The Tata Power Company Ltd		OPEN TENDER NOTIFICATION
Tender Reference: ***CC27AAM009***		*Document Date:* ***26th May 2026***

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 bid submission
For the following package please send mail to Ms. Ayesha Abbas Mujawar (ayesha.mujawar@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com).					
1.	1 year OLA for supply of Package sub-stations for Mumbai Distribution	CC27AAM009	13,00,000/-	2,000 /-	16th June 2026

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 ayesha.mujawar@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.

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

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OPEN TENDER NOTIFICATION

FOR

CC27AAM009- 1 year OLA for supply of Package sub-stations 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	**CC27AAM009**
Description	**1 year OLA for supply of Package sub-stations for Mumbai Distribution**
Type of Tender	**Outline Agreement**
Estimated Period	**1 year**
Tender Fee	**Rs 2000/-**
Earnest Money Deposit (EMD)	**Rs 13,00,000/-** **Rs. Thirteen Lakh only**
Price Basis	**Price variation**
Executive Handling this Tender*	Name: Ms. Ayesha Abbas Mujawar E-Mail ID: ayesha.mujawar@tatapower.com
Technical Query *	Name: Mr. Pote .R.R E-mail id- rrpote@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 2nd June 2026
(b)	Access to Tender Documents through E-Tender system to authorized person of Interested Bidder	2nd June 2026
(c)	Last Date of receipt of pre-bid queries, if any.	6th June 2026
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	8th June 2026
(e)	Last date and time of receipt of Bids	16th June 2026

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

Sr no	Parameter	Tata Power Requirement	Documents To be submitted by Bidder to ascertain meeting of Pre-qualification requirement
1	Infrastructure	Bidder must be an OEM/supplier 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 during last 3 years or b) A single order of 6 nos or c) Two orders of 4 nos during last 3 yrs 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, Completion Certificates and performance certificates are to be submitted. 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 and qualification.
3	Performance	The bidder should have performance certificates for 2 years 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 of Annual turnover of the bidder for last three years shall not be less than Rs. 10 Crs.	Copy of audited Balance Sheet and P&L Account along with UDIN number to be submitted in this regard.
5	Type Test	The bidder shall submit Type test reports obtained from CPRI/ERDA/ NABL/	Type Test Reports and clause wise compliance list to be

		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/NABL/ International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted before dispatch of the equipment / material.	submitted along with bid. 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 as per specification requirements.

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 (PV) Clause: .

Prices shall be subject to IEEMA Price Variation Clause with following conditions:

IEEMA variation applicable to distribution transformer shall be used to calculate the PSS cost.
IEEMA formulae and factors governing the price variation shall be as follows:

$$P = Po/100 (7 + 35\ C/Co + 30\ ES/ESo + 7\ IS/ISo + 8\ IM/IMo + 7\ ER/ERo + 6\ W/Wo)$$

P - Price payable as adjusted in accordance with the formula
PO- Price quoted / confirmed (Each)
C - Price of Coper - Applicable in the Month of ordering.
CO - Price of Coper - as per base month of tender.
ES- Price of CRGO - Applicable in the Month of ordering.
ESO- Price of CRGO - as per base month of tender.
IS- Price of HR Coil of 3.15mm - Applicable in the Month of ordering.
ISO- Price of HR Coil of 3.15mm - as per base month of tender.
IM- Price of Insulating Materials - Applicable in the Month of ordering.
IMO - Price of Insulating Materials - as per base month of tender.
ER- Price of Epoxy resin - Applicable in the Month of ordering.
ERO- Price of Epoxy resin - as per base month of tender.
W - All India average Consumer price index - Applicable in the Month of ordering.

WO- All India average Consumer price index average - as per base month of tender.

Base circular shall be Apr 2026 circular issued in May 2026. Base month for Bid Price shall remain same throughout the negotiation process till Outline Agreement / Rate Contract is finalized. Base month circular has to be attached in the price bid.

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 PV 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.

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

3.1 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.

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Annexure 1

Schedule Of Items

Sr.No	Material code	Item Description	Unit	Estimated Quantity	Unit Rate	Total Value

1	3000052116	PSS, CRT, 1000 KVA, 11KV/415V	EA	15		-
2	3000105210	PSS CRT-1600 kVA, 11KV/415V	EA	10		-
3	3000105209	PSS CRT-1600 kVA, 22KV/415V	EA	12		-
4	New code	PSS, CRT, 11-22/0.415kV 1600 KVA dual ratio.	EA	2		-
5	New code	PSS, CRT, 11-22/0.415kV 1000 KVA dual ratio.	EA	3		-
		Sub Total				-
		GST	%			-
		Total Value including GST	**Rs**			-

AGREED TERMS & CONDITIONS (ATC)- Indigenous Supply

Bidder's Name: M/s. _____

RFQ ref. No. CC27AAM009

Enquiry Description: 1 year OLA for supply of Package sub-stations 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:**	
5	**Delivery Terms** Confirm delivery terms FOR basis	
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 & Transit insurance are included in base price	
8	**Taxes and duties:** GST: __% HSN/ SAC Code: Any other tax as applicable:	
9	**LD clause**: Confirm that Bidder agrees to the LD clause mentioned in GTC	
10	**Completion/Delivery Period:** Mention your delivery timelines from the date of order	
11	**Payment Terms Acceptance:** Confirm acceptance as per GTC – Supply	
12	**Warranty / Latent Defect Liability Period:** Confirm acceptance as per GTC – Supply	
13	**Contract Performance Bank Guarantee**: Confirm acceptance to Submission of Unconditional Bank Guarantee as per GCC Supply.	
14	**Testing and Inspection charges (if applicable):** Confirm the quoted are Inclusive of all testing and inspection charges as per Tender specification	

S. No.	Description	BIDDER'S RESPONSE
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:

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

CORPORATE SUSTAINABILITY POLICY

At Tata Power, our Sustainability Policy integrates economic progress, social responsibility and environmental concerns with the objective of improving quality of life. We believe in integrating our business values and operations to meet the expectations of our customers, employees, partners, investors, communities and public at large

- We will uphold the values of honesty, partnership and fairness in our relationship with stakeholders
- We shall provide and maintain a clean, healthy and safe working environment for employees, customers, partners and the community
- We will strive to consistently enhance our value proposition to the customers and adhere to our promised standards of service delivery
- We will respect the universal declaration of human rights, International Labour Organization's fundamental conventions on core labour standards and operate as an equal opportunities employer
- We shall encourage and support our partners to adopt responsible business policies, Business Ethics and our Code of Conduct Standards
- We will continue to serve our communities:
    - By implementing sustainable Community Development Programmes including through public/private partnerships in and around our area of operations
    - By constantly protecting ecology, maintaining and renewing bio-diversity and wherever necessary conserving and protecting wild life, particularly endangered species
    - By encouraging our employees to serve communities by volunteering and by sharing their skills and expertise
    - By striving to deploy sustainable technologies and processes in all our operations and use scarce natural resources efficiently in our facilities
    - We will also help communities that are affected by natural calamities or untoward incidence, or that are physically challenged in line with the Tata Group's efforts

The management will commit all the necessary resources required to meet the goals of Corporate Sustainability.

(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

TATA POWER
Lighting up Lives!

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.

Tata Code of Conduct- (TCoC): https://www.tatapower.com/pdf/aboutus/Tata-Code-of-Conduct.pdf

Whistle Blower Policy: https://www.tatapower.com/pdf/aboutus/whistle-blower-policy-and-vigil-mechanism.pdf

Anti-Bribery & Anti-Corruption Policy: https://www.tatapower.com/pdf/aboutus/abac-policy.pdf

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:

Toll-free Number	1800 267 4065
Email	tatapower@tip-offs.in
Website & Chatbot	www.tatapower.tip-offs.in
Postal address	Attn to: Mr. Puneet Arora, Deloitte Touch Tohmatsu India LLP, 6 floor, AIPL Business, Sector 62, Gurugram, Haryana 122102

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION OF 11 kV & 22 KV kVA PSS WITH CAST RESIN TRANSFORMER

The Tata Power Company Ltd.

Engineering Services (ENSE),

Distribution Division, Senapati Bapat Marg,

Lower Parel, Mumbai – 400013 Maharashtra

Document No: ENSE-DS-2047-R0

Document Title: TECHNICAL SPECIFICATION OF 11 kV & 22 KV kVA PSS WITH CRT

01	For tender purpose (ENSE-DS-2047-R01)	07/05/26	KSJ		RRP		VK	
00	ENSE-DS-2047-R00	08/06/2024	YMM		AVP		RMB	-
Rev No.	**Remarks**	**Date**	**Initials**	**Sign**	**Initials**	**Sign**	**Initials**	**Sign**
			Prepared By		**Checked By**		**Approved and Issued By**	

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

CONTENTS

1	**SCOPE**	1. This specification covers technical requirement of design, engineering, manufacture, testing at manufacturing work, painting, packing, forwarding, supply and performance of Package type substation comprising an enclosure containing high voltage switchgear, transformer, low voltage switch gear. The transformer shall be of 1000kVA Cast resin, the HV compartment shall comprise of RMU and the LV compartment shall include ACB along with MCCBs and auxiliary equipment's with interconnection inside the enclosure for efficient and trouble-free operation of the distribution network for Tata Power Company Ltd. at Mumbai. 2. It is not our intent to specify completely herein all details of design and construction of the equipment. However, the equipment shall conform in all respects to high standards of Engineering design and workmanship and shall be capable of performing in a manner acceptable to the purchaser (TPC) who will interpret the meaning of drawings and specification and shall be entitled to reject any work or material which in his judgement is not in full accordance therewith. 3. All the bought-out items shall be of reputed make and shall be subject to approval by the PURCHASER (TPC) after award of contract.
2	**APPLICABLE STANDARDS**	The equipment shall conform to this specification and latest revision of following codes with all amendments.

Sr. No.	Title	Standard
1	IEC 62271-202	HV switchgear and control gear- HV/LV Pre-fabricated substation.
2	IEC 62271-200	HV switchgear and control gear-AC metal enclosed switchgear and control gear for voltages above 1kV and up to and including 52kV
3	IEC 60694	Common specifications for high voltage switchgear and control gear standards
4	IS 8623	Specification for low voltage switchgear
5	IEC 60529	Degrees of protection provided by enclosures (IP code)
6	IEC 62271-102	HV switchgear and control gear-Alternating current disconnectors and earthing switches
7	IEC 62262	Degree of protection provided by enclosures for electrical equipment against mechanical impacts (IP Code)
8	IEC 60060	High-voltage test techniques
9	IEC 60947 / IS 13947	Low voltage switchgear and control gear

		10	IEC 60439-1	Low voltage switchgear and control gear assemblies- Type tested and Partially type tested assemblies
		11	IEC 60076 / IS 2026	Power Transformer
		12	IEC 60255-3	Electrical Relays – Part 3: Single input energizing quantity measuring relays with dependent or independent time
		13	IS 2705	Current transformers
		14	IS 3156	Voltage transformers
		15	IEC 60376	Specification of technical grade sulphur hexafluoride (SF6) for use in electrical equipment
		16	IEC 61958	High voltage prefabricated switchgear and control gear assemblies – Voltage presence indicating systems
		18	IS 2099: 1986	Specification for Bushings for Alternating Voltages above 1000 Volts
		19	IS 7421: 1988	Specification for porcelain bushings for alternating voltages up to and including 1000kV.
		20	IS 8603 (Part-1)	1977 Dimensions for Porcelain Transformer Bushings for Use in Heavily Polluted Atmospheres - Part I: 12 kV and 17.5 kV Bushings
		21	IS 26291985	Recommended practice for Hot dips Galvanizing of iron & steel
		22	IS 2633:1986	Test for Uniformity of Zinc Coating CEA guidelines dt August 2008 for energy efficient distribution transformer.
		23	IS 5	Color of ready mixed paints
		24	IS 5082	Wrought Aluminium & Al alloy plates & sheets for electrical application
		25	IS 2551	Danger Notice plates

3	**CLIMATIC CONDITIONS OF THE INSTALLATION**	

1	Maximum ambient temperature	43°C
2	Max. Daily average ambient temp	35°C
3	Min Ambient Temperature	07°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 dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

4. GENERAL TECHNICAL REQUIREMENTS

Sr. No	Item Description	Tata Power Requirement	
*	PSS rating	1000kVA	1600kVA
1	Application	Outdoor	
2	Rated voltage	12kV or 24 kV	
3	Service Voltage	11kV or 22 kV	
4	System Frequency	50 Hz	
5	Rated maximum power of substation	1000kVA Cast Resin (Ventilation Louvers)	1600kVA Cast Resin (Ventilation Louvers)
6	Degree of Protection for Enclosure	IP 54	
7	Internal arc test	IAC-AB as per IEC 62271-202 (20KA for 1sec)	
8	**Rated external mechanical impact Class of enclosure**	**Class IK10 according to IEC 62262:2002;**	
9	Temperature rises for any accessible part of the enclosure	Maximum permissible temperature shall not exceed 70 deg C at an ambient temperature not exceeding 40 deg C	
10	**Rated thermal class of enclosure as per IS/IEC 62271-202 : 2022**	**10K**	
A	**HV Insulation Level**		
10	Rated Impulse withstand voltage (11kV or 22kV)	75kVP or 125 kVP	

11	Power Frequency Withstand voltage (11kV or 22kV)	28kV RMS or 50 kV RMS	
B	**HV Network and Bus Bar**		
12	RMU	3 way, Non-extensible (2nos isolator + 1no. Breaker)	
13	Rated current of incomer Load break Switch	630 A	
14	Rated Current Of Circuit – Breaker	630 A	
15	Rated Short Time Current Withstand (3 Sec)	21kA for 3 Sec (11 KV)	
		25kA for 1 Sec (22 KV)	
16	Rated Short Circuit Making Current	50 kA	
C	**LV Network**		
17	Rated LT voltage	415V	
18	**LV Incomer ACB**	**1no, 3 pole 1600A & 230V AC shunt Tripping coil**	**1no, 3 pole 2500A & 230V AC shunt Tripping coil**
19	**LV Outgoing MCCBs**	**6 nos., 630A**	**6 nos., 630A**

5.0	**General Construction**	
5.1	**ENCLOSURE**	1. The Enclosure shall be made of minimum 2-3 mm thick GI sheet with a base of 3 mm (min), tropicalized to meet Indian weather condition. The base of the enclosure shall ensure rigidity for easy transport and installation. The Structure of the substation should be provided with additional supporting beams capable of supporting the gross weight of all the equipment's. The roof of the substation compartments shall be designed to support adequate loads with a minimum clearance of 300 mm provided up to the top of any component installed inside the substation. There shall be provision of proper ventilation through louver apertures so as to allow circulation of hot air inside enclosure naturally. The complete design shall be compartmentalized. 2. The HV compartment shall comprise of one no. 3 way, non-extensible, 11kV or 22kV RMU with 2 nos. incomer and one no. circuit breaker as outgoing. Termination bolts and boots for RMU shall be supplied by bidder. 3. The Transformer shall be 11/0.415kV or 22/0.415kV, 1000kVA/1600kVA, Cast resin type, copper coil, naturally cooled (AN) construction with Taps on Primary side. The LV compartment shall comprise of one no. 1600A/2500A ACB with 6 nos. 630A each MCCBs and other auxiliary components with interconnection required for complete operation of substation. 4. Degree of protection for over all the enclosure shall be **IP 54** with transformer compartment as IP23. There shall be no bolting arrangement on the doors and sides (periphery) so as to avoid access of dust and water inside. This would also ensure that the unit is well protected from outside nuisance owing to its being located in crowded and outdoor areas.

