4 nos last 3 years. Indian Subsidiaries of global companies having plant in India are also eligible to bid if the qualification requirements stated above are met independently or in combination with the parent company. Declaration from parent company needs to be submitted.	Purchase Order Copies and Completion Certificates. Self-undertaking to be submitted in this regard. Declaration from parent company needs to be submitted. TATA Power reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter.
3	Performance	The bidder should have performance certificates for 2 year satisfactory performance from at least 2 reputed Distribution Utilities for equipments of similar or higher rating. The work against these issued certificates should be completed in last seven years from the date of bid submission. In case the bidder has a previous association with any of Tata Power Groups for similar products and services, the performance feedback for that bidder by Tata Power User Group shall only be considered irrespective of performance certificates issued by any third organization.	Supply List & Performance Certificates from the utilities
4	Commercial Capability	Average Annual turnover of the bidder for last three years shall not be less than Rs 20 Crs	Copy of audited Balance Sheet and P&L Account along

S.No.	Description	Qualifying Criteria	Evaluation Documents Required
			with UDIN number to be submitted in this regard.
5	Type Test	The bidder shall submit Type test reports obtained from CPRI/ERDA/ International Accredited Lab for the equipment / material offered. The type tests should have been conducted on the equipment / material of the same design. The type tests should have been conducted within 5 years prior to the date of bid opening. Time period for type test can be extended by another 5 years as a special case, if there is no change in design / material of construction (MOC). In case the type test reports furnished are not for the quoted equipment / material but for the equipment / material with higher voltage class and/or different capacity, then type test shall be carried out for the offered equipment / material from CPRI/ERDA / International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted before dispatch of the equipment / material.	Type Test Report. Undertaking that there is no change in design / material of construction (MOC) if Type Test Report older than 5 years. Type test reports for the offered equipment / material from CPRI/ERDA/ International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted along with BID.

1.7 Pre-Bid Queries

Technical or Commercial Pre-Bid Queries if any has to be sent through message in E-Tender System. Pre-Bid Query has to be sent only in the Query / Clarification / Deviation (QCD) Format. Pre-Bid Queries sent in any other format or send through any other communication channel will not be accepted and answered. Pre-Bid Query have to be sent in the stipulated timeline as defined in the Tender Document. No Pre-Bid Query will be accepted after the due time and date as specified as "Last Date of receipt of pre-bid queries, if any"

1.8 Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts and other parts of Tender Documents. Bidders must agree to these rules prior to participating. In addition to other remedies available, Tata Power 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 General Condition of Contracts or other part of the Tender Documents. A bidder who violates the market place rules or engages in behavior that disrupts the fair execution of

the marketplace, may result in restriction of a bidder from further participation in the marketplace for a 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 terms as published in TENDER
- Submit irrelevant documents or frequently cases of missing documents as part of compliance to Qualifying, Technical or Commercial Requirements causing unnecessary delay in Tender Evaluation

1.9 Supplier Confidentiality

All information contained in this tender is confidential and shall not be disclosed, published or advertised in any manner without written authorization from Tata Power. This includes all bidding information submitted to Tata Power. All tender documents remain the property of Tata Power and all suppliers are required to return these documents to Tata Power upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

1.10 Payment Terms

100% payment shall be made within **60 days** (45 days for MSME) from the receipt and acceptance of the material at the Consignee Stores/Site/Location as per the Contractual Terms and Conditions.

2. Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions.
- The bids will be evaluated commercially on the overall all-inclusive lowest cost for the complete tender BOQ / each line item as calculated in Schedule of Items. Tata Power however, reserves right to split the order line item wise and/or quantity wise among more than one Bidder. Hence all bidders are advised to quote their most competitive rates against each line item.
- Bidder has to mandatorily quote against each item of Schedule of Items. Failing to do so, Tata Power may reject the bids.

NOTE: In case of a new bidder not registered with Tata Power, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However Tata Power reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification. In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be evaluated any further and shall be summarily rejected. The decision of Tata Power shall be final and binding on the bidder in this regard.

2.1 **Price Variation Clause and Cap:** On PV basis.

IEEMA formulae and factors governing the price variation shall be-

P = Po/100 (20 + 28 IS/ISo + 26C/Co + 4 Al/Alo + 9 In/Ino + 13 W/Wo)

P	Price payable as adjusted in accordance with the formula
Po	Price quoted / confirmed (Each)
IS	WPI for manufacture of Basic Metal - Applicable in the month, two months prior to delivery.
ISo	WPI for manufacture of Basic Metal – Applicable two months prior to base month of tender.
C	Price of Copper wire bars- Applicable in the month, two months prior to delivery.
Co	Price of Copper wire bars - as per base month of tender.
Al	Price of busbar grade Aluminium- Applicable in the month, two months prior to delivery.
Alo	Price of busbar grade Aluminium - as per base month of tender.
In	Price of Epoxy resin for indoor circuit breaker and switchgears- Applicable in the month, two months prior to delivery.
Ino	Price of Epoxy resin for indoor circuit breaker and switchgears - as per base month of tender..
W	All India average Consumer price index - Applicable in the month, three months prior to delivery.
Wo	All India average Consumer price index average - as per two months prior to base month of tender.

- Base circular shall be April 2024 circular issued in May 2024. Base month for Bid Price shall remain same throughout the negotiation process till Outline Agreement / Rate Contract is finalized.
- Whenever Firm Order has to be placed against Outline Agreement / Rate Contract Tata Power shall seek PVC corrected price based on index published and available during the said month from the bidder. Purchase Order against Outline Agreement / Rate Contact will be placed at PVC corrected price. The said price shall then remain firm till completion of delivery and bill payment.
- There will be no cap on Positive side and negative side

If due date of bid submission is extended due to any reason, the base date will remain unchanged for the calculation of PV clause

3. Submission of Bid Documents

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document. Bids shall be submitted in 3 (three) parts:

FIRST PART: "EMD – BANK GUARANTEE" of Value detailed in 1.1 valid for 180 days from the due date of bid submission in the form of Bank Guarantee favoring 'The Tata Power Company Limited'. The EMD has to be strictly in the format as mentioned in Tender Document, failing which it shall not be accepted by Tata Power and the bid as submitted shall be liable for rejection.

Note : BG of 180 days and further claim period of 180 days is needed. In case the same cannot be issued by your bank then BG valid for 365 days can be provided.

Note : At times bidders have sought Tata Power bank details which is needed by them to make BG. Hence the same is reproduced below. These details are only provided to facilitate making of BG if needed:

Tata Power's Bank Details for submitting EMD BG:

Bank Name & Address – HDFC Bank, Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400 023.
A/c no. - 00600110000763
IFSC Code – HDFC0000060

The hard copy of EMD in a sealed envelope should be sent on address mentioned in Tender document.

First Part has to be submitted in Sealed Envelope.

SECOND PART: "TECHNICAL / UN-PRICED COMMERCIAL BID" shall contain the following documents:

a) Documentary evidence in support of Technical, Commercial qualifying criteria
b) Technical literature/GTP/Type test report/Details of Qualified Manpower Available/ Testing Facility available etc. *(complete in all respect as desired and detailed in Technical Specification and Technical Requirement Section)*
c) Duly filled Technical and Commercial Deviation Sheets
d) Duly filled formats like Authorization affidavit form
e) *Unpriced Commercial Bid*

The technical / un-priced commercial bid shall be properly indexed and is to be submitted in Soft Copy though E-Tender system of Tata Power. Hard Copy of Technical Bids need not be submitted.

Second Part has to be submitted through E-Tender System Only

THIRD PART: "PRICE BID" shall contain only the price details and strictly in Price Bid format along with explicit break up of basic prices and applicable GST. Basic price should include packaging forwarding, freight, transit insurance and any other cost envisaged by the bidder.

Third part has to be submitted through E-Tender System (ARIBA) only.

FOR BIDS INVITED THROUGH E-TENDER SYSTEM (TECHNICAL AND UN-PRICED COMMERCIAL BID) :

In response to advertisement Bidder has to provide details of person authorized to Bid on behalf of the Bidder. An e-mail will be generated by E-Tender System and the authorized person can download the Tender Documents from the system.
SECOND and THIRD PART of the Bid have to be submitted in E-Tender System.

Bidders have to mandatorily submit SECOND PART (Technical and Un-priced commercial Bid) only through E-Tender system of Tata Power. Bids submitted through any other form/ route shall not be admissible.

EMD
"Please mention Tender Reference No"

Please mention our Tender Reference No on the Tender and drop the same in our Tender Box located at The Tata Power Company Limited, Smart Center of Procurement Excellence,2nd Floor, Sahar Receiving Station, Near Hotel Leela, Sahar Airport Road, Andheri East, Mumbai-400059

Bids submitted by Email/Telex/Telegram /Fax will be rejected. No request from any Bidder to Tata Power to collect the proposals from Courier/Airlines/Cargo Agents etc. shall be entertained.

SIGNING OF BID DOCUMENTS:

The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

The Bid being submitted must be signed by a person holding a Power of Attorney authorizing him to do so, certified copies of which shall be enclosed.

The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid.

A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

The Bidder's name stated on the Proposal shall be the exact legal name of the firm.

3.2 Contact Information

Communication Details: Detailed in 1.1

3.3 Bid Prices

Bidders shall quote for the entire Scope of Supply/ work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of Tata Power. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications/ Scope of Work/ SLA mentioned in the tender, shall be deemed to be included in prices quoted.

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only. It also may be noted that the denomination of Purchase Order / Outline Agreement / Rate Contract and associated Payment to Successful Bidder shall also be in Indian Rupees Only. In case Bidder intends to import any equipment, part etc and supply to Tata Power then all liability and costs related to import will rest with the Bidder. All statutory compliances, payments, expenditure etc related to importing of equipment will be responsibility of the bidder.

3.5 Period of Validity of Bids

Bids shall remain valid for 180 days from the due date of submission of the bid.

Notwithstanding clause above, Tata Power may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

3.6 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 regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the bidding documents.

3.7 Modifications and Withdrawal of Bids

The bidder is not allowed to modify or withdraw its bid after the Bid's submission. The EMD as submitted along with the bid shall be liable for forfeiture in such event.

3.8 Earnest Money Deposit (EMD)

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the tender. The EMD is required to protect the Tata Power against the risk of bidder's conduct which would warrant forfeiture.
The EMD shall be in following form:

- Bank Guarantee valid for 180 days after due date of submission.

The EMD shall be forfeited in case of:

a) The bidder withdraws its bid during the period of specified bid validity.

Or

b) In case of a successful bidder, if the Bidder, within 15 days, does not
i) accept the purchase order, or
ii) furnish the required Contract Performance Bank Guarantee (CPBG)

Original Bank Guarantee submitted as EMD shall be returned only after completion of award process for unsuccessful bidders and issue of Contract Performance Bank Guarantee (CPBG) for successful bidder.

4. Bid Opening & Evaluation process

4.1 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 Tata Powers processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

4.2 Technical Bid Opening

Bids will be opened at Corporate Office of Tata Power as per our standard Process. The bids shall be opened internally by Tata Power. Technical bid must not contain any cost information whatsoever.

First the envelope marked "EMD" will be opened. Bids without EMD of required amount/ validity in prescribed format, shall be rejected.

Next, the technical bid of the bidders who have furnished the requisite EMD will be opened in E-Tender system.

4.3 Preliminary Examination of Bids/Responsiveness

Tata Power 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. Tata Power may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Prior to the detailed evaluation, Tata Power 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.

Bid determined as not substantially responsive will be rejected by the Tata Power and/or the Tata Power and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

4.4 Techno Commercial Clarifications

Bidders need to ensure that the bids submitted by them are complete in all respects. To assist in the examination, evaluation and comparison of Bids, Tata Power may, at its discretion, ask the Bidder for a clarification on its Bid for any deviations with respect to the Tata Power specifications and attempt will be made to bring all bids on a common footing. 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 owing to any clarifications sought by Tata Power.

4.5 Price Bid Opening

The EMD of the bidder withdrawing or substantially altering his offer at any stage after the technical bid opening will be forfeited at the sole discretion of Tata Power without any further correspondence in this regard.

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.

4.6 Reverse Auction and Price Matching Option

Tata Power reserves the right to go for Reverse Auction (RA) for price negotiation and discover the most competitive price on ARIBA portal, Tata Power's official e-tendering platform. This will be decided after techno-commercial evaluation of the bids. Bidders need to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case Tata Power decides to go for RA.

Only those bidders who are techno-commercially qualified shall be eligible to participate further in RA process. However, the original H1 bidder (whose price bid is the highest post techno-commercial evaluation) shall not be allowed to participate in further RA process provided minimum three techno-commercially qualified bids are available.

For case where more than one bidders have to be awarded (including Rate Contract / Outline Agreement) Price Matching Option will be exercised. Volume of job allocated to original competitive bidder will be more than bidder who is chosen through Price Matching Option. Tata Power decision regarding work sharing shall be final and no explanation OR clarification shall be given regarding the same.

5.0 Award Decision

Tata Power will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in Priced Bid Format subject to any corrections required in line with Clause 4.3 above. The decision to place purchase order/Outline Agreement/ Rate Contact solely depends on Tata Power on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Tata Power may deem relevant.

Tata Power 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 assigning any reason thereof.

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

5.1 Rate Contract / Outline Agreement

Rate Contract / Outline Agreement does not guarantee any assured business volume in Rupees or Quantity. Quantities are only indicative and specified for the purpose of readiness as per the request from Purchaser. Supplies shall be only against Firm Purchase Orders placed as per the agreed terms and conditions of Rate Contract / Outline Agreement. Purchaser shall be entitled at its discretion to place firm order for such supplies on "As and When Required Basis" without minimum take-off guarantee.

Rate Contract / Outline Agreement will have list of Items with Unit Rate and applicable Taxes and Duties. There will be a cap on value for which order which can be placed against the Rate Contract / Outline Agreement. Actual quantity ordered for each line item may differ significantly from the tentative quantity indicated in the Tender Document. One / few / all items of Rate Contract / Outline Agreement can be ordered till the Cap Value is reached.

6.0 Order of Preference/Contradiction:

In case of contradiction in any part of various documents in tender, following shall prevail in order of preference:

1. Outline Agreement/Purchase Order (with Commercial conditions)
2. Special Terms and conditions (if applicable)
3. General Terms and conditions
4. Technical Specifications

In case there is a discrepancy in the BOQ mentioned in tender (to the extent modified through subsequent Corrigendum, if any) and the bid submitted by any bidder, the description as mentioned in the tender (to the extent modified through subsequent Corrigendum, if any) shall prevail.

7.0 Ethics

Tata Power is an ethical organization and as a policy Tata Power lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice.

Tata Power work practices are governed by the Tata Code of Conduct. Bidder is request to refer Tata Code of Conduct Clause in General Terms and Conditions.

8.0 General Condition of Contract and Special Condition of Contracts

Any condition not mentioned above shall be applicable as per General Terms and Conditions and Special Condition of Contracts attached along with this tender.

---XXX---

Annexure 1

Schedule Of Items

Sr. no.	Material / Service Short Text (as per SAP)	Estimated Quantity	UoM	Unit Rate (Basic)	Total
1	Switchgear ICOG 33KV 1600A Indoor VCB	6	EA		
2	Switchgear ICOG 22KV 1250A Indoor VCB	1	EA		
	Total				
	GST				
	Total Value including GST				
Total Amount with taxes in Words					

(All Values to be entered in Indian Rs.)

TECHNICAL SPECIFICATION

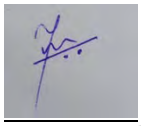
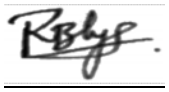
33KV INDOOR ICOG PANEL with BCPU RELAY

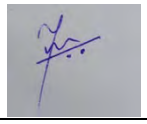
The Tata Power Company Ltd.
Engineering Services (ENSE),
Distribution Division,
Senapati Bapat Marg,
Lower Parel,
Mumbai – 400013
Maharashtra

TECHNICAL SPECIFICATION COVER SHEET

Document No: ENSE-DS-2036-R00

Document Title: SPECIFICATION of 33 kV INDOOR ICOG PANEL with BCPU relay

00	**For tender purpose (ENSE-DS-2036-R00)**	**08/02/24**	**Y.M.M.**		**A.V.P.**		**R.M.B.**	
Rev No.	Remarks	Date	Initials	Sign	Initials	Sign	Initials	Sign
			Prepared By		Checked By		Approved and Issued By	

Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
	05/02/24	05/02/24	05/02/24

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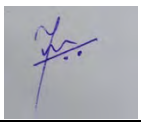
ANNEXURE-1, & 2

Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
	05/02/24	05/02/24	05/02/24

1.0	SCOPE	This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store and performance of 33kV, 1250 AMP VCB panels complete with all accessories. It is not the intent to specify completely herein all details of the equipments nevertheless the equipment shall be complete and operative in all respects and shall confirm to the highest standard of engineering, design and workmanship of International Standards/IEC. The scope also covers installation, testing, commissioning of 33KV panels at site along with SCADA interfacing and associated earthing, inter panel wiring. The bidder shall be responsible for engineering and functioning of the complete system, meeting the intent and requirement of this specification and data sheets. Bidder should depute project manager at site for monitoring and co-ordinating commissioning activity. It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform to practices consistent with sound environmental management and local statues. It is also expected that equipment shall comply in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TATA POWER, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble-free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not. **Note: Bidder shall be OEM of 33kV ICOG Indoor Breaker Panel.**
2.0	APPLICABLE STANDARDS	The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest editions of the following standards/IEC and shall conform to the regulations of local statutory authorities. a) IEC 60068-1:2013: Environmental testing - Part 1: General and guidance b) IS 2705: Current Transformers c) IS 3156: Voltage Transformers d) IS 16227-1: Instrument Transformers e) IEC 62271-200: High-voltage Switchgear and controlgear f) IS 694: PVC insulated cables for working voltage up to and including 1100V g) IS 2629: Recommended practice for Hot Dip Galvanizing of iron & Steel h) IS 2633: Test for uniformity of Zinc Coating. i) IEC 60445:2021: Identification of equipment terminals, conductor terminations and conductors j) IEC 62053-22: Static meter for active energy (Class 0.2s and 0.5s) k) IEC 60255: Measuring Relays and Protection Equipment l) IEC 60529: Degrees of Protection provided by enclosures (IP Code). m) IEC 62271-100: HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR: Alternating current circuit breakers. n) IEC 62271-200: High voltage switchgear & control gear: Metal-Enclosed Switchgear and Control gear. o) IEC 62271-1: High voltage switchgear & control gear: Common specifications. p) IEC 61010-1: Safety requirement for electrical equipment for measurement and Laboratory use. q) IEC 61850: Communication networks and systems for power utility automation (all parts including IEC 61850-8-1, IEC 61850-9-2).

r) IEC 61588/IEEE 1588v2: Precision clock synchronization protocol for networked measurement and control systems
s) IEC 62351: Power systems management and associated information exchange Data and communications security.
t) IEC 60060 : High-voltage test techniques.

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION

1	Maximum ambient temperature	43 deg.C
2	Max. Daily average ambient temp	35 deg.C
3	Min Ambient Temperature	07 deg.C
4	Maximum Relative Humidity	100%
5	Minimum Relative Humidity	40%
6	Average No. of thunderstorm per annum	50
7	Average Annual Rainfall	2380mm
8	Average No. of rainy days per annum	115
9	Rainy months	June to Oct.
10	Altitude above MSL not exceeding	300 meters
11	Average Air Pressure	29.6-inch Hg

Atmosphere is generally laden with mild acid and dust suspended during summer months and subjected to fog in winter months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

4.0 GENERAL TECHNICAL REQUIREMENTS

Sr No.	Description	Requirement
1.0	**SWITCHGEAR PANEL**	
1.1	Architecture	Vacuum Insulated Metal Clad
1.2	No. of Phases	Three
1.3	Rated Voltage	36 kV
1.4	Service Voltage	33 kV
1.5	Rated Frequency	50 Hz
1.6	Rated Lightning Impulse withstand voltage	170 kVp
1.7	One Minute Power Frequency Withstand Voltage	70 kV rms
1.8	Rated short time withstand current	25 kA for 3 sec
1.9	Peak withstand current rating	62.5 kA
1.10	Normal service condition	Indoor
1.11	Internal arc Protection	IAC-A FLR as per IEC 62271-200, Shall withstand 25 kA for 1 sec.
1.12	Degree of Protection Enclosure / Partitions / for meters, relay & BCU	IP4X – Enclosure IP2X – Partitions IP5X or equivalent to completely protect against dust ingress.
2.0	**BUS BAR**	
2.1	Type	Extensible on both sides
2.2	Bus bar continuous rated current	1250 A
2.3	Bus bar material	Copper with Silver / Tinned Coated contacts
2.4	Rated short time withstand current	25 kA for 3 sec

2.5	Max. permissible temperature rated normal Current	The maximum permissible current temperature for bus bar shall be as per IEC	
3.0	**CIRCUIT BREAKER FOR IC/OG (INCOMER AND OUTGOING FEEDER)**		
3.1	Application /Class	Indoor	
3.2	Type of circuit	Vacuum (VCB)	
3.3	No. of poles	3	
3.4	Rated Voltage	36 kV rms	
3.5	Rated Insulation Level	36 KV	
3.6	Lighting impulse	170 kV peak	
3.7	One minute power frequency withstand	70 kV rms	
3.8	Rated frequency	50 Hz	
3.9	Rates normal current	1250 A	
3.10	Rated operating sequence	O-t-CO-T-CO (t=0.3sec, T= 3 min.)	
3.11	Max. Spring Charging Time of Motor	10 sec	
3.12	Max. Power consumption of Trip & close coils	100 W	
3.13	Rated load breaking current (sym)	25 kA rms	
3.14	Rated short circuit withstand current	25 kA rms for 3 sec	
3.15	Rated short circuit making current	62.5 kA peak	
5.0	**OPERATING AUXILIARY VOLTAGES**		
5.1	For Protection relays	220V DC	
5.2	For Ant condensation Heaters	220V AC	
5.3	Spring Charging Motor (Universal Motor)	230V AC	
5.4	No. of spare auxiliary contacts with wring	8NO + 8 NC	
6	**VOLTAGE TRANSFORMER**		
6.1	Location	Access from Front side of the panel and VT should be for incomer side	
6.2	Type	Plug In type, Dual ratio	
6.3	Ratio	33KV/√3 / 110/√3 -110/√3	
6.4	Core Details	Core-I	Core-II
i)	Accuracy class	0.2	3P
ii)	Burden	50VA	50 VA
7	**CURRENT TRANSFORMER**		
7.1	For Metering and Protection		
7.1.1	Ratio	400 – 800 /5 -5 A	
7.1.2	Burden & Class		
i)	Core –I	0.2S , 10VA; Isf < 5	

		ii)	Core –II	5P20, 10 VA
		7.3	For Differential Protection	Incomer
		i)	Ratio	400-800/5 A
		ii)	Core- III	PS, 10 VA
5.0	**GENERAL CONSTRUCTION**			
5.1	**Switchgear**			

1. All supplied Units shall be fitted with engraved metallic logo of “Tata Power” on the front side as per annexure.
2. The High Voltage Switchboard shall be metal-clad and shall comprise of standard prefabricated, CRCA sheet steel units assembled to form a rigid, freestanding, and dead-front structure. As a minimum, 2mm sheet steel shall be used for all front and rear doors and covers, and 1.6mm sheet steel for inter-panel partitions, Frame 3 mm, Removable Gland plate 3 mm. wherever required, stiffeners shall be provided to increase stiffness of large size doors and covers.
3. The switchboards shall be totally enclosed and vermin-proof. If necessary, openings for natural ventilation shall be provided. These shall be louvered and provided with wire mesh having opening less than 1mm. The enclosure shall have complete protection against approach to live parts or contact with internal moving parts.
4. Each unit of the switchgear shall have necessary internal sheet metal barriers to form separate compartments for circuit breaker, bus bars, instruments and relays, cable connections etc. Compartments for cable connections shall allow cable termination and connection work with the switchgear energised.
5. Independent pressure relief devices shall be provided for all HV compartments, i.e. bus bar, cable and breaker compartments and each compartment shall have type test certificate for withstanding internal arc fault.
6. All identical equipment and corresponding parts shall be fully interchangeable.
7. Safety barriers or shutters shall be provided to permit personnel to work safely within an empty compartment with the bus bars energised. The shutters should block the bus & cable compartments.
8. **The opening of shutter shall be prevented when the breaker truck is racked out & either main bus or cable compartment is energised. Electrical interlock of cable side shutter & bus side shutter to be provided to prevent opening of shutters when breaker is racked out.**
9. The draw out carriage on the switchboard shall have three positions: "Service", "Test" and "Drawout" viz:
10. "Full in" or "Service" position - In this position both power and control circuits shall be connected. This shall be the normal operating position of the circuit breaker.

11. "Test" position - The power contacts shall be disconnected in this position but the control connections shall not be disturbed, it shall be possible to close and trip the breakers in this position.

12. "Draw out" Position - both power and control circuits shall be disconnected in this position.

13. The circuit breaker shall be lockable in "service" and "test" positions. Automatic safety shutters shall be provided to ensure the inaccessibility of all live parts after the carriage is drawn out.

14. There shall be a distinct overall door for the breaker compartment, which can be closed with the carriage in draw out position and it shall be lockable type. All openings on the door shall be with a provision of padlock.

15. All circuit breaker modules of the same rating shall be inter-changeable. Suitable interlocks shall be provided to prevent the following operations:
    - "Plugging in" or "drawing out" of a closed breaker.
    - "Plugging in" a breaker with the earthing switch closed.
    - "Closing" of the earthing switch with the breaker "plugged in".
    - Pulling out the auxiliary circuit plug with the breaker in the service position.
    - Pushing in the breaker to the service position, with the auxiliary circuit plug not in position.
    - All operations behind closed doors.
    - It should not be possible to open front door when circuit breaker is closed in service position.
    - Mimic to be provided on front fascia of panel.
    - **The back door opening shall be possible only when cable is in dead condition.**
    - **Castle key interlock or mechanical interlock to be provided in such a way that for opening of back door castle key shall be required.**
    - **Cable back charge indicating LED on front & rear side of panel is to be provided.**

16. All hardware shall be corrosion-resistant. All joints and connections of the panel members shall be made by zinc-passivated, or cadmium-plated, high-quality steel bolts, nuts and washers, secured against loosening.

17. Suitable removable type eyebolts shall be provided for the lifting of the panel/shipping section. These bolts, when removed shall not leave any opening in the panels.

18. Switch board shall be designed for IP 4X. The covers and doors should only be opened when the part of main circuit contained in the compartment being made accessible is dead. Partitions of metal-clad switchgear and control gear shall be metallic and earthed. All the meters, detachable units of relays, relays and BCPU shall be minimum IP5X (For Low voltage) or with an equivalent provision to completely protect it against dust ingress.

19. The overall dimension should not exceed 3.0 M X 2 M x 2.8 M (DXWXH).

20. All foundation equipment, anchor bolts etc. including the supporting channel shall be furnished by successful bidder along with despatch of panels. The bottom plates of the panels shall be fitted with removable gland plates not less than 3mm in thickness.