		5. HV and LV compartment shall be accessible on the side of substation through doors with key lock and nitrile rubber seal. The doors shall have provision of pad locked to ensure theft prone locking arrangement. Heavy duty hinges shall be provided for each door such that they are not visible from outside and hence not removable. The outgoing of the distribution transformer shall be connected directly to incomer of LV distribution through busbars. Transformer shall be accessible from both sides of enclosure. HV, LV and transformer compartment should be isolated from each other internally. 6. There shall be an arrangement for internal lighting activated by associated switch on door for HV, Transformer and LV compartment separately. Space heater with thermostat shall be provided in both cable compartment. Suitable for lifting package type substation should be provided. 7. **External mechanical impact class of enclosure &** Ventilation aperture shall be as per class IK10 & substation shall be type tested for internal Arc withstand test as per IEC. The bidder shall provide provision for remote monitoring of status of RMU, fault passage indicator, LT ACB & MCCBs. 8. **All ventilation apertures, louvers, etc., part of the external enclosure shall have mechanical impact resistance of minimum IK10 in accordance with IS/IEC 62262.**The Transformer compartment doors shall have Limit switch with wiring to trip RMU breaker when the door is opened.
5.1.1	**EARTHING**	1. All metallic components of substation shall be earthed to a common earth conductor of size 50X6 tinned Cu or 65x10 mm GI strip running all long the periphery of package substation. 2. Four nos. earthing/studs shall be provided on the enclosure at each corner position which shall be internally connected to the common earth conductor /strips provided for entire substation. The diameter of stud shall be at least 12mm and shall be able to connect and terminate the external earth conductor. 3. The connecting point shall be marked with protective earth symbol as per IEC, separate earthing conductor /strips shall be provided for transformer neutral and the same shall be insulated from the body earth and suitably brought out from the enclosure for connecting to external system earth
5.1.2	**PAINT**	1. All paint shall be applied on clean, dry surfaces under suitable atmosphere condition by seven tank process and powder coating. 2. The paint shall not be scale off or crinkle or be removed by abrasion during normal handling. 3. The enclosure for the substation shall be painted with shade Gray RAL 7032.
5.1.3	**GALVANIZING**	The 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 electrogalvanized 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 have galvanic bath, which could have a determine effect on the durability of the zinc coating. a) After galvanizing no drilling or welding shall be performed on the galvanized parts of equipment except that nuts may be threaded after galvanizing. b) 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 dip

		galvanization. The galvanized steel shall be subjected to test as per IS-2633/BS 729 amended to date.
5.2	**HV COMPARTMENT**	**Approved Makes: ABB, Siemens, Schneider** Ring Main Units shall be as under (All configurations shall have Motorised LBS compartment) for 11 kV and 22kV 3 Way with 2 LBS + 1 VCB (For Indoor application): Non extensible 3 Nos. 630A Load Break Switches + Electronic Fault Passage Indicator in each LBS compartment (of TPC approved make).- **EKL8000, C&S, SICAM make to be considered with dual energy source-with self-powered inbuilt batter with protentional free contact for remote low battery indication.**
5.2.1	**MAIN TANK**	1. The switchgear and bus bar shall be contained in a stainless steel tank filled with SF6 gas and the outer body shall be made of GI high tensile steel/CRCA 2mm thick with thick gland plates as per IS 513. 2. The tank shall have SS sheet of 2.5 mm thickness minimum (or as per type tested design of bidder with undertaking on letter head) and meet the "sealed pressure system" criteria in accordance with the IEC 62271-200. This is a system for which no handling / refilling of gas shall be required throughout the expected operating life, i.e. 30 years. Sealed pressure systems are completely assembled, filled and tested in the factory. 3. The maximum leakage rate of SF6 gas shall be lower than 0.1% of the total initial mass of SF6 gas per annum from main tank. The filling pressure for the switchgear shall be just above the atmospheric pressure so as to prevent the tendency to leak. SF6 gas used for the filling of the RMU shall be in accordance with IEC 376. 4. It is mandatory to fit an absorption material in the tank to absorb the moisture from the SF6 gas and to regenerate the SF6 gas following arc interruption. The degree of protection for RMU tank (Indoor/Outdoor) shall be IP 67. 5. The RMU shall be complete with all connection and copper bus bar with continuous current carrying capacity of 630A. The bus bar shall be fully encapsulated by SF6 gas inside the steel tank. 6. The tank shall have separate SF6 refilling valve and the filling pressure must be mentioned near the valve. And the refilling valve should be marked properly. 7. If same valve is used for pressure indicator or remote communication, then the procedure to refill to be mentioned near the NRV from with permanent sticker. 8. The SF6 tank shall be completely enclosed in the enclosure such way that any rodent entry on top or side of tank is deterred. 9. All configurations should be in one tank without any coupling/joint on main Busbar. 10. Tank explosion vent shall be at the bottom.
5.2.2	**GENERAL DETAILS**	1. The mimic board shall be provided with IP2X degree of protection for Indoor RMUs.). Cable compartment shall be IP54. 2. The RMU shall be suitable for mounting on plinth with trench below and shall have base frame on sides with mounting bolt accessibility from outside of RMU the mounting bolts provision shall be min. M12/M16 bolts on all four sides. The mounting bolts and

		nuts shall be of hot dip galvanized to avoid rusting. The provision for cabling shall be through base plate from bottom of RMU through trench below. The RMU shall be designed so that the position of the different devices is visible to the operator on the front face plate with permanent type indicators. 3. The RMU shall be identified by an appropriately sized permanent labels which clearly indicates the functional units and their operation directions etc. The ON or OFF shall be marked as words and only I/O labelling shall not suffice. 4. The RMU shall be designed to be tamper proof to prevent access to all live parts during operation without the use of special tools. 5. The earth bus bar shall be covered if passing through the cable chamber and enclosed in an enclosure housing to prevent theft/tampering. Only extension outside enclosure shall open for access. 6. There shall be continuity between the metallic parts of the RMU and cables so that there is no electric field pattern in the surrounding air, thereby ensuring the safety of people. The enclosure and cable compartment and tank shall be connected to common earthing. 7. All parts of main circuit to which access is required or provided shall be capable of being earthed prior to becoming accessible. This does not apply to removable parts which become accessible after being separated from the switchgear and control gear. The cables shall be earthed by an earth switch with short-circuit making capacity in compliance with IEC 62271-102. 8. The LBS /CB shall not be closed in case Earth Switch is closed. The earth switch shall be fitted with its own operating mechanism and manual closing shall be driven by a fast-acting mechanism, independent of operator action. Mechanical interlocking systems shall prevent access to the operating shaft to avoid all operator errors such as closing the earth switch when the Load break switch is closed or when cable is charged. 9. All panel covers shall be provided with anti-vandal screw bolts so that opening of panel covers is only possible with special tools, which shall be provided by the Bidder as mandatory spare/tool. 10. The default design of cable compartment for TATA Power shall be suitable for 3Cx300 sq.mm cables in feeder compartments & in the breaker compartment 11Kv, 3R, 1CX185 sq. mm **& 22kV, 3R, 1C, 240 sq.mm Copper** cables. 11. The circuit breakers, Load break switches and earthing switches shall have pad lock provision & can be locked in the open or closed position by 1 to 3 padlocks 6 to 8mm in diameter. 12. Anticorrosive fasteners & components to be provided on switchgear. 13. The main bus bar current density shall be less than 2.7A/sq.mm. 14. The cable gland plate shall have split type design having two parts for removal of cable with termination. 15. The vacuum interrupter shall withstand 10-7 milli-bar Vacuum Pressure ensuring high quality vacuum for interruption and shall have Copper Chromium Arcing Contacts. The interrupter manufacturing unit shall have shall be single Shot brazing and have high First pass Yield. (Shall be part of Bidders own vendor evaluation criteria)

		16. For each terminals bolt should be provided with Cup or Belleville Washer and flat washers. (Note- The cut spring washers are not accepted) 17. The CT secondary wires and Trip coil wires shall not have any joint in-between CT and TB or relay.
5.2.3	**INTERNAL ARC TESTING**	1. Any accidental over pressure inside the sealed chamber tank shall be limited by the opening of a pressure limiting device provided at the bottom part of the tank. Gas shall be released to the bottom without affecting cables and termination of the RMU with partition between cable chamber such way that gas releases away from the operator. Bidder shall provide type test report to prove compliance to the 'Internal fault IAC- A FL minimum for indoor as per IEC 62271-200 on main tank and cable chambers. 2. An anti-reflex mechanism on the operating lever shall prevent any attempts to reopen immediately after closing of the switch or earth switch. All manual operations shall be carried out on the front of the RMU. In case of SF6 gas leakage from gas tank or any kind of repair should be done at site or replacement of complete RMU to be done free of cost within guarantee period.
5.2.4	**Incomer Load Break Switches (LBS)**	1. Load break switches shall be maintenance-free. The position indicator shall provide positive contact indication in accordance with IEC 60265-1. In addition, manufacturer shall prove reliability of indication in accordance with the standard. The switches shall be of the "increased operating frequency" in accordance with IEC 60265-1. 2. The LBS shall have at least 3 positions, open-disconnected, closed, and earth (with making capacity) and shall be constructed in such a way that natural interlocking prevents unauthorized operations. 3. The disconnector should have the maximum 200 micro-ohm contact resistance. 4. Earthing of the cable shall be either through a three-position switch of a separate snap action type or Earth Switch having fault making capacity. 5. The switches shall be fully mounted and inspected in the factory. Provision for future motorisation of LBS and CB should be kept in configuration while designing RMU. 6. The load break switch and earthing switch operating mechanism shall have mechanical endurance of at least 1000 (M0) operations. The type test reports to be submitted along with Bid. 7. Load break switch shall have mechanical switch operation counter and should be visible on front in horizontal alignment. The Load break switch should have minimum spare 3 NO+ 3 NC auxiliary contacts and 1NO+1NC for earth switch. The load break switch shall be compatible for remote operation without any modification of the operating mechanism and without de-energizing the RMU, The LBS shall be fitted with an electrical operating mechanism and can remotely open-disconnected, closed and earthed from a reserved location.
5.2.5	**Circuit Breaker For Transformer / Local Feeder Control**	5.5.1 The circuit breakers/ interrupter shall be of the maintenance free. 5.5.2 The circuit breakers shall have at least 2 positions: Open-disconnected and closed and shall be constructed in such a way that natural interlocks prevent all unauthorized operations. 5.5.3 In view of safety each VCB shall be assisted with disconnector having 3 positions, open-disconnected, closed, and earth (having fault making capacity) and shall be

		constructed in such a way that natural interlocking prevents unauthorized operations. 5.5.4 They shall be fully mounted and inspected in the factory. 5.5.5 Breaker contact resistance should be <=50 micro-ohms. The various circuit contact resistance should comply with provisions in IEC 62271-200. 5.5.6 The breaker should have minimum spare 2 NO + 2 NC auxiliary contacts. 5.5.7 An operating mechanism can be used to manually close and open the circuit breaker with single push on push buttons. It shall be fitted with a local system for manual tripping by an integrated push button. There will be no mechanical automatic re-closing. 5.5.8 The circuit breaker compartment shall have three current transformers, an electronic self-powered relay, a Series & Shunt trip coil for CB tripping. 5.5.9 CT shall be mounted on cables. The mounting arrangement shall be flexible to move to & fro, up and down based on site condition of cable terminations etc. The mounting arrangement shall ensure that the CT should not reach less tan 300mm from live part of bushing. The CT mounting shall be fixed at position while dispatch such that the cable entry, the bushing terminal bolt, and CT core hole are co-axial. 5.5.10 Fixing bracket to be provided for fixing CT on particular position without touching termination cores. Bolting arrangement to be provided for fixing CT on the mounting bracket. 5.5.11 In any mounting the CT shall be mounted in such a way that the secondary connection shall be accessible and visible form front side after opening cable compartment door 5.5.12 Breaker shall have mechanical endurance of at least 2000 (M1) operations. Relevant type test reports to be submitted along with bid. 5.5.13 Breaker operation counter should be provided and should be visible on front in horizontal alignment. 5.5.14 In control cabinet the Terminal block shall have AC input wiring provision and MCB provision for incoming of LT AC supply. 5.5.15 The relay auxiliary power, communication ports and other required ports should be wired up on the TB. The breaker should have one series trip coil and one shunt trip coil. 5.5.16 The shunt trip coil shall be of 230V AC & wired up on TB 5.5.17 Protection relay: • Electronic self-powered target latched by battery or capacitive unit. • There shall be Conformal Coating on relay PCB The protection relaying shall have following features: Phase Protection: With Definite time/ IDMT element having standard characteristics of Standard Inverse, Very inverse, Extremely Inverse (as per IEC 255-3) or Fuse Characteristics.

		Earth Fault Protection: With Definite time or IDMT element having standard characteristics of Standard Inverse, Very inverse, Extremely Inverse as per IEC 255-3 standard. The CTs of 5P10 Class shall be employed. CT ratio shall be 100/1 (Further CT ratio may finalized during detailed engineering) The preferable make of relay is Ashida (ADR 241S), make relay. 5.5.18 The terminal protectors to be supplied with the 11 KV RMU by the vendor along with the cable termination bolt for termination 185 Sq. mm 11kV 1C cable in breaker & 300 Sq. mm 11kV 3 C for isolator compartment. 5.5.19 The touch proof cable termination Raychem RICS 5133 to be supplied with the 22 kV RMU by the vendor along with the cable termination bolt for termination 185 Sq. mm 22 kV 1C cable in breaker & 240 Sq. mm 22 kV 3 C for isolator compartment. The make of the vacuum bottle shall be same as that of the Type tested design. Specific requirements of control & Protection circuits 1. HT Breaker of RMU shall be wired to trip on followings: A) WTI B) Door switch of transformer compartment
5.2.6	**Bushings and Cable terminations**	5.6.1 Bushing should be of Epoxy resin. Each cable compartment shall be provided with three bushings of adequate sizes to terminate the incoming and outgoing cables. The termination bolt shall be M12/M16 for Tata Power supplies 5.6.2 The bushings shall be conveniently located for proper bend so as to allow easy working and termination of cables. The cable termination shall be done with Heat shrinkable /Push ON termination method so that adequate clearances are maintained between phases & cable shall be held by HDPE/Nylon (fire retardant) cleat. The Sizes of incoming and outgoing cable shall be as per clause no. 5.2.10. 5.6.3 Bidder should provide bimetallic washer for connection between copper bushing stud and Aluminium Lug. Necessary spring and flat washers to be provided on each terminal. The bimetallic washer shall be suitable M12/M16 bolt for supply and 630A rating in all compartments with minimum thickness of 2mm and sufficiently cover the completely copper bushing stud. The bidder can alternately offer tinned copper surface of bushing then bimetallic washer not required. 5.6.4 The Terminal bolt shall have arrangement for fixing the cable test rod through cable boot opening. Cable boot should have opening for test rod insertion. 5.6.5 The bolt tightening pressure must be written inside each cable chamber with permanent sticker. 5.6.6 Cable boot for cable termination should be as per IS 13573-2. Boot should be easy to install. 5.6.7 The cable compartment must be without any holes or gaps and properly vermin proofed before inspection.

		5.6.8 The cable compartment doors shall have interlocks such that doors can be opened only with earth switch in closed position. 5.6.9 Termination boots shall be as per type tested design. And should have a proper opening to facilitate the testing. The opening in boot shall be covered by means of removable protection cap. 5.6.10 All cable compartments shall have front door opening. The cable cover door shall be pad lockable and shall be Tamper and Arc proof. The circuit breaker and earth switch shall be lockable in the open or closed positions by 1 to 3 padlocks. 5.6.11 RMU door should have pad lock provision and cable door shall have interlock so that it shall not be opened by external forces. Also it shall not be possible to operate the load break switch / isolator or breaker from outside once door closed. This is required to prevent pilferage. 5.6.12 Locking provision of cable compartment door to be provided in case of any switch/CB is at earth position to avoid pilferage. Note: Supply of Cable terminations is not to be part of 11 KV RMU supply. Supply of touch proof cable termination is part of RMU supply in 22 KV RMU.
5.2.7	**Earthing:**	5.7.1 The RMU outdoor metal clad switchgear enclosure, load Break Switch, VCB, SF6 tank etc. shall be equipped with an copper earth bus throughout all compartments and securely fixed along the base of the RMU with cover. 5.7.2 The extension of this earth bus shall be taken out minimum 50mm outside the enclosure on both sides for fixing of the Tata Powers GI earth flat of 50mm width. The extension coming out of enclosure shall be properly sealed such a way to ensure vermin proofing of the cable compartment. 5.7.3 The size of copper earth bus-bar should be Min.105 sq.mm inside the enclosure to withstand short time current carrying capacity as per IEC. 5.7.4 Two nos. body earthing bolts of M12X70 mm to be provide on the extended bus-bar. 5.7.5 The mother earth needs to be extended up to 250mm periphery of cable entry hole so that the cable termination earthing can be connected easily to the main mother earth with 12mm bolt and washers. This arrangement needs to be provided in each compartment of RMU. 5.7.6 The main tank must be connected to mother earth at least two positions with proper contact. 5.7.7 In outdoor type compact design bidders should ensure the earthing from mother earth is provided inside the cable compartment for earthing of the cable terminations. that TATA POWER shall provide only two main earthing on switchgear 5.7.8 Bidder to ensured that the earth bus shall be single conductor/bus suitable for taking specified fault current and both main earthing are interconnected by earth bus and not through thank or enclosure. 5.7.9 If bolt are provided as current carrying path then the bolt material shall be brass and size shall be suitable to carry specified fault current. 5.7.10 Two nos. body earthing bolts of M12X70 mm to be provide on the extended bus-bar. Bolts must be hot dipped galvanized.

5.2.8	**Voltage indicator lamps and phase comparators**	5.8.1	Each compartment of RMU shall be equipped with a fixed type voltage indicator lamps having dip ports for insertion of phase comparators or line tester to check the phase sequence or presence of charge in cable. This is to be fixed on the front face plate to indicate presence of voltage in the cables. The capacitive dividers will supply low voltage power to the indicator lamps. Three inlets can be used to check the synchronization of phases with phase comparator or other device. These devices shall be in compliance with IEC 62271-206:2011 standard. The VPIS without dip ports are not accepted.
		5.8.2	All the VIPS installed on compartments shall have auxiliary contacts wired up to the terminal block of respective compartment which shall be further used for remote status indication at SCADA. The auxiliary contacts in VPIS shall be wired for electrical interlock of cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS.
5.2.9	**Front Cover**	5.9.1	The front cover shall provide a clear mimic diagram that indicates the different functions. This shall be permanent in nature throughout the useful life of the RMU.
		5.9.2	The position indicators shall give a true reflection of the position of the main contacts. Position Indicators shall be clearly visible to the operator.
		5.9.3	The lever operating direction shall be clearly indicated in the mimic diagram.
		5.9.4	The bidder shall provide a operating sequence process on each compartment with permanent type arrangements. So that all data shall be self-explanatory.
		5.9.5	The mimic shall have clear Words for “CLOSE/OPEN/EARTH’ at each desired place.
		5.9.6	All status indicators shall be marked appropriately with permanent labels as Earth On/OFF, Disconnector/LBS On/OFF, CB On/OFF.
		5.9.7	All operating ports shall have marking like spring charging provision, three position disconnector port and Shutter operator for interlocking, Operation allowed along with arrow indication and labelled as earth operation or disconnector operation.
		5.9.8	For better clarity of earthing related operations shutters and ports shall be painted in Green (TPCL) background such way that the persons should get clear indication that if operating in yellow region means he is performing earthing related operation. The details shall be as per annexture-2 of this specification.
		5.9.9	There shall be one label for SF6 gas pressure indicator and a clear message must be fixed near pressure indicator that region of safe operation and Alert message stating ‘If GAS pressure not OK. Do not operate any switchgear and report to OEM (name) customer care/engineer in charge’ this message should be clearly visible in front with suitable background and shall be with permeant marked.
		5.9.10	For gas pressure indication a dial type manometer to be provided with will show actual pressure. Gas pressure shall have SCADA compatible contacts and wired up on TB with labelling.
		5.9.11	All the other accessories and boxes shall be properly labelled with permanent marking/printing such a way that the product is self-explanatory for user.

		5.9.12 The mimic plate or cover should be separate for each module/feeder of the RMU in view of safety. In case of any work to be done on mechanism of any one feeder then operation staff shall have only access to particular feeder via opening feeder mimic pate or cover plate.
5.2.10	**Fault Passage Indicators**	5.10.1 Fault Passage Indicators shall be installed on the Ring Main Unit. These devices shall be electronic devices with dual energy source – with self-powered inbuilt battery, **low battery indication contact** and with provision of 24V DC aux supply. It must be connected to Single 3 phase Split Core CTs for O/C. These shall be provided with bright LED s / flag Indicators, which shall be clearly visible in the daytime. These shall have the following resetting facilities: a. Manual reset b. Resetting after a set time duration c. Electrically reset from remote with at least 2-spare potential free contacts. d. Resetting on restoration of LV 5.10.2 The unit shall have Short Circuit adjustable to different settings with separate Current transformer. They shall be fully field-programmable and shall have at least and 5 settings for Phase fault or over current. 5.10.3 The preferred range is – O/C setting range 200-1000A. 5.10.4 The default setting shall be and 800A for overcurrent. This shall be ensured before inspection call in each RMU. 5.10.5 It shall be possible to Test these indicators at site thru “Test” push button. The Fault Passage Indicators shall also be provided with a SCADA output contact. 5.10.6 The process of fixing the FPI shall be fixed on the wall of the incomer LBS cable compartment along with pictorial view. 5.10.7 FPI connecting wires should be properly dressed and covered in insulated sleeve and tied to the side walls with help of cable ties. If sticking type arrangement is provided, then it must be with good quality permanent adhesive from reputed makes like 3M and should not come out with force of 10kN. 5.10.8 These shall confirm to the following standards: IEC 60068-2-6, IEC 60068-2-9 : Environmental testing – For Vibration, solar radiations IEC 60950 : Information Technology equipment – Safety IEC 1000-2 : Electromagnetic compatibility for low-frequency conducted disturbances and signaling in public low power supply systems IEC 1000-4 : EMC – Testing & Measurement IEC 1000-6 : EMC- Immunity for Residential, Commercial and light industrial environments.
5.2.11	**Remote Control of the RMU:**	LV Box at top (accessible from front side only)

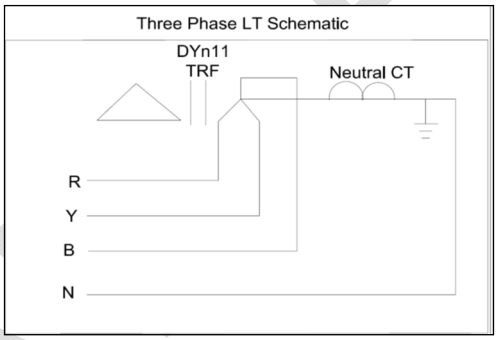
		For motorized RMU- The motors to be fitted in LBS sections only. The fitting of the motors to the mechanism must not in any way impede or interfere with the manual operation of the switches. An auxiliary contact to prevent motorized operation of the mechanism while the operating handle is inserted into the operating point shall also be provided. Harting plug arrangement to be provided on each feeder of RMU. All the pins not used in harting plugs needs to be provided separately as spare**. 4 nos quantity of 10 pin harting plugs to be considered. Refer Annexure-6 for harting pin configuration.** Preferred communication protocol for FRTU shall IEC-60870-5-104. **Supply of FRTU is not in bidder scope.** All Close-Open coils / signaling contacts shall be rated for 24 V DC. Following signaling contacts are essential for remote operation of RMU: A) Aux. contact for Line Isolator (Status) B) Aux. contact for all earthing switch (Status) C) Aux. contact for Breaker (Status) D) Aux. contact for FPI indication E) Aux. contact for Protection trip (Breaker module) F) Aux. Contact for Low Gas Pressure 2 Nos. spare relay tripping NO, NC contacts to be provided. Flag Indications on RMU when tripped should be on shunt trip. A provision for physical disconnection of motor supply (like fuse) of line isolator must be provided in RMU unit itself. (A flag is required for series and shunt coil actuation). There should be harting plug arrangement for individual Isolator as well as breaker motor connections, which will be fitted on the RMU body itself. Also the PCB of motor should be covered by anti-tracking agent. There should be relay with timer instead of only relay, which is used in the latching circuit. Suitable unlatching system to be provided to prevent mal operation of motor in case of any latched command/ non executed command at RMU (case like fuse failure etc.) The separator between terminals to be provided to avoid any tracking etc. Signal requirement for field RTU (which shall be mounted near RTU) is attached (refer Annexure-1).
5.2.12	**Paint**	All paint shall be applied on clean dry surfaces under suitable atmospheric conditions by seven tank process and powder coating. The overall paint thickness shall not be less than 70 microns. The paint shall not scale off or crinkle or be removed by abrasion during normal handling. The enclosure of the RMU shall be painted with shade light Grey, i.e. RAL 7032. If any damage observed after delivery same need to be touch-up painted after delivery at site.
5.2.13	**Control Cabinet**	5.14.1 Control cabinet with a terminal block (TB) located at convenient accessible location so as to wire all inputs & outputs (IOs) up to the terminal block (TB). All the cable secondary wiring should be rooted through marshalling box separately for relay, CT etc. 5.14.2 The wiring of the relay to be done on the TB for its terminals along with communication terminals.