21. Indicating instruments and meters shall be at a suitable height so that the lettering on the display can be easily read. Control switches/push buttons and relay resetting knobs shall be conveniently located for ease of operation. The center lines of the switches push buttons and indicating lamps shall be not less than 900 mm from the bottom of the panel. The centre lines of relays, meters etc. shall be not less than 450 mm from the bottom of the panel matched. Isolating switch fuse units shall be provided at the panel for incoming AC and DC supplies. Push buttons shall be made of non-hygroscopic material with shrouds. All other insulator shall also be made of non-hygroscopic material.

22. All the HV design shall ensure conformity to IEC-62271-200 Appendix 'A' and must be Type tested for Internal Arc Test. It shall withstand 25 kA for 1 sec. The suppliers shall submit Type Test report from CPRI/ERDA accredited laboratory to prove the above. Auxiliary and control equipments installed on the panel shall be suitably protected against disruptive discharge from main circuit. Bus bars shall be insulated with heat shrinkable insulating sleeves, wherever bare conductor is employed.

23. All indicating lamps shall be of LED type and suitable for continuous operation at 85% to 110% of their rated voltage LED and replaceable from the front of the panel.
    The following indicating lamps with colour shall be mounted over switchgear to indicate important status/alarm of breaker

    • Breaker ON---------- Red
    • Breaker OFF---------- Green
    • DC Fail ----------Amber,
    • Space Heater not healthy ----- Blue
    • Spring Charge---------- Blue
    • Trip coil healthy---------- White
    • Auto trip---------- Amber
    • Breaker in service----------Red
    • Breaker in Test----------Service
    PT back charge AC lamps should be provided
    R ph Healthy LED ------RED
    Y ph Healthy LED ------YELLOW
    B ph Healthy LED ------BLUE

All colour caps shall be similar and interchangeable and all LEDs shall be of same type and ratings. The LED lamps shall be furnished 20% in excess of actual numbers required.

24. All grounding system, special tools and tackles, O&M manuals etc. required for erection, operation, testing and maintenance of switch gear shall be supplied within the quoted price.

25. The offered equipment shall be brand new with state of art technology and proven field track record. No prototype equipment shall be offered. Vendor shall ensure availability of spare parts and maintenance support services for the offered equipment for at least for 15 years from the date of supply. Vendor shall give a notice of at least one year to us before phasing out the product/spares to enable the end user for placement of order for spares.

26. DC fail supervision relay (80) shall be provided on all control and relay panels. DC fail annunciation shall be provided on each panel and loss of DC & trip circuit fail alarm will be suitably annunciate at the panel as well as at the SCADA. All the relays and

auxiliaries shall have DC auxiliary supply. Identification of components shall be in agreement with the indication on the wiring diagrams and drawings. If a component is of the plug-in type, an identification mark should be placed on the component and on the fixed part where it is to be plugged-in. Control cables are to be placed in trucking and it should be suitable to accommodate 20% wiring for future modifications. The disconnection type details are as follows

I) Control supply in individual bay has to be distributed through MCBs of suitable rating for individual control function like

- Protection Relay
- Trip circuit – shorting links
- Close circuits
- Spring charging circuit
- Heating and lighting circuit

II) MCB shall be rated for 10kA short circuit rating. It shall be quick make, quick break, and independent manual type with trip free feature. The DC MCBs and AC MCBs ratings shall be separately mentioned and the panel having AC MCB of higher rating in lieu of DC MCB shall not be accepted. MCB shall have the following

- Over current protection
- ON/OFF Trip position indicators
- Auxiliary contact block (wherever required)

27. Wherever CB contacts are to be multiplied, latch type relay shall be used for contact multiplication. Auxiliary contact multiplier relays shall be reputed make and selected on the basis of continuous Current carrying capacity and rated voltage. The fluctuation in voltage level shall be accounted for (+/-) 10% continuously.

28. Fuse failure relay and trip circuit supervision relay shall be suitably selected, considering burden and auxiliary voltage. External circuitry like compensating resistances will not be accepted. Separate Trip circuit supervision relay not required if it is part of numerical relay.

29. Each switchgear panel shall have 20% spare terminals. The terminals should be droppable type. All equipments mounted on front side of the panel shall have individual nameplates with equipment designation engraved. Alarms for Trip & non-trip should be separate. The termination links for cables shall be segregated in vertical plane. The bidder shall deliver to site completely assembled, wired, tested panels and only the interconnecting cables shall be connected at site. The Bay Control unit shall have the provision to communicate with the future data concentrator in IEC 60870 -5-103 VDW implementation without any additional hardware.

30. Feeder protection, and transformer differential protection relays shall be considered alongwith the switchgear panel.

31. CT, PT, TRIP, CLOSE CT links shall be different coloured coded for easily identification in breaker panels for all Incoming and Outgoing panels.

32. CT, PT, breaker name plate details shall be embossed on front, back side of breaker panel.

33. Separate doors section shall be provided for cable and bus compartment separately with handle arrangement.

34. LOTO lock arrangement shall be provided for Cable compartment, Bus compartment and breaker compartment separately.

35. Cable back charge indication shall be provided on Front & Rear side of Cable compartment.

36. The back door opening shall be possible only when cable is in dead condition.

37. Castle key interlock or mechanical interlock to be provided in such a way that for opening of back door castle key shall be required.

38. All TB's in breaker control panel shall be DISCONNECTING Type

39. Extender of breaker plug is required which is used for breaker test in removed position.

40. **Hygrostat with space heaters to be provided in bus bar & cable compartment. Hygrostat shall be communicable type with Temperature & humidity data on central server through RS485 port.**

41. All auxiliary relays like contact multiplier, Transformer Device relays, Lock out relay shall be fast acting numerical relays with flag indication.

42. Status/indication of all draw out type power equipment's to be made available locally.

43. RYB Nomenclature/paint marking required on all Bus Bar and accessible location.

44. Status contact shall be used for only one application in control schematics.

45. Direct trip from relay BO to Trip coil also to be configured & indicated in the drawing for all panels.

46. Cut off timer to be considered for spring charging motor. Soft drop off timer required in CFC logic in series with Spring Charging Bl to keep the Close permissive High till the time spring remains discharged.

47. Separate Status contact shall be used for relay Bl's and local indication Lamp.

48. Relay DC supply and Trip Circuit Supervision shall not be under the same DC MCB. Separate MCB for relay to be provided.

49. The shutter mechanism in the breaker cubicle shall operate automatically i.e. when the breaker truck is racked in or out. Shutters provided shall comply with IP2X.

50. The bidder can also consider Centralised Protection System with intelligent merging unit.

51. The bidder shall provide auxiliary relays for Transformer devices – PRV Main tank,

		OSR – OLTC, Buccholz, MOG Main tank, MOG OLTC, OTI, WTI
5.2	**Circuit Breaker**	a. Vacuum circuit breakers shall be used in the switchboard. Breaker transport trolleys required for cassette mounted breakers shall be provided for each switchboard. b. The breaker shall be of class M2, E2 [w/o auto reclosing duty], and C2. The breaker shall be encapsulated with no live part exposed within breaker chamber. c. Vacuum circuit breakers shall be designed to have low switching-over voltage levels and with a long switching life. The interrupter shall be leak-free. d. The breakers shall have at least 4 normally open (NO) and 4 normally closed (NC) spare auxiliary contacts for purchaser's use. If these are not available, auxiliary relays shall be used to multiply the auxiliary contacts of the breakers. e. The breakers shall have a motor-operated, spring-charged mechanism. It shall also be possible to charge the springs manually. The closing spring shall get re-charged (for subsequent closing) soon after a closing shot and prior to breaker tripping. In case the limit switch fails to cut out the spring charging motor with the springs fully charged, the motor shall be automatically decoupled. f. The control circuit shall be suitable for local as well as remote control. Breakers shall be trip-free and shall have an anti-pumping device. The breaker operating duty shall be O-0.3 sec-CO-3 min CO. g. Operating Mechanism: Electric power operating mechanism shall be motor wound spring charged stored energy type. However, manual-operating mechanism may be of the spring charging stored energy type or the spring assisted type. For circuit breakers with electrical power operating mechanism, provision shall also be made for manual spring charging. Closing time of circuit breakers with manual operating mechanism shall be independent of the speed of the operating handle. h. All stored energy operating mechanism shall be equipped with following features. • Failure of springs, vibrations or shocks shall not cause unintended operation of breaker or prevent intended tripping operation. • Closing of circuit breakers shall be prevented unless the spring is fully charged. i. All electrical power operating mechanisms shall be suitable for remote operation and shall be equipped with following features. • Provided with universal motor operable on AC or DC control supplies. • Provided with emergency manual charging facility. The motor shall be automatically, decoupled (mechanically) once the manual-charging handle is inserted. • Closing operation of circuit breaker shall automatically initiate charging of the spring for the next closing operation without waiting for tripping of circuit breaker. • Closing operation shall be completed once the closing impulse is given and the first device in the control scheme has responded even though the control switch / Push Button is released provided no counter trip impulse is present. j. Circuit breaker trip and closing coils in case of electrically operated breakers and trip coil in ease of mechanically operated breakers and circuit breaker indication shall be suitable for satisfactory operation on a control supply system indicated in data sheets/job specification. k. All circuit breakers shall be provided with mechanically operated emergency trip device. This device shall be available on the front of the panel. Mechanically operated 'closing' device shall be provided for all breakers. However mechanical closing shall be inhibited for all circuit breakers in service position. l. The breakers shall be provided with anti-pumping & trip free provision. Each breaker shall be also provided with an operation counter. m. Line PT shall be mounted in a separate draw out carriage. In case of truck mounted breaker, line PT shall be provided in a separate panel n. The complete breaker assembly should have inter-changeability with breakers of

		identical ratings. o. Breaker shall be with temperature sensor for monitoring the temperature. p. The Limit switch base in breaker shall have better material having long life.
5.3	**BUS BARS AND CONNECTORS**	1. The switchboard shall comprise of 3-phase bus bars which shall extend through all units of the switchgear line-up. The main bus bars shall have uniform cross-section throughout their length, and shall be sized to carry continuously the rated current specified in the data sheet. 2. Bus bars shall be of high conductivity electrolytic copper supported on insulators made of non-hygroscopic, non-inflammable material with tracking index equal to or more than that defined in Indian standards. 3. Bus bars shall be housed in a separate chamber and shall be accessible for inspection. Wire guards shall be provided inside the enclosure to allow visual inspection of bus bars, to avoid accidental contact when the cover is removed. 4. Both bus bars and the supports shall be adequately sized and braced to withstand the specified short-circuit current for 1 second. Dynamic stresses shall be calculated on the basis of the specified peak short-circuit current. All bus supports shall be of non-carbonising material, resistant to acids and alkalis. 5. Bus bars shall be insulated by using heat-shrinkable sleeves. The sleeves shall be rated to withstand the system line-to-line voltage for 1 minute. This shall be verified by a type test in which the line voltage will be applied between the sleeved main bus bar and an aluminium foil wrapped closely around the insulation over a length of at least 500mm. 6. All bus bar joints and all tap-off connections from the main horizontal bus bars shall be provided with removable FRP shrouds. 7. Bus bars shall be prominently marked with red, yellow and blue colour rings for easy phase identification at regular interval and at every power tap off point. 8. The thermal design of the bus bars shall be based on installation of the switchgear in poorly ventilated conditions. The cooling air volume shall take into account only the bus bar enclosure. 9. The hot spot temperature for bus bars including joints at design ambient temperature shall not be formed and shall be as per IEC for normal operating conditions. 10. Only zinc passivated or cadmium plated high tensile strength steel bolts, nuts and washers shall be used for all bus bar joints and supports. 11. The current rating as defined for switchboard and components in data sheet/job specification are for design ambient temperature at site conditions and for being inside the cubicle at fully loaded condition. The vendor shall suitably derate the nominal rating to suit the above condition. 12. It shall be possible to earth all busbar sections in make-proof way.
5.4	**CURRENT TRANSFORMER**	1. Current transformers shall be cast-resin insulated. The primary and secondary terminals shall be marked indelibly and easily approachable for termination and testing etc. 2. Current transformers shall conform to IS: 2705. The short-time rating shall be equal to that of the switchboard. They shall be mounted on the stationary part of the switchboard. Protective CTs shall have an accuracy class of 5P and an accuracy limit factor greater than 10. CTs for instruments shall have an accuracy class of 0.2S and an instrument safety factor less than 5.0. One leg of the CTs shall be earthed. 3. Separate CT core of class PS shall be provided for Differential protection. 4. All CTs shall be star connected. 5. Proper access to each set of CTs shall be provided for repair / maintenance.

		6. The polarity of the primary and secondary windings of each transformer shall be clearly indicated at the respective terminals and in addition labels shall be fitted in a readily accessible position to indicate the ratio, class duty of each transformer. The CT ratios shall be as per the details specified in this specification's; secondary shorting shall be done by black colour 2.5 sq. mm black wires. 7. The TTB should be provided for metering core with droppable links for Energy meter requirement. 8. The TTB details are as follows: DAV make 50 Amps, Screw type, front connection disconnecting type. 9. All the wires should be connected from top and bottom side and fixed top mounted on door. **10. The CTs in the panels & Spare CTs shall be applied with silicone paint.**
5.5	**Voltage Transformer**	1. Voltage transformers shall be cast-resin insulated. The voltage transformers shall conform to IS: 3156. The voltage transformers shall be of draw out type, and shall be provided with 4 pole miniature circuit breakers with auxiliary contacts on the secondary side. 2. The draw out mechanism shall disconnect the VT from the bus bars. The primary connection shall be disconnected before the VT become accessible. Neutral point of the star connected VTs both on the primary and secondary sides shall be earthed in test position also. 3. The VTs shall have an over-voltage factor of 1.9 times for 30 seconds, and an accuracy class of 0.2 from 10% to 120% of normal voltage. VT selected shall be compatible with system grounding. 4. The primary rated voltage shall be equal to V/~3 (phase and neutral). 5. If not otherwise specified, the secondary voltage shall be 110 / Sq.rt of 3 V. The burden and class of accuracy shall be as specified in SLD. 6. A separate truck should be provided for easy racking out/racking in the VT unit. 7. VPIS 2NO+2NC shall be present in each Outgoing feeder with 230V (+or-) 10% DC aux voltage. 8. VT back charging lamp shall be provided on backside of individual breaker panel. **9. The VTs in the panels & Spare VTs shall be applied with silicone paint.**
5.6	**PROTECTION METERING & CONTROL**	a) All the Bays (Incomer / Outgoing feeder switchgears) shall be provided with Integrated Bay Control, Protection & metering Unit (BCPU). b) The BCPUs shall communicate at station level on IEC 61850 protocols and with local and existing remote master on IEC-104 protocol. c) The BCPU shall support fibre-optic port (In and Out) for fault-tolerant fibre optic ring or RJ-45 port for making star connection at switch. Also the BCPU should support centralized parameterization and DR files downloading from remote. d) The BCPUs shall have capability to communicate with multiple masters on independent network. e) Web browsing feature should be available in BCPU. f) Provision of TTB to be made with respect to future revenue meter installation. All the metering CTs/PTs (Bus PT) to be wired up to TTB for revenue meter installation. The meter size is 300X180X180. g) The 10 Nos. flag relays combiflex RXME1 fast acting type to be provided in the 33KV panels for transformer trouble identifications. h) Bidder to provide all necessary configuration, testing, health monitoring tools (Hardware & Software) for the proposed system. i) All droppable type links of Connect well (CDTTS) or elmax to be provided in the

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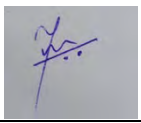
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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		panels. j) The Multi-Function Meters shall be Communicable to RTU on Rs485 MODBUS. This can be eliminated by taking analog data from BCPU, current can be viewed in the BCPU itself & huge cabling work can be avoided. Aux supply shall be 220 V DC k) The buses to be supported with suitable insulators in order to avoid the vibrations. l) Overall design should be such that the Bay Control function is handled by the individual relays provided on the respective bays. m) Adequate spare DI /DO provision of BCU should be there for future station miscellaneous signals. n) Separate AC and DC MCB of 16 A to be provided for AC and DC. o) Extendable Circuit Breaker Test Plug for test purpose length of 10 Mts p) Locally copper bar to be installed in Control Panel as an extension of main Earth Bus. All peripherals body earthing are connected to copper bar through green color 2.5 sq mm wire. q) All CT Neutrals shall be grounded individually to the Copper Strip
5.7	**BCPU**	1) The offered BCPU shall have feeder protective elements having software algorithm based on Sampling of energized currents, analog to digital conversion and numerical handling. 2) The BCPU shall support over current / Earth fault protection function. (50/51 Ph & N) With definite Time or inverse time over current characteristic. Broken conductor function shall be provided 3) The inverse characteristics shall as per IEC which should include normal inverse, very inverse, Extremely inverse, long inverse curves and shall be soft ware selectable at site. 3a) BCPU should have minimum 2 nos. independent selectable setting groups. 3b) Circuit Breaker failure protection: BCPU should have a feature of circuit breaker failure protection, which generates another trip signal if the breaker fails to trip on fault, which can be wired to upstream breaker trip coil. 4) The BCPU shall have minimum 3 PT inputs and 4 CT inputs with ring type lugs termination facility, which can be used as 3 Nos. over current and 1 Earth fault. 5) BCPU shall have configurable binary input, which can be used to develop blocking based scheme and minimum five nos. of freely configurable output contacts. BCPU shall have adequate BIs and BOs required for Local and Remote monitoring and control. BCPU shall be modular & expandable to accommodate the required BIs and BOs for monitoring and Control. Separate contact outputs shall be used for remote control (SCADA open/Close) and Trip functions. 6) The Input shall have galvanic isolation. The trip out put contact should be capable of controlling the circuit breaker and shall be programmable for either hand reset or self-reset. 7) The BCPU enclosure shall be dust tight having degree of protection minimum as IP5X. 8) The BCPU must have facility for local settings and control through front keypad from relay itself. Relay should have facility of online relay setting i.e. it should be possible to alter setting without switching off breaker. 9) The offered BCPU shall have LCD display for monitoring and control, settings, status, measurement and fault data & indication. It shall also have Fixed function LEDs for fault

trip, relay healthy, control supply ON & Relay out of service.

10) BCPU shall have comprehensive self-diagnostic feature with indication of relay failure on relay front and alarm should be generated without tripping the feeder. However, while diagnostic algorithm runs, it must not interfere in the main protective relay circuit and allow working of main protective circuit continuously.

11) The BCPU shall support FDR (Fault disturbance Recording) for minimum 5 Nos. of latest fault trip records.

12) The BCPU shall support metering function (of CL0.2) for Energy (trivector parameters), and panel metering (Line currents, voltage, PF etc). The Energy Measurements shall be as per 3-wattmeter method. Bidder shall mention the accuracy of all analog measurements.

13) No separate earth bus shall be required for the BCPUs. It shall be possible to connect the relay earth to the common earth bus in the substation.

14) The offered relay must be immune to any kind of electromagnetic interference. Vendor to submit all related type test reports for the offered model along with the offer.

15) The relay should conform to the requirements of IS: 3231 / IEC60255 standards with respect to features/ construction/design etc.

16) The relay shall have built in communication facility for hooking the relay on MMI / upstream communication system. Manufacturer of relays having their own Substation Automation System shall be preferred. So that they shall be possible to provide a system solution also if required in future.

17) BCPU software should be supplied along with relays for viewing and downloading measurement, fault records and to carry out easy settings of relays locally.

18) BCPUs shall be suitable for flush mounting type and consisting of multifunctional draw out type modules.

19) BCPU should have direct connectivity to the Copper ground bus of the switchgear installation.

20) BCPU relay PCB's and other electronic devices should be CONFORMAL coated.

21) BCPU should have minimum of 16 Binary Inputs and 10 Binary Output Channels for Substation and other Aux. Signals.

22) The BCPU for differential protection shall have minimum 3 PT inputs & 8 CT Inputs with ring type lugs termination facility. The BCPU Differential relay shall have biased current differential numerical protection with REF, and Directional O/C & E/F protection. It should include the following features:

Vector group compensation.

CT ratio correction.

Biased differential protection.

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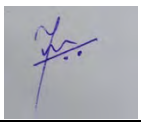
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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High-set. Element of suitable setting range

2nd and 5th Harmonic restrains.

Transformer trouble alarm/ Trip e.g. Bucholz / PRD / Winding Temp / Oil Temp etc. shall be taken as binary inputs in the differential BCPU as a common input indicating "Transformer trouble". However, auxiliary Flag relays shall be provided independently for Transformer trouble and trip along with the panel.

BCPU shall be suitable for both residually connected CT input as well as CBCT input. BCPU shall have 2 CT inputs separately for NCT in 33 KV INCOMERS

23) Protection against CT, PT transients, CT saturation blocking feature to be provided in BCPU relay

Tata Power Approved Relays

Application	Make-1 Siemens	Make-2 ABB	Make-3 Schneider	Make-4 Areva
Transformer Differential Relay	7UT61	RET620	---------	MICOM P642
Feeder protection Relay	7SJ66 , 7SJ63	REF615/REF620	P3	------

7.0 Communication software of BCPU

Relay	Make	Software
REF615	ABB	PCM 600 2.7
		PCM600 2.6
REF620	ABB	PCM 600 2.6
REF630	ABB	PCM 600 2.5
		PCM 600 2.6
7SJ63	Siemens	P-Set 04.67.01
7SJ66	Siemens	Digsi 4.92
7UT61	Siemens	Digsi 4.92
P3	Schneider	Easergy

Note: 1. All higher version software should be capable of communicating with old version relay or support should be provided interms of providing appropriate software/Firmware. For siemens relay the vendor should supply digsi software installed laptops as single laptop does not support multiple digsi version.

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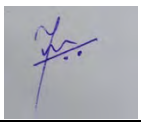
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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1. HMI (Front Display):

1.1. The intuitive user interface and the various communication interfaces allow easy control and monitoring of the switchgear units, simple and comprehensive setting as well as access to readings of extensive recordings.

1.2. It shall be possible to equip the BCPU with a large HMI for local control, visualization of single line diagrams with analog, alarms and overview of service status (Breakers and Isolators).

1.3. The graphical display shall be easily configured by means of symbol library.

1.4. The HMI shall include LEDs for status indication and at least 15 configurable LEDs for alarm indication.

1.5. The front display shall be able to work in harsh environment, and temperature up to 70°C.

1.6. Vendor to deliver the HMI display, which shall not blacken out after in use of the BCU life time.

2. **Communication Ports:**

2.1. A galvanic isolated front port shall be available for connection of a personal computer for configuration.

2.2. At least 2 No. Fiber optic port IN and OUT, for fault tolerant fiber-optic ring, RJ-45 port for making star connection at switch.

2.3. 2 Nos. IP ports are required and each port would have capability of communicating minimum 8 no. of SCADA masters simultaneously.

3. Protocols:

3.1. IEC 61850-8-1, communication protocol shall be available. The BCPU shall meet the IEC 61850 standard in every respect. Interoperability and interchangeability and with other manufacture's BCPU and tools will be preferred.

3.2. Data exchange is to be realized using IEC 61850 protocol with a redundant managed switched Ethernet communication infrastructure.

3.3. All the BCPUs must be fully IEC 61850 compliant and must have the following features.

- Have peer-to-peer communication using GOOSE messages (IEC 61850) for interlocking/ protection schemes.
- Should be interoperable with third party IEC 61850 compliant devices
- Should generate XML file for integration/engineering with vendor independent SCADA systems.
- Should be directly connected to the fiber optic ring and communicating on IEC 61850 without the use of any gateways.

3.4. IEC61850 GOOSE messaging shall be used to transmit BI's data quickly on the fiber optic LAN to reflex automation/protection schemes.

3.5. IEC 61850 support - Interoperability table shall be provided

4. Communication Architecture:

4.1. The BCPUs shall be connected on Fiber Optic 10/100 Mbps network with ring topology and communicate with each other as well as Gateway using IEC61850 with GOOSE message.

4.2. The communication shall be made in fiber optic fault tolerant ring, excluding the links between EM to individual bay BCPUs to switch wherein the redundant connections are not envisaged, such that failure of one set of fiber shall not affect the normal operation of the switchgear.

4.3. However failure of fiber shall be alarmed on Purchaser's SCADA System. Each fiber optic cable shall have minimum two (2) spare fibers.

4.3 BCPU's should have front RJ45, serial usb or DB-9(RS 232) port for front or direct communication with laptop. In case of DB-9 port vendor has to provide RS232 to USB converter with BCPU's.

5. **Algorithm and Logic:**

5.1. The BCPU shall be based on advanced and proven algorithms and an easy and efficient upgrade of the BCPU functionality shall be possible.

5.2. The application software within the control/protection devices shall be programmed in a functional block language.

5.3. The BCPU shall be provided with programmable logic for tripping and indications as well as a sufficient number of logic blocks and timers for user adaptation.

5.4. Command is always to be given in two stages: selection of the object and command for operation under all mode of operation except emergency operation. Final execution shall take place only when selection and command are actuated (Select-before-execute).

5.5. It shall also be possible to interconnect and derive input and output signals, logic functions, using built-In functions, complex voltage and currents, additional logics (AND-gates, OR gates and timers). (Multi-activation of these additional functions should be possible).

5.6. A delay/integrator shall allow the pick-up and reset of binary signals to be delayed before being displayed or used to control other functions.

5.7. Refer below matrix for controlling of the switchgear.

PANEL	BCPU	SCADA OPEN	SCADA CLOSE	BCPU OPEN	BCPU CLOSE	TNC OPEN	TNC CLOSE
REMOTE	REMOTE	Y	Y	N	N	N	N
REMOTE	LOCAL	N	N	Y	Y	N	N
LOCAL	REMOTE	N	N	N	N	Y	Y
LOCAL	LOCAL	N	N	N	N	Y	Y

6. Self-Supervision:

6.1. The BCPU shall have extensive self-supervision including analog channels.

6.2. Each BCPU shall be independent from each other and its functioning shall not be affected by any fault occurring in any of the other bay control units of the station.

6.3 Command execution timer (configurable) must be available for each control level point. If the control Action is not completed within a specific BCPU time, the command

should get cancelled (Run Time Command cancellation). In case of restoration of communication links, power supply after failure, the Software along with hardware shall be capable of automatically synchronizing with the remaining System without any manual intervention.

7. Disturbance & Event Recording:

7.1. The protection system shall include an inbuilt disturbance recorder function in each bay unit, which shall record

- 10 analog parameters including bay phase currents, voltages
- Minimum of 20 binary signals.
- Last 5 disturbances.

The sampling frequency of this disturbance recorder function shall be selectable from 2400 Hz, 1200 Hz or 600 Hz at 50 Hz. The recording period shall be at least 1.5 s at 2400 Hz. Minimum 10 trigger signals shall be available.