		5.14.3 All terminals wires shall have proper identification ferrules and the identification marking provided on TB. Control cabinet shall have control cable entry arrangement on both sides of the RMU top control cabinet with proper grommet such that the opening is sealed in normal installations when not used for our door extension box arrangement to be provided any other arrangement to be explained in drawing during tender.
5.3	**DISTRIBUTION TRANSFORMER:**	**Approved Makes:** TMC, HITACHI, Raychem. 1. The transformers shall be Cast resin type, copper coil, naturally cooled (AN), 11/0.433 kV or 22/0.433 kV, 1000kVA or 1600kVA, 50 Hz,. The transformer shall be suitable for service with fluctuations in supply voltage upto plus 12.5% to minus 12.5%. The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. **2. The power transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the prefabricated substation enclosure. The enclosure class (10K) as per IS/IEC 62271-202 shall limit the additional temperature rise caused by the enclosure but shall not permit exceeding the transformer insulation temperature-rise limits.** 3. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment.
5.3.1	**CORE**	1. Transformer core shall be stack type, constructed from high grade cold rolled, non-ageing, grain oriented, silicon steel lamination which shall be properly annealed (under inert atmosphere, if required) to relieve stresses. 2. The core shall have low loss and good grain properties. It should be coated with hot oil proof insulation, bolted together with frames to prevent vibration and noise. 3. The core thickness should be 0.23mm or less and grade should be 23HP85[d] as per IS 3024 or better. 4. All core clamping bolts (if any) shall be effectively insulated. 5. Only one grade and one thickness of core shall be accepted and mixing of different grades shall not be allowed. 6. Core lamination shall be coated with insulation inorganic coating equivalent to C5 type as per ESTM A976 or IS 3024 like carlite-3. 7. The complete design of the core must ensure maximum permanency of the core losses without continuous working of the transformers. 8. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated. The vendor shall submit the calculations in support of the same. 9. The transformer shall be suitable for continuous service without damage under 'over fluxing' where the ratio of voltage over frequency exceeds the corresponding ratio at rated voltage and rated frequency up to 12.5% and the core shall not get saturated. 10. The No Load current shall not exceed 2% of the Full Load current and will be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no-load current by 5% maximum of full load current. 11. The core shall be visibly grounded to the enclosure frame by means of a removable flexible copper grounding strap.
5.3.2	**WINDING CONNECTIONS**	1. The conductor used in the windings shall be high grade electrolytic solid drawn copper encapsulated winding. The high voltage and low voltage windings shall be vacuum cast in epoxy in a metal mould utilizing a proven casting process that ensures the absence of

		voids & minimise the partial discharge. The winding shall be designed for better voltage regulation and mechanical strength. 2. All Inter turn and inter layer insulation both for HV & LV winding coils shall be suitable for Class H or better as per IS 1271-1985. Bidder to submit relevant test report. There shall be uniform insulation on the HV and LV side. 3. Copper Strips to be considered for HV winding with suitable grade insulation for handling high voltages. 4. However, enamelled conductors shall not be acceptable for any winding. 5. All turns of windings shall be adequately supported to prevent movement. In cases where turns are spaced out, a suitable inter- turn packing shall be provided. All leads from the windings to the terminal board and bushings shall be rigidly supported to prevent injury from vibration or short circuit stresses. 6. Neutral connection shall be brazed on neutral copper busbar. 7. The current density for HV and LV winding shall not be more than 2.5 Ampere per sq.mm. The insulation between core and bolts and core and clamps shall withstand 2.5 kV for one minute. The bidder shall submit characteristics of insulation paper with the offer. The transformer shall have vibration pads installed between core coil assembly and enclosure base structures to prevent the transmission of structure borne vibration. 8. Guide tube shall be used wherever practicable. The core and coil assembly shall be securely fixed in position so that no shifting or deformation occurs during movement of transformer. The core and coil assembly shall be capable of withstanding without injury, thermal and mechanical effects of short circuit at the terminals of any winding as per IS 2026 with latest amendments thereto. 9. Tolerance for the winding resistance measured from different phases but at the same Taps shall be limited to 2 %. 10. Both HV & LV windings shall be resin casted. 11. The winding shall have minimum 2 RTD pocket embedded inside resin cast on LV winding & 2 RTD/coil to be fixed in LV winding & properly wired up on junction TB placed on core-coil assembly. Then it should be further wired up to marshalling box from junction TB. The core RTD shall also wired through junction TB. 12. Hydrophobic anti tracking coating shall be applied on resin casted winding inside & outside. Bidder to provide details of the same during technical evaluation. 13. Insulated sleeves to be provided on connecting links of HV delta formation. End link of delta formation should be rounded off.
5.3.3	**LOSSES**	1. The bidder shall guarantee the total loss at 50% and 100% load condition (at rated voltage and frequency and at 145ºC) and these should be within the limits of maximum total losses declared by Tata Power for both 50% and 100% loading values (as per table below). **Description** / **1000kVA** / **1600kVA** Maximum Losses at 50% loading at 145ºC (Watts) / **4820** / **6760** Maximum Losses at 100% loading at 145ºC (Watts) / **12840** / **17980** No positive tolerance shall be allowed on the losses as mentioned above. However, bidder can offer losses less than specified but no consideration in cost will be given for the same. 2. The successful bidder shall guarantee the quoted losses for at least five years. If at any point of time during operation if it is found that the total losses at 50% and 100% load

		are more than the values given in specifications, then bidder shall be liable to pay a fine of Rs 250 per watt to the amount by which losses at 50% loading and 100% loading increase the values given in specifications. 3. During testing at Bidder's works if it is found that the actual measured losses are more than the values quoted by the Bidder, TATA POWER shall reject the transformer and shall have the right to reject the complete lot. 4. During testing at Bidder's works, if the temperature rise exceeds the specified values, the entire lot shall be rejected by TATA POWER. 5. During testing at Bidder's works, if the impedance values differ from the guaranteed values including tolerance, the transformer shall be rejected by TATA POWER.
5.3.4	**TERMINAL ARRANGEMENT FOR INCOMING & OUTGOING :**	RMU : For HT side termination, connecting to RMU with 1C AL XLPE cable for Breaker. ACB : For LT side termination, with AL bus bar of **1600A (for 1000kVA) and 2500A (for 1600kVA)** capacity for connecting. Colour sleeves to be provided on busbars for easy identification.
5.3.5	**TAPS**	1. Tap changing shall be carried out by means tinned brass links when the transformer is in de-energised condition. The link should be rounded off at end terminals. 2. The taps shall be provided in HV winding and each tap change shall result in voltage variation of 2.5%. 3. Switch position no.1 shall correspond to the maximum tapping (+10%) and position 9 shall correspond to minimum tapping (i.e,-10%). 4. Suitable plate shall be fixed for tap changing switch to know the position number of tap.
5.3.6	**EARTHING CONNECTION:**	**NEUTRAL EARTHING:** **1. Separate LV neutral bushing to be provided on side of LV box for neutral earthing. Neutral bushing should have provision of connection of 2 runs of 65X10 GI strip.** **BODY EARTHING:** **2. Two body earthing terminals, located on the lower side of the transformer, diagonally opposite to each other of M12 size (taken 100mm out) shall be provided on Transformer with Bolt.**
5.3.7	**RADIO INTERFERENCE:**	When operated at voltages up to 12.5% in excess of the normal system rating, transformers shall be substantially free from partial discharges (i.e. corona discharges in either internal or external insulation) which are likely to cause interference with radio or telephone communication.
5.3.8	**TEMPERATURE INDICATORS**	Winding Temperature Indicator (WTI) for measuring the hot spot temperature of the winding shall be provided. It shall be suitable for control room as well as marshalling box installation and is built for long and trouble-free operation under extreme conditions of service associated with the Cast resin Dry type transformers. It shall comprise of the following devices/features: a) Resistance Temperature Detector (RTD) sensors shall be suitable to allow the user to monitor max. Six Critical Temperature parameters on the Transformer & 1 no on Core. Routing of cable shall be done through cable turf with necessary tying through nylon tie belts. b) It shall be programmable to display, store and note maximum temperature such that the same can be recalled even after the power for the device is interrupted. c) It shall be compatible for communication with Computer.

		d) It shall be provided with settable set-points – i. To warn the user of high temperature ii. To trip the transformer in case of excessive heating. e) The temperature indication range shall be -25 to 300 deg C. f) The display shall be seven segment LED type for displaying temperature and channel number. g) The enclosure shall be of M.S. sheet box, powder coated, with acrylic viewing window and minimum degree of protection shall be IP52. h) It shall be operated by the supply voltage of 240 V AC. i) It shall not consume power more than 5 VA during operation. j) It shall be suitable for operation under maximum ambient temperature conditions. k) It should have inbuilt rechargeable & replaceable cell/battery provision. **Following make of WTI to be considered with back-to-back warranty with OEM:** **Embelink Technologies - Model TPR-108-RC with 8 channel RTD PT-100 inputs and 1no 4-20mA+ 1no RS485 outputs with inbuilt rechargeable battery**
5.3.9	**TERMINAL MARKING:**	All transformers shall have the primary and secondary terminal markings plainly and indelibly marked on the transformer adjacent to the relevant terminal. (Vendor to specify the type of marking in the GTP. It should be such that if it comes out should not cause reduction in clearances). High voltage phase windings shall be marked both in the terminal boards inside the tank and on the outside with capital letter 1U, 1V, 1W and low voltage winding for the same phase marked by corresponding small letter 2u, 2v, 2w. The neutral point terminal shall be indicated by the letter 2n. Sequence of marking should be 1U, 1V, 1W and 2n, 2u, 2v, 2w). Colour codes to be marked in addition to 1U,1V, 1W & 2u, 2v, 2w and 2n. R , Y, B identification marking shall be provided on RMU Cable compartment & similarly R,Y, B, N marking to be done on Outgoing MCCB cable compartment.
5.3.10	**FASTENERS**	All bolts, studs, screw threads, pipe threads, bolt heads and nut bolts shall comply within the appropriate Indian standards for metric threads. Bolts or studs shall not be less than 6mm in diameter except when used for small wiring terminals. All nuts and pins shall be adequately locked. Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt shall remain in position. All ferrous bolts, nuts and washers shall be hot dip galvanized**,** except high tensile steel bolts and spring washers which shall have electrolytic action between dissimilar metals. Each bolt shall project at least one thread but more than three threads through the nut. The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members. All bolts of current carrying part shall have taper washers. Protective washers of suitable material shall be provided on front and back of the securing screws.
5.3.11	**Surge Arrestor**	**Approved makes: Raychem, LAMCO, CG, Oblum** **1. The HT side of the transformer shall have polymeric surge arresters of DH class inside the main body.** **2. For 22 KV Surge Arrestor 18 kV, 10 kA & for 11 KV Surge Arrestor rating of 9 kV, 10 KA to be used.**

<table>
<tr><td></td><td></td><td>
3. Connection to LA shall be through insulated cable of rating equal to HV voltage of TRF.
4. Surge arrestor common grounding provision to be provide inside of the enclosure.
Insulation terminal cap to be provided over the terminal connection of surge arrestor.
</td></tr>
<tr><td>5.3.12</td><td>Transformer Neutral Current Transformer</td><td>
The Neutral CTs window type, resin cast of protection class for E/F shall be provided for transformers on the LT side. The Protection LT CTs shall be cast resin type. The Current transformer shall be mounted with suitable clamping arrangement. The current transformer shall comply with IS 2705. The terminals shall have shorting facility. The CT should not get saturated up to 200% of rated current. The CTs shall have following parameters. CT terminal box for secondary of CT shall be provided of suitable size on the side of transformer. Box shall have droppable terminal blocks with shorting link. Secondary of CTs shall be stud type with lock nut. Colour coded wires shall be used for control and CT wiring.
<table>
<tr><td>Parameter</td><td>Neutral CT</td></tr>
<tr><td>Type</td><td>Cast Resin</td></tr>
<tr><td>Accuracy class</td><td>5P20</td></tr>
<tr><td>Burden</td><td>15 VA</td></tr>
<tr><td>Application</td><td>Protection E/F</td></tr>
<tr><td>ISF</td><td><=5</td></tr>
<tr><td>CT ratio for 1000 KVA Transformer</td><td>1600/5</td></tr>
<tr><td>CT ratio for 1600 KVA Transformer</td><td>2500/5</td></tr>
</table>


</td></tr>
<tr><td>5.4</td><td><u>LV COMPARTMENT:</u></td><td>
Approved Makes: Schneider/ L&T/ Siemens/ C&S/ ABB/ Eaton

The complete arrangement of ACB & MCCBs shall be provided on framework of channel with adequate strength to support the weight of ACB & MCCBs. Each outgoing shall be compartmentalized with MS sheet with adequate space/clearance. The framework shall be covered from the front with GI sheet of thickness not less than 2mm.such that no live part is accessible at any time during the operation or testing period. All mechanism shall be made of such material as to prevent corrosion due to sticking of dust. Cast iron shall be used for any part of equipment which may be subjected to mechanical stresses. All connections and contacts shall be of ample section and surfaces for carrying continuously the specified current without undue heating and shall be secured rigidly & locked in position.
</td></tr>
</table>

		All apparatus shall be so designed and constructed as to obviate the risks or short circuit of the live parts by lizards/rodents. Corresponding parts of similar apparatus shall be mutually interchangeable. All apparatus to minimize risks of fire and any damage which might cause in the event of fire.
5.4.1	**ACB & MCCBS WITH BUSBAR:**	1. The bus bar shall be of electrolytic grade aluminium, duly sleeved with shrinkable coloured sleeves and maximum current density of 1.0A/sq mm. 2. The bus bar from transformer secondary shall enter the LV compartment and suitably terminated at incoming of the 3 pole LT ACB. 3. The ACB shall be mounted at a height to accommodate mounting of 6 nos. MCCBs (3 pole, 630A each) directly below the ACB with sufficient space for cable termination. Phase barriers shall be provided suitably at the terminals. 4. The outgoing from the ACB should be connected to bus bar which in turn are connected to the incoming bus bar of MCCBs. 5. All LV bus bar shall be supported on the LV compartment frame with suitable bus support insulators of 1.1KV class. 6. The minimum clearance between phase to phase shall be 25 mm and between phase to earth 20mm. 7. ACB termination shall be with tinned copper or tinned aluminium Bus Bar. Wherever required bimetallic washer to be provided if bare copper terminal is provided. 8. Busbars shall be of aluminium with Bakelite shrouding, rated for a) 1000kVA: 1600A, 50 kA for 1 sec and shall have 2000 sq mm cross section to carry the rated continuous and short time current. **b) 1600kVA: 2500A, 50 kA for 1 sec and shall have 3000 sq mm cross section to carry the rated continuous and short time current.** 9. Main Bus bar should be continuous/ without any joint. All bus bars, bus taps and joints shall be PVC taped. Neutral bus bar shall be rated as main bus bar rating. **10. The ACBs shall be mechanical operated fixed type 3 Pole with shunt trip coil without any microprocessor protection release. Ashida make (A22F) relay to be provided for tripping the breaker with Overcurrent & earth faut protection. Spare ACB contacts for shunt trip should be provided.** 11. The entire mechanism of breakers along with framework shall be suitably earthed 25 x 6 sq mm tinned copper or equivalent Aluminium earth conductor at two distinct points and further connected to the common earth conductor provided for the entire sub-station. 12. Each MCCB should have ON & OFF indication lamp. LOTO lock arrangement to be done for LT ACB ON & OFF push button switch & Spring charging Handle. 13. LT ACB should have additional 230V AC Shunt Tripping coil for tripping of LT ACB through Remote. 14. The control terminals shall be as follows: a. Stud type with disconnecting facilities for CT circuits b. Stud type for voltage and other circuits. 15. Incomer shall be provided with resin cast CTs for metering & protection. 1000kVA PSS | MFM CT & For Ashida make O/C+E/F relay | 3 nos. of dual core CT-1600/5A Core 1: 0.5 Cl, Core 2: 5P20, 15 VA

			Energy Metering	3 nos. of single core CT-1600/5A 0.5 Cl, 15 VA
			Neutral unbalance protection	1 no single core CT 1600A/5A, 5P20, 15 VA

1600kVA PSS	**MFM CT & For Ashida make O/C+E/F relay**	**3 nos. of dual core CT-2500/5A Core 1: 0.5 Cl, Core 2: 5P20, 15 VA**
	Energy Metering	**3 nos. of single core CT-2500/5A 0.5 Cl, 15 VA**
	Neutral unbalance protection	**1 no single core CT 2500A/5A, 5P20, 15 VA**

16. All CT termination should be round plug type.
17. Secondary wiring shall be carried out with 1.1KV grade PVC insulated stranded copper conductor of 2.5 Sq. mm for CT circuits and 2.5 Sq. mm for PT and other circuits. All wires will be colour coded.
18. Test terminal box for Energy Metering should be Front Connection, Screw Type (4SF), 50 A to be provided and the convention of the wiring in the TTB should be Incoming from the bottom side and outgoing to Meter from top side. No lugs shall be provided for wires to meter, TTB, and Fuses (PT secondary). Sealing arrangement to be provided for Energy Meters. Inspection glass (Transparent Toughened Glass) to be provided for viewing of meter.
19. Provision to be provided for mounting the energy meter with max dimensions as L x B x D: 360 x 200 x 200 mm (Energy meter will be supplied by TPC).
20. Makes of various bought out items shall be limited to the following:

Sr. No.	Items	Approved Make
1	ACB	Schneider/ L&T/ Siemens/ C&S/ ABB/ Eaton
2.	CT	Reco/Newtek/Pragati/Kappa/ECS/Adcon

21. Neutral bus shall be connected with earth bus. All control cable should be multi stranded and FRLS. CT ISF should be less than or equal to 5. Close and Open status of the breaker should be available on SCADA through spare auxiliary contact and on LT side through LED Lamp.
22. The LT ACB shall have neutral E/F (NEF) with Alstom Make CDG11 self-powered relay for earth fault protection. The relay type is normal inverse with 3 sec with E/F setting of 0.5 to 2 A.
23. Fault diagnostic kiosk is required with suitable battery, battery charger, latching relay & indicating LEDs. The latching relay contacts to be wired for tripping RMU & indication LED. The wiring diagram is attached for reference in annexures.

5.5	**PAINT:**	All paint shall be applied on clean, dry surfaces under suitable atmospheric conditions by seven tank process and powder coating. The paint shall not be scale off or crinkle or be

		removed by abrasion during normal handling. The Enclosure body shall be painted with shade RAL 7032.
6.0	**NAME PLATE AND MARKING**	
6.1	**PSS enclosure**	i. Manufacture's Name ii. Rated Voltage iii. System Frequency iv. Rated Short time withstand current for 1 Sec v. Rated Impulse withstand Voltage vi. Degree of Protection vii. Rated thermal class of enclosure. viii. **Rated external mechanical impact class of enclosure**. ix. **"Don't open the Door Transformer will Trip"** Name plate to be pasted on the PSS Transformer compartment Door. x. **"Transformer Check Meter** "Name plate to be pasted on the PSS LV Compartment Door. Name plates shall be suitably embossed with "PO no. with date" "PROPERTY OF TATA POWER" & "CODE NUMBER" along with the following information. All supplied Units shall be fitted with engraved metallic logo of Tata Power on the front side as per Annexure 2.
6.2	**RMU**	1. Manufacture's Name 2. Type Designation or serial no. 3. Year of manufacture 4. Application Rated values 5. Mass of unit 6. SF6 gas filling pressure
6.3	**TRANSFORMER**	A stainless-steel rating plate, of at least 1 mm thickness, shall be fitted to each transformer in a visible position and shall carry all the information as specified in the standards. The letters on the rating plate shall be engraved black on the white/silver background. Fixing screws for outdoor use shall be of stainless steel or any other corrosion resistant metals. Danger notice shall have red lettering on a white background, or they may be pictorial as approved by the Purchaser. The name plate shall contain following information: 1. Type of transformer 2. Relevant standard. 3. Manufacturer's Name 4. Manufacturer's Serial No. 5. Year of Manufacture 6. No. of phases 7. Rated kVA 8. Rated frequency 9. Rated Voltage 10. Rated current 11. Connection symbol

		12. Percentage impedance voltage at rated current 13. Total mass 14. BIL 15. **Material code as mentioned in PO.** 16. **Winding material** In addition to the above information the rating plate shall also contain the following: 1. Guaranteed values of no load losses and full load losses at 50% & 100 % load 2. Temperature rise 3. Table giving the tapping voltage, tapping current and tapping power of each tap. 4. Indication of winding which is fitted with tapping's 5. Value of short circuit impedance on extreme tapping and on principal tapping and Indication of winding to which impedance is related. 6. Actual losses of transformer 7. Overall dimensions
6.4	**LV ACB AND MCCBs**	1. Manufacturer name 2. Type Designation or serial no. 3. No of the relevant standard 4. Utilization category 5. Rated voltage 6. Rated Current 7. Rated Frequency 8. Rated service Short breaking capacity (Ics) 9. Rated Ultimate short circuit breaking capacity (Icu) 10. Indication of open and closed position 11. Terminal marking on O/G MCCB 12. Indication lamp for MCCB ON / OFF
7.0	**TESTS**	Bidder shall furnish the type test certificates of the PSS for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/International accredited laboratory as per relevant standards. The test shall have been conducted in certified test laboratories during the period not exceeding 5 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. Following Type test to be conducted on equipment as below :
7.1	**Type Test**	
7.1.1	Total package substation assembly as per IEC62271-202	a. Dielectric tests - Lightning impulse voltage test - Power Frequency voltage withstand test b. Temperature rise test **with all components (Verification of enclosure class 10K)** c. Short time withstand current & peak withstand current test on main and earthing circuits **d. Internal arc type test** **e. Noise level package substation assembly**

f. Insulation Resistance (IR) test

g. Verification of ingress protection

Sr. No.	Type Tests stipulated as per Tender Spec.	Applicable st andard	Acceptance Clause as per IS / IEC
1	PF withstand voltage test & Lightning Impulse voltage withstand test for Switches	IEC62271-103	Cl 6.2 0f IEC62271-103, Cl 7.2.7.2 & 7.2.7.3 of IEC62271-1
2	PF withstand voltage test & Lightning Impulse voltage withstand test for CB	IEC 62271-200	Cl 6.2.6.1 & 6.2.6.2-IEC 62271-200
3	Measurement of contact resistance & Temperature rise test LBS & CB combined unit (if individual then two separate reports required)	IEC 62271-200	Cl 6.4 & Cl 6.5 of IEC 62271-200
4	Short Time current and Peak current withstand tests Main Circuit	IEC 62271-200	Cl 6.6 a & b -IEC 62271-200
5	Short Time current and Peak current withstand tests Earthing Circuit	IEC 62271-200	Cl 6.6 a & b -IEC 62271-200
6	Short Circuit Breaking current tests LBS	IEC 62271-103	Cl 6.101, Table 3 of IEC 62271-103
7	Short Circuit Making current test on LBS	IEC 62271-103	Cl 6.101.1.2, Table3 of IEC 62271-103
8	Short Circuit Making test on Earth Switch	IEC 62271-102	Cl 7.101 of IEC 62271-102
9	Short circuit making & Breaking tests on CB – three phase fault	IEC 62271-100	Cl 6.112.1 of IEC 62271-100
10	Single Phase test on CB	IEC 62271-100	Cl 6.108 of IEC 62271-100
11	Double Erath Fault test on CB	IEC 62271-100	Cl 6.108 of IEC 62271-100
12	Mechanical operation tests on LBS	IEC 62271-200	Cl 6.102.2 - IEC62271-200
13	Mechanical operation tests on CB	IEC 62271-200	Cl 6.102.2 - IEC62271-200
14	Mechanical Endurance tests on LBS	IEC 62271-103	Cl 6.102.2. - IEC 62271-103
15	Mechanical Endurance tests on CB	IEC 62271-100	Cl 6.101.2.4 of IEC 62271-100
16	Mechanical Endurance tests on DS	IEC 62271-102	Cl 7.102.3 of IEC 62271-102
17	Partial Discharge test on CB & LBS	IEC 62271-200	Annex BB , Procedure B of IEC 62271-200
18	Pressure withstand test of gas filled compartment/Tank	IEC 62271-200	Cl 6.103.1 of IEC62271-200

7.1.2 RMU

		<table><tr><td>19</td><td>IP67 of Gas compartment/Tank</td><td>IEC 62271-200</td><td>Cl 6.7.1 of IEC62271-200</td></tr><tr><td>20</td><td>IP54 for outdoor RMU</td><td>IEC 62271-200 & IEC- 60529</td><td>Cl 6.7.1 of IEC62271-200</td></tr><tr><td>21</td><td>IAC on Cable Compartment</td><td>IEC 62271-200</td><td>Cl 6.106 IEC62271-200</td></tr><tr><td>22</td><td>IAC on Gas Compartment</td><td>IEC 62271-200</td><td>Cl 6.106 IEC62271-200</td></tr><tr><td>23</td><td>Cable charging current breaking test</td><td>IEC 62271-100</td><td>Cl 6.102, 6.105 of IEC 62271-100</td></tr><tr><td>24</td><td>Capacitive current switching test</td><td>IEC 62271-100</td><td>Cl 6.111 of IEC 62271-100</td></tr></table> Note: The bidder can submit the test report with combination of above listed tests. The test of CB & LBS to be done on combined unit. If bidder submits individual unit CB/LBS tests then both units test detailed test reports are to be submitted.
7.1.2	**Transformer**	a. Temperature rise test for determining the maximum temperature rise after continuous full load Run. The ambient temperature and time of test should be stated in the test certificate. b. Impulse voltage test: with chopped wave of IS 2026 (part-III). c. Short-circuit test – Thermal and dynamic ability. d. Noise level measurement. e. Measurement of Zero-phase sequence impedance. f. Measurement of Harmonics of no-load current. Note: - Out of the above-mentioned type tests, the tests under sl. no. a, b, c shall be conducted at CPRI/ERDA labs and the balance shall be acceptable as in- house NABL accreditation test lab.
7.1.3	**ACB & MCCM**	As per relevant IS type test documents to be submitted.
7.2	**Routine Test**	
7.2.1	RMU	1. Power Frequency Withstand Test. 2. Dimensional & Visual Checks 3. Operational & Interlock Tests of breaker & isolator switches 4. Measurement of Circuit Resistance 5. SF-6 chamber pressure withstands/leakage test. 6. HV withstand test across isolator distance. 7. HV withstand test of control and auxiliary circuits. 8. Voltage Indication Tests. 9. Breaker Contact Resistance Test 10. Total Trip Time Check Test through Current Injection in primary. 11. IR Value.
7.2.2	**Transformer**	1. Measurement of Winding Resistance at each tap [As per IS 2026 (Part 1)].

		2. Measurement of voltage ratio, check of voltage displacement, polarity, phase sequence and vector group [As per IS 2026 (Part 1)]. 3. Measurement of short circuit impedance (principal tapping, when applicable) and load loss at 50% and 100% load [As per IS 2026 (Part 1)]. 4. Measurement of insulation resistance [As per IS 2026 (Part 1)]. 5. Induced over voltage withstand test [As per IS 2026 (Part 3)]. 6. Separate Source voltage withstand test [As per IS 2026 (Part 3)]. 7. Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 112.5% of rated voltage. [As per IS 2026 (Part 1)]. 8. Neutral current measurement: The value of the zero sequence current in the neutral of the star winding shall not be more than 2% of the full load current 9. CORE IR at 500 V. 10. Calibration of WTI as RTD 11. 2 kV withstand test for all secondary windings. 12. Partial discharge measurement
7.3	**Acceptance Test**	
7.3.1	RMU	All the tests specified in below tableshall be carried out as acceptance test on RMU. Random samples as per sampling plan under IEC/IS for each lot or OEM test reports shall be verified at discretion of Tata Power.