7.2. The disturbance recorder buffer memory shall be of non-volatile type and shall not require the use of batteries.

7.3. It should be possible to record the sum of selected analog currents. Summation of currents to be confirmed on BCPU.

7.4. An event recorder that can handle up to 1000 time tagged events per disturbance and that can record the last 5 disturbances shall also be included. The event recorder buffer memory shall be of non-volatile type and shall not require the use of batteries.

7.5. It shall be possible to retrieve the disturbance and event recorder information based on Comtrade format from a remote location shall be made available up to the gateway for further processing by Master.

7.6. All recorded disturbance data from BCPU shall be automatically uploaded (event triggered or once per day) to a Purchaser's SCADA Systems.

7.7. Automatic back up retrieval of relay database from remote should be possible.

8. Control and Monitoring:

8.1. The system shall incorporate the control, monitoring and protection functions specified, self-monitoring, signalling and testing facilities, measuring as well as memory functions, event recording and evaluation of disturbance records.

8.2. The BCPUs shall accept direct CT / PT inputs and provide the following minimum analog

Parameters at 0.2 class accuracy,

- Phase & Neutral Currents
- Phase Voltages
- Active & Reactive Power
- Active & Reactive Energy (Import & Export)
- Power Factor
- Frequency
- Demand

8.3. Control of protection relay systems in or out of service shall be available through BCPU

8.4. The operation shall depend on the conditions of other functions, such as interlocking, synchro check (if any), etc.

8.5. The analog values acquired/calculated in bay control/protection/Energy meter unit shall also be displayed locally on the BCPU HMI and in the SCADA Systems. The abnormal values must be discarded if BCPU's are used for analog measurements. The analog values shall be updated every 1 second.

8.6. Level of Operation with control rights along with sequence of operation to be clearly mentioned (Password Protection).

8.7. The commands are always to be executed in two stages: selection of the object and command for operation under all mode of operation except emergency operation.

Final execution shall take place only when selection and command are actuated.

8.8. Command execution timer (user configurable) must be available for each Binary output. If the control action is not completed within a specified time, the command should get cancelled.

9. Power Supply:

9.1. Power supply modules from 48 to 250 V DC +/- 20 % shall be available

9.2. A redundant power supply module shall be available for the Gateway unit.

10. **Time Synchronization:**

10.1. Time synchronization will be effected through gateway.

10.2. Time synchronization interface: The unit shall be capable to synchronize the internal RTC via Communication ports on IEEE 1588,

10.3. Timing Accuracy: The bay control shall time-tag event reports to an absolute accuracy of 10 µs or better Bay controls at different system locations shall have the same absolute minimum timing accuracy.

10.4. BCPU shall capable to get synchronized from main as well as redundant gateway.

11. BCPU parameter setting:

11.1. It shall be possible to access all protection and control (logic) BCPUs for reading the parameters (settings) from the Purchaser's SCADA System or from a Central remote monitoring computer. The setting of parameters or the activation of parameter sets shall only be allowed after entering a password.

11.2. Level Wise enabling of settings with User Rights should be incorporated as per the Password protection.

12. Test Function:

12.1. Vendor to provide the detailed test procedure for testing the BCPU functionalities using IEC61850, GOOSE Messaging and protection scheme

implemented/proposed. Vendor to ensure availability of the required Hardware and software to test the above at the time of FAT and SAT.

12.2. The protection system shall support a test mode where it shall be possible to set or reset binary input Signals, signalling and tripping contacts individually or in groups.

12.3. All output relay contacts can be blocked via a setting and configuration program. Using the test function, it Shall be possible to set or reset signalling and tripping contacts individually.

12.4. A test sequencer for the local bay protection functions shall be part of the user interface program. Virtual Current, voltage and binary signals shall be programmable in a minimum of six different sequences to verify The correct operation of the respective functions and settings in the respective bay unit.

12.5. Vendor shall provide predefined saved cases for test sequence, during commissioning and for routine Maintenance.

12.6. Bidder should follow Standard BCPU IO wiring practice and Standard Alarm indication list. The same will be Shared and finalized during detail engineering.

10.0 Warranty

Vendor shall warrant that the equipment including software, hardware, firmware and associated documentation are free of defects in material and workmanship and from defects or faults in design, in so far as the equipment fails to meet the requirements of this technical specification, for a period of **60 months** from the date of supply **and 48 months** from final acceptance by the purchaser after completion of 30 days trouble free operation whichever is the earliest. With respect to defects in equipment part, vendor's liability is to make good by replacing the faulty equipment. It is the responsibility of the vendor to replace the faulty equipment within 7 working days. After replacement of the faulty equipment, the purchaser will return parts that are defective to the vendor. The vendor will cover the cost associated with the shipping of defective or failed items during warranty period. The new equipment, parts shall be delivered to the purchaser's facility CIF (Cost, Insurance, and Freight) free of charge. With respect to software, the purchaser will notify the problem to the vendor, including a detailed description of the deficiency and associated condition. Vendor

shall guide the purchaser for corrective action. If the same is not resolved, the vendor shall depute his personnel to attend the same within 24 hours from the time of reporting the problem. The system vendor will be fully responsible to resolve any such deficiency reported by the purchaser.

With respect to third-party software and consumable parts supplied, the vendor shall make reasonable effort to obtain the best warranties possible from the sub-vendor thereof and assign to the purchaser any such warranties to the extent that such warranties may be assigned to the purchaser. Vendor may consider longer warranties than included in these specifications. Vendor shall extend all warranties /guarantees to the purchaser, provided by sub-vendors, of duration longer than that in this specification.

11.0 Upgrades and Modifications

1) Vendor shall continuously keep the Purchaser informed of all Software and Hardware upgrades as & when these are released.
2) Vendor shall supply upgrades of all installed software (both own and third party) for a period of five years from the date of system acceptance without any commercial implication.
3) Vendor shall rectify all design defects and software bugs at no extra cost for a period of 5 years from the date of system acceptance.
4) Vendor shall provide lifetime support (15 years) for the system, even if no upgrades are implemented. The system referred to above includes Vendor's own as well as third party components.
5) Vendor shall port the supplied software onto upgraded hardware (as per Vendor's standard offerings) without additional Software License Fees.

12.0 Training

The vendor shall include in his offer Training for Tata Power engineers. The training shall cover development, integration, installation and commissioning of both software & hardware components of the system. The training shall have two parts

1) Training at Vendor's / Collaborator's Works(Before project commence) -5 man-weeks
2) Training at Site -5 man-weeks

		Bidder shall indicate per man-week rates for addition / deletion if any. The vendor shall provide Classroom as well as hands-on training on the system. All required training materials such as system catalogues, test instruments, demo equipment, and simulation jigs, etc. shall be provided by the vendor. The training shall equip the Purchaser's engineers for installation, commissioning, operation and post-warranty maintenance of hardware, software (Operating System, Administration and Applications), protocols and all third party systems.
5.8	**AUXILIARY SWITCHES AND CONTACTORS**	Auxiliary switches shall be provided on all circuit breakers for local, remote & SCADA indication, control and interlocking. With each circuit-breaker there shall be supplied all necessary auxiliary switches, contactors and mechanisms for indication, protection, metering, control, interlocking, supervisory and other services. All such auxiliary switches shall be enclosed in dust free housing. Not less than four spare auxiliary switch ways shall be provided with each circuit breaker. All auxiliary switches shall be wired up to a terminal board on the L.V panel of the switchgear whether they are in use or not in the first instance and shall be arranged in the same sequence on all equipment.
5.9	**TERMINAL BLOCKS**	a) The terminal blocks shall be 1100 V grade, 10 A rated, one piece moulded, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts and identification strips. The terminal blocks for CT shall be of disconnecting type. Markings on the terminal strips shall correspond to wire numbers on the wiring diagrams. The terminal blocks shall be fully enclosed with easily removable covers and made of moulded non-inflammable plastic material. b) A minimum clearance of 250 mm between the first row of terminal blocks and the associated cable and plate shall be ensured. Also the minimum clearance between two rows of terminal blocks shall be 150mm. c) All spare contacts and terminals of the panel mounted equipment and devices shall be wired to terminal blocks. All the TB's shall be of single Decker type. a) Acrylic cover for all the TTB's to be provided.
5.10	**ANTI-CONDENSATION HEATERS**	a) Strip type space heaters of adequate capacity shall be provided in breaker compartment, cable compartment and bus compartment in each panel to prevent moisture condensation on the wiring and panel mounted equipment. Space heaters shall be rated for 240 V, 1 phase, 50 Hz supply. Heaters inside the panels shall not be mounted close to the wiring or any panel mounted equipment. Heaters shall be complete with either miniature circuit breakers nor with isolating switches, HRC fuse on phase and link on the neutral of the heater supply. b) An adjustable type hygrostat (0 to 100% Humidity) shall be provided in the heater control circuit. The indication shall be provided for monitoring the healthiness of Space heater. c) Heater shall have humidity control and shall be arranged to cut off when cubicle internal Humidity exceeds safe value. 'Heater ON' indication shall be also provided. Also, door limit switch and internal lighting shall be provided for LV compartment.
5.11	**INTERIOR LIGHTING AND**	a) Each panel shall be provided with a compact fluorescent lighting fixture rated for 240 V, 1 phase, 50 Hz supply for the interior illumination of the panel during maintenance. The fitting shall be complete with switch-fuse unit and the Switching of the fitting shall be controlled by

	RECEPTACLES	the respective panel door switch. b) Each panel shall be provided with a 240 V, 1 Phase, 50 Hz, 15 A, 5 Pin receptacle with switch. The receptacle with switch shall be mounted inside the panel at a convenient location.
5.12	**POWER AND CONTROL SUPPLIES**	a) Each control panel shall be provided with necessary arrangement for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signalling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with MCBs. Supply monitoring arrangement shall be provided. Selection of the MCB ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall also be protected by MCBs. b) If auxiliary voltages other than those specified are required, then necessary arrangement shall be made by the bidder within the panel to obtain the desired voltages by providing step-down transformers and inverter/converter, etc. However it is desired that no other control voltage shall be prevalent in the panel. c) All fuses shall be HRC cartridge type conforming to relevant standards, mounted on plug-in type fuse bases and cover with locking arrangement for fuse link. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.
5.13	**PANEL WIRING**	a) Panels shall be supplied completely wired internally to equipment and terminal blocks and ready for the Purchaser's external cable connections at the terminal blocks. Panel wiring shall be securely supported, neatly arranged by lacing and tying, readily accessible and connected to equipment terminals and terminal blocks. Flame retardant, plastic wiring channels/troughs with strap on plastic covers shall be used for this purpose. When panels are arranged to be mounted adjacent to each other all inter-panel wiring and connections between panels shall be provided by the Bidder. b) All wiring shall be carried out with 1100 V grade, single core stranded copper conductor wires with PVC insulation. Extra flexible wires shall be used for wiring of devices mounted on moving parts such as swinging panels and doors. The minimum size of the stranded copper conductor used for panel wiring shall be as follows i) All circuits except CT and PT circuits: 2.5 mm^2 per lead grey colour ii) CT circuits: 4 mm^2 per lead with colour coded PT circuit : 2.5 mm^2 colour coded The terminals are marked with the terminal number in accordance with the schematics and terminal diagram. The terminals do not have any function designation and are of the tension spring, screw type and plug-in type for inter panel wiring. c) Longitudinal troughs extending throughout the full length of the panels shall be provided for inter panel wiring, for AC and DC supplies, PT circuits, annunciator circuits and other common services .Interconnections to adjacent panels shall be brought out to a separate set of terminal blocks located near the slots or holes meant for taking the interconnecting wires. Arrangements shall permit easy inter-connections to adjacent panels at site and wires for this purpose shall be provided by the bidder looped and bunched properly inside the panels.

		d) If accidental short circuiting of certain wires is likely to result in malfunction of equipment, such as closing or tripping of a breaker or positive and negative wires, these wires shall not be terminated on adjacent terminal blocks. The unused instrument space on the front or rear of the panels shall be kept clear of wiring, to facilitate addition of devices without rewiring associated portion of the panels. e) Wire terminations shall be made with soldieries crimping type of (ring type lugs for all CT & PT circuits and pin type lugs for other circuits) tinned copper lugs which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations. Engraved core identification plastic ferrules, marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wires and shall not fall off when the wire is disconnected. Lock in type ferrule shall be provided. There should be provision of cable tray for laying of BCPU looping cable on the top of the switchgear LT compartment. f) Bidder shall be solely responsible for looping all protection relays up to the BCU/BCPU or DC as per the requirement. Network cable required to communicate BCU/BCPUs with DC shall be under bidder's scope. Looping and networking cable shall be CAT-5 type. The Bidder shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment. In case the cables are to be routed through trenches, necessary metal clad conduits shall be used. g) Internal wiring to be connected to external equipment shall terminate on terminal blocks. The terminal blocks for CTs and VTs shall be provided with test links and isolating facilities. The CT terminal blocks shall be provided with short circuiting and earthing facilities. Change of CT cores should be possible by linking & delinking of terminals. Switchgear shall have 20% terminals as spare terminals in each panel &should be uniformly distributed in all the terminal blocks and shall be wired. Note: Two wires shall not be crimped on a single lug. CT Ferrules shall have reference of CT Core and CT Taps
5.14	**CABLES TERMINATION :**	1) There should be provision of connecting 1 no 33KV, 3CX400 sq. mm, XLPE Al AR cables. There should be proper approach for manpower to work inside the cable compartments of incomer and outgoing section. Ample space for connection for these cables shall be provided at the rear of the switchboards. 2) In order to avoid accidental contact in the cable compartment while carrying out inspection by opening the rear cover, a removable expanded metal barrier shall be provided in the cable compartment. 3) Unless otherwise specified, the power cable shall enter the switchboard from the bottom. 4) Non-magnetic cable gland plates shall be provided for feeders wherever single core cables are used. 5) The switchboard shall be supplied complete with supports for clamping outgoing and incoming cables. The head-room available between cable gland plate and terminal lugs shall not be less than 800 mm for 33 kV cables. 6) In case the standard panel depth cannot accommodate the specified no. of cables, a rear extension panel of full height shall be provided. An earth strip shall also be brought to this extension panel. 7) Unless otherwise specified, all power cables shall enter the switchgear from the bottom.

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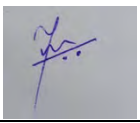
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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		8) A rear viewing window shall be provided on the cable chamber rear cover to inspect cable connection without opening rear cover. The material of this window shall be the same as that used in breaker chamber.
5.15	**LABELS**	a) All equipment mounted on front and rear side as well as equipment mounted inside the panels shall be provided with individual labels with equipment designation engraved. Also on the top of each panel on front as well as rear side, large and bold nameplates shall be provided for circuit/ feeder designation. The labels shall be mounted directly below the respective equipment. b) All front mounted equipment shall be provided, at the rear also with individual labels engraved with tag numbers corresponding to the ones shown in the panel internal wiring to facilitate easy tracing of the wiring. c) Each lED and meter shall be prominently marked. All relays and other devices shall be clearly marked with manufacturer's name, type, serial number and electrical rating data. d) Labels both external &internal shall be made on non-rusting metal preferably Aluminium anodized one. Labels shall have white letters on black background. The lettering size shall be 6 mm for panel designation and minimum 3mm for device labels. The label designations shall be subject to the Purchaser's approval. e) Each switch shall bear clear inscription identifying its function e.g. 'BREAKER' '52A' etc. Similar Inscription shall also be provided on each device whose function is not otherwise defined. If any switch device doesn't bear this inscription, separate name plate giving its function shall be provided for it. Switch shall also have clear inscription for each position indication e.g. 'Trip-Neutral-Close', 'ON-OFF', 'R-Y-B-OFF' ETC. f) Section differentiation marking, bus differentiation and phase differentiation marking shall be provided a visible colour coding as per Indian coding will be preferred.
5.16	**EARTHING**	a) All panels shall be equipped with a separate earth bus securely fixed along with the inside base of panels. When several panels are mounted adjoining each other, the earth bus shall be made continuous and shall be bolted with two bolts. Provision shall be made for future extension of the earth bus. Provision shall be made on the earth bus bars of the end panels for connecting the same to the earthing grid. b) An earthing conductor of 40x10 sq.mm Cu (minimum) shall be provided extending the whole length of switchgear and control gear to sustain the Rated short time withstand current. Each equipment mounted in the panel shall be directly earth pad to this earth bus by distinct connections. Bidder shall provide separate electronic earthing for all LED's. Separate earth bus bar to be run along switchgear for protection earthing of relays and communication equipments and LEDs and shall be insulated from the frame. Two bolts shall be provided for connecting the earthing conductor. c) All metallic cases of relays, instruments and other panel mounted equipments shall be connected to the earth bus by independent copper wires of size not less than 4.0 sq.mm for VT and CT secondary neutral or common lead shall be earthed at one place only, preferably at the terminal blocks where they enter the panel. The colour coding for earthing wires shall be given. Bidder shall provide separate electronic earthing for all IEDs.

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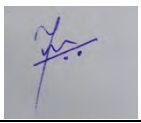
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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		d) Looping of earth connections, which would result in loss of earth connection to the other devices when the loop is broken, shall not be permitted. However, looping of earth connections between equipment to provide alternative paths to earth bus shall be provided. a) Individual Earthing bus shall be extended from main earth bus in each breaker panel for which all peripherals body earthing are connected through green colour 2.5 sq.mm wire. b) All live/energized equipment shall have body earth and reference ground via copper strip or Copper wires of minimum 6 Sq mm.
5.17	**PAINTING**	All sheet steel work shall be phosphated in accordance with the IS: 6005 "Code of practice for phosphating iron and steel". It should follow the seven tank process. Oil, grease, dirt and swarf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water rinsing with a slightly alkaline hot water and drying. After phosphate, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoved type zinc chromate primer. The first coat may be "flash dried" while the second coat shall be stoved. Thereafter an established painting procedure like electrostatic painting shall be followed for powder coating the panel. The colour shade shall be RAL 7032 (Grey). Minimum paint thickness of 120 micron is required.
5.18	**GALVANIZING**	a) All galvanizing shall be carried out by the hot dip process, in accordance with IS 2629/ ISO 1460 amended to date. However, high tensile steel nuts, bolts and spring washers shall be electro galvanized to service condition four. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives to the galvanic bath, which could have a detrimental effect on the durability of the zinc coating. b) After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment except that nuts may be threaded after galvanizing. c) To avoid the formation of white rust, galvanized material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization. The galvanized steel shall be subjected to tests as per IS-2633/ BS 729 amended to date. **Approved Sub-vendor for bought out items: -**

Sr. No	Items	Approved sub vendor
1	Epoxy Resin Cast C.T.	Pragati Make /ECS/Huphen Fabricator/Reputed as per OEM approved
2	Epoxy Resin Cast P.T.	Pragati Make /ECS/Huphen Fabricator/Reputed as per OEM approved
3	TTB	DAV make & Model name is SSFS
4	TB	Connectwell/Elmex
5	HRC Fuse	C&S / L&T /Equivalent
6	Space Heater	Girish Make

6.0	**NAME PLATE AND MARKING**	**NAME PLATE AND MARKING:** All the components and operating devices of the switchgear shall be provided with durable and legible nameplates containing all technical parameters. Name plates shall be suitably embossed with" PO no. with date", "PROPERTY OF Tata Power-' & "CODE NUMBER" along with the following information. A Danger plate of appropriate size shall also be provided on the enclosure. a) Manufacturer's Name b) Month and year of supply c) Type/Model d) Rated Voltage e) Rated current f) Service voltage g) System Frequency h) Rated Short time withstand current for 3 sec i) Rated Impulse withstand Voltage j) Degree of Protection k) Serial no. CT & PT details to be mentioned at the rear cover of switchgear panel. The name plate of each functional unit shall be legible during normal service. The removable parts, if any shall have a separate nameplate with the data relating to the functional units they belong to, but this nameplate need only be legible when the removable parts is in removed position.
7.0	**TESTS**	All the Routine, acceptance and Type tests shall be carried out in accordance with the relevant IS/IEC standards. All routine/acceptance tests shall be witnessed by the Purchaser/ his authorized representative. All the components should also be type tested as per the relevant standards. All meters and metering elements in BCU shall also be routine and type tested as per the relevant standards and shall further be tested at site by the successful bidder. For Type test of Numerical relays, control IEDs, and communication equipment, and Factory acceptance test, relevant IS/IEC has to be followed. Bidder shall also be responsible for conducting point to point testing of all gateway configurations on the site (SAT) after the installation. Bidder shall ensure integrated FAT of switchgear along with SCADA at one location along with RTU functional tests. Following tests shall be necessarily conducted on the switchgear in addition to the others specified in IS/IEC. **A) For Breaker panels** **I) Type Tests** 1. Test to verify the protection of person against dangerous electrical effects. 2. Electromagnetic compatibility Tests of Auxiliary and control circuits (Emission & Immunity test) 3. Dielectric Test: Impulse & Power frequency 4. Internal Arc Test

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5. Measurement of the resistance of the main circuits
6. Short-time withstand and Peak withstand current test
7. Verification of Degree of Protection.
8. Verify the Insulation level of the equipment including at power frequency test voltage on auxiliary circuits.
9. Temperature Rise tests.
10. Short-circuit current making and breaking tests
11. Mechanical operation test at ambient temperature
12. Test to prove the satisfactory operation of the included switching device and removable parts (Mechanical operation test)
13. Mechanical operation test

II) Routine Tests

1. Dielectric test on main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Dimensions and visual checks
5. Mechanical operation test
6. Partial Discharge measurement

III) Acceptance Test

1. Dielectric test on main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Dimensions and visual checks
5. Mechanical operation test
6. Partial Discharge measurement

B) <u>For Current Transformers</u>

I) Type Tests

a) Short time current Test

b) Temperature rise Test.

c) Lightning impulse tests

d) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

II) Routine Tests

a) Verification of terminal marking and Polarity

b) Power frequency dry withstand tests on Primary Windings.

c) Power frequency dry withstand tests on Secondary windings

d) Over Voltage inter-turn test.

e) Partial Discharge tests.

f) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

g) For PS class core – Knee point voltage & Excitation current, Secondary winding resistance, Turns ratio.

C) <u>For Voltage Transformers</u>

I) Type Tests

a) Short time current Test

b) Temperature rise Test.

c) Lightning impulse tests

d) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

II) Routine Tests

a) Verification of terminal marking and Polarity

b) Power frequency dry withstand tests on Primary Windings.

c) Power frequency dry withstand tests on Secondary windings

d) Partial Discharge tests.

e) Determination of errors or other charterstics according to the requirements of the appropriates designation or accuracy class.

For CTs & PTs routine test reports from the OEM to be provided.

D) <u>For Relays</u>

I) Type Tests for Numerical Relays/ Devices:

1. Dielectric Withstand Test: IEC60255-5
2. High Voltage Impulse Test, class III: IEC 60255-5
   (5 kV peak; 1.2/50 us; 0.5 J; 3 positive and 3 negative shots at interval of 5 sec.)

		3. DC Supply Interruption: IEC 60255-11 4. AC Ripple on DC Supply: IEC 60255-11 5. Voltage Dips and Short Interruptions: IEC 61000-4-11 6. High Frequency Disturbance: IEC 60255-22-1, class III 7. Fast Transient Disturbance: IEC 60255-22-4, class IV 8. Surge Withstand Capability: IEEE / ANSI C 37.90.1 (1989) However, in case any type test is not carried out/carried out at In-house laboratories, the same shall be decided for acceptance as per the mutual agreement between the Purchaser and Bidder.
8.0	**TYPE TEST CERTIFICATE**	The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA laboratories as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 10 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TATA POWER LTD. Type tests shall have been conducted in certified Test laboratories during the period not exceeding 10 years from the date of opening the bid. In case if type test conducted beyond 10 years then bidder to certify on letter head of parent OEM that no design change & no manufacturing plant change occurred from type tested product. In the event of any discrepancy in the test reports, i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TATA POWER. Bids without all type test report shall stand disqualified.
9.0	**PRE-DISPATCH INSPECTION**	Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material is liable to rejection. The bidder shall grant free access to the places of manufacture to the Purchaser's representatives at all times when the work is in progress. Inspection by the Purchaser or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by the Purchaser. Following documents shall be sent along with material. a) Test reports b) MDCC issued by Tata power c) Invoice in duplicate d) Packing list e) Drawings & catalogue f) Hard copy of drawings g) Delivery Challan Other Documents (as applicable) All Document should be English Language

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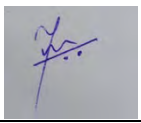
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TATA POWER Store will be inspected for acceptance and shall be liable for rejection if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department. If any deviation or anomaly observed at this stage same need to be rectified by bidder at bidders own cost at earliest.
11.0	**GUARANTEE**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the " Security cum Performance Deposit" as the case may be. In case of GP failure, BA shall report at site within 48 hours from intimation and arrange for rectification of fault within a mutually agreed time. In case rectification at site is not possible then alternative arrangement (replacement) to be made by BA within 15 days of intimation of failure. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.
12.0	**PACKING AND TRANSPORT**	Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. No single use plastic to be used in packaging. The packaging material shall be environmentally friendly & recyclable.
13.0	**TENDER SAMPLE**	Not applicable.
14.0	**TRAINING**	The vendor shall include in his offer Training for Tata Power engineers. The training shall cover development, integration, installation and commissioning of both software & hardware components of the system. The training shall have two parts Training at Vendor's / Collaborator's Works(Before project commence)- 5 man-weeks Training at Site - 10 man-weeks Bidder shall indicate per man-week rates for addition / deletion if any. The vendor shall provide Classroom as well as hands-on training on the system. All required training materials such as system catalogs, test instruments, demo equipment, and simulation jigs, etc. shall be provided by the vendor. The training shall equip the Purchaser's engineers for installation, commissioning, operation and post-warranty maintenance of hardware, software (Operating System, Administration and Applications), protocols and all third party systems.

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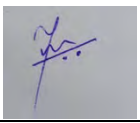
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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15.0	**QUALITY CONTROL**	The bidder shall submit with the offer, assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and after finishing, bought out items and fully assembled component and equipment including drives. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's or its nominated representative engineer shall have free access to the manufacturer/sub-supplier's works to carry out inspections.
16.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in-house testing facilities for carrying out all routine tests & Acceptance tests as per relevant International/Indian standards.
17.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit GTP & Drawing with 15 days from placement of order/OLA for approval. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable).
18.0	**SPARES, ACCESSORIES AND TOOLS**	
18.1	**SPARES:**	Bidder should provide following mandatory spares along with the bid. a) Trip Coil: 1 nos b) Closing coil: 1 nos c) Spring charging motor: 1 nos d) T-N-C Switch: 1 nos f) Local/remote selector switch: 1 no g) Tulip/ Finger contact: 6 nos h) Indication lamps: 50 nos i) Auxiliary switches: 10 nos j) CTs: 2 nos k) VTs: 2 nos In addition to above bidder shall submit recommended list of spares for 5 years of operation, if Any with unit prices and recommended quantity.
18.2	**SPECIAL TOOLS & GAUGES:**	A list of complete set of special tools and gauges required for erection & maintenance and installation procedure should be submitted. The Bidder shall give an assurance that special maintenance tools & tackles and spares will continue to be available through the life of the equipment, which shall be 25 years minimum. However, the supplier shall give a minimum of 12 months' notice in the event of plan to discontinue manufacture of any component used in this equipment. Any special maintenance tools & tackles apparatus, parts or tools shall be subject to the same specification, tests and conditions as similar material supplied under the Contract. They shall be strictly interchangeable and suitable for use in place of the corresponding parts supplied with the plant and must be suitably marked and numbered for identification. Spanners and other maintenance equipment provided under this contract shall not be used for the purpose of erection.