Sr. No.	Tests details	Applicable standard	Acceptance Criteria
1	PF withstand voltage test on LBS and CB combined with switches closed position	IEC62271-103 & IEC 62271-200	Cl 6.2 0f IEC62271-103, Cl 7.2.7.2 & 7.2.7.3 of IEC62271-1 Cl 6.2.6.1 & 6.2.6.2-IEC 62271-200 Should withstand 28kV for 1minute
2	HV withstand test across isolator distance with opened contact of VCB	IEC 62271-200	Should withstand 28kV for 1minute
3	Voltage Indication Tests on VPIS	-	VPIS indication should lit up when voltage applied in all phases
4	Measurement of contact resistance on LBS & CB combined with all switches in closed condition	IEC 62271-200	Cl 6.4 & Cl 6.5 of IEC 62271-200 Total resistance limit shall be maximum 350micro ohm with busbar & switches closed.
5	Dimensional & Visual Checks	-	As per approved drawing and technical compliance document for tender
6	Operational & Interlock Tests of breaker & isolator switches	As per specification	All interlock shall operate without fail in any operation

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<tr><td></td><td></td><td>
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<tr><td>7</td><td>Leak Detection Test at bushing terminals after RMU assembly</td><td>IEC 62271-1 clause 8.5</td><td>For gas-filled systems tested in factory, the probing test using a sniffing device to be done. The sensitivity of the sniffing device shall be at least 10-8 Pa × m3/s.</td></tr>
<tr><td>8</td><td>HV withstand test of control and auxiliary circuits of motorised and Smart RMU</td><td></td><td>Should withstand 2kV for one minute</td></tr>
<tr><td>9</td><td>Insulation resistance test</td><td></td><td>With open contacts and closed contacts of switches. Should be in Giga-ohms.</td></tr>
<tr><td>10</td><td>Other components, as per applicability, the RTC as per relevant IS/IEC from Original Equipment manufacturer (OEM) to be shared for
a. cable boot
b. Relay
c. CT
d. motor</td><td></td><td>OEM reports as per IS and IEC.</td></tr>
<tr><td>11</td><td>Relay testing- Relay testing should be done with primary injection kit on installed relay.</td><td></td><td>Total tripping time with relay & without relay (Without relay shall be done at trip coil directly) timing shall be within specified in specification.</td></tr>
</table>
Bidder should have all the requisite testing equipment’s to carry out routine and acceptance test mentioned above including:
1. Facility for primary current injection up to 1000amp.
2. Facility to check total trip timing of breaker along with breaker main contacts through primary current injection</td></tr>
<tr><td>7.3.2</td><td>Transformer</td><td>1. Temperature Rise Test (on one unit of every lot offered for inspection for each rating).
2. Each transformer of the offered lot shall be subjected to all the tests mentioned under the section Routine Test Clause 7.2.2 in presence of Tata Power representative at the place of manufacture before dispatch without any extra charges.</td></tr>
<tr><td>7.3.3</td><td>ACB & MCCB</td><td>As per relevant IS/IEC following test to be conducted and OEM test report verification.

a. Operational checks
b. Insulation Resistance (IR) test
c. High voltage test
d. Primary current inspection & breaker stability check</td></tr>
</table>

7.3.4	**Total Package substation**	**a. Temperature rise test of enclosure along with transformer for verification of temperature category of enclosure. ((on one unit of every lot offered for inspection for each rating). The transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the package substation enclosure** **b. Operational & functional checks** **c. Insulation Resistance (IR) test** **d. Dielectric test** **e. High voltage test** **f. Verification of the auxiliary and control circuits**
8.0	**TYPE TEST CERTIFICATE**	The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. Type Test to be conducted on similar Design/ rating panel. All the tests shall be conducted at CPRI / ERDA/ International accredited laboratory as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. Type tests shall have been conducted in certified Test laboratories during the period not exceeding 5 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.
9.0	**PRE-DISPATCH INSPECTION**	The Material shall be subject to inspection by a duly authorized representative of the TATA POWER COMPANY. Inspection may be made at any stage of manufacture at the discretion of the Purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TATA POWER COMPANY `s representatives when the work is in progress. Inspection by the TATA POWER COMPANY or its authorized representatives shall not relieve the Bidder of his obligation of furnishing equipment in accordance with the specifications. TATA POWER COMPANY authorized representatives shall have the right to inspect the design, materials and workmanship and to report thereon, at any stage of manufacture, if found necessary. All facilities shall be extended to our representatives for witnessing the tests. Due notice shall be given to us to enable us to depute our representatives for stage inspection. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TATA POWER COMPANY. Five certified copies of all test certificates including type tests, sample test certificates shall be sent to us for our approval prior to dispatch of materials. Following documents shall be sent along with material a) Test reports b) MDCC issued by TATA POWER COMPANY c) Invoice in duplicate d) Packing list

		e) Drawings & catalogue f) Delivery Challan g) Other Documents (as applicable).
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPC, Mumbai store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection or any other parameters observed after delivery. The material should be delivered at TPC, Mumbai stores & same shall be checked during delivery and overdue material shall not be accepted. Bidders to plan the delivery accordingly. Bidders to attend and rectify the defect if any at his own cost. The material shall be accepted in stores only after rectification of any observed flaw. The delay in rectification shall lead to any contractual penalty. Billing shall be processed only after acceptance of the material.
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 TATA POWER COMPANY up to a period of at least 36 months from the date of commissioning or 48 months from the date of last supplies made under the contract whichever is later, (the time scale of 36/48 months could be enhanced subject to mutual agreements) 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 TATA POWER COMPANY 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 the item covered under this specification shall be packaged for rail/road transport in a manner so as to protect the equipment from damage in transit. 1) Packing protection- Against shocks, vibration & corrosion, damages during transportation 2) Packing identification labels, to show purchaser name, PO number, Manufacturer serial number 3) Handling instruction- To be marked on packing boxes. 4) Bidders should prefer to use recyclable & environmentally friendly materials for packing. 5) No single use plastic to be used. 6) Packing should be done with environment friendly recyclable materials.

13.0	**TENDER SAMPLE**	Not Applicable
14.0	**QUALITY CONTROL**	The Bidder shall submit with the offer Quality 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 bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TATA POWER COMPANY shall reserve the sole rights for the type test of a random sample from the lot and in case of any discrepancy or deviation from the Type test certificates submitted along with the Bid; the complete Lot shall be rejected. TATA POWER COMPANY representative or its nominated representative shall have free access to the Bidder's works to carry out inspections. If anything missing in QAP and required as per other clauses of this document, bidder is liable to perform the same without cost implication.
15.0	**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 and as specified above.
16.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit first GTP & Drawing with 7 days from placement of outline agreement for approval and complete the approval process within 14 days of outline agreement. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable).
17.0	**SPARES, ACCESSORIES, AND TOOLS**	Bidder shall provide a list of recommended spares with quantity and unit price for 5 year of operation after commissioning. The purchaser may order all of any of the spare parts listed at the time of contract award and the spare parts so ordered shall be supplied as part of the definite works. The purchaser may order additional spares at any time during the contract period at the rate stated in the contract document. The bidder shall provide one SF6 gas leak indicator & one no. phase comparator. A list of complete set special tools and gauges required for erection & maintenance and installation procedure shall be submitted. Bidder shall give an assurance that spare parts and consumable items will continue to be available through the life of the equipment which shall be 25 year minimum. However the purchaser shall give a minimum of 12 month notice in the event that the bidder or any sub vendor plans to discontinue manufacture of any component use in this equipment. Any spare apparatuses, parts or tools shall be subjected 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 identifications.

Bidder shall provide following spares as commissioning spares strictly as per specification along with PSS.

SL. No.	Name of Spare Parts	Required spares up to 5 No. of PSS
A	For RMU	
1	Breaker Mechanism	1 No's
2	Isolator Mechanism	1 No's
3	Trip Coil	2 No's
4	CT – 100/A for ADR241S relay	1 Set (1 Set = 3 Nos.)
5	Bolt (For cable connection)	1 Set (1 Set = 3 Nos.)
6	"L" Key (All Size)	2 nos
7	VPIs	4
8	Manometer	2
9	24V DC Motor for Isolator	2
10	RMU PCB Card with Contactors	2
11	FPI CT	1 Set
12	FPI	2 nos'
13	ADR241S relay	1 No
14	For Schneider FBX RMU: Control Card for Isolator Function Motorization	2
B	For Transformer	
15	RTD sensor	6 no's RTD sensors
16	Surge Arrestor	1 no
C	For LT compartment	
17	A22F relay	1 NO
18	CDG11 relay	2 Nos
19	MFM	1 No.
20	1600/5A(1MVA) / 2500/5A(1.6MVA), 5P20 & 15 VA for Neutral unbalance protection	1 No

18.0	**DRAWING AND DOCUMENTS**	Following drawings and documents shall be prepared based on TATA POWER COMPANY specifications and statutory requirements and shall be submitted with the bid. All the documents & drawings shall be in English language 1) Completely filled in Technical Particulars 2) General description of the equipment and all components including brochures. 3) General arrangement drawing 4) Single Line Diagram. 5) Bill of material 6) Experience List 7) Type test certificates 8) Foundation Plan & Loading Details 9) HV and LV Compartment Layout 10) Schematic Diagram 11) Earthing Plan 12) Installation Instruction 13) Instruction for Use & Maintenance 14) QA & QC Plan 15) Transport/Shipping Dimension Drawing 16) Any other technical document, if required
19.0	**GAURANTEED TECHNICAL REQUIREMENTS**	

A. ENCLOSURE FOR PSS				
Sr. No	**Descriptions**	**Unit**	**As Specified By Tata Power**	**As Furnished By Bidder**
1	Application		Outdoor	
2	Rated voltage	KV	12 or 24	
3	Service Voltage	KV	11 or 22	
4	System Frequency	Hz	50	
5	Rated impulse withstand voltage	KVP	75 or 125	
6	Rated power frequency withstand voltage	KV rms	28 or 50	
7	Rated LT voltage	V	415	
8	Degree Protection for Enclosure		IP54	
9	Internal Arc Test		IAC-AB as per IEC 62271-202 (20 KA for 1 s)	
10	Max. Permissible Temperature for accessible part of the enclosure.	◦C	Maximum permissible température shall not be exceed 70 deg C at an	

			ambient temperature not exeeding 40 deg C	
11	Dimension of Enclosure (Overall PSS) (LxWxH)	mm x mm x mm	To be provided by bidder	
12	Thickness of sheet for enclosure – For base		2-3mm (min) GI sheet steel 3mm (min) GI sheet steel	
13	Control wiring	Colour code	To be provided by bidder	
	a) Type of insulation		PVC	
	b) Voltage grade	KV (Max)	1.1	
	c) Conductor Material with PVC colour coded sleeves.		Copper	
	d) Conductor Size & insulation wiring	Sq. mm	1.5 & 2.5	
	e) CT wiring wiring	Sq. mm	4	
	f) Wiring identification mark & Accessories as per specification		To be provided by bidder	
14	**Rated external mechanical impact Class of enclosure & Ventilation aperture**		**Class IK10**	
15	**Rated thermal class of enclosure as per IS/IEC 62271-202 : 2022**		**10K**	
16	Locking arrangement		The doors shall be padlocked As well as protected.	
17	Earthing to be provided -PSS -RMU -Trf body and neutral -LV ACB & MCCB		To be provided by bidder	
18	Accessories like Heater, Lamps, door switch, etc.		To be provided by bidder	
19	Paint		RAL 7032	
20	Guarantee-from date of taking over by Tata Power		36 Months from the date of commissioning or 48 months from the date of last supplies made under the contract whichever is later	
21	Availability of spares		Assurance by bidder for 25 years	
22	Total weight	Kg	To be provided by bidder	
23	HT and LT connection between Trf ,RMU & LT ACB		HT RMU Breaker to Transformer: 1 C Al cable	

			LT Transformer to LV bus: Al busbar	

B	GTP OF RMU		
S.N.	**Description**	**As specified by TATA Power (Options defined in specs)**	**As furnished by Bidder**
1.0	RMU Category	3Way - 1CB & 2 LBS	
2.0	RMU application	Outdoor	
3.0	Offered Model nos. and OEM type	To be provided bidder	
4.0	Dielectric medium	SF6	
5.0	Interrupting medium	Vacuum- for CB SF6 for LBS and earth switch	
6.0	System Frequency	50 Hz	
7.0	Rated Voltage	12 KV or 24 KV as mentioned in tender	
8.0	Service Voltage	11 KV or 22 KV as mentioned in tender	
9.0	Rated current -Line Switches	630 A	
10.0	Rated Current-CB and LBS	630 A for all type	
11.0	Rated Short time current withstand	21 KA /3 s for 11 KV 25 KA /1 s for 22 KV	
12.0	Rated Short time Making capacity	50 KA	
13.0	Rated cable charging interrupting current of incomer load break switch	10 A	
14.0	Rated load interrupting line current	630 A	
15.0	Rated cable charging breaking current of breaker	25 A	
16.0	No. of operations at rated short circuit current on line switches, earthing switches should be E2	LBS- 5 close ES- 5 close The ES in line with CB	
17.0	Opening time of breaker (max.) Without relay time	3 cycle	
18.0	Closing time of breaker (max.)	3 cycle	
19.0	Breaker Duty Cycle	O – 3min - CO - 3min - CO	
20.0	i. Mechanical endurance for Isolator & Earth Switch	Min 1000 (M0) Operations	
	ii. Mechanical endurance for Circuit Breaker	Min 2000 (M1) Operations	
21.0	Electrical operations of at rated current a. LBS/Disconnector b. Earth Switch	To be provided by bidder	
22.0	Temp rise above ambient of +40 deg.	+40 Deg C. (Type Tested as per IEC and complying to requirements)	

23.0	Min Gas pressure in bar	To be provided by bidder based on type tested design	
24.0	SF6 Gas pressure manometer with indicating bars/scale to measure the actual gas pressure (indirect method RFS etc. not accepted)	Dial type Manometer to be provided for gas pressure indication Contacts to be provided and wires up on the TB for SCADA communication of gas status	
25.0	Enclosure	The RMU metal parts shall be greater than 2mm thickness high tensile steel/CRCA. The overall paint thickness shall be not less than 70 microns.	
26.0	Guaranteed SF6 leakage per annum	Less than 0.1% from main tank	
27.0	Degree of protection	a. IP 67 for the tank and b. IP2X for the front cover / mimic board and c. IP 54 (Main door closed) for Outdoor RMUs. d. IP 54 for cable compartment	
28.0	Internal Arc rating	IAC AFL or better	
29.0	Internal Arc test	20kA for 1 Sec.	
30.0	Lightning Impulse withstand Voltage	75 kVp or 125 KVp as mentioned in tender	
31.0	Power Frequency withstand voltage	28 kVrms.or 50 KV rms mentioned in tender	
32.0	SF6 Tank design	Hermetically/robotically sealed unpainted stainless-steel enclosure with SF6 Gas. Sealed pressure system by Laser welding so that no refilling of gas is required for 30 years. No gas work at site. Complete body shall be tamperproof to prevent access to live parts. No gaskets shall be used. No bolts shall be provided.	
32.1	Tank material and grade of SS 304 and welding	Should be of SS 304 and non-corrosive, offered grade of SS to be mentioned. The welding shall be such that there shall be no corrosion of welding for useful life of equipment.	
33.0	Earth bus bars	In enclosure to prevent tampering.	
34.0	Material & size of earth bus bar	Copper earth bus-bar should be Min.105 sq.mm	
35.0	Earthing of main CCT Cables shall be earthed with earth switch with S/C making capacity as per IEC 129. closing shall be possible only when Isolator is open	To be provided by bidder	
36.0	Incomer Load Break switch: Shall be SF6 insulated with least maintenance.	To be provided by bidder	

	Shall have at least 3 positions, Open, Close & earth with natural interlocks. Fitting of motor at site shall be possible & shall have mechanical interlock		
37.0	Circuit Breakers: a. With VCB interrupter and SF6 insulated bus with minimum maintenance and shall have at least 2 positions I.e. Open & Close, Manual operation & fitting of motor at site shall be possible if required. b. In view of safety each VCB shall be assisted with disconnector having 3 positions, open-disconnected, closed, and earth (having fault making capacity) and shall be constructed in such a way that natural interlocking prevents unauthorized operations.	To be provided by bidder as per specs.	
38.0	Electrical interlock for cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS	To be provided by bidder. For 11 KV RMU only	
39.0	Make of self-powered Relay & offered model	Ashida,241S	
40.0	Paint thickness	Minimum 80 microns	
41.0	The cable compartment doors shall have interlocks such that doors can be opened only with earth switch in closed position	To be provided by bidder	
42.0	Protection against theft	Design of RMU shall be tamper & arc proof. Anti vandal screws shall be provided. Cable covers shall be pad lockable. All live parts and internal parts etc. shall be covered with antitheft covers.	
43.0	Doors	Hinged Main doors shall be provided for outdoor type RMU. The hinges for the doors need to be riveted and shall not have any access from outside. Bolted shall not be acceptable.	

44.0	Voltage indicator box shall be fixed type-This device shall be in compliance with IEC 62271-206:2011 standard only	Capacitive dividers type which will supply low voltage to power the lamps AND 3 inlets can be used to check phase sequence or presence of voltage in cable	
45.0	Cable cleats (full circle)	HDPE/Nylon (Fire Retardant)	
46.0	Cable compartment suitability shall be	Suitable for cable sizes In the isolators compartment 11kV, 3C X 300 sq. mm or 22 KV 3C x 240 sq mm	
47.0	The cable compartment	All cable compartments shall be bottom entry and front opening type only	
48.0	Size of bimetallic washer in all compartments	Must be suitable for M12 for TPC bolt and bushing sizes with min. 2mm thick.	
49.0	Height of bushing terminal from base plate	Minimum 550mm for proper termination space.	
50.0	Fault passage indicator	One per RMU in all LBS compartments	
51.0	Operating handle	To be provided by bidder as a part of RMU with each RMU and to be placed on front or on door	
52.0	Non removable MIMIC Diagram on Front of panel	To be provided by bidder with detailed descriptions as mentioned in specs. And earth switch marking background shall be Green for TPC, Mumbai background. As per annexture-2	
53.0	Main Bus bar Material	Copper	
53.1	Bus bar Cross Section	Copper earth bus-bar should be Min.105 sq.mm	
54.0	Opening & Closing times with relay	125 ms maximum	
55.0	Current Transformer for CB compartment	Shall be epoxy resin casted and mounted on cables. The CTs around the cables shall be supported on the sheet steel bracket and should be fixed with bolts. The mounting frame should be moveable up and down or to and fro but shall be fixed at co-axial position with base plat holes and bushing terminal bolts. 75/1 (further finalization in detailed engineering), 5P10	
56.0	Motorization and SCADA Compatibility	To be provided	
57.0	Guarantee	As per specification	
58.0	Dimension (LxWxH) (mm x mm x mm)	To be provided by bidder	
59.0	Total weight	To be provided by bidder	
60.0	Paint	Light Gray shade RAL 7032	
61.0	Type test of product	To be provided by bidder as per specification	

62.0	Availability of spares	Assurance by bidder for 25 years, list of spares as mentioned in specification to be provide along with RMU lot.	
63.0	VPIS auxiliary contact	a) The VPIS shall have auxiliary contact such that it can be configured with SCADA for remote status indication of cable charged. The auxiliary contact to be wired up in TB. b) For 11 KV RMU only, the auxiliary contacts in VPIS shall be wired for electrical interlock of cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS.	
63.1	VPIS	In all compartments	
64.0	Breaker operation counter	To be provided by bidder	
65.0	LBS operation counter	To be provided by bidder	
66.0	Moisture absorption material in SF6 tank	Bidder should provide the detail of the moisture absorption material.	
68.0	Making of earthing operations	All earth operation to be marked with green back ground and permanent in nature.	
69.0	Auxiliary contacts (total numbers and spare numbers)	LBS Earth Switch CB CB Disconnector - CB earth switch-	
70.0	Control cable entry provision	To be provided	
71.0	Shunt trip coil 24V DC/ 230V AC	230V AC shunt trip coil to be provided. Trip coils to be wired up on TB.	
72.0	MCB for LT AC incomer and TB connection of all CT, Aux switches and relay wiring	To be provided	
74.1	RMU Cable Boot/ terminal protector for 11 KV RMU		
a	Terminal protector	Insulating Boots	
b	System voltage	12 kV	
c	AC High voltage	28kV For 1 min	
d	Impulse withstand voltage	75kV	
e	Bushing Diameter	To be provided by bidder	
f	Bushing Types	To be mentioned by bidder	
g	Cable cross section suitability	Bidder to provide complying to specs.	
h	Dimensions of cable protector	Suitable for cables & bushing in specs. (Offered size to be provided by bidder)	
i	Material of the component	To be specified by bidder	

74.2	Cable termination for 22 KV	To be provided	
a	Type	Heat Shrinkable	
b	System Voltage	24 KV	
c	AC High voltage	50 kV for 1 min	
d	Impulse withstand voltage	125 KVp	
e	Type	Raychem RICS 5133	
75	Type test reports	Bidders to provide detailed list of tests conducted at lab name, conducted dates, report number along with full reports.	
For motorized RMU			
1	SCADA Compatibility-Remote operation of RMU shall be possible by using motors fitted to operating mechanism of isolators & CB etc.	To be provided	
2	Harting Plug arrangement for individual isolator as well as breaker motor connections, which will be fitted on RMU body itself.	To be provided	
3	Details of I/O	As per Annexure-IO list of this specs	
4	System to prevent mal operation in case of latch command	Bidder to provide inbuilt system to prevent any mal operation in case of latch command at RMU in case of any fuse failure or DC fail situation	
5	**Technical Details of motors**		
a	Operating Voltage	24 V DC	
b	Max. power rating	240 Watts	
c	Max current drawn	9 Amp (±10%)	
d	Operating time	4-8 seconds	
e	Power Supply	There shall be provision of 230 V AC (maximum 5 Amp current) & 24 V DC	

C	**DRY TYPE TRANSFORMER GTP**			
Sl. No.	**Description**	**Unit**	**As Specified by TATA POWER**	**As furnished by Bidder**
1	Application		Indoor	
2	Continuous Rating	kVA	1000/1600	
3	Type of Transformer		Cast Resin	

4	Name of Manufacturer		To be furnished by Bidder	
5	Place of Manufacture		To be furnished by Bidder	
6	Voltage ratio	kV	11/0.415/22/0.415	
7	Vector group		Dyn-11	
8	Type of cooling		AN	
9	Class of Insulation(Over all)		Class H	
10	Winding Material		Copper	
11	Core material used and Grade			
	a) Thickness		0.23 or less	
	b) Grade		23HP85d or better grade to be mentioned as per IS 3024	
	c) Flux Density at normal voltage	Wb/mm^2	1.6	
	d) Over fluxing without saturation (Curve to be furnished by the Manufacture in support of his claim)	Wb/mm^2	**1.8**	
12	Maximum temperature rise of:			
	a) Windings by resistance method	Deg.C	**115**	
13	Magnetizing (no-load) current at:			
	a) 90% Voltage	%	To be furnished by Bidder	
	b) 100% Voltage	%	2	
	c) 112.5% Voltage	%	5	
14	Resistance of windings at 20 deg.C			
	a) HV windings	Ohms/Ph	To be furnished by Bidder	
	b) LV windings	Ohms/Ph	To be furnished by Bidder	
15	No load losses		To be furnished by Bidder	
16	Load Losses @50% loading at 145 deg C		To be furnished by Bidder	
17	Load Losses @ 100% loading at 145 degC		To be furnished by Bidder	
18	Total losses@50% load at 145°C	W	As per specification	
19	Total Losses@100%load at 145°C	W	As per specification	
20	**Winding insulation class (The transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the package substation enclosure)**		**Class H**	

21	**Winding construction details**			
21.a	**Insulation material for HV (Inter turn/inter layers)**		To be furnished by Bidder	
21.b	**Insulation material for LV (Inter turn/inter layers)**		To be furnished by Bidder	
21.c	**HV coils fully resin casted/ not**		To be furnished by Bidder	
21.d	**LV coils fully resin casted/ not**		To be furnished by Bidder	
22	Current density used for :			
	a) HV winding	Amp./sq. mm	≤ 2.5	
	b) LV winding	Amp./sq. mm	≤ 2.5	
23	Clearances :			
	a) Core and LV	mm	To be furnished by Bidder	
	b) LV and HV	mm	To be furnished by Bidder	
	c) HV Phase to phase	mm	To be furnished by Bidder	
24	Efficiency at 75°C			
	a) Unity P.F	%	To be furnished by Bidder	
	1) 125% load	%	To be furnished by Bidder	
	2) 100% load	%	To be furnished by Bidder	
	3) 75% load	%	To be furnished by Bidder	
	4) 50% load	%	To be furnished by Bidder	
	5) 25% load	%	To be furnished by Bidder	
	b) 0.8 P.F.	%	To be furnished by Bidder	
	1) 125% load	%	To be furnished by Bidder	
	2) 100% load	%	To be furnished by Bidder	
	3) 75% load	%	To be furnished by Bidder	
	4) 50% load	%	To be furnished by Bidder	
	5) 25% load	%	To be furnished by Bidder	
25	Regulation at :			
	a) Unity P.F.	%	To be furnished by Bidder	
	b) 0.8 P.F. at 145°C	%	To be furnished by Bidder	
26	% Impedance at 145°C	%	To be furnished by Bidder	
27	Power frequency voltage withstand test:			

	a) HV for 1 minute	kV	28 (For 11kV) 50 (For 22kV)	
	b) LV for 1 minute	kV	3	
28	a) Over potential Test (Double voltage and double frequency for 1 minute)	V	830	
	b) Impulse voltage withstands test (HV)	kVP	75 (For 11kV) 125 (For 22kV)	
29	Mass of :			
	a) Core lamination (minimum)	Kg	To be furnished by Bidder	
	b) Windings (minimum)	Kg	To be furnished by Bidder	
	c) Total weight	Kg	To be furnished by Bidder	
30	Transformer Overall length × Breadth × Height	mm × mm × mm	To be furnished by Bidder	
31	Inter layer insulation provided in design for :			
	a) In between all layer	mm	To be furnished by Bidder	
32	Insulation materials provided			
	a) For conductors			
	1. HV		To be furnished by Bidder	
	2. LV		To be furnished by Bidder	
	3. Core		To be furnished by Bidder	
33	Material and size of the wire used			
	1) HV Strip	mm /SWG	To be furnished by Bidder	
	a) Total area of cross section	sq.mm	To be furnished by Bidder	
	2) LV	mm /SWG	To be furnished by Bidder	
	a) Strip size/Foil	mm	To be furnished by Bidder	
	b) No. of conductors in parallel	Nos.	To be furnished by Bidder	
	c) Total area of cross section	sq.mm	To be furnished by Bidder	
34	Painting as per Specifications	YES/NO	To be furnished by Bidder	
35	Whether the danger plate provided as required in Specifications	YES/NO	To be furnished by Bidder	

36	Whether the name plate gives all particulars as required in Specifications	YES/NO	To be furnished by Bidder	
37	Whether the offer conforms to the limits of impedance mentioned in the specification	YES/ NO	To be furnished by Bidder	
38	Whether the offer conforms the limits of temperature rise mentioned in the specification	YES/NO	To be furnished by Bidder	
39	Whether the losses of the transformers offered are within the limits specified.	YES/NO	To be furnished by Bidder	
40	Whether the transformer offered is already type tested for the design and test reports enclosed.	YES/NO	To be furnished by Bidder	
41	Hydrophobic anti tracking coating shall be applied on resin casted winding inside & outside	YES/NO	To be furnished by Bidder	
42	Climatic, Environmental, Fire Class compliance certificates	YES/NO	To be furnished by Bidder	