19.0 DRAWING AND DOCUMENTS

Following drawings & Documents shall be prepared based on Purchaser's specifications and Statutory requirements and shall be submitted with the bid:

a) Completely filled-in Technical Parameters.
b) General descript ion of the equipment and all components including brochures
c) General arrangement drawings
d) Single Line Diagram
e) Bill of material
f) Type Test Certificates
g) Experience List
h) Foundation fixing drawings.

After the award of contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval.

Sr. No	Description	For Approval	For Review information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Single Line Diagram	√		√
4	Typical Mimic diagram	√		√
5	Schematic / inter logic diagrams	√		√
6	Bill of Material	√		√
7	Foundation Plan & loading details	√		√
8	Manual/Catalogues/drawings for DC, BCU meters, relays, switches, lamps etc.		√	√
9	Control and Operational Philosophy of Automation		√	√
10	Input/output List		√	√
11	Cable Schedule & interconnection diagram		√	√
12	Programming language manual		√	√
13	Details of the Communication protocol & interoperability list for the future interfacing.		√	√
14	Equipment wise detailed circuit diagram		√	√
15	Electronic earthing scheme		√	√
16	Configuration diagram with functional write up		√	√
17	I/O mapping		√	√
18	3 nos. of working drawings		√	√
19	3 nos. of as-built drawings		√	√

20	Relay co-ordination scheme		√	√
21	Installation / commissioning manual		√	√
22	Instruction for Use		√	√
23	Transport Shipping dimension drawing		√	√
24	QA &QC Plan	√	√	√
25	Routine, Acceptance & Type Test Certificates	√	√	√

All the documents & drawings shall be in English language.

After the receipt of the order, the successful bidder will be required to furnish all detailed drawings of components for TATA POWER approval.

Instruction Manuals: Bidder shall furnish softcopies manuals of Switchgear, Relay (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

20.0 GUARANTEED TECHNICAL PARTICULARS

S.No	Description	Units	Units As Furnished by Bidder
1	**SWITCHBOARD**		
a)	Architecture		
b)	Applicable standard		
c)	Dimensions (In mm) WXDXH		
d)	Internal Arc Protection		
e)	Normal Service conditions		
f)	Service Voltage	KV	
g)	Rated Voltage	KV	
h)	Rated capacity	MVA	
i)	Rated power frequency withstand voltage (rms)	KV	
j)	Rated impulse withstand voltage(1.2, 50us)	KVP	
k)	Rated Short time withstand current	KA	
l)	Rated Peak withstand current	KA	
m)	Busbar material		
n)	Main busbars insulation		
o)	Busbar rated continuous current	A	
p)	Max current Density for Bus bar	A/sq mm	
q)	Max. Permissible temp. rise at rated normal current		
r)	LOTO lock arrangement shall be provided for Cable compartment, Bus compartment and breaker compartment seperately		
s)	Separate doors section shall be provided for cable and bus compartment separately with handle arrangement		

	t)	Degree of Protection for enclosure / Partitions / for meters, relays and BCU		
	u)	CT, PT, breaker name plate details shall be embossed on front door panel		
	v)	Extendable Circuit Breaker Test Plug for test purpose length of 10 Mts		
	2	**CIRCUIT BREAKER**		
	a)	Standard		
	b)	Type		
	c)	No of poles		
	d)	Rated load breaking current (sym)	KA	
	e)	Rated short circuit withstand current	KA	
	f)	Rated short circuit making current	KA	
	g)	Isolation		
	h)	Rated Voltage	KV	
	i)	Service voltage	KV	
	j)	Rated frequency	HZ	
	k)	Rated Insulation Level		
	i)	Lightning impulse withstand voltage	KVP	
	ii)	One min. power frequency withstand voltage	KV (rms)	
	l)	Rated operating sequence		
	m)	Opening time	msec	
	n)	Arcing time	msec	
	o)	Total break time	msec	
	p)	Making time	msec	
	q)	Temperature Rise		
	3	**OPERATING AUXILIARY VOLTAGES**		
	a)	Control and signalling voltage		
	b)	Spring Charging Motor (Universal Motor)		
	c)	Heater and lighting circuits		
	d)	No. of spare auxiliary contacts		
	4.1	**CURRENT TRANSFORMER**		
	a)	Type		
	b)	Short circuit withstand		
	c)	Location		
	d)	Ratio		
	e)	Burden & Class (Metering and Protection)		
	i)	Core –I		
	ii)	Core –II		
	iii)	Core-III		
	f)	Ratio		
	g)	Burden &Class (Differential)		
	i)	Core- I		

ii)	Make of CTs			
5	**VOLTAGE TRANSFORMER**			
a)	Make			
b)	Location			
c)	Mounting arrangement			
d)	Ratio			
e)	Burden &Class			
i)	Core- I			
ii)	Core –II			
Iv)	Ramp provided for rack in/rack out			
6	Protection , Control, Metering & Communication			
7	MIMIC Diagram on Relay			
8	Provision of flag indications and contacts for remote annunciation for Self powered backup relay for incomers			
9	Electrically reset type, High speed relay for tripping.			
10	Anti-pumping Relay			
11	Makes for Auxiliary Relays			
12	Provision of DC fail Relay for each panel			
13	PT back charging lamp shall be provided on backside of individual breaker panel.			
14	**OTHERS**			
a)	Cable charge indication			
b)	TNC Switch			
c)	Local/Remote switch			
d)	Indication Lamps CB ON/OFF			
e)	Indication Lamps CB Auto Trip			
f)	Indication Lamps for CB Test /Service positions			
g)	Spring charged indication			
h)	Trip ckt. supervision scheme			
i)	MCB for AC			
j)	MCB for DC			
k)	MCB for space heater			
l)	MCB for VT's			
m)	Trip alarm scheme with hooter, Accept/Reset PB etc			
n)	Panel anti-condensation heater with thermostat.			
o)	Panel illumination lamp with switch			
p)	15 A, 3 pin socket.			
q)	Makes of indicating lamps			
r)	Makes of MCB			
s)	Wiring of breaker auxiliary contacts up to terminals			
t)	Makes for Fuses / Fuse bases			

	u)	CB handling trolley		
	14	**BCPU** (Bay Control and Protection Units)		
	14.1	BCPU Functions (as per IEC/IEEE/ANSI/NEMA)		
	14.2	Accuracy class of internal energy meter		
	14.3	Input / Output capacity per BCPU		
	14.4	System Frequency		
	14.5	Rated current		
	14.6	Auxiliary Voltage		
	14.7	Timing Accuracy		
	14.8	Sampling Rate:		
	14.9	Sequential Events & Recorder memory		
	14.10	Environment		
	14.11	Ingress Protection		
	14.12	Protection functions for BCPU		
	14.13	Additional separate protection if any		
	14.14	Feeder protection, and transformer differential protection relays shall be considered seperately		
	15	Software tools		
	15.1	Communication Ports		
	15.2	Protocols		
	15.3	Recording		
	15.4	Level & security of Operation		
	15.5	Time Synchronisation		
	15.6	Adherence to standards		
	15.7	Control function		
	15.8	Password protection		
	15.9	Configuration tool		
	15.10	Integrated checks		
	17	Commissioning activity		
	17.1	Integrated FAT considered		
	17.2	Deputation of Project Manager at site considered		
	18	**Castle key interlock to be provided in such a way that for opening of back door castle key shall be required.**		
	19	**The back door opening shall be possible only when cable is in dead condition**		
	20	**The opening of shutter shall be prevented when the breaker truck is racked out & either main bus or cable compartment is energised.**		

	Electrical interlock of cable side shutter & bus side shutter to be provided to prevent opening of shutters when breaker is racked out.		
21	Panel paint thickness	120 micron	

General Technical Parameters of BCPU

S N.	Description	Specification
1.0	Approved vendors	SIEMENS/ABB/ALSTOM/SCHNEIDER
1.1	System Frequency	50 Hz
1.2	Rated current	5/1A
1.3	Auxiliary Voltage	220V DC +/- 20%
1.4	Timing Accuracy	10 µs or better
1.5	Sampling Rate	Disturbance events should be recorded up to 2 seconds at 8 kHz sampling rate and 5 seconds at 1 kHz sampling rate.
1.6	Sequential Events & Recorder Memory	Latest 1000 entries should be stored
1.7	Environment	Shall be suitable for continuous operation over a temperature range of 10ºC to 50ºC in accordance with IEC 60255-6**. The relays internal PCB board should coated with conformal coating.**
1.8	Ingress Protection	IP-54

	1.9	Protection functions for BCPU	POL & EF with Hiset1, Hiset2, IDMT Breaker failure Trip circuit supervision Synchro check / energizing check, Negative Sequence Current, VT supervision relay and Trip circuit supervision relay, Integrated CB failu.re protection, Configurable LEDs shall also be provided to indicate the BCPU operation and the alarm/status change of a bay equipment e.g. Phase Fault operated/ Earth Fault operated/ CB Open/ CB Close/ Spring charged etc., Auto Reclose (79) Protection, synch-check facility.
			Configuration of all input and output logical signals and binary inputs, Analog Inputs and relay outputs for all built-in functions and signals shall be possible both locally and remotely. BCPU must have broken conductor and fault locator facility
			Electrically reset type high speed, heavy duty relay (master trip 86) shall be used for tripping on operation of BCPU. Tripping coil hall be provided with independent potential free contacts from different fused DC supplies. The trip relay shall be supervised. Trip relay should be such that on resetting its flag should be automatically reset
	1.10	Protection functions for BCPU	Transformer protection, Differential protection
	1.11	Software tools	A user-friendly engineering and disturbance handling tool shall be available.
			It shall be possible to retrieve/download the disturbance records and parameterization of all BCPUs through Gateway/Master.
			It shall be possible to access the BCPU

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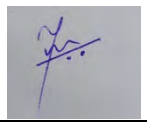
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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				remotely from the Master Station for configuration / maintenance activity. The bay control shall have multilevel passwords to safeguard bay control, logic, and automation settings.
				User friendly on-line monitoring facility of real time data shall be provided to maintenance engineer for monitoring/analysing the real time status of the process, program logic from the engineering station (Configuration tool – Laptop).
				BCPU should support all BO's as per attached IO list. BCPU should possess minimum 16 No BI's and 8 No BO's
		1.12	Breaker Health Monitoring	BCPU should support Breaker Health monitoring feature like opening time, closing time, I^2t, etc.
		1.13	Group Setting	BCPU should support Group setting change control from remote as well as local.

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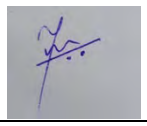
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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21.0 SCHEDULE OF DEVIATION

The bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications.

(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

Sr. No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company **Signature :**

Designation :

Annexure 1:

Inspection Testing Plan

1. Dielectric test on main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Dimensions and visual checks
5. Mechanical operation test
6. Partial Discharge measurement

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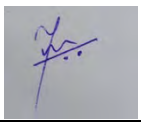
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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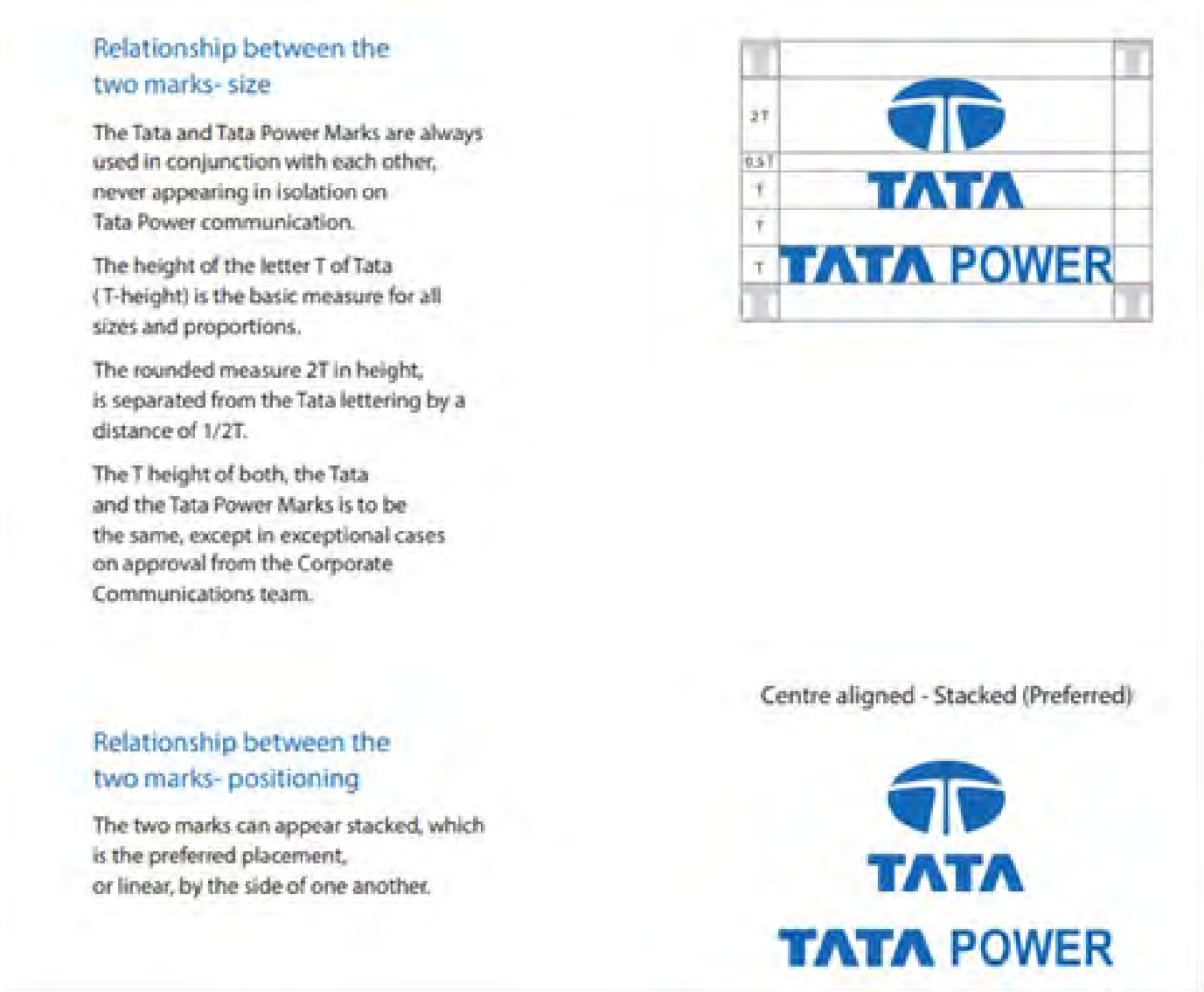
Annexture-2

Tata power Branding Name plate -

Separate metallic name plate with Tata Power Logo of Dimension 12*12 Inches in clear font as shown below.



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TECHNICAL SPECIFICATION

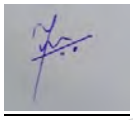
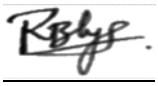
22KV INDOOR ICOG PANEL with BCPU RELAY

The Tata Power Company Ltd.
Engineering Services (ENSE),
Distribution Division,
Senapati Bapat Marg,
Lower Parel,
Mumbai – 400013
Maharashtra

TECHNICAL SPECIFICATION COVER SHEET

Document No: ENSE-DS-2039-R00

Document Title: SPECIFICATION of 22 kV INDOOR ICOG PANEL with BCPU relay

00	**For tender purpose (ENSE-DS-2039-R00)**	**08/02/24**	**Y.M.M.**		**A.V.P.**		**R.M.B.**	
Rev No.	Remarks	Date	Initials	Sign	Initials	Sign	Initials	Sign
			Prepared By		Checked By		Approved and Issued By	

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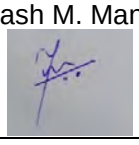
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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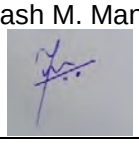
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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1.0	**SCOPE**	This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store and performance of 22kV, 1250 AMP VCB panels complete with all accessories. It is not the intent to specify completely herein all details of the equipments nevertheless the equipment shall be complete and operative in all respects and shall confirm to the highest standard of engineering, design and workmanship of International Standards/IEC. The scope also covers installation, testing, commissioning of 22KV panels at site along with SCADA interfacing and associated earthing, inter panel wiring. The bidder shall be responsible for engineering and functioning of the complete system, meeting the intent and requirement of this specification and data sheets. Bidder should depute project manager at site for monitoring and co-ordinating commissioning activity. It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform to practices consistent with sound environmental management and local statues. It is also expected that equipment shall comply in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TATA POWER, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble-free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not. **Note: Bidder shall be OEM of 22kV ICOG Indoor Breaker Panel.**
2.0	**APPLICABLE STANDARDS**	The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest editions of the following standards/IEC and shall conform to the regulations of local statutory authorities. a) IEC 60068-1:2013: Environmental testing - Part 1: General and guidance b) IS 2705: Current Transformers c) IS 3156: Voltage Transformers d) IS 16227-1: Instrument Transformers e) IEC 62271-200: High-voltage Switchgear and controlgear f) IS 694: PVC insulated cables for working voltage up to and including 1100V g) IS 2629: Recommended practice for Hot Dip Galvanizing of iron & Steel h) IS 2633: Test for uniformity of Zinc Coating. i) IEC 60445:2021: Identification of equipment terminals, conductor terminations and conductors j) IEC 62053-22: Static meter for active energy (Class 0.2s and 0.5s) k) IEC 60255: Measuring Relays and Protection Equipment l) IEC 60529: Degrees of Protection provided by enclosures (IP Code). m) IEC 62271-100: HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR: Alternating current circuit breakers. n) IEC 62271-200: High voltage switchgear & control gear: Metal-Enclosed Switchgear and Control gear. o) IEC 62271-1: High voltage switchgear & control gear: Common specifications. p) IEC 61010-1: Safety requirement for electrical equipment for measurement and Laboratory use. q) IEC 61850: Communication networks and systems for power utility automation (all parts including IEC 61850-8-1, IEC 61850-9-2).

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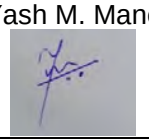
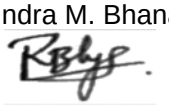
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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r) IEC 61588/IEEE 1588v2: Precision clock synchronization protocol for networked measurement and control systems
s) IEC 62351: Power systems management and associated information exchange Data and communications security.
t) IEC 60060 : High-voltage test techniques.

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION

1	Maximum ambient temperature	43 deg.C
2	Max. Daily average ambient temp	35 deg.C
3	Min Ambient Temperature	07 deg.C
4	Maximum Relative Humidity	100%
5	Minimum Relative Humidity	40%
6	Average No. of thunderstorm per annum	50
7	Average Annual Rainfall	2380mm
8	Average No. of rainy days per annum	115
9	Rainy months	June to Oct.
10	Altitude above MSL not exceeding	300 meters
11	Average Air Pressure	29.6-inch Hg

Atmosphere is generally laden with mild acid and dust suspended during summer months and subjected to fog in winter months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

4.0 GENERAL TECHNICAL REQUIREMENTS

Sr No.	Description	Requirement
1.0	**SWITCHGEAR PANEL**	
1.1	Architecture	Vacuum Insulated Metal Clad
1.2	No. of Phases	Three
1.3	Rated Voltage	24 kV
1.4	Service Voltage	22 kV
1.5	Rated Frequency	50 Hz
1.6	Rated Lightning Impulse withstand voltage	125 kVp
1.7	One Minute Power Frequency Withstand Voltage	50 kV rms
1.8	Rated short time withstand current	25 kA for 3 sec
1.9	Peak withstand current rating	62.5 kA
1.10	Normal service condition	Indoor
1.11	Internal arc Protection	IAC-A FLR as per IEC 62271-200, Shall withstand 25 kA for 1 sec.
1.12	Degree of Protection Enclosure / Partitions / for meters, relay & BCU	IP4X – Enclosure IP2X – Partitions IP5X or equivalent to completely protect against dust ingress.
2.0	**BUS BAR**	
2.1	Type	Extensible on both sides
2.2	Bus bar continuous rated current	1250 A
2.3	Bus bar material	Copper with Silver / Tinned Coated contacts
2.4	Rated short time withstand current	25 kA for 3 sec

	2.5	Max. permissible temperature rated normal Current	The maximum permissible current temperature for bus bar shall be as per IEC
	3.0	**CIRCUIT BREAKER FOR IC/OG (INCOMER AND OUTGOING FEEDER)**	
	3.1	Application /Class	Indoor
	3.2	Type of circuit	Vacuum (VCB)
	3.3	No. of poles	3
	3.4	Rated Voltage	24 kV rms
	3.5	Rated Insulation Level	22 KV
	3.6	Lighting impulse	125 kV peak
	3.7	One minute power frequency withstand	50 kV rms
	3.8	Rated frequency	50 Hz
	3.9	Rates normal current	1250 A
	3.10	Rated operating sequence	O-t-CO-T-CO (t=0.3sec, T= 3 min.)
	3.11	Max. Spring Charging Time of Motor	10 sec
	3.12	Max. Power consumption of Trip & close coils	100 W
	3.13	Rated load breaking current (sym)	25 kA rms
	3.14	Rated short circuit withstand current	25 kA rms for 3 sec
	3.15	Rated short circuit making current	62.5 kA peak
	5.0	**OPERATING AUXILIARY VOLTAGES**	
	5.1	For Protection relays	220V DC
	5.2	For Ant condensation Heaters	220V AC
	5.3	Spring Charging Motor (Universal Motor)	230V AC
	5.4	No. of spare auxiliary contacts with wring	8NO + 8 NC
	6	**VOLTAGE TRANSFORMER**	
	6.1	Location	Access from Front side of the panel and VT should be for incomer side
	6.2	Type	Plug In type, Dual ratio
	6.3	Ratio	22KV/√3 / 110/√3 -110/√3
	6.4	Core Details	Core-I / Core-II
	i)	Accuracy class	0.2 / 3P
	ii)	Burden	50VA / 50 VA
	7	**CURRENT TRANSFORMER**	
	7.1	For Metering and Protection	
	7.1.1	Ratio	300 – 600 /5 -5 A
	7.1.2	Burden & Class	
	i)	Core –I	0.2S , 10VA; Isf < 5

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		ii)	Core –II	5P20, 10 VA
		7.3	For Differential Protection	Incomer
		i)	Ratio	300-600/5 A
		ii)	Core- III	PS, 10 VA
5.0	**GENERAL CONSTRUCTION**			
5.1	**Switchgear**			

1. All supplied Units shall be fitted with engraved metallic logo of “Tata Power” on the front side as per annexure.
2. The High Voltage Switchboard shall be metal-clad and shall comprise of standard prefabricated, CRCA sheet steel units assembled to form a rigid, freestanding, and dead-front structure. As a minimum, 2mm sheet steel shall be used for all front and rear doors and covers, and 1.6mm sheet steel for inter-panel partitions, Frame 3 mm, Removable Gland plate 3 mm. wherever required, stiffeners shall be provided to increase stiffness of large size doors and covers.
3. The switchboards shall be totally enclosed and vermin-proof. If necessary, openings for natural ventilation shall be provided. These shall be louvered and provided with wire mesh having opening less than 1mm. The enclosure shall have complete protection against approach to live parts or contact with internal moving parts.
4. Each unit of the switchgear shall have necessary internal sheet metal barriers to form separate compartments for circuit breaker, bus bars, instruments and relays, cable connections etc. Compartments for cable connections shall allow cable termination and connection work with the switchgear energised.
5. Independent pressure relief devices shall be provided for all HV compartments, i.e. bus bar, cable and breaker compartments and each compartment shall have type test certificate for withstanding internal arc fault.
6. All identical equipment and corresponding parts shall be fully interchangeable.
7. Safety barriers or shutters shall be provided to permit personnel to work safely within an empty compartment with the bus bars energised. The shutters should block the bus & cable compartments.
8. **The opening of shutter shall be prevented when the breaker truck is racked out & either main bus or cable compartment is energised. Electrical interlock of cable side shutter & bus side shutter to be provided to prevent opening of shutters when breaker is racked out.**
9. The draw out carriage on the switchboard shall have three positions: "Service", "Test" and "Drawout" viz:
10. "Full in" or "Service" position - In this position both power and control circuits shall be connected. This shall be the normal operating position of the circuit breaker.

11. "Test" position - The power contacts shall be disconnected in this position but the control connections shall not be disturbed, it shall be possible to close and trip the breakers in this position.

12. "Draw out" Position - both power and control circuits shall be disconnected in this position.

13. The circuit breaker shall be lockable in "service" and "test" positions. Automatic safety shutters shall be provided to ensure the inaccessibility of all live parts after the carriage is drawn out.

14. There shall be a distinct overall door for the breaker compartment, which can be closed with the carriage in draw out position and it shall be lockable type. All openings on the door shall be with a provision of padlock.

15. All circuit breaker modules of the same rating shall be inter-changeable. Suitable interlocks shall be provided to prevent the following operations:
    - "Plugging in" or "drawing out" of a closed breaker.
    - "Plugging in" a breaker with the earthing switch closed.
    - "Closing" of the earthing switch with the breaker "plugged in".
    - Pulling out the auxiliary circuit plug with the breaker in the service position.
    - Pushing in the breaker to the service position, with the auxiliary circuit plug not in position.
    - All operations behind closed doors.
    - It should not be possible to open front door when circuit breaker is closed in service position.
    - Mimic to be provided on front fascia of panel.
    - **The back door opening shall be possible only when cable is in dead condition.**
    - **Castle key interlock or mechanical interlock to be provided in such a way that for opening of back door castle key shall be required.**
    - **Cable back charge indicating LED on front & rear side of panel is to be provided.**

16. All hardware shall be corrosion-resistant. All joints and connections of the panel members shall be made by zinc-passivated, or cadmium-plated, high-quality steel bolts, nuts and washers, secured against loosening.

17. Suitable removable type eyebolts shall be provided for the lifting of the panel/shipping section. These bolts, when removed shall not leave any opening in the panels.

18. Switch board shall be designed for IP 4X. The covers and doors should only be opened when the part of main circuit contained in the compartment being made accessible is dead. Partitions of metal-clad switchgear and control gear shall be metallic and earthed. All the meters, detachable units of relays, relays and BCPU shall be minimum IP5X (For Low voltage) or with an equivalent provision to completely protect it against dust ingress.

19. The overall dimension should not exceed 3.0 M X 2 M x 2.8 M (DXWXH).

20. All foundation equipment, anchor bolts etc. including the supporting channel shall be furnished by successful bidder along with despatch of panels. The bottom plates of the panels shall be fitted with removable gland plates not less than 3mm in thickness.

21. Indicating instruments and meters shall be at a suitable height so that the lettering on the display can be easily read. Control switches/push buttons and relay resetting knobs shall be conveniently located for ease of operation. The center lines of the switches push buttons and indicating lamps shall be not less than 900 mm from the bottom of the panel. The centre lines of relays, meters etc. shall be not less than 450 mm from the bottom of the panel matched. Isolating switch fuse units shall be provided at the panel for incoming AC and DC supplies. Push buttons shall be made of non-hygroscopic material with shrouds. All other insulator shall also be made of non-hygroscopic material.

22. All the HV design shall ensure conformity to IEC-62271-200 Appendix 'A' and must be Type tested for Internal Arc Test. It shall withstand 25 kA for 1 sec. The suppliers shall submit Type Test report from CPRI/ERDA accredited laboratory to prove the above. Auxiliary and control equipments installed on the panel shall be suitably protected against disruptive discharge from main circuit. Bus bars shall be insulated with heat shrinkable insulating sleeves, wherever bare conductor is employed.

23. All indicating lamps shall be of LED type and suitable for continuous operation at 85% to 110% of their rated voltage LED and replaceable from the front of the panel.
    The following indicating lamps with colour shall be mounted over switchgear to indicate important status/alarm of breaker

    • Breaker ON---------- Red
    • Breaker OFF---------- Green
    • DC Fail ----------Amber,
    • Space Heater not healthy ----- Blue
    • Spring Charge---------- Blue
    • Trip coil healthy---------- White
    • Auto trip---------- Amber
    • Breaker in service----------Red
    • Breaker in Test----------Service
    PT back charge AC lamps should be provided
    R ph Healthy LED ------RED
    Y ph Healthy LED ------YELLOW
    B ph Healthy LED ------BLUE

All colour caps shall be similar and interchangeable and all LEDs shall be of same type and ratings. The LED lamps shall be furnished 20% in excess of actual numbers required.

24. All grounding system, special tools and tackles, O&M manuals etc. required for erection, operation, testing and maintenance of switch gear shall be supplied within the quoted price.

25. The offered equipment shall be brand new with state of art technology and proven field track record. No prototype equipment shall be offered. Vendor shall ensure availability of spare parts and maintenance support services for the offered equipment for at least for 15 years from the date of supply. Vendor shall give a notice of at least one year to us before phasing out the product/spares to enable the end user for placement of order for spares.

26. DC fail supervision relay (80) shall be provided on all control and relay panels. DC fail annunciation shall be provided on each panel and loss of DC & trip circuit fail alarm will be suitably annunciate at the panel as well as at the SCADA. All the relays and

auxiliaries shall have DC auxiliary supply. Identification of components shall be in agreement with the indication on the wiring diagrams and drawings. If a component is of the plug-in type, an identification mark should be placed on the component and on the fixed part where it is to be plugged-in. Control cables are to be placed in trucking and it should be suitable to accommodate 20% wiring for future modifications. The disconnection type details are as follows

I) Control supply in individual bay has to be distributed through MCBs of suitable rating for individual control function like

- Protection Relay
- Trip circuit – shorting links
- Close circuits
- Spring charging circuit
- Heating and lighting circuit

II) MCB shall be rated for 10kA short circuit rating. It shall be quick make, quick break, and independent manual type with trip free feature. The DC MCBs and AC MCBs ratings shall be separately mentioned and the panel having AC MCB of higher rating in lieu of DC MCB shall not be accepted. MCB shall have the following

- Over current protection
- ON/OFF Trip position indicators
- Auxiliary contact block (wherever required)

27. Wherever CB contacts are to be multiplied, latch type relay shall be used for contact multiplication. Auxiliary contact multiplier relays shall be reputed make and selected on the basis of continuous Current carrying capacity and rated voltage. The fluctuation in voltage level shall be accounted for (+/-) 10% continuously.

28. Fuse failure relay and trip circuit supervision relay shall be suitably selected, considering burden and auxiliary voltage. External circuitry like compensating resistances will not be accepted. Separate Trip circuit supervision relay not required if it is part of numerical relay.

29. Each switchgear panel shall have 20% spare terminals. The terminals should be droppable type. All equipments mounted on front side of the panel shall have individual nameplates with equipment designation engraved. Alarms for Trip & non-trip should be separate. The termination links for cables shall be segregated in vertical plane. The bidder shall deliver to site completely assembled, wired, tested panels and only the interconnecting cables shall be connected at site. The Bay Control unit shall have the provision to communicate with the future data concentrator in IEC 60870 -5-103 VDW implementation without any additional hardware.

30. Feeder protection, and transformer differential protection relays shall be considered alongwith the switchgear panel.

31. CT, PT, TRIP, CLOSE CT links shall be different coloured coded for easily identification in breaker panels for all Incoming and Outgoing panels.

32. CT, PT, breaker name plate details shall be embossed on front, back side of breaker panel.

33. Separate doors section shall be provided for cable and bus compartment separately with handle arrangement.

34. LOTO lock arrangement shall be provided for Cable compartment, Bus compartment and breaker compartment separately.

35. Cable back charge indication shall be provided on Front & Rear side of Cable compartment.

36. The back door opening shall be possible only when cable is in dead condition.

37. Castle key interlock or mechanical interlock to be provided in such a way that for opening of back door castle key shall be required.

38. All TB's in breaker control panel shall be DISCONNECTING Type

39. Extender of breaker plug is required which is used for breaker test in removed position.

40. **Hygrostat with space heaters to be provided in bus bar & cable compartment. Hygrostat shall be communicable type with Temperature & humidity data on central server through RS485 port.**

41. All auxiliary relays like contact multiplier, Transformer Device relays, Lock out relay shall be fast acting numerical relays with flag indication.

42. Status/indication of all draw out type power equipment's to be made available locally.

43. RYB Nomenclature/paint marking required on all Bus Bar and accessible location.

44. Status contact shall be used for only one application in control schematics.

45. Direct trip from relay BO to Trip coil also to be configured & indicated in the drawing for all panels.

46. Cut off timer to be considered for spring charging motor. Soft drop off timer required in CFC logic in series with Spring Charging Bl to keep the Close permissive High till the time spring remains discharged.

47. Separate Status contact shall be used for relay Bl's and local indication Lamp.

48. Relay DC supply and Trip Circuit Supervision shall not be under the same DC MCB. Separate MCB for relay to be provided.

49. The shutter mechanism in the breaker cubicle shall operate automatically i.e. when the breaker truck is racked in or out. Shutters provided shall comply with IP2X.

50. The bidder can also consider Centralised Protection System with intelligent merging unit.

51. The bidder shall provide auxiliary relays for Transformer devices – PRV Main tank,

		OSR – OLTC, Buccholz, MOG Main tank, MOG OLTC, OTI, WTI
5.2	**Circuit Breaker**	a. Vacuum circuit breakers shall be used in the switchboard. Breaker transport trolleys required for cassette mounted breakers shall be provided for each switchboard. b. The breaker shall be of class M2, E2 [w/o auto reclosing duty], and C2. The breaker shall be encapsulated with no live part exposed within breaker chamber. c. Vacuum circuit breakers shall be designed to have low switching-over voltage levels and with a long switching life. The interrupter shall be leak-free. d. The breakers shall have at least 4 normally open (NO) and 4 normally closed (NC) spare auxiliary contacts for purchaser's use. If these are not available, auxiliary relays shall be used to multiply the auxiliary contacts of the breakers. e. The breakers shall have a motor-operated, spring-charged mechanism. It shall also be possible to charge the springs manually. The closing spring shall get re-charged (for subsequent closing) soon after a closing shot and prior to breaker tripping. In case the limit switch fails to cut out the spring charging motor with the springs fully charged, the motor shall be automatically decoupled. f. The control circuit shall be suitable for local as well as remote control. Breakers shall be trip-free and shall have an anti-pumping device. The breaker operating duty shall be O-0.3 sec-CO-3 min CO. g. Operating Mechanism: Electric power operating mechanism shall be motor wound spring charged stored energy type. However, manual-operating mechanism may be of the spring charging stored energy type or the spring assisted type. For circuit breakers with electrical power operating mechanism, provision shall also be made for manual spring charging. Closing time of circuit breakers with manual operating mechanism shall be independent of the speed of the operating handle. h. All stored energy operating mechanism shall be equipped with following features. • Failure of springs, vibrations or shocks shall not cause unintended operation of breaker or prevent intended tripping operation. • Closing of circuit breakers shall be prevented unless the spring is fully charged. i. All electrical power operating mechanisms shall be suitable for remote operation and shall be equipped with following features. • Provided with universal motor operable on AC or DC control supplies. • Provided with emergency manual charging facility. The motor shall be automatically, decoupled (mechanically) once the manual-charging handle is inserted. • Closing operation of circuit breaker shall automatically initiate charging of the spring for the next closing operation without waiting for tripping of circuit breaker. • Closing operation shall be completed once the closing impulse is given and the first device in the control scheme has responded even though the control switch / Push Button is released provided no counter trip impulse is present. j. Circuit breaker trip and closing coils in case of electrically operated breakers and trip coil in ease of mechanically operated breakers and circuit breaker indication shall be suitable for satisfactory operation on a control supply system indicated in data sheets/job specification. k. All circuit breakers shall be provided with mechanically operated emergency trip device. This device shall be available on the front of the panel. Mechanically operated 'closing' device shall be provided for all breakers. However mechanical closing shall be inhibited for all circuit breakers in service position. l. The breakers shall be provided with anti-pumping & trip free provision. Each breaker shall be also provided with an operation counter. m. Line PT shall be mounted in a separate draw out carriage. In case of truck mounted breaker, line PT shall be provided in a separate panel n. The complete breaker assembly should have inter-changeability with breakers of

		identical ratings. o. Breaker shall be with temperature sensor for monitoring the temperature. p. The Limit switch base in breaker shall have better material having long life.
5.3	**BUS BARS AND CONNECTORS**	1. The switchboard shall comprise of 3-phase bus bars which shall extend through all units of the switchgear line-up. The main bus bars shall have uniform cross-section throughout their length, and shall be sized to carry continuously the rated current specified in the data sheet. 2. Bus bars shall be of high conductivity electrolytic copper supported on insulators made of non-hygroscopic, non-inflammable material with tracking index equal to or more than that defined in Indian standards. 3. Bus bars shall be housed in a separate chamber and shall be accessible for inspection. Wire guards shall be provided inside the enclosure to allow visual inspection of bus bars, to avoid accidental contact when the cover is removed. 4. Both bus bars and the supports shall be adequately sized and braced to withstand the specified short-circuit current for 1 second. Dynamic stresses shall be calculated on the basis of the specified peak short-circuit current. All bus supports shall be of non-carbonising material, resistant to acids and alkalis. 5. Bus bars shall be insulated by using heat-shrinkable sleeves. The sleeves shall be rated to withstand the system line-to-line voltage for 1 minute. This shall be verified by a type test in which the line voltage will be applied between the sleeved main bus bar and an aluminium foil wrapped closely around the insulation over a length of at least 500mm. 6. All bus bar joints and all tap-off connections from the main horizontal bus bars shall be provided with removable FRP shrouds. 7. Bus bars shall be prominently marked with red, yellow and blue colour rings for easy phase identification at regular interval and at every power tap off point. 8. The thermal design of the bus bars shall be based on installation of the switchgear in poorly ventilated conditions. The cooling air volume shall take into account only the bus bar enclosure. 9. The hot spot temperature for bus bars including joints at design ambient temperature shall not be formed and shall be as per IEC for normal operating conditions. 10. Only zinc passivated or cadmium plated high tensile strength steel bolts, nuts and washers shall be used for all bus bar joints and supports. 11. The current rating as defined for switchboard and components in data sheet/job specification are for design ambient temperature at site conditions and for being inside the cubicle at fully loaded condition. The vendor shall suitably derate the nominal rating to suit the above condition. 12. It shall be possible to earth all busbar sections in make-proof way.
5.4	**CURRENT TRANSFORMER**	1. Current transformers shall be cast-resin insulated. The primary and secondary terminals shall be marked indelibly and easily approachable for termination and testing etc. 2. Current transformers shall conform to IS: 2705. The short-time rating shall be equal to that of the switchboard. They shall be mounted on the stationary part of the switchboard. Protective CTs shall have an accuracy class of 5P and an accuracy limit factor greater than 10. CTs for instruments shall have an accuracy class of 0.2S and an instrument safety factor less than 5.0. One leg of the CTs shall be earthed. 3. Separate CT core of class PS shall be provided for Differential protection. 4. All CTs shall be star connected. 5. Proper access to each set of CTs shall be provided for repair / maintenance.

		6. The polarity of the primary and secondary windings of each transformer shall be clearly indicated at the respective terminals and in addition labels shall be fitted in a readily accessible position to indicate the ratio, class duty of each transformer. The CT ratios shall be as per the details specified in this specification's; secondary shorting shall be done by black colour 2.5 sq. mm black wires. 7. The TTB should be provided for metering core with droppable links for Energy meter requirement. 8. The TTB details are as follows: DAV make 50 Amps, Screw type, front connection disconnecting type. 9. All the wires should be connected from top and bottom side and fixed top mounted on door. **10. The CTs in the panels & Spare CTs shall be applied with silicone paint.**
5.5	**Voltage Transformer**	1. Voltage transformers shall be cast-resin insulated. The voltage transformers shall conform to IS: 3156. The voltage transformers shall be of draw out type, and shall be provided with 4 pole miniature circuit breakers with auxiliary contacts on the secondary side. 2. The draw out mechanism shall disconnect the VT from the bus bars. The primary connection shall be disconnected before the VT become accessible. Neutral point of the star connected VTs both on the primary and secondary sides shall be earthed in test position also. 3. The VTs shall have an over-voltage factor of 1.9 times for 30 seconds, and an accuracy class of 0.2 from 10% to 120% of normal voltage. VT selected shall be compatible with system grounding. 4. The primary rated voltage shall be equal to V/~3 (phase and neutral). 5. If not otherwise specified, the secondary voltage shall be 110 / Sq.rt of 3 V. The burden and class of accuracy shall be as specified in SLD. 6. A separate truck should be provided for easy racking out/racking in the VT unit. 7. VPIS 2NO+2NC shall be present in each Outgoing feeder with 230V (+or-) 10% DC aux voltage. 8. VT back charging lamp shall be provided on backside of individual breaker panel. **9. The VTs in the panels & Spare VTs shall be applied with silicone paint.**
5.6	**PROTECTION METERING & CONTROL**	a) All the Bays (Incomer / Outgoing feeder switchgears) shall be provided with Integrated Bay Control, Protection & metering Unit (BCPU). b) The BCPUs shall communicate at station level on IEC 61850 protocols and with local and existing remote master on IEC-104 protocol. c) The BCPU shall support fibre-optic port (In and Out) for fault-tolerant fibre optic ring or RJ-45 port for making star connection at switch. Also the BCPU should support centralized parameterization and DR files downloading from remote. d) The BCPUs shall have capability to communicate with multiple masters on independent network. e) Web browsing feature should be available in BCPU. f) Provision of TTB to be made with respect to future revenue meter installation. All the metering CTs/PTs (Bus PT) to be wired up to TTB for revenue meter installation. The meter size is 300X180X180. g) The 10 Nos. flag relays combiflex RXME1 fast acting type to be provided in the 22KV panels for transformer trouble identifications. h) Bidder to provide all necessary configuration, testing, health monitoring tools (Hardware & Software) for the proposed system. i) All droppable type links of Connect well (CDTTS) or elmax to be provided in the

		panels. j) The Multi-Function Meters shall be Communicable to RTU on Rs485 MODBUS. This can be eliminated by taking analog data from BCPU, current can be viewed in the BCPU itself & huge cabling work can be avoided. Aux supply shall be 220 V DC k) The buses to be supported with suitable insulators in order to avoid the vibrations. l) Overall design should be such that the Bay Control function is handled by the individual relays provided on the respective bays. m) Adequate spare DI /DO provision of BCU should be there for future station miscellaneous signals. n) Separate AC and DC MCB of 16 A to be provided for AC and DC. o) Extendable Circuit Breaker Test Plug for test purpose length of 10 Mts p) Locally copper bar to be installed in Control Panel as an extension of main Earth Bus. All peripherals body earthing are connected to copper bar through green color 2.5 sq mm wire. q) All CT Neutrals shall be grounded individually to the Copper Strip
5.7	**BCPU**	1) The offered BCPU shall have feeder protective elements having software algorithm based on Sampling of energized currents, analog to digital conversion and numerical handling. 2) The BCPU shall support over current / Earth fault protection function. (50/51 Ph & N) With definite Time or inverse time over current characteristic. Broken conductor function shall be provided 3) The inverse characteristics shall as per IEC which should include normal inverse, very inverse, Extremely inverse, long inverse curves and shall be soft ware selectable at site. 3a) BCPU should have minimum 2 nos. independent selectable setting groups. 3b) Circuit Breaker failure protection: BCPU should have a feature of circuit breaker failure protection, which generates another trip signal if the breaker fails to trip on fault, which can be wired to upstream breaker trip coil. 4) The BCPU shall have minimum 3 PT inputs and 4 CT inputs with ring type lugs termination facility, which can be used as 3 Nos. over current and 1 Earth fault. 5) BCPU shall have configurable binary input, which can be used to develop blocking based scheme and minimum five nos. of freely configurable output contacts. BCPU shall have adequate BIs and BOs required for Local and Remote monitoring and control. BCPU shall be modular & expandable to accommodate the required BIs and BOs for monitoring and Control. Separate contact outputs shall be used for remote control (SCADA open/Close) and Trip functions. 6) The Input shall have galvanic isolation. The trip out put contact should be capable of controlling the circuit breaker and shall be programmable for either hand reset or self-reset. 7) The BCPU enclosure shall be dust tight having degree of protection minimum as IP5X. 8) The BCPU must have facility for local settings and control through front keypad from relay itself. Relay should have facility of online relay setting i.e. it should be possible to alter setting without switching off breaker. 9) The offered BCPU shall have LCD display for monitoring and control, settings, status, measurement and fault data & indication. It shall also have Fixed function LEDs for fault

trip, relay healthy, control supply ON & Relay out of service.

10) BCPU shall have comprehensive self-diagnostic feature with indication of relay failure on relay front and alarm should be generated without tripping the feeder. However, while diagnostic algorithm runs, it must not interfere in the main protective relay circuit and allow working of main protective circuit continuously.

11) The BCPU shall support FDR (Fault disturbance Recording) for minimum 5 Nos. of latest fault trip records.

12) The BCPU shall support metering function (of CL0.2) for Energy (trivector parameters), and panel metering (Line currents, voltage, PF etc). The Energy Measurements shall be as per 3-wattmeter method. Bidder shall mention the accuracy of all analog measurements.

13) No separate earth bus shall be required for the BCPUs. It shall be possible to connect the relay earth to the common earth bus in the substation.

14) The offered relay must be immune to any kind of electromagnetic interference. Vendor to submit all related type test reports for the offered model along with the offer.

15) The relay should conform to the requirements of IS: 3231 / IEC60255 standards with respect to features/ construction/design etc.

16) The relay shall have built in communication facility for hooking the relay on MMI / upstream communication system. Manufacturer of relays having their own Substation Automation System shall be preferred. So that they shall be possible to provide a system solution also if required in future.

17) BCPU software should be supplied along with relays for viewing and downloading measurement, fault records and to carry out easy settings of relays locally.

18) BCPUs shall be suitable for flush mounting type and consisting of multifunctional draw out type modules.

19) BCPU should have direct connectivity to the Copper ground bus of the switchgear installation.

20) BCPU relay PCB's and other electronic devices should be CONFORMAL coated.

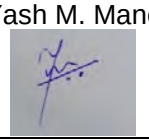
21) BCPU should have minimum of 16 Binary Inputs and 10 Binary Output Channels for Substation and other Aux. Signals.

22) The BCPU for differential protection shall have minimum 3 PT inputs & 8 CT Inputs with ring type lugs termination facility. The BCPU Differential relay shall have biased current differential numerical protection with REF, and Directional O/C & E/F protection. It should include the following features:

Vector group compensation.

CT ratio correction.

Biased differential protection.

Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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High-set. Element of suitable setting range

2nd and 5th Harmonic restrains.

Transformer trouble alarm/ Trip e.g. Bucholz / PRD / Winding Temp / Oil Temp etc. shall be taken as binary inputs in the differential BCPU as a common input indicating "Transformer trouble". However, auxiliary Flag relays shall be provided independently for Transformer trouble and trip along with the panel.

BCPU shall be suitable for both residually connected CT input as well as CBCT input. BCPU shall have 2 CT inputs separately for NCT in 22 KV INCOMERS

23) Protection against CT, PT transients, CT saturation blocking feature to be provided in BCPU relay

Tata Power Approved Relays

Application	Make-1 Siemens	Make-2 ABB	Make-3 Schneider	Make-4 Areva
Transformer Differential Relay	7UT61	RET620	---------	MICOM P642
Feeder protection Relay	7SJ66 , 7SJ63	REF615/REF620	P3	------

7.0 Communication software of BCPU

Relay	Make	Software
REF615	ABB	PCM 600 2.7
		PCM600 2.6
REF620	ABB	PCM 600 2.6
REF630	ABB	PCM 600 2.5
		PCM 600 2.6
7SJ63	Siemens	P-Set 04.67.01
7SJ66	Siemens	Digsi 4.92
7UT61	Siemens	Digsi 4.92
P3	Schneider	Easergy

Note: 1. All higher version software should be capable of communicating with old version relay or support should be provided interms of providing appropriate software/Firmware. For siemens relay the vendor should supply digsi software installed laptops as single laptop does not support multiple digsi version.

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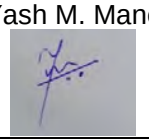
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
	05/02/24	05/02/24	05/02/24

1. HMI (Front Display):

1.1. The intuitive user interface and the various communication interfaces allow easy control and monitoring of the switchgear units, simple and comprehensive setting as well as access to readings of extensive recordings.

1.2. It shall be possible to equip the BCPU with a large HMI for local control, visualization of single line diagrams with analog, alarms and overview of service status (Breakers and Isolators).

1.3. The graphical display shall be easily configured by means of symbol library.

1.4. The HMI shall include LEDs for status indication and at least 15 configurable LEDs for alarm indication.

1.5. The front display shall be able to work in harsh environment, and temperature up to 70°C.

1.6. Vendor to deliver the HMI display, which shall not blacken out after in use of the BCU life time.

2. **Communication Ports:**

2.1. A galvanic isolated front port shall be available for connection of a personal computer for configuration.

2.2. At least 2 No. Fiber optic port IN and OUT, for fault tolerant fiber-optic ring, RJ-45 port for making star connection at switch.

2.3. 2 Nos. IP ports are required and each port would have capability of communicating minimum 8 no. of SCADA masters simultaneously.

3. Protocols:

3.1. IEC 61850-8-1, communication protocol shall be available. The BCPU shall meet the IEC 61850 standard in every respect. Interoperability and interchangeability and

with other manufacture's BCPU and tools will be preferred.

3.2. Data exchange is to be realized using IEC 61850 protocol with a redundant managed switched Ethernet communication infrastructure.

3.3. All the BCPUs must be fully IEC 61850 compliant and must have the following features.

- Have peer-to-peer communication using GOOSE messages (IEC 61850) for interlocking/ protection schemes.
- Should be interoperable with third party IEC 61850 compliant devices
- Should generate XML file for integration/engineering with vendor independent SCADA systems.
- Should be directly connected to the fiber optic ring and communicating on IEC 61850 without the use of any gateways.

3.4. IEC61850 GOOSE messaging shall be used to transmit BI's data quickly on the fiber optic LAN to reflex automation/protection schemes.

3.5. IEC 61850 support - Interoperability table shall be provided

4. Communication Architecture:

4.1. The BCPUs shall be connected on Fiber Optic 10/100 Mbps network with ring topology and communicate with each other as well as Gateway using IEC61850 with GOOSE message.

4.2. The communication shall be made in fiber optic fault tolerant ring, excluding the links between EM to individual bay BCPUs to switch wherein the redundant connections are not envisaged, such that failure of one set of fiber shall not affect the normal operation of the switchgear.

4.3. However failure of fiber shall be alarmed on Purchaser's SCADA System. Each fiber optic cable shall have minimum two (2) spare fibers.

4.3 BCPU's should have front RJ45, serial usb or DB-9(RS 232) port for front or direct communication with laptop. In case of DB-9 port vendor has to provide RS232 to

USB converter with BCPU's.

5. **Algorithm and Logic:**

5.1. The BCPU shall be based on advanced and proven algorithms and an easy and efficient upgrade of the BCPU functionality shall be possible.

5.2. The application software within the control/protection devices shall be programmed in a functional block language.

5.3. The BCPU shall be provided with programmable logic for tripping and indications as well as a sufficient number of logic blocks and timers for user adaptation.

5.4. Command is always to be given in two stages: selection of the object and command for operation under all mode of operation except emergency operation. Final execution shall take place only when selection and command are actuated (Select-before-execute).

5.5. It shall also be possible to interconnect and derive input and output signals, logic functions, using built-In functions, complex voltage and currents, additional logics (AND-gates, OR gates and timers). (Multi-activation of these additional functions should be possible).

5.6. A delay/integrator shall allow the pick-up and reset of binary signals to be delayed before being displayed or used to control other functions.

5.7. Refer below matrix for controlling of the switchgear.

PANEL	BCPU	SCADA OPEN	SCADA CLOSE	BCPU OPEN	BCPU CLOSE	TNC OPEN	TNC CLOSE
REMOTE	REMOTE	Y	Y	N	N	N	N
REMOTE	LOCAL	N	N	Y	Y	N	N
LOCAL	REMOTE	N	N	N	N	Y	Y
LOCAL	LOCAL	N	N	N	N	Y	Y

6. **Self-Supervision:**

6.1. The BCPU shall have extensive self-supervision including analog channels.

6.2. Each BCPU shall be independent from each other and its functioning shall not be

affected by any fault occurring in any of the other bay control units of the station.

6.3 Command execution timer (configurable) must be available for each control level point. If the control Action is not completed within a specific BCPU time, the command should get cancelled (Run Time Command cancellation). In case of restoration of communication links, power supply after failure, the Software along with hardware shall be capable of automatically synchronizing with the remaining System without any manual intervention.

7. Disturbance & Event Recording:

7.1. The protection system shall include an inbuilt disturbance recorder function in each bay unit, which shall record

- 10 analog parameters including bay phase currents, voltages
- Minimum of 20 binary signals.
- Last 5 disturbances.

The sampling frequency of this disturbance recorder function shall be selectable from 2400 Hz, 1200 Hz or 600 Hz at 50 Hz. The recording period shall be at least 1.5 s at 2400 Hz. Minimum 10 trigger signals shall be available.

7.2. The disturbance recorder buffer memory shall be of non-volatile type and shall not require the use of batteries.

7.3. It should be possible to record the sum of selected analog currents. Summation of currents to be confirmed on BCPU.

7.4. An event recorder that can handle up to 1000 time tagged events per disturbance and that can record the last 5 disturbances shall also be included. The event recorder buffer memory shall be of non-volatile type and shall not require the use of batteries.