D	**LTP**			
Sr. No	**Descriptions**	**Unit**	**As Specified By Tata Power**	**As Furnished By Bidder**
1	Thickness of sheet for the frame	Mm	2-3mm (min) GI	
2	Max. Current Density of bus bar	A/sq mm	1.0	
3	Max, permissible temperature		80 deg C at terminal with an amb. Temp not exceeding 40 deg C	
4	Min. clearance between phases	Mm	25	
5	Min. clearance between phase to earth	Mm	20	
	ACB			
6	Application		Indoor	
7	Rated voltage	V	415	
8	Rated current	A	1600A / 2500A	
9	Relay		Ashida A22F with 4 Element	
10	Current Transformers (Approved Make of CTs: Reco/Newtek/Pragati/Kappa/ECS/Adcon)		7 Nos. Single resin cast.	
10.A			a) 3 nos dual core CT's of ratio 1600/5A(1MVA) / 2500/5A(1.6MVA) Core 1: Class 0.5 & 15VA burden – For MFM	

			Core 2: 5P20 & 15VA – For Ashida make O/C+E/F relay	
10.B			b) 3 nos single core CTs of ratio 1600/5 A(1MVA) / 2500/5A(1.6MVA), Class 0.5 & 15 VA forEnergy meter (Energy meter is not in bidder scope)	
10.C			c) 1 no single core CT of ratio 1600/5A(1MVA) / 2500/5A(1.6MVA), 5P20 & 15 VA for Neutral unbalance protection	
11	Rated insulation with colour coded sleeves.	V	690	
12	Rated impulse-Withstand voltage	kV	8	
13	No of poles		3	
14	Rated short time withstand capacity Icw	KA RMS	50 kA	
15	External Shunt trip release coil to be provided		230 V AC	
16	Main LV Busbar size	Sq mm	2000 / 3000	
17	Earth Fault protection relay (NEF)		Alstom make CDG11 self-powered. Relay type is normal inverse with 3 Sec with E/F setting of 0.5 to 2 A	

D	**MCCB GTP**			
Sr. No	**Descriptions**	**Unit**	**As Specified By Tata Power**	**As Furnished By Bidder**
1	Application		Indoor	
2	Rated Voltage	V	415	
3	Rated Current	A	630	
4	No of MCCBs		6 nos. 630A, 3P with LSIG release	
5	No of poles		3	
6	Rated insulation voltage	V	690	
7	Impulse-Withstand voltage	kV	8	
8	Rated operation voltage	V	415	
9	Rated short time withstand capacity Icw	KA RMS	36 kA	
10	Overload release setting		50-100%	

11	Thermal shrouds		To be provided	
12	Phase barriers		To be provided	

20.0	**SCHEDULE "B"DEVIATIONS**	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

A)

All the tests specified in below shall be carried out as acceptance test on each RMU.

Sr. No.	Tests details	Applicable standard	Acceptance Criteria
1	PF withstand voltage test on LBS and CB combined with switches closed position	IEC62271-103 & IEC 62271-200	Cl 6.2 0f IEC62271-103, Cl 7.2.7.2 & 7.2.7.3 of IEC62271-1 Cl 6.2.6.1 & 6.2.6.2-IEC 62271-200 Should withstand 28kV for 1minute
2	HV withstand test across isolator distance with opened contact of VCB	IEC 62271-200	Should withstand 28kV for 1minute
3	Voltage Indication Tests on VPIS	-	VPIS indication should lit up when voltage applied in all phases
4	Measurement of contact resistance on LBS & CB combined with all switches in closed condition	IEC 62271-200	Cl 6.4 & Cl 6.5 of IEC 62271-200 Total resistance limit shall be maximum 350micro ohm with busbar & switches closed.
5	Dimensional & Visual Checks	-	As per approved drawing and technical compliance document for tender
6	Operational & Interlock Tests of breaker & isolator switches	As per specification	All interlock shall operate without fail in any operation
7	Leak Detection Test at bushing terminals after RMU assembly	IEC 62271-1 clause 8.5	For gas-filled systems tested in factory, the probing test using a sniffing device to be done. The sensitivity of the sniffing device shall be at least 10-8 Pa × m3/s.
8	HV withstand test of control and auxiliary circuits of motorised and Smart RMU		Should withstand 2kV for one minute
9	Insulation resistance test		With open contacts and closed contacts of switches. Should be in Giga-ohms.
10	Other components, as per applicability, the RTC as per relevant IS/IEC from Original Equipment manufacturer (OEM) to be shared for a. cable boot b. Relay c. CT d. motor		OEM reports as per IS and IEC.
11	Relay testing- Relay testing should be done with primary injection kit on installed relay.		Total tripping time with relay & without relay (Without relay shall be done at trip coil directly) timing shall be within specified in specification.

Bidder should have all the requisite testing equipment's to carry out routine and acceptance test mentioned above including:

3. Facility for primary current injection up to 1000amp.
4. Facility to check total trip timing of breaker along with breaker main contacts through primary current injection

Temperature Rise Test (on one unit of every lot offered for inspection for each rating).
Each transformer of the offered lot shall be subjected to all the tests mentioned under the section Routine Test Clause 7.2.2 in presence of Tata Power representative at the place of manufacture before dispatch without any extra charges.

Total Package substation

a. Temperature rise test of enclosure along with transformer for verification of temperature category of enclosure. (on one unit of every lot offered for inspection for each rating). The transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the package substation enclosure
b. Operational & functional checks
c. Insulation Resistance (IR) test
d. Dielectric test
e. High voltage test
f. Verification of the auxiliary and control circuits

ACB & MCCB

As per relevant IS/IEC following test to be conducted and OEM test report verification.

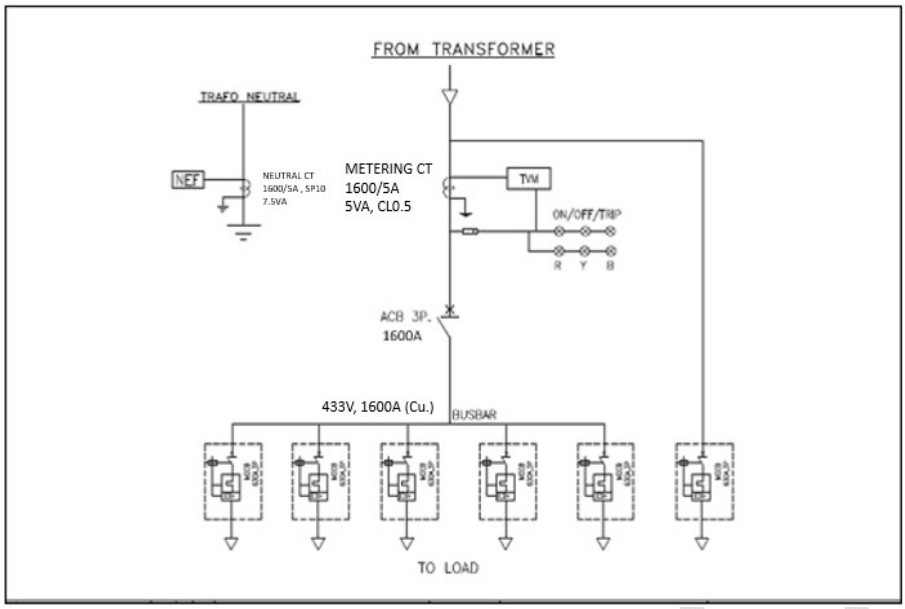
a. Operational checks
b. Insulation Resistance (IR) test
c. High voltage test
d. Primary current inspection & breaker stability check

Overall

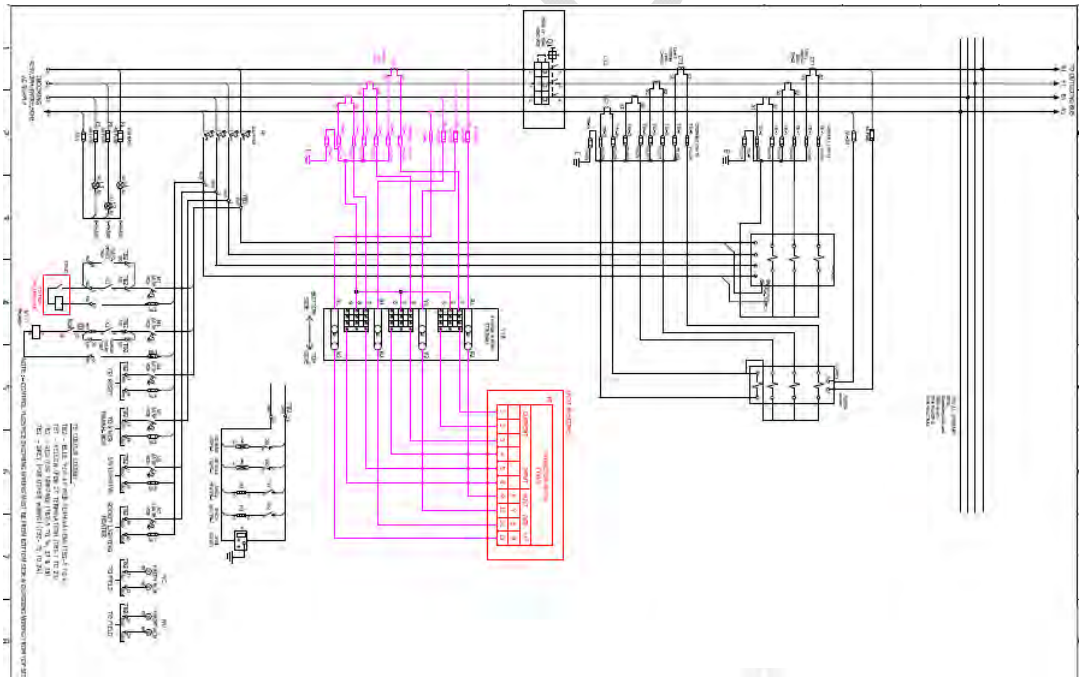
1) Physical & Dimensional checks
2) Control wiring & functional checks
3) Tripping checks

Annexure – 2

Reference drawings



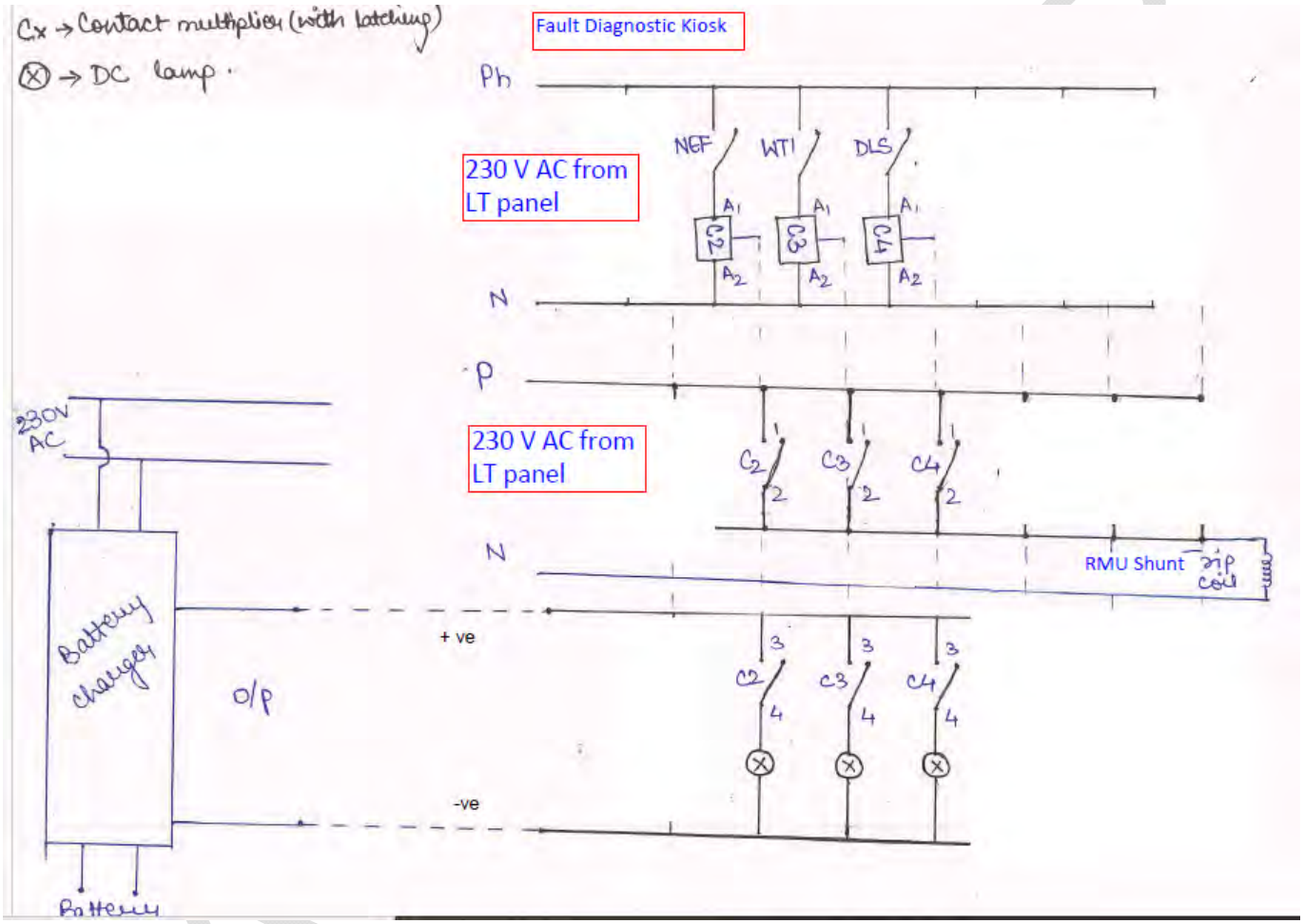
Control Wiring Diagram



Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R01	Ketan S. Jadhav	Ravindra Pote	Vikas Koul
Date	07/05/26	07/05/26	07/05/26

Annexure – 3

Fault Diagnostic kiosk reference drawing