7.5. It shall be possible to retrieve the disturbance and event recorder information based on Comtrade format from a remote location shall be made available up to the gateway for further processing by Master.

7.6. All recorded disturbance data from BCPU shall be automatically uploaded (event triggered or once per day) to a Purchaser's SCADA Systems.

7.7. Automatic back up retrieval of relay database from remote should be possible.

8. Control and Monitoring:

8.1. The system shall incorporate the control, monitoring and protection functions specified, self-monitoring, signalling and testing facilities, measuring as well as memory functions, event recording and evaluation of disturbance records.

8.2. The BCPUs shall accept direct CT / PT inputs and provide the following minimum analog

Parameters at 0.2 class accuracy,

- Phase & Neutral Currents
- Phase Voltages
- Active & Reactive Power
- Active & Reactive Energy (Import & Export)
- Power Factor
- Frequency
- Demand

8.3. Control of protection relay systems in or out of service shall be available through BCPU

8.4. The operation shall depend on the conditions of other functions, such as interlocking, synchro check (if any), etc.

8.5. The analog values acquired/calculated in bay control/protection/Energy meter unit shall also be displayed locally on the BCPU HMI and in the SCADA Systems. The abnormal values must be discarded if BCPU's are used for analog measurements. The analog values shall be updated every 1 second.

8.6. Level of Operation with control rights along with sequence of operation to be clearly mentioned (Password Protection).

8.7. The commands are always to be executed in two stages: selection of the object and command for operation under all mode of operation except emergency operation. Final execution shall take place only when selection and command are actuated.

8.8. Command execution timer (user configurable) must be available for each Binary output. If the control action is not completed within a specified time, the command should get cancelled.

9. Power Supply:

9.1. Power supply modules from 48 to 250 V DC +/- 20 % shall be available

9.2. A redundant power supply module shall be available for the Gateway unit.

10. **Time Synchronization:**

10.1. Time synchronization will be effected through gateway.

10.2. Time synchronization interface: The unit shall be capable to synchronize the internal RTC via Communication ports on IEEE 1588,

10.3. Timing Accuracy: The bay control shall time-tag event reports to an absolute accuracy of 10 µs or better Bay controls at different system locations shall have the same absolute minimum timing accuracy.

10.4. BCPU shall capable to get synchronized from main as well as redundant gateway.

11. BCPU parameter setting:

11.1. It shall be possible to access all protection and control (logic) BCPUs for reading the parameters (settings) from the Purchaser's SCADA System or from a Central remote monitoring computer. The setting of parameters or the activation of parameter sets shall only be allowed after entering a password.

11.2. Level Wise enabling of settings with User Rights should be incorporated as per the

Password protection.

12. Test Function:

12.1. Vendor to provide the detailed test procedure for testing the BCPU functionalities using IEC61850, GOOSE Messaging and protection scheme implemented/proposed. Vendor to ensure availability of the required Hardware and software to test the above at the time of FAT and SAT.

12.2. The protection system shall support a test mode where it shall be possible to set or reset binary input Signals, signalling and tripping contacts individually or in groups.

12.3. All output relay contacts can be blocked via a setting and configuration program. Using the test function, it Shall be possible to set or reset signalling and tripping contacts individually.

12.4. A test sequencer for the local bay protection functions shall be part of the user interface program. Virtual Current, voltage and binary signals shall be programmable in a minimum of six different sequences to verify The correct operation of the respective functions and settings in the respective bay unit.

12.5. Vendor shall provide predefined saved cases for test sequence, during commissioning and for routine Maintenance.

12.6. Bidder should follow Standard BCPU IO wiring practice and Standard Alarm indication list. The same will be Shared and finalized during detail engineering.

10.0 Warranty

Vendor shall warrant that the equipment including software, hardware, firmware and associated documentation are free of defects in material and workmanship and from defects or faults in design, in so far as the equipment fails to meet the requirements of this technical specification, for a period of **60 months** from the date of supply **and 48 months** from final acceptance by the purchaser after completion of 30 days trouble free operation whichever is the earliest. With respect to defects in equipment part, vendor's liability is to make good by replacing the faulty equipment. It is the responsibility of the vendor to replace the faulty equipment within 7 working days.

After replacement of the faulty equipment, the purchaser will return parts that are defective to the vendor. The vendor will cover the cost associated with the shipping of defective or failed items during warranty period. The new equipment, parts shall be delivered to the purchaser's facility CIF (Cost, Insurance, and Freight) free of charge. With respect to software, the purchaser will notify the problem to the vendor, including a detailed description of the deficiency and associated condition. Vendor shall guide the purchaser for corrective action. If the same is not resolved, the vendor shall depute his personnel to attend the same within 24 hours from the time of reporting the problem. The system vendor will be fully responsible to resolve any such deficiency reported by the purchaser.

With respect to third-party software and consumable parts supplied, the vendor shall make reasonable effort to obtain the best warranties possible from the sub-vendor thereof and assign to the purchaser any such warranties to the extent that such warranties may be assigned to the purchaser. Vendor may consider longer warranties than included in these specifications. Vendor shall extend all warranties /guarantees to the purchaser, provided by sub-vendors, of duration longer than that in this specification.

11.0 Upgrades and Modifications

1) Vendor shall continuously keep the Purchaser informed of all Software and Hardware upgrades as & when these are released.
2) Vendor shall supply upgrades of all installed software (both own and third party) for a period of five years from the date of system acceptance without any commercial implication.
3) Vendor shall rectify all design defects and software bugs at no extra cost for a period of 5 years from the date of system acceptance.
4) Vendor shall provide lifetime support (15 years) for the system, even if no upgrades are implemented. The system referred to above includes Vendor's own as well as third party components.
5) Vendor shall port the supplied software onto upgraded hardware (as per Vendor's standard offerings) without additional Software License Fees.

12.0 Training

The vendor shall include in his offer Training for Tata Power engineers. The training

		shall cover development, integration, installation and commissioning of both software & hardware components of the system. The training shall have two parts 1) Training at Vendor's / Collaborator's Works(Before project commence) -5 man-weeks 2) Training at Site -5 man-weeks Bidder shall indicate per man-week rates for addition / deletion if any. The vendor shall provide Classroom as well as hands-on training on the system. All required training materials such as system catalogues, test instruments, demo equipment, and simulation jigs, etc. shall be provided by the vendor. The training shall equip the Purchaser's engineers for installation, commissioning, operation and post-warranty maintenance of hardware, software (Operating System, Administration and Applications), protocols and all third party systems.
5.8	**AUXILIARY SWITCHES AND CONTACTORS**	Auxiliary switches shall be provided on all circuit breakers for local, remote & SCADA indication, control and interlocking. With each circuit-breaker there shall be supplied all necessary auxiliary switches, contactors and mechanisms for indication, protection, metering, control, interlocking, supervisory and other services. All such auxiliary switches shall be enclosed in dust free housing. Not less than four spare auxiliary switch ways shall be provided with each circuit breaker. All auxiliary switches shall be wired up to a terminal board on the L.V panel of the switchgear whether they are in use or not in the first instance and shall be arranged in the same sequence on all equipment.
5.9	**TERMINAL BLOCKS**	a) The terminal blocks shall be 1100 V grade, 10 A rated, one piece moulded, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts and identification strips. The terminal blocks for CT shall be of disconnecting type. Markings on the terminal strips shall correspond to wire numbers on the wiring diagrams. The terminal blocks shall be fully enclosed with easily removable covers and made of moulded non-inflammable plastic material. b) A minimum clearance of 250 mm between the first row of terminal blocks and the associated cable and plate shall be ensured. Also the minimum clearance between two rows of terminal blocks shall be 150mm. c) All spare contacts and terminals of the panel mounted equipment and devices shall be wired to terminal blocks. All the TB's shall be of single Decker type. a) Acrylic cover for all the TTB's to be provided.
5.10	**ANTI-CONDENSATION HEATERS**	a) Strip type space heaters of adequate capacity shall be provided in breaker compartment, cable compartment and bus compartment in each panel to prevent moisture condensation on the wiring and panel mounted equipment. Space heaters shall be rated for 240 V, 1 phase, 50 Hz supply. Heaters inside the panels shall not be mounted close to the wiring or any panel mounted equipment. Heaters shall be complete with either miniature circuit breakers nor with isolating switches, HRC fuse

		on phase and link on the neutral of the heater supply. b) An adjustable type hygrostat (0 to 100% Humidity) shall be provided in the heater control circuit. The indication shall be provided for monitoring the healthiness of Space heater. c) Heater shall have humidity control and shall be arranged to cut off when cubicle internal Humidity exceeds safe value. 'Heater ON' indication shall be also provided. Also, door limit switch and internal lighting shall be provided for LV compartment.
5.11	**INTERIOR LIGHTING AND RECEPTACLES**	a) Each panel shall be provided with a compact fluorescent lighting fixture rated for 240 V, 1 phase, 50 Hz supply for the interior illumination of the panel during maintenance. The fitting shall be complete with switch-fuse unit and the Switching of the fitting shall be controlled by the respective panel door switch. b) Each panel shall be provided with a 240 V, 1 Phase, 50 Hz, 15 A, 5 Pin receptacle with switch. The receptacle with switch shall be mounted inside the panel at a convenient location.
5.12	**POWER AND CONTROL SUPPLIES**	a) Each control panel shall be provided with necessary arrangement for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signalling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with MCBs. Supply monitoring arrangement shall be provided. Selection of the MCB ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall also be protected by MCBs. b) If auxiliary voltages other than those specified are required, then necessary arrangement shall be made by the bidder within the panel to obtain the desired voltages by providing step-down transformers and inverter/converter, etc. However it is desired that no other control voltage shall be prevalent in the panel. c) All fuses shall be HRC cartridge type conforming to relevant standards, mounted on plug-in type fuse bases and cover with locking arrangement for fuse link. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.
5.13	**PANEL WIRING**	a) Panels shall be supplied completely wired internally to equipment and terminal blocks and ready for the Purchaser's external cable connections at the terminal blocks. Panel wiring shall be securely supported, neatly arranged by lacing and tying, readily accessible and connected to equipment terminals and terminal blocks. Flame retardant, plastic wiring channels/troughs with strap on plastic covers shall be used for this purpose. When panels are arranged to be mounted adjacent to each other all inter-panel wiring and connections between panels shall be provided by the Bidder. b) All wiring shall be carried out with 1100 V grade, single core stranded copper conductor wires with PVC insulation. Extra flexible wires shall be used for wiring of devices mounted on moving parts such as swinging panels and doors. The minimum size of the stranded copper conductor used for panel wiring shall be as follows i) All circuits except CT and PT circuits: 2.5 mm^2 per lead grey colour ii) CT circuits: 4 mm^2 per lead with colour coded PT circuit : 2.5 mm^2 colour coded The terminals are marked with the terminal number in accordance with the

		schematics and terminal diagram. The terminals do not have any function designation and are of the tension spring, screw type and plug-in type for inter panel wiring. c) Longitudinal troughs extending throughout the full length of the panels shall be provided for inter panel wiring, for AC and DC supplies, PT circuits, annunciator circuits and other common services .Interconnections to adjacent panels shall be brought out to a separate set of terminal blocks located near the slots or holes meant for taking the interconnecting wires. Arrangements shall permit easy inter-connections to adjacent panels at site and wires for this purpose shall be provided by the bidder looped and bunched properly inside the panels. d) If accidental short circuiting of certain wires is likely to result in malfunction of equipment, such as closing or tripping of a breaker or positive and negative wires, these wires shall not be terminated on adjacent terminal blocks. The unused instrument space on the front or rear of the panels shall be kept clear of wiring, to facilitate addition of devices without rewiring associated portion of the panels. e) Wire terminations shall be made with soldieries crimping type of (ring type lugs for all CT & PT circuits and pin type lugs for other circuits) tinned copper lugs which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations. Engraved core identification plastic ferrules, marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wires and shall not fall off when the wire is disconnected. Lock in type ferrule shall be provided. There should be provision of cable tray for laying of BCPU looping cable on the top of the switchgear LT compartment. f) Bidder shall be solely responsible for looping all protection relays up to the BCU/BCPU or DC as per the requirement. Network cable required to communicate BCU/BCPUs with DC shall be under bidder's scope. Looping and networking cable shall be CAT-5 type. The Bidder shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment. In case the cables are to be routed through trenches, necessary metal clad conduits shall be used. g) Internal wiring to be connected to external equipment shall terminate on terminal blocks. The terminal blocks for CTs and VTs shall be provided with test links and isolating facilities. The CT terminal blocks shall be provided with short circuiting and earthing facilities. Change of CT cores should be possible by linking & delinking of terminals. Switchgear shall have 20% terminals as spare terminals in each panel &should be uniformly distributed in all the terminal blocks and shall be wired. Note: Two wires shall not be crimped on a single lug. CT Ferrules shall have reference of CT Core and CT Taps
5.14	**CABLES TERMINATION :**	1) There should be provision of connecting 1 no 22KV, 3CX240 sq. mm, XLPE Al AR cables. There should be proper approach for manpower to work inside the cable compartments of incomer and outgoing section. Ample space for connection for these cables shall be provided at the rear of the switchboards. 2) In order to avoid accidental contact in the cable compartment while carrying out inspection by opening the rear cover, a removable expanded metal barrier shall be provided in the cable compartment. 3) Unless otherwise specified, the power cable shall enter the switchboard from the

		bottom. 4) Non-magnetic cable gland plates shall be provided for feeders wherever single core cables are used. 5) The switchboard shall be supplied complete with supports for clamping outgoing and incoming cables. The head-room available between cable gland plate and terminal lugs shall not be less than 800 mm for 22 kV cables. 6) In case the standard panel depth cannot accommodate the specified no. of cables, a rear extension panel of full height shall be provided. An earth strip shall also be brought to this extension panel. 7) Unless otherwise specified, all power cables shall enter the switchgear from the bottom. 8) A rear viewing window shall be provided on the cable chamber rear cover to inspect cable connection without opening rear cover. The material of this window shall be the same as that used in breaker chamber.
5.15	**LABELS**	a) All equipment mounted on front and rear side as well as equipment mounted inside the panels shall be provided with individual labels with equipment designation engraved. Also on the top of each panel on front as well as rear side, large and bold nameplates shall be provided for circuit/ feeder designation. The labels shall be mounted directly below the respective equipment. b) All front mounted equipment shall be provided, at the rear also with individual labels engraved with tag numbers corresponding to the ones shown in the panel internal wiring to facilitate easy tracing of the wiring. c) Each lED and meter shall be prominently marked. All relays and other devices shall be clearly marked with manufacturer's name, type, serial number and electrical rating data. d) Labels both external &internal shall be made on non-rusting metal preferably Aluminium anodized one. Labels shall have white letters on black background. The lettering size shall be 6 mm for panel designation and minimum 3mm for device labels. The label designations shall be subject to the Purchaser's approval. e) Each switch shall bear clear inscription identifying its function e.g. 'BREAKER' '52A' etc. Similar Inscription shall also be provided on each device whose function is not otherwise defined. If any switch device doesn't bear this inscription, separate name plate giving its function shall be provided for it. Switch shall also have clear inscription for each position indication e.g. 'Trip-Neutral-Close', 'ON-OFF', 'R-Y-B-OFF' ETC. f) Section differentiation marking, bus differentiation and phase differentiation marking shall be provided a visible colour coding as per Indian coding will be preferred.
5.16	**EARTHING**	a) All panels shall be equipped with a separate earth bus securely fixed along with the inside base of panels. When several panels are mounted adjoining each other, the earth bus shall be made continuous and shall be bolted with two bolts. Provision shall be made for future extension of the earth bus. Provision shall be made on the earth bus bars of the end panels for connecting the same to the earthing grid. b) An earthing conductor of 40x10 sq.mm Cu (minimum) shall be provided extending the whole length of switchgear and control gear to sustain the Rated short time withstand

		current. Each equipment mounted in the panel shall be directly earth pad to this earth bus by distinct connections. Bidder shall provide separate electronic earthing for all LED's. Separate earth bus bar to be run along switchgear for protection earthing of relays and communication equipments and LEDs and shall be insulated from the frame. Two bolts shall be provided for connecting the earthing conductor. c) All metallic cases of relays, instruments and other panel mounted equipments shall be connected to the earth bus by independent copper wires of size not less than 4.0 sq.mm for VT and CT secondary neutral or common lead shall be earthed at one place only, preferably at the terminal blocks where they enter the panel. The colour coding for earthing wires shall be given. Bidder shall provide separate electronic earthing for all IEDs. d) Looping of earth connections, which would result in loss of earth connection to the other devices when the loop is broken, shall not be permitted. However, looping of earth connections between equipment to provide alternative paths to earth bus shall be provided. a) Individual Earthing bus shall be extended from main earth bus in each breaker panel for which all peripherals body earthing are connected through green colour 2.5 sq.mm wire. b) All live/energized equipment shall have body earth and reference ground via copper strip or Copper wires of minimum 6 Sq mm.
5.17	**PAINTING**	All sheet steel work shall be phosphated in accordance with the IS: 6005 "Code of practice for phosphating iron and steel". It should follow the seven tank process. Oil, grease, dirt and swarf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water rinsing with a slightly alkaline hot water and drying. After phosphate, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoved type zinc chromate primer. The first coat may be "flash dried" while the second coat shall be stoved. Thereafter an established painting procedure like electrostatic painting shall be followed for powder coating the panel. The colour shade shall be RAL 7032 (Grey). Minimum paint thickness of 120 micron is required.
5.18	**GALVANIZING**	a) All galvanizing shall be carried out by the hot dip process, in accordance with IS 2629/ ISO 1460 amended to date. However, high tensile steel nuts, bolts and spring washers shall be electro galvanized to service condition four. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives to the galvanic bath, which could have a detrimental effect on the durability of the zinc coating. b) After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment except that nuts may be threaded after galvanizing. c) To avoid the formation of white rust, galvanized material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization. The galvanized steel shall be subjected to tests as per IS-2633/ BS 729 amended to date. **Approved Sub-vendor for bought out items: -**

		<table><tr><th>Sr. No</th><th>Items</th><th>Approved sub vendor</th></tr><tr><td>1</td><td>Epoxy Resin Cast C.T.</td><td>Pragati Make /ECS/Huphen Fabricator/Reputed as per OEM approved</td></tr><tr><td>2</td><td>Epoxy Resin Cast P.T.</td><td>Pragati Make /ECS/Huphen Fabricator/Reputed as per OEM approved</td></tr><tr><td>3</td><td>TTB</td><td>DAV make & Model name is SSFS</td></tr><tr><td>4</td><td>TB</td><td>Connectwell/Elmex</td></tr><tr><td>5</td><td>HRC Fuse</td><td>C&S / L&T /Equivalent</td></tr><tr><td>6</td><td>Space Heater</td><td>Girish Make</td></tr></table>
6.0	**NAME PLATE AND MARKING**	**NAME PLATE AND MARKING:** All the components and operating devices of the switchgear shall be provided with durable and legible nameplates containing all technical parameters. Name plates shall be suitably embossed with" PO no. with date", "PROPERTY OF Tata Power-' & "CODE NUMBER" along with the following information. A Danger plate of appropriate size shall also be provided on the enclosure. a) Manufacturer's Name b) Month and year of supply c) Type/Model d) Rated Voltage e) Rated current f) Service voltage g) System Frequency h) Rated Short time withstand current for 3 sec i) Rated Impulse withstand Voltage j) Degree of Protection k) Serial no. CT & PT details to be mentioned at the rear cover of switchgear panel. The name plate of each functional unit shall be legible during normal service. The removable parts, if any shall have a separate nameplate with the data relating to the functional units they belong to, but this nameplate need only be legible when the removable parts is in removed position.
7.0	**TESTS**	All the Routine, acceptance and Type tests shall be carried out in accordance with the relevant IS/IEC standards. All routine/acceptance tests shall be witnessed by the Purchaser/ his authorized representative. All the components should also be type tested as per the relevant standards. All meters and metering elements in BCU shall also be routine and type tested as per the relevant standards and shall further be tested at site by the successful bidder. For Type test of Numerical relays, control IEDs, and communication equipment, and Factory acceptance test, relevant IS/IEC has to be followed. Bidder shall also be responsible for conducting point to point testing of all gateway configurations on the site (SAT) after the installation. Bidder shall ensure integrated FAT of switchgear along with SCADA at one location along with RTU functional tests. Following tests shall be necessarily conducted on the switchgear in addition to the others specified in IS/IEC. **A) For Breaker panels**

I) Type Tests

1. Test to verify the protection of person against dangerous electrical effects.
2. Electromagnetic compatibility Tests of Auxiliary and control circuits (Emission & Immunity test)
3. Dielectric Test: Impulse & Power frequency
4. Internal Arc Test
5. Measurement of the resistance of the main circuits
6. Short-time withstand and Peak withstand current test
7. Verification of Degree of Protection.
8. Verify the Insulation level of the equipment including at power frequency test voltage on auxiliary circuits.
9. Temperature Rise tests.
10. Short-circuit current making and breaking tests
11. Mechanical operation test at ambient temperature
12. Test to prove the satisfactory operation of the included switching device and removable parts (Mechanical operation test)
13. Mechanical operation test

II) Routine Tests

1. Dielectric test on main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Dimensions and visual checks
5. Mechanical operation test
6. Partial Discharge measurement

III) Acceptance Test

1. Dielectric test on main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Dimensions and visual checks
5. Mechanical operation test
6. Partial Discharge measurement

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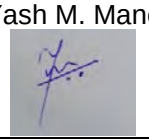
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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B) For Current Transformers

I) Type Tests

a) Short time current Test

b) Temperature rise Test.

c) Lightning impulse tests

d) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

II) Routine Tests

a) Verification of terminal marking and Polarity

b) Power frequency dry withstand tests on Primary Windings.

c) Power frequency dry withstand tests on Secondary windings

d) Over Voltage inter-turn test.

e) Partial Discharge tests.

f) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

g) For PS class core – Knee point voltage & Excitation current, Secondary winding resistance, Turns ratio.

C) For Voltage Transformers

I) Type Tests

a) Short time current Test

b) Temperature rise Test.

c) Lightning impulse tests

d) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

II) Routine Tests

a) Verification of terminal marking and Polarity

b) Power frequency dry withstand tests on Primary Windings.

c) Power frequency dry withstand tests on Secondary windings

d) Partial Discharge tests.

e) Determination of errors or other charterstics according to the requirements of the appropriates designation or accuracy class.

		For CTs & PTs routine test reports from the OEM to be provided. **D) <u>For Relays</u>** **I) Type Tests for Numerical Relays/ Devices:** 1. Dielectric Withstand Test: IEC60255-5 2. High Voltage Impulse Test, class III: IEC 60255-5 (5 kV peak; 1.2/50 us; 0.5 J; 3 positive and 3 negative shots at interval of 5 sec.) 3. DC Supply Interruption: IEC 60255-11 4. AC Ripple on DC Supply: IEC 60255-11 5. Voltage Dips and Short Interruptions: IEC 61000-4-11 6. High Frequency Disturbance: IEC 60255-22-1, class III 7. Fast Transient Disturbance: IEC 60255-22-4, class IV 8. Surge Withstand Capability: IEEE / ANSI C 37.90.1 (1989) However, in case any type test is not carried out/carried out at In-house laboratories, the same shall be decided for acceptance as per the mutual agreement between the Purchaser and Bidder.
8.0	**TYPE TEST CERTIFICATE**	The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA laboratories as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 10 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TATA POWER LTD. Type tests shall have been conducted in certified Test laboratories during the period not exceeding 10 years from the date of opening the bid. In case if type test conducted beyond 10 years then bidder to certify on letter head of parent OEM that no design change & no manufacturing plant change occurred from type tested product. In the event of any discrepancy in the test reports, i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TATA POWER. Bids without all type test report shall stand disqualified.
9.0	**PRE-DISPATCH INSPECTION**	Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material is liable to rejection. The bidder shall grant free access to the places of manufacture to the Purchaser's representatives at all times when the work is in progress. Inspection by the Purchaser or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by the Purchaser. Following documents shall be sent along with material. a) Test reports

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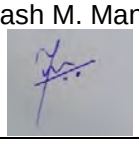
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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		b) MDCC issued by Tata power c) Invoice in duplicate d) Packing list e) Drawings & catalogue f) Hard copy of drawings g) Delivery Challan Other Documents (as applicable) All Document should be English Language
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TATA POWER Store will be inspected for acceptance and shall be liable for rejection if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department. If any deviation or anomaly observed at this stage same need to be rectified by bidder at bidders own cost at earliest.
11.0	**GUARANTEE**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the " Security cum Performance Deposit" as the case may be. In case of GP failure, BA shall report at site within 48 hours from intimation and arrange for rectification of fault within a mutually agreed time. In case rectification at site is not possible then alternative arrangement (replacement) to be made by BA within 15 days of intimation of failure. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.
12.0	**PACKING AND TRANSPORT**	Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. No single use plastic to be used in packaging. The packaging material shall be environmentally friendly & recyclable.
13.0	**TENDER SAMPLE**	Not applicable.
14.0	**TRAINING**	The vendor shall include in his offer Training for Tata Power engineers. The training shall cover development, integration, installation and commissioning of both software & hardware components of the system. The training shall have two parts Training at Vendor's / Collaborator's Works(Before project commence)- 5 man-weeks Training at Site - 10 man-weeks

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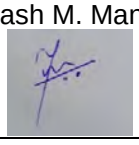
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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		Bidder shall indicate per man-week rates for addition / deletion if any. The vendor shall provide Classroom as well as hands-on training on the system. All required training materials such as system catalogs, test instruments, demo equipment, and simulation jigs, etc. shall be provided by the vendor. The training shall equip the Purchaser's engineers for installation, commissioning, operation and post-warranty maintenance of hardware, software (Operating System, Administration and Applications), protocols and all third party systems.
15.0	**QUALITY CONTROL**	The bidder shall submit with the offer, assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and after finishing, bought out items and fully assembled component and equipment including drives. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's or its nominated representative engineer shall have free access to the manufacturer/sub-supplier's works to carry out inspections.
16.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in-house testing facilities for carrying out all routine tests & Acceptance tests as per relevant International/Indian standards.
17.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit GTP & Drawing with 15 days from placement of order/OLA for approval. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable).
18.0	**SPARES, ACCESSORIES AND TOOLS**	
18.1	**SPARES:**	Bidder should provide following mandatory spares along with the bid. a) Trip Coil: 1 nos b) Closing coil: 1 nos c) Spring charging motor: 1 nos d) T-N-C Switch: 1 nos f) Local/remote selector switch: 1 no g) Tulip/ Finger contact: 6 nos h) Indication lamps: 50 nos i) Auxiliary switches: 10 nos j) CTs: 2 nos k) VTs: 2 nos In addition to above bidder shall submit recommended list of spares for 5 years of operation, if Any with unit prices and recommended quantity.
18.2	**SPECIAL TOOLS & GAUGES:**	A list of complete set of special tools and gauges required for erection & maintenance and installation procedure should be submitted. The Bidder shall give an assurance that special maintenance tools & tackles and spares will continue to be available through the life of the equipment, which shall be 25 years minimum. However, the supplier shall give a minimum of 12 months' notice in the event of plan to discontinue manufacture of any component used in this equipment. Any special maintenance tools & tackles apparatus, parts or tools shall be subject to the

		same specification, tests and conditions as similar material supplied under the Contract. They shall be strictly interchangeable and suitable for use in place of the corresponding parts supplied with the plant and must be suitably marked and numbered for identification. Spanners and other maintenance equipment provided under this contract shall not be used for the purpose of erection.
19.0	**DRAWING AND DOCUMENTS**	Following drawings & Documents shall be prepared based on Purchaser's specifications and Statutory requirements and shall be submitted with the bid: a) Completely filled-in Technical Parameters. b) General descript ion of the equipment and all components including brochures c) General arrangement drawings d) Single Line Diagram e) Bill of material f) Type Test Certificates g) Experience List h) Foundation fixing drawings. **After the award of contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval.**

Sr. No	Description	For Approval	For Review information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Single Line Diagram	√		√
4	Typical Mimic diagram	√		√
5	Schematic / inter logic diagrams	√		√
6	Bill of Material	√		√
7	Foundation Plan & loading details	√		√
8	Manual/Catalogues/drawings for DC, BCU meters, relays, switches, lamps etc.		√	√
9	Control and Operational Philosophy of Automation		√	√
10	Input/output List		√	√
11	Cable Schedule & interconnection diagram		√	√
12	Programming language manual		√	√
13	Details of the Communication protocol & interoperability list for the future interfacing.		√	√
14	Equipment wise detailed circuit diagram		√	√
15	Electronic earthing		√	√

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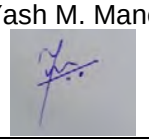
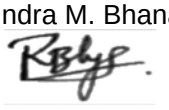
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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		scheme			
		16	Configuration diagram with functional write up		√	√
		17	I/O mapping		√	√
		18	3 nos. of working drawings		√	√
		19	3 nos. of as-built drawings		√	√
		20	Relay co-ordination scheme		√	√
		21	Installation / commissioning manual		√	√
		22	Instruction for Use		√	√
		23	Transport Shipping dimension drawing		√	√
		24	QA &QC Plan	√	√	√
		25	Routine, Acceptance & Type Test Certificates	√	√	√

All the documents & drawings shall be in English language.

After the receipt of the order, the successful bidder will be required to furnish all detailed drawings of components for TATA POWER approval.

Instruction Manuals: Bidder shall furnish softcopies manuals of Switchgear, Relay (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

		S.No	Description	Units	Units As Furnished by Bidder
20.0	**GUARANTEED TECHNICAL PARTICULARS**	1	**SWITCHBOARD**		
		a)	Architecture		
		b)	Applicable standard		
		c)	Dimensions (In mm) WXDXH		
		d)	Internal Arc Protection		
		e)	Normal Service conditions		
		f)	Service Voltage	KV	
		g)	Rated Voltage	KV	
		h)	Rated capacity	MVA	
		i)	Rated power frequency withstand voltage (rms)	KV	
		j)	Rated impulse withstand voltage(1.2, 50us)	KVP	
		k)	Rated Short time withstand current	KA	
		l)	Rated Peak withstand current	KA	
		m)	Busbar material		
		n)	Main busbars insulation		
		o)	Busbar rated continuous current	A	
		p)	Max current Density for Bus bar	A/sq mm	
		q)	Max. Permissible temp. rise at rated normal current		
		r)	LOTO lock arrangement shall be		

		provided for Cable compartment, Bus compartment and breaker compartment seperately		
	s)	Separate doors section shall be provided for cable and bus compartment separately with handle arrangement		
	t)	Degree of Protection for enclosure / Partitions / for meters, relays and BCU		
	u)	CT, PT, breaker name plate details shall be embossed on front door panel		
	v)	Extendable Circuit Breaker Test Plug for test purpose length of 10 Mts		
	2	**CIRCUIT BREAKER**		
	a)	Standard		
	b)	Type		
	c)	No of poles		
	d)	Rated load breaking current (sym)	KA	
	e)	Rated short circuit withstand current	KA	
	f)	Rated short circuit making current	KA	
	g)	Isolation		
	h)	Rated Voltage	KV	
	i)	Service voltage	KV	
	j)	Rated frequency	HZ	
	k)	Rated Insulation Level		
	i)	Lightning impulse withstand voltage	KVP	
	ii)	One min. power frequency withstand voltage	KV (rms)	
	l)	Rated operating sequence		
	m)	Opening time	msec	
	n)	Arcing time	msec	
	o)	Total break time	msec	
	p)	Making time	msec	
	q)	Temperature Rise		
	3	**OPERATING AUXILIARY VOLTAGES**		
	a)	Control and signalling voltage		
	b)	Spring Charging Motor (Universal Motor)		
	c)	Heater and lighting circuits		
	d)	No. of spare auxiliary contacts		
	4.1	**CURRENT TRANSFORMER**		
	a)	Type		
	b)	Short circuit withstand		
	c)	Location		
	d)	Ratio		
	e)	Burden & Class (Metering and		

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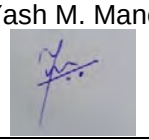
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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	Protection)			
i)	Core –I			
ii)	Core –II			
iii)	Core-III			
f)	Ratio			
g)	Burden &Class (Differential)			
i)	Core- I			
ii)	Make of CTs			
5	**VOLTAGE TRANSFORMER**			
a)	Make			
b)	Location			
c)	Mounting arrangement			
d)	Ratio			
e)	Burden &Class			
i)	Core- I			
ii)	Core –II			
Iv)	Ramp provided for rack in/rack out			
6	Protection , Control, Metering & Communication			
7	MIMIC Diagram on Relay			
8	Provision of flag indications and contacts for remote annunciation for Self powered backup relay for incomers			
9	Electrically reset type, High speed relay for tripping.			
10	Anti-pumping Relay			
11	Makes for Auxiliary Relays			
12	Provision of DC fail Relay for each panel			
13	PT back charging lamp shall be provided on backside of individual breaker panel.			
14	**OTHERS**			
a)	Cable charge indication			
b)	TNC Switch			
c)	Local/Remote switch			
d)	Indication Lamps CB ON/OFF			
e)	Indication Lamps CB Auto Trip			
f)	Indication Lamps for CB Test /Service positions			
g)	Spring charged indication			
h)	Trip ckt. supervision scheme			
i)	MCB for AC			
j)	MCB for DC			
k)	MCB for space heater			
l)	MCB for VT's			
m)	Trip alarm scheme with hooter, Accept/Reset PB etc			
n)	Panel anti-condensation heater with thermostat.			

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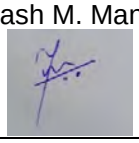
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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o)	Panel illumination lamp with switch			
p)	15 A, 3 pin socket.			
q)	Makes of indicating lamps			
r)	Makes of MCB			
s)	Wiring of breaker auxiliary contacts up to terminals			
t)	Makes for Fuses / Fuse bases			
u)	CB handling trolley			
14	**BCPU** (Bay Control and Protection Units)			
14.1	BCPU Functions (as per IEC/IEEE/ANSI/NEMA)			
14.2	Accuracy class of internal energy meter			
14.3	Input / Output capacity per BCPU			
14.4	System Frequency			
14.5	Rated current			
14.6	Auxiliary Voltage			
14.7	Timing Accuracy			
14.8	Sampling Rate:			
14.9	Sequential Events & Recorder memory			
14.10	Environment			
14.11	Ingress Protection			
14.12	Protection functions for BCPU			
14.13	Additional separate protection if any			
14.14	Feeder protection, and transformer differential protection relays shall be considered seperately			
15	Software tools			
15.1	Communication Ports			
15.2	Protocols			
15.3	Recording			
15.4	Level & security of Operation			
15.5	Time Synchronisation			
15.6	Adherence to standards			
15.7	Control function			
15.8	Password protection			
15.9	Configuration tool			
15.10	Integrated checks			
17	Commissioning activity			
17.1	Integrated FAT considered			
17.2	Deputation of Project Manager at site considered			
18	**Castle key interlock to be provided in such a way that for opening of back door castle key shall be required.**			

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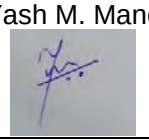
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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19	**The back door opening shall be possible only when cable is in dead condition**		
20	**The opening of shutter shall be prevented when the breaker truck is racked out & either main bus or cable compartment is energised. Electrical interlock of cable side shutter & bus side shutter to be provided to prevent opening of shutters when breaker is racked out.**		
21	Panel paint thickness	120 micron	

General Technical Parameters of BCPU

S N.	Description	Specification
1.0	Approved vendors	SIEMENS/ABB/ALSTOM/SCHNEIDER
1.1	System Frequency	50 Hz
1.2	Rated current	5/1A
1.3	Auxiliary Voltage	220V DC +/- 20%
1.4	Timing Accuracy	10 µs or better
1.5	Sampling Rate	Disturbance events should be recorded up to 2 seconds at 8 kHz sampling rate and 5 seconds at 1 kHz sampling rate.
1.6	Sequential Events & Recorder Memory	Latest 1000 entries should be stored
1.7	Environment	Shall be suitable for continuous operation over a temperature range of 10ºC to 50ºC in accordance with IEC 60255-6**. The relays internal PCB board should coated with**

			conformal coating.
	1.8	Ingress Protection	IP-54
	1.9	Protection functions for BCPU	POL & EF with Hiset1, Hiset2, IDMT Breaker failure Trip circuit supervision Synchro check / energizing check, Negative Sequence Current, VT supervision relay and Trip circuit supervision relay, Integrated CB failu.re protection, Configurable LEDs shall also be provided to indicate the BCPU operation and the alarm/status change of a bay equipment e.g. Phase Fault operated/ Earth Fault operated/ CB Open/ CB Close/ Spring charged etc., Auto Reclose (79) Protection, synch-check facility.
			Configuration of all input and output logical signals and binary inputs, Analog Inputs and relay outputs for all built-in functions and signals shall be possible both locally and remotely. BCPU must have broken conductor and fault locator facility
			Electrically reset type high speed, heavy duty relay (master trip 86) shall be used for tripping on operation of BCPU. Tripping coil hall be provided with independent potential free contacts from different fused DC supplies. The trip relay shall be supervised. Trip relay should be such that on resetting its flag should be automatically reset
	1.10	Protection functions for BCPU	Transformer protection, Differential protection

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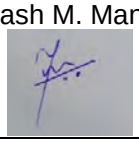
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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	1.11	Software tools	A user-friendly engineering and disturbance handling tool shall be available.
			It shall be possible to retrieve/download the disturbance records and parameterization of all BCPUs through Gateway/Master.
			It shall be possible to access the BCPU remotely from the Master Station for configuration / maintenance activity. The bay control shall have multilevel passwords to safeguard bay control, logic, and automation settings.
			User friendly on-line monitoring facility of real time data shall be provided to maintenance engineer for monitoring/analysing the real time status of the process, program logic from the engineering station (Configuration tool – Laptop).
			BCPU should support all BO's as per attached IO list. BCPU should possess minimum 16 No BI's and 8 No BO's
	1.12	Breaker Health Monitoring	BCPU should support Breaker Health monitoring feature like opening time, closing time, I^2t, etc.
	1.13	Group Setting	BCPU should support Group setting change control from remote as well as local.

21.0 SCHEDULE OF DEVIATION

The bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications.

(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

Sr. No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company **Signature :**

Designation :

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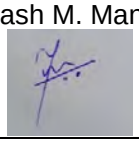
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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Annexure 1:

Inspection Testing Plan

1. Dielectric test on main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Dimensions and visual checks
5. Mechanical operation test
6. Partial Discharge measurement

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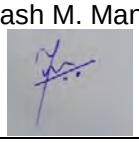
R00	Yash M. Mane 	Ajay V. Potdar 	Ravindra M. Bhanage 
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Annexture-2

Tata power Branding Name plate -

Separate metallic name plate with Tata Power Logo of Dimension 12*12 Inches in clear font as shown below.

Relationship between the two marks- size

The Tata and Tata Power Marks are always used in conjunction with each other, never appearing in isolation on Tata Power communication.

The height of the letter T of Tata (T-height) is the basic measure for all sizes and proportions.

The rounded measure 2T in height, is separated from the Tata lettering by a distance of 1/2T.

The T height of both, the Tata and the Tata Power Marks is to be the same, except in exceptional cases on approval from the Corporate Communications team.

Relationship between the two marks- positioning

The two marks can appear stacked, which is the preferred placement, or linear, by the side of one another.

Centre aligned - Stacked (Preferred)

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The Tata Power Company Limited is hereunder referred to as the "Purchaser" or "Company". The person, firm or company selling the goods, the subject of this purchase order is referred to as "Vendor" or "Contractor". The subject of this purchase order is hereinafter referred to as the "Material(s)"or "Goods".

The Contract shall mean the contract as derived from the following:

1. Purchase Order (with 'Commercial Notes' and Annexures to the Purchase Order referred thereon)
2. Technical Specifications.
3. General Terms & Conditions

The documents including all reference document (s) and Annexures forming the Contract are to be read together as a whole and are to be taken as mutually explanatory.

1. Price:

Unless otherwise specifically stipulated, the price shall be firm and shall not be subject to escalation for any reason till the validity of this Contract.

Unless otherwise specifically stipulated, the price shall be inclusive of road/ rail worthy water-proof packing & forwarding charges up to effecting delivery at FOT/ FOR despatch point, GST and shall also be inclusive of inland freight, terminal taxes and entry taxes as leviable on the transportation or entry of goods into any local area limits pursuant to the Contact.

2. Taxes and Duties:

2.1 The Contract Price shall be inclusive of all taxes, duties, including but not limited to GST or any local taxes, levies imposed by State/Central/Local governments

2.2 Taxes as mentioned in the Contract Price or Price Schedule shall be paid to the contractor subject to the Contractor complying with all the statutory requirements and furnishing the relevant documents including error free invoices containing detailed break-up of the taxes

2.3 However the payment of GST or local levies shall be restricted to the total amount as indicated in the price schedule.

2.4 Any duties, levies or taxes not mentioned in Contract Price or Price Schedule but applicable as per any statute (s) shall be deemed to be included in the Contract price and shall be to the account of the Contractor.

2.5 Any statutory variation in duties, levies or taxes if applicable and specified in this Contract till the scheduled date for supply of Goods and limited to direct invoices of the Contractor shall be to the account of Purchaser. The Contractor shall have the obligation to provide the necessary documentary evidence / supporting by way of gazetted notifications etc. to prove the change in such levies or taxes between the due date of submission of the Bid and the scheduled date of supply of goods to claim the difference.

2.6 The Contractor shall pass on to the Purchaser all the benefits of either reduction in tax rates, exemptions, concessions, rebate, set off, credits etc. or introduction of new tax rates exemptions, concessions, rebate, set off, credits etc. pertaining to all taxes, duties, imposts, fees and levies in respect of the supplies of Goods or performance of obligations under the contract. This would specifically include reduction of tax rates as a result of statutory changes or judicial rulings.

2.7 Any other taxes, levies and duties not mentioned in Contract Price or Price Schedule but applicable as per any statute (s) or introduction (omission) of new taxes, levies and duties shall be deemed to be included in the Contract Price and shall be to the account of the Contractor.

2.8 For facilitating availment of a credit, set-off, rebate, drawback or like benefit available to the Purchaser, the Contractor will facilitate the Purchaser by providing the necessary documentary and/or procedural support. In any process of assessment or re-assessment, of taxes payable by the Purchaser. Wherever expressly agreed the purchaser would provide the statutory form 'C' to the seller for availing the concessional rate of Central sales tax.

2.9 The Contractor shall bear and pay all the costs, liabilities, levies, interest, penalties in respect of non-compliances of any legal requirements as per various statutory provisions. The contractor shall keep the owner indemnified at all times from any tax liability, interest, penalties or assessments that may be imposed by the statutory authorities for non-compliances or non-observation of any statutory requirements by the Contractor.

2.10 Purchaser shall pay the invoices to the Vendor after necessary deductions as prescribed under the applicable law, income – tax or other

deductions under the State Tax laws as may be applicable to the Contract.

3 Packing details:

Packing details: The material must be packed in suitable packing to suit the mode of transport and to ensure its safe receipt at point of delivery. Any damage to material noticed at the time of delivery at site, due to improper packing or any other reason whatsoever shall be the responsibility of the Vendor. Such damaged goods shall be replaced within 14 days from intimation from the Purchaser.

4 Transportation and Unloading at Site:

The Vendor shall deliver the Material(s) at site/ Stores as per the delivery address specified in the Purchase order. The unloading at delivery shall be organised by the Purchaser unless otherwise specified. The receipt of the material/ equipment is subject to inspection and rejection if Material(s) is found unsatisfactory or any of the clauses under this purchase order are violated.

5 Insurance:

Unless otherwise specified, Purchaser will be responsible to obtain transit insurance for the Material(s). The Vendor shall intimate the Order Manager (as mentioned in the Purchase Order) along with Invoice, packing list, the Railway Receipt/Truck or Lorry Receipt etc. immediately after the consignment is booked, at the e-mail id mentioned in the Purchase order.

6 Payment Terms:

100% payment shall be made within 60 days from the receipt and acceptance of the material at the Consignee Stores/ Site/ Location as per the Contractual terms and conditions herein.

7 Bills and invoice:

The tax invoices should contain the details to comply with the GST Law. The supplier shall:

i) Furnish (electronically) and communicate to the Owner, the details of Goods or Services supplied by the 10th of the month succeeding the said tax period,
ii) Upon discovery of any discrepancy, rectify it and shall pay the tax and interest thereof,
iii) Furnish the returns (electronically), for the inward and outward supplies of Goods and/or Services, before the specified dates as per the GST Law,
iv) Communicate the tax paid, credits etc. as and when credited.
v) The Invoice should clearly state the description of the goods, quantity, sale price, tax %, and tax amount;
vi) The Invoice should be signed by an Authorized Signatory.

Bills/Invoices in the name of The Tata Power Company Ltd. with packing lists in triplicate shall be forwarded along with the equipment.

Contractor to furnish GST Registration no. in all invoices as well as Purchaser's (Tata Power's) GST no.

8 Transfer of Title and risk:

The transfer of property and risk of Material(s) shall be deemed to take place as follows:

a. For delivery F.O.R. or F.O.T. despatch point: Transfer of property on handing over the Material(s) to the carrier against receipt of clean Railway Receipt/Truck or Lorry Receipt and such receipt having been handed over to Purchaser. However, the risk of loss shall pass to the Purchaser on delivery of goods at the specified destination.

b. In case the Material(s) are procured by the Vendor from sub-vendors on receipt of duly endorsed documents of title to the goods.

9 Contract Performance Bank Guarantee (In case applicable):

9.1 The Vendor shall within 15 days of issue of this Purchase Order furnish an unconditional irrevocable bank guarantee duly stamped and strictly as per the prescribed format of the Purchaser from any nationalized bank or any scheduled bank having a branch in Mumbai and approved by the Purchaser for a sum equivalent to 10% of the Total value of Order valid for a period not less than 6 months from the expiry of the Warranty period.

9.2 Irrespective of the performance demonstrated as part of the Factory Acceptance Tests Take-over tests / Performance Tests etc, the Purchaser may call for re-validation of performance of the system during the performance guarantee period by conducting fresh performance tests if in its opinion, the

system is not able to deliver the designed performances based on its operational performance results. If the equipment fails to prove the performance during such performance tests, the Purchaser may allow the Vendor to either rectify the system by addition / modification of equipment etc at the Vendor's costs & risk to restore the performance levels. Failure to rectify the system to achieve the designed performance levels may result in imposition of penalties including revocation of the Performance Bank Guarantee and forfeiture of the entire amount under the Performance Guarantee.

9.3 In case the Vendor fails to furnish the requisite Bank Guarantee as stipulated above, then the Company shall have the option to terminate the contract besides other contractual remedies.

10 Price reduction:

10.1 The Vendor agrees that time of supply of Material(s) is of prime importance.
If the Vendor fails to supply Material(s) before the respective scheduled / fixed date for supply. Company may without prejudice to any other right or remedy available to the Company: -

10.1.1 Recover from the Vendor ascertained and agreed, genuine pre-estimate liquidated damages, and not by way of penalty, a sum equivalent to 1% (of total value of order) per week or part thereof for each week's delay, beyond the scheduled supply date each subject to maximum of 10% of the total order value, even though the Company may accept delay in supply after the expiry of the scheduled supply date. The Company may, at its discretion, set off the aforesaid amounts from any other amounts owed by the Company to the Vendor or recover such amounts in other manner as may be permissible under applicable laws.

10.1.2 Arrange to get supply from elsewhere on account and at the sole risk of the Vendor, such decision of the Company being final and binding on the Vendor; or

10.1.3 Terminate the contract or a portion of supply of the supply work thereof, and if so desired, arrange for the supply in default by the Vendor to be attained from elsewhere at the sole risks and costs of the Vendor.

10.2 Liquidated damages for performance shortfall (if applicable) shall be specified in the Technical Specifications.

10.3 The Liquidated Damages referred in this clause 10 may be recovered by the Company from the Vendor as set off against any monies owed by the Company to the Vendor or in any other manner permissible under applicable laws.

11 Warranties:

11.1 Materials and Workmanship: Vendor shall fully warrant that all the stores, equipment and component supplied under the order shall be new and of first class quality according to the specifications and shall be free from defects (even concealed fault, deficiency in design, materials and workmanship).

11.2 Should any defects be noticed in design, material and/or workmanship within 12 months after the Material(s) or any portion thereof as the case may be have been commissioned or for 24 months from the date of delivery, whichever period concludes earlier. Purchaser shall inform Vendor and Vendor shall immediately on receipt of such intimation, depute their personnel within 7 days to investigate the causes of defects and arrange rectification/ replacement/modification of the defective equipment at site, without any cost to Purchaser within a reasonable period. If the Vendor fails to take proper corrective action to repair/replace defects satisfactorily within a reasonable period, Purchaser shall be free to take such corrective action as may be deemed necessary at Vendor's risk and cost after giving notice to the Vendor, including arranging supply of the Goods from elsewhere at the sole risk and cost of the Vendor.

11.3 In case defects are of such nature that equipment shall have to be taken to Vendor's work for rectification etc., Vendor shall take the equipment at his costs after giving necessary undertaking or security as may be required by Purchaser. After repair Vendor shall deliver the equipment at site on freight paid basis. Any taxes applicable in relation to this repair shall be to the Vendor's account. All risks in transit to and fro shall be borne by the Vendor.

11.4 Equipment or spare parts thereof replaced shall have further warranty for a period of 12 months from the date of acceptance.

12 Quality, Testing, inspection, installation:

12.1 All Material(s) supplied under this Contract shall be new and unused.

12.2 Wherever a specific Quality Assurance Plan is provided with the Request for Quotation (RFQ) or agreed as part of the commercial/ technical discussions, the same shall be binding on the Vendor.

12.3 The material shall be inspected

a. At consignee end by Purchaser.

b. At factory premise of the Vendor/ sub-vendor by Purchaser or third party duly nominated by Purchaser. The Vendor shall extend all necessary co-operation to Purchaser/ third party inspector carrying out the inspection. The Inspector(s) shall have the right to carry out the inspection or testing, which will include inspection and testing of the raw materials at manufacturers shop, at fabricators shop and at the time of actual despatch before and/or after completion of packing.

12.4 The Vendor will inform Purchaser at least eight (8) days in advance of the exact place, date and time of tendering the Material(s) for required inspection and provide free access to the Inspector(s) during normal working hours at Vendor's or his/ its sub-Suppliers works, and place at the disposal of the Inspector(s) all useful means for undertaking the Inspection, checking the results of tests performed, marking the Material(s), getting additional tests conducted and final stamping of the Material(s).

12.5 Even if the inspection and tests are fully carried out, the Vendor shall not be absolved from its responsibilities to ensure that the Material(s), raw materials, components and other inputs are supplied strictly to conform and comply with all the requirements of the Contract at all stages, whether during manufacture and fabrication, or at the time of Delivery as on arrival at site and after its erection or start up or consumption, and during the defect liability period. The inspections and tests are merely intended to prima facie satisfy Purchaser that the Material(s) and the parts and components comply with the requirements of the Contract.

12.6 *All costs associated with the inspection shall be included in cost of Material(s).*

12.7 Original material test certificate/ performance test certificate/ fitment certificate/ test reports etc. relevant/ applicable as per the specifications/ standards shall be dispatched along with the material supply failing which the material may be rejected.

13 Rejection:

13.1 Rejected goods shall be removed and replaced within 14 days of the date of communication of rejection.

13.2 Claim in respect of breakage/shortages in any cases shall be referred on the Vendor within ninety (90) days from the date of receipt of Goods by the Purchaser which shall be replaced/made good by the Vendor at his own cost. All risk of loss or damage to the material shall be upon the Vendor till it is delivered to the purchaser/consignee.

14 **General Indemnity:**

The Vendor shall indemnify and keep the Purchaser indemnified from and against any and all claims, costs, liabilities (financial), litigations, compensations, judgments, expenses or damages (including attorney's fees and other related expenses) arising out of any breach or alleged breach of any of the conditions of this Contract, performance of the obligations hereunder, or any representation or misrepresentation made by the Vendor or any third party with regard to the subject of this Contract.

15 **Indemnity against IPR:**

The equipment, system, drawings, and other materials that shall be supplied against the order will become the Purchaser's property. Without limitation of any liability of whatsoever nature, the Purchaser shall be indemnified and kept indemnified against any claim for infringement or breach of any of the statues, rules & regulations by the use of or sale of any article or material supplied by the Vendor. The indemnity shall include any infringement of patent, trade mark, design, copyright or other property rights whether in Country of Origin, or elsewhere resulting from the Vendor's design, manufacture, use, supply or re-supply & would also cover use or sale of any article or material supplied by the Vendor to the Purchaser under the Purchase Order. The Indemnity shall cover any claim/action taken by a third party either directly against the Purchaser or any claim/action made against the Vendor & where under the Purchaser is made liable. The

Indemnity shall be for losses, damages, and costs including litigation costs, attorney fees etc incurred by the Purchaser in relation to the Purchase Order.

16 Latent Defects Liability period (if applicable):

Notwithstanding the inspections, acceptance tests, quality checks etc carried out by the Vendor and witnessed/accepted by the Purchaser, the Vendor shall further warrant the equipment for any latent defects in its design, material or workmanship against the specifications set forth and shall make good any such defects by way of repair or replacement of the part or whole of the defective product at its own cost & risks as and when such latent defects are observed and intimated by the Purchaser and intimated to the Vendor within 36 months of completion of warranty period.

17 Force Majeure:

17.1 In the event of either party being rendered unable by force majeure to perform any obligation required to be performed by it under this Contract the relative obligation of the party affected by such force majeure shall, after notice under this articles be suspended for the period during which such cause lasts. The term 'Force Majeure' as employed herein shall mean acts of God, wars (declared or undeclared), riots or civil commotion, fire, floods, and acts and regulations of the Government of India or State Government or any of the statutory agencies. Both the party shall pay to the other party, the amount payable upon the date of the occurrence of such force majeure.

17.2 Upon the occurrence of such cause and upon its termination, the party alleging that it has been rendered unable as aforesaid, thereby shall notify the other party in writing immediately but not later than twenty four (24) hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of the claims.

17.3 During the period, the obligations of the parties are suspended by force majeure, the contractor shall not be entitled to payment of any rate.

17.4 In the event of the force majeure conditions continuing or reasonably expected to continue for a period more than thirty (30) days, Purchaser shall have the option of terminating the contract by giving seven (7) days notice thereof to the contractor.

18 Variation:

Except for any provisions in this Purchase Order, any change /modification to the terms and conditions of this Order can be issued only by Purchaser or with the prior written approval from Purchaser.

19 Termination

19.1 The Contract shall be deemed to be terminated on completion of delivery of Material(s)

19.2 Termination of Default by Vendor:
Purchaser may terminate the contract at any time if the Vendor fails to carry out any of his obligations including timely delivery under this Contract. Prior to termination, the Vendor shall be advised in writing of the causes of unsatisfactory performance to be improved upon 15 days of the receipt of notice. In case, if the Vendor fails to bring about the improvement to the satisfaction of the Purchaser, then the order shall be terminated.

19.3 Without prejudice to the rights and remedies available to Purchaser, Purchaser may terminate the Contract or part thereof with immediate effect with written notice to the Vendor if,:

19.3.1 The Vendor becomes bankrupt or goes into liquidation.

19.3.2 The Vendor makes a general assignment for the benefit of creditors.

19.3.3 A receiver is appointed for any substantial property owned by the Vendor.

19.3.4 The Vendor has misrepresented to Purchaser, acting on which misrepresentation Purchaser has placed the Purchase Order on the Vendor.

The Vendor/ Contractor shall not be entitled to any further payment under the Contract if the Contract is terminated. If the order is terminated under clause 19.2 and 19.3, the Vendor shall not be entitled to any further payment, except that, if Purchaser completes the supply of Material(s) and the costs of completion are less than the Total Order value, the Purchaser shall pay Vendor an amount properly allocable to supply of Material(s) fully performed by Vendor prior to termination for which payment was not made to Vendor. In case, the cost of completion of Material(s) exceed the total Order value, the additional cost incurred by Purchaser for such completion shall be paid by the Vendor.

19.4 Purchaser shall be entitled to terminate the Contract at it's convenience, at any time by giving thirty (30) Days prior notice to the Contractor. Such notice of termination shall specify that termination is for Companies convenience and the date upon which such termination becomes effective. Upon receipt of such notice, the Contractor shall proceed as follows:

19.4.1 cease all further work, except for such work as may be necessary and instructed by the Company/ Company's representative for the purpose of protecting those parts of the supplies already manufactured;

19.4.2 stop all further sub-contracting or purchasing activity, and terminate Sub-contracts;

19.4.3 handover all Documents, equipment, materials and spares relating to the supply of goods prepared by the Contractor or procured from other sources up to the date of termination for which the Contractor has received payment equivalent to the value thereof; and

19.4.4 handover those parts of the supplies manufactured by the Contractor up to the date of termination.

Upon termination pursuant to clause 19.4, the Vendor shall be entitled to be paid the full value on the Material(s) delivered in accordance with the Contract.

19.5 The Contractor shall not be released from any of his obligations or liabilities accrued under the Contract on termination. For the avoidance of doubt, the termination of the Contract in accordance with this clause shall neither relieve the Contractor of his accrued obligations for Warranty or his accrued liability to pay (liquidated) damages for Delay nor shall entitle him to reduce the value of Performance Security.

20 Sub letting and assignment:

The contractor shall not without prior consent in writing of the Purchaser, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever, provided nevertheless that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.

21 **Dispute Resolution**:

Dispute or differences arising out or relating to this Order shall be resolved amicably by the parties. Failing such amicable resolution of dispute / differences either party may refer the matter to arbitration of a Sole Arbitrator to be appointed jointly by both the parties. The award of the Arbitrator shall be final, binding and conclusive on the parties. The venue for arbitration shall be Mumbai. The Arbitration proceedings will be governed and regulated by the provisions of Indian Arbitration and Conciliation Act, 1996 as amended from time to time and the rules framed there under.

22 Governing laws

This Contract shall be construed in accordance with and governed by the Laws of India without giving effect to any principle of conflict of law.

23 Jurisdiction

This Contract and the transaction contemplated herein shall be subject to the exclusive jurisdiction of the competent Courts in Mumbai only.

24 Limitation of Liability

Notwithstanding anything contained in the Contract, the Contractor's aggregate liability under this Contract shall be limited 100% of the Total order value. This shall however, exclude liability arising pursuant to clause 2.8- tax indemnity, clause 14- General Indemnity, clause 15- Indemnity against IPR, clause 25 – Confidentiality and liabilities arising due to wilful misconduct, gross negligence, third party claims and corrupt acts attributable to the Vendor.

25 Confidentiality:

The Vendor shall use the Confidential Information of the Purchaser only in furtherance of this Contract and shall not transfer or otherwise disclose the Confidential Information to any third party. The Vendor shall (i) give access to such Confidential Information solely to those employees with a need to have access thereto; and (ii) take the same security precautions to protect against disclosure or unauthorized use of such Confidential Information that the party takes with its own confidential information but, in no

event, shall a party apply less than a reasonable standard of care to prevent such disclosure or unauthorized use.

26 Consequential Damages:

Unless otherwise specified, neither Party shall be responsible for and nor shall be liable to the other Party for indirect/consequential losses and damages suffered by such Party including for loss of use, loss of profit whether such liability or claims are based upon any negligence on the part of the other Party or its employees in connection with the performance of the Purchase Order.

27 New Legislation (The Micro, Small and Medium Enterprise Development Act 2006)

a. This Act has been enacted and made effective from 2nd October 2006. The Interest on Delayed Payments to Small Scale and Ancillary Industrial Undertaking Act, 1993 is repealed.

b. Vendor is requested to inform the purchaser if vendor fall under The Micro, Small and Medium Enterprises Development Act, 2006 legislation and provide the purchaser, registration number and date to enable purchaser to take necessary care. The vendors are also requested to mention the same on their invoice / bill.

28 Relation between parties:

The Purchase Order shall be entered into on a principal-to-principal basis only. The Purchase order shall not be construed as a partnership or an association of persons. There is no agent and principal relationship between the parties. Each party shall be responsible for its own conduct. The Vendor shall ensure at all times that all the work carried out under this contract either by its own person or through any of its sub-Vendors shall be always done under its own direct supervision.

29 Environment / ISO 14001 Certification:

The Vendor to confirm whether their organization is ISO 14001 certified. If not, the Vendor must certify that the handling, use and disposal of their product / by-products conform to practices consistent with sound environmental management and local statutes. The Vendor shall ensure that all the wastes are disposed in environmental friendly way with strict compliance to applicable laws including adherence to MoEF guidelines with respect to disposal of batteries, lead waste, copper cables, ash, waste oil, e-waste etc which shall be disposed through MoEF approved parties only. The Vendor shall also be responsible to collect and recycle all the e-waste generated at the end of the product life cycle at its own costs and risks as per the MoEF guidelines/ orders.

30 Tata Code of Conduct

The Purchaser abides by the Tata Code of Conduct in all its dealing with stake holders and the same shall be binding on the Purchaser and the Vendor for dealings under this Purchase Order. A copy of the Tata Code of Conduct is available at our website: http://www.tatapower.com/aboutus/code-of-conduct.aspx. The Vendor is requested to bring any concerns regarding this to the notice of our Chief Ethics Officer on the e-mail ID: cecounsellor@tatapower.com.

31 Responsible Supply Chain Management:

The Purchaser is committed for a cleaner environment and respect of Human rights through its Responsible Supply Chain Management policy. The Vendor is required to comply with all the environment & Human rights related laws, including emission norms, Labour and environmental regulations. The Purchaser encourages its Vendors/ Contractors/ Business partners to pay more attention to green design, green supply, green production, green logistics and green packaging in performing their business obligations.

The Vendor is required to abide by the Tata Power Corporate Environment policy, Energy Conservation and Corporate Sustainability Policy.

A copy of the Responsible Supply Chain Management Policy along with Environment policy, Energy Conservation policy, Sustainability policy, Health & Safety policy and Human Rights policy is available at website: http://www.tatapower.com/sustainability/policies.aspx.

Vendor/Bidder is required to completely fill the attached "Supplier Sustainability Questionnaire" in support of their Green Supply Chain Management initiatives and submit the same with their offer.

The Owner recognizes that diversity in the workplace positively impacts business. The Owner is committed to help people from SC/ST background either by helping them to become entrepreneurs or by engaging workforce from SC/ST community under the contracts agreed herein. To encourage engaging SC/ST community, the owner may consider on the merit to incentivize the Contractor by paying additional 1% of the service contract portion if the number of SC/ST workforce engaged in the contract exceeds 30% of the total deployed strength and 2%, if the strength goes beyond 50%. While the Contractor will assist the workforce so engaged to become self-reliant in meeting the work expectation, the Owner may also volunteer its training resources to the extent possible to improve their employability. The Contractor shall maintain the proper documentation of such category of the workforce engaged and the owner may consider to pay the incentive after its verification.

The Owner may also consider extending price preference of 5% in the bid evaluation for an order value up to Rs.50 Lacs, provided the company is owned by a person from SC/ST community having minimum 50% holding in the company.

32 Vendor rating

You are requested to ensure compliance to the terms of the individual orders with regards to timely delivery, provision of all applicable documents / challans / test certificate, quality of the material etc. Your performance with respect to the said factors will be taken into consideration for future business.

33 Vendor Feedback:

33.1 In this dealing Vendors feedback is important for the purchaser to improve its processes. If vendor have to report any grievance, problem or require any clarification, information, vendor is requested to contact purchaser at email ID: CC_CUSTOMERFEEDBACK@tatapower.com

33.2 Vendor is requested to ensure compliance to the terms of the individual orders with regards to timely delivery, provision of all applicable documents / challans / test certificate, quality of the material etc. Vendor performance with respect to the said factors will be taken into consideration for future business.

34 Non-Waiver:

Failure of Purchaser or its representatives to insist upon adherence to any of the terms or conditions incorporated in the Contract or failure or delay to exercise any right or remedies herein or by law accruing, or failure to promptly notify the Vendor in the event of breach or the acceptance of or the payment of any Material(s) hereunder or approval of any design or Material(s) shall not release the Vendor and shall not be deemed a waiver of any right of Purchaser to insist upon the strict performance thereof or of any of its rights or remedies as to any such Material(s) regardless of when the Material(s) are shipped, received or accepted not shall any purported oral modification or revisions of the Contract by Purchaser or its representative(s) act as waiver of the terms hereof.

35 **Repeat Order**:

Purchaser may place the repeat order for 100% of ordered quantities within a span of 6 months from the date of issue of this Purchase Order & Vendor shall execute it at same rates, terms and conditions.

36 Severability

If any provision of this Contract is invalid, unenforceable or prohibited by law, this Contract shall be considered divisible as to such provision and such provision shall be inoperative and shall not be part of the consideration moving from any Party hereto to the others, and the remainder of this Contract shall be valid, binding and of like effect as though such provision was not included herein.

ESG FRAMEWORK FOR BUSINESS ASSOCIATES

Tata Power's Sustainability philosophy sits at the core of its Business Strategy. Tata Power Sustainability Model has an overarching objective of 'Leadership with care' with key elements of 'Care for the Environment'; 'Care for the Community'; 'Care for our Customers / Partners' and 'Care for our People'. These sustainability objectives encompass the Environmental, Social and Governance objectives driven as integrated elements.

Tata Power, together with its stakeholders is determined to achieve sustainable growth while creating shared value for all.
As a part of future ready roadmap, Tata Power has targeted following as our Environment, Social and Governance priorities:

- Being Carbon Net Zero before 2045
- Growing Clean capacity (80% by 2030)
- Customer centricity
- Becoming water neutral before 2030
- Achieving zero waste to landfill before 2030
- No net loss of biodiversity before 2030
- Positively impacting 80 million lives by 2027

In order to create a sustainable business ecosystem, Tata Power expects that all its Business Associates (BA) which includes its suppliers, vendors, consultants and service providers to align to its ESG and sustainability commitments.

Tata Power encourages improved efficiencies and scaling up of green initiatives through technology and innovation taking us farther on the journey of reducing carbon emissions and preparing the entire eco-system towards products and services that would have net positive impact on the environment and communities that we operate in.

The Vendors/ bidders wishing to associate with Tata Power are expected to share their own sustainability and ESG journey. We at Tata Power promote all Business Associates to have a sustainable procurement policy for their supplier and service providers to contribute to our integrated approach in achieving a sustainable supply chain. The BA is encouraged to carry out the assessment of their sub-contractors and sub-vendors on sustainability readiness so that they are aware of the expectation/ business requirement.

The Vendor/ Bidder shall fill-in the 'Environment, Social and Governance Compliance Screening Questionnaire for Business Associates' attached at Annexure-I and submit the same along with the Bid in Ariba online platform.

Responsible Supply Chain Management:

Tata Power is committed for a cleaner environment and respect of Human rights through its Responsible Supply Chain Management policy.
Tata Power Business Associate (BA) shall comply with all the environment & Human rights related laws, including emission norms, Labour and environmental regulations.

Tata Power encourages its BA to focus on green design, green supply, green production, green logistics and green packaging in performing their business obligations. The BA is expected to abide by the Tata Power Corporate Environment policy, Energy Conservation and Corporate Sustainability Policy (enclosed with this document as Annexure-II).

The BA is expected to:

- Strive towards Conservation of Energy, Water, Resources and optimize transportation of Men & Materials to minimize environmental impact and reduce carbon footprint.
- Carry out the assessment of materials used for construction, operation & maintenance, consumables and accordingly phase out those materials which are environmentally hazardous.
- Be cognizant that diversity in the workplace positively impacts business.
- Promote affirmative action by supporting people from SC/ ST background by engaging workforce from SC/ ST community under the contracts agreed herein.
- Share the commitment of 'No child labour', 'No forced labour', Non-discrimination on the basis of caste, colour, religion, gender, disability, maternity or pregnancy or any other factor unrelated to the requirements of the job
- Pay the wages or remuneration to the workforce, personnel deployed in compliance to all applicable laws and regulations.
- Provide its employees/ deployed labor with an employment environment that is free of physical or psychological harassment.
- Carry out the assessment of their Sub-contractors on their Sustainability Readiness so that they are aware of the above expectation/ standards
- To ensure usage of suitable package material which is more environmentally sustainable. Further the packing material shall be recycled to the extent possible. The material used for packing is expected to suit the mode of transport and to ensure its safe receipt at point of delivery.

Waste Disposal:

The BA is expected to follow best practices for disposal of waste, few of which are listed below:

- Have a detailed project plan that includes the waste management, segregation of all designated waste material (Recyclable/ Non-Recyclable), collecting, storing, disposing and transferring the same to pre-arranged facility/ destination in timely and safe manner as per environmental legislations. The project plan shall also include the innovative construction practice to eliminate or minimize waste, protect surface/ground water, control dust and other emissions to air and control noise.

- Have purchase policy to encourage the procurement of material with recycled and minimum packaging of goods during delivery and appropriate means for site-to-site transportation of materials to avoid damage and litter generation.

- Ensure that the residents living near the site are kept informed about proposed working schedule and timings/ duration of any abnormal noise full activity that is likely to happen.

- Ensure the regular maintenance and monitoring of vehicles and equipment for efficient fuel use so that emissions and noise are within acceptable limits to avoid air pollution.

Water Management:

The BA is expected to follow best practices for water management, few of which include a management and monitoring system for water withdrawals and consumption, procedures to reduce water usage or reuse/recycle water, and pretreatment of wastewater before disposal.

Compliance to Law:
The BA shall adhere to responsible business practices and comply with the provision of all the Statutory Acts Applicable. Special attention of the BA is drawn towards the compliance of provision of the following statues: (along with the latest amendments/additions, as applicable):

- The Child Labour (Prohibition and Regulation) ACT, 1986.
- The Contract Labour (Regulation and Abolition) ACT, 1970.
- The Employee's Pension Scheme, 1995.
- The Employee's Provident Funds and miscellaneous provisions Act, 1952.
- The Employees State Insurance Act, 1948.
- The Equal Remuneration Act, 1976.
- The Industrial Disputes Act, 1947.
- The Maternity Benefit Act, 1961.
- The Minimum Wages Act, 1948.
- The Payment of Bonus Act, 1965
- The Payment of Gratuity Act, 1972.
- The Payment of Wages Act, 1936.
- The Shops & Establishment Act, 1954.
- The Workmen's Compensation Act, 1923.
- The Employer's Liability Act, 1938.
- and any other applicable statutory act

Social Accountability (SA 8000):

Tata Power expects its BAs to follow guidelines of SA 8000:2014 on the following aspects

- Child Labour
- Forced or Compulsory Labour
- Health & Safety
- Freedom of Association & Right to Collective Bargaining
- Discrimination
- Disciplinary Practices
- Working Hours
- Remuneration
- Management System

Health and Safety

The BA is expected to ensure the health and safety of his and his Sub-contractor's staff and labour. The BA shall, in collaboration with and according to the requirements of the local health authorities, ensure that medical staff, first aid facilities, sick bay and ambulance service are available at the accommodation and on the Site at all times, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. The BA shall maintain records and make reports concerning health, safety and welfare of persons deployed, and damage to property, as the Owner's Representative may reasonably require. The BA shall be responsible for the medical treatment / hospitalization of his and his Sub-contractor's staff/ labour.

The BA shall appoint a qualified Safety officer at the Site to be responsible for maintaining the safety, and protection against accidents, of all personnel on the Site. Such Safety officer shall have the authority to issue instructions and take protective measures to prevent accidents.

The BA shall comply in toto with the Tata Power's Contractor Safety Terms & Conditions, Health Safety & Environment Manual while working on Tata Power Site/ Services/ Contracts.

Grievance Mechanism

The BA is expected to have grievance procedures that allow stakeholders to anonymously bring environmental and/or work-related violations and/or concerns to the attention of management. In addition, the BA is expected to have procedures for examining reports of environmental and/or work-related violations or concerns and/or privacy complaints.

Data Protection

The BA is expected to have a formal process to address data security or privacy issues.

ANNEXURE-I

Sr. No.	Question Description	Response (Y/N)	Remarks
Organization			
1	Does your Company have Sustainability Policy at Organization Level? If Yes, Please attach		
2	Do you have sustainable procurement policy in place for your own suppliers? If Yes, Please attach		
3	Does your company do regular assessment of its suppliers on ESG parameters?		
4	Are there ESG risks, or negative impacts identified in your supply chain		
Governance			
1	Is diversity taken into consideration when appointing board members/ senior management? Do you have an independent director/s?		
2	Has your company taken initiatives to ensure ethical practices at workplace? Please share the details, Policies etc.		
3	Does your company have a formal process to address data security or privacy issues? Please share the details, Policies etc.		
4	Does your company have grievance mechanism for stakeholder issues and track resolution?		
Environment/ Planet			
1	Does your company have Environmental Policy? If Yes, Please attach		
2	Do you have a formal process for waste management including solid wastes, liquid wastes and hazardous waste?		
3	Does your company track greenhouse gas emission? Also, what percentage of own consumption comes from the renewable energy?		
4	Does your company have a formal process for water management including monitoring of water consumption and withdrawals, and if applicable, pretreatment of wastewater?		
Green Technology/ Innovation			
1	Are your facility/ Product/ Services provided by you is based on green design, green production, green packaging or green logistics considerations? Please elaborate.		
2	Do your products or services have any environmental or social features or benefits (e.g. environmental/energy certification, ecolabels, fair trade certification, etc.)?		
Social/ People			
1	Does you facility/ Company have written personnel policies in place Are you an equal opportunity employer?		
2	Please describe any formal programme / campaign in place to promote company involvement with the community (volunteering, etc.). What is the percentage of profit spend on community activities?		
3	Does your company have a written Health & Safety Policy or Program? If Yes, Please attach		
Certifications: Does your company have following certifications (valid till date-please mention validity)			
1	ISO9001 accreditation		
2	SA8000 or equivalent		
3	ISO 14001 certification		
4	ISO 18001/45001 or equivalent		
5	ISO/IEC 27001 or equivalent		
6	Any Other (Please specify)		

Signature

Business Associate Name

ANNEXURE-II

Tata Power, our Sustainability Policy integrates economic progress, social responsibility a
vironmental concerns with the objective of improving quality of life. We believe in integrati
r business values and operations to meet the expectations of our customers, employe
rtners, investors, communities and public at large

We will uphold the values of honesty, partnership and fairness in our relationship w
stakeholders

We shall provide and maintain a clean, healthy and safe working environment for employe
customers, partners and the community

We will strive to consistently enhance our value proposition to the customers and adhere
our promised standards of service delivery

We will respect the universal declaration of human rights, International Labour Organizatio
fundamental conventions on core labour standards and operate as an equal opportunit
employer

We shall encourage and support our partners to adopt responsible business policies, Busine
Ethics and our Code of Conduct Standards

We will continue to serve our communities:

- By implementing sustainable Community Development Programmes including throu
public/private partnerships in and around our area of operations
- By constantly protecting ecology, maintaining and renewing bio-diversity and wherev
necessary conserving and protecting wild life, particularly endangered species
- By encouraging our employees to serve communities by volunteering and by sharing th
skills and expertise
- By striving to deploy sustainable technologies and processes in all our operations and u
scarce natural resources efficiently in our facilities
- We will also help communities that are affected by natural calamities or untowa
incidence, or that are physically challenged in line with the Tata Group's efforts

e management will commit all the necessary resources required to meet the goals
rporate Sustainability.

Supplier Code of Conduct

Tata Power follows the Tata Code of Conduct (TCoC) and the Whistle blower Policy and expect all its Suppliers to adhere to the same principles. **"Supplier"** here means any business, company, corporation, person or other entity that provides, sells or seeks to sell, any kind of goods or services to Tata Power, including the Supplier's employees, agents and other representatives. The suppliers are expected to adhere to the following Do's and Don'ts:

Do's

1. The Suppliers shall be committed to supplying products and services of high quality that meet all applicable standards and laws, including product packaging, labelling and after-sales service obligations.
2. Comply with all applicable laws and regulations, both in letter and in spirit, in all the territories in which it operates.
3. Strive to provide a safe, healthy and clean working environment for its employees.
4. Strive for environmental sustainability, particularly with regard to the emission of greenhouse gases, consumption of water and energy and the management of waste and hazardous materials.
5. The Supplier shall represent our company (including Tata brand) only with duly authorised written permission from our company.
6. Safeguard the confidentiality on the use of intellectual property, information and data of the Company.
7. Gifts and hospitality given or received should be modest in value and appropriate as per Company Policy.
8. The assets of Tata Power shall be employed primarily and judiciously for the purpose of conducting the business for which they are duly authorised.
9. All actual or potential conflicts due to financial or any other relationship with a Tata Power employee shall be disclosed.

Don'ts

1. The Supplier shall not make unfair or misleading statements about the products and services of competitors.
2. Children shall not be employed at workplaces.
3. Forced labour shall not be used in any form.
4. The Suppliers shall neither receive nor offer or make, directly or indirectly, any illegal payments, remunerations, gifts, donations or comparable benefits that are intended, or perceived, to obtain uncompetitive favours for the conduct of its business with Tata Power.

Reporting Violations

The Supplier shall notify the Company regarding any known or suspected improper behaviour of other suppliers or employees relating to its dealings with Tata Power, by email to: cecounsellor@tatapower.com.

The same can also be raised through our 3rd party ethics helpline facility:

1. Email id: tatapower@ethics-line.com ; Website: www.tip-offs.com
2. Helpline numbers: Toll free - 0008001004382 and 0008001008277. Also accessible at normal domestic call rates within India: +91-11-71279005
3. Postal address: Deloitte Touche Tohmatsu India LLP
   c/o Arjun Rajagopalan, Partner (Ethics Helpline Services)
   19th Floor, 46 - Prestige Trade Tower, Palace Road,
   High Grounds, Bengaluru, Karnataka – 560001

AGREED TERMS & CONDITIONS (ATC)- Indigenous Supply

Bidder's Name: M/s. _____

RFQ ref. No. CC25VJS010

Enquiry Description: 1 Year OLA for Supply of 33 /22 kV Switchgears for Mumbai Distribution
Bidder's Offer Ref.: *<pls mention your offer reference no here>*

1. SUBMISSION OF THIS DOCUMENT DULY SIGNED, SHALL CONSTRUE THAT ALL THE CLAUSES OF AGREED TERMS AND CONDITIONS HAVE BEEN ACCEPTED BY YOU. PURCHASE ORDER, IF ANY, SHALL BE GOVERNED BY THE CONFIRMATION PROVIDED HERE.

S. No.	Description	BIDDER'S RESPONSE
A	**TECHNICAL**	
1	Acceptance of technical specifications / scope of work including General/Technical notes as per Tender specification **In case of deviation, confirm that the same has been furnished separately.**	
2	Confirm data sheets duly filled in have been submitted, wherever required as requested in Technical specification/ Scope of work	
B	**COMMERCIAL**	
3	**Bid Validity** Confirm Bid Validity 180 days from date of bid submission.	
4	**Firm price:** Price Variation applicable with base month as April last week.	
5	**Delivery Terms** Confirm delivery terms DAP (FOR) basis for any spares/consumables	
6	**Packing & Forwarding** Confirm that Packing & Forwarding charges including Special Packaging Requirement (if applicable) are included in base price	
7	**Freight Charges** Confirm that Freight charges are included in base price	
8	**Taxes and duties:** GST: __% HSN/ SAC Code: Any other tax as applicable:	
9	**Price Reduction / LD / SLA**: Confirm that Bidder agrees to the LD charges as specified in GTC Supply	
10	**Delivery Period:** Mention the delivery timelines from the date of order	
11	**Payment Terms Acceptance:** Confirm acceptance to the Payment terms as specified in GCC Supply.	
12	**Warranty / Latent Defect Liability Period:** Confirm that Bidder agrees to the clause as specified in Technical specs	
13	**Contract Performance Bank Guarantee**: Confirm acceptance to Submission of Unconditional Bank Guarantee as per GCC Supply.	

S. No.	Description	BIDDER'S RESPONSE
14	**Testing and Inspection charges (if applicable):** Confirm the quoted are Inclusive of all testing and inspection charges as per Tender specification	
15	**Compliance to other terms & conditions** Acceptance of all other terms & conditions as forming the Part of the RFQ/ Tender document and communicated vide subsequent addendum(s) if any: **In case of deviation, confirm that the same has been furnished separately.**	

*Bidders / Vendor shall note that in case of any contradiction between the Agreed Terms and Conditions (ATC); and the Bidders offer, the ATC shall prevail.

Bidder's Authorised Signatory and stamp:

Name: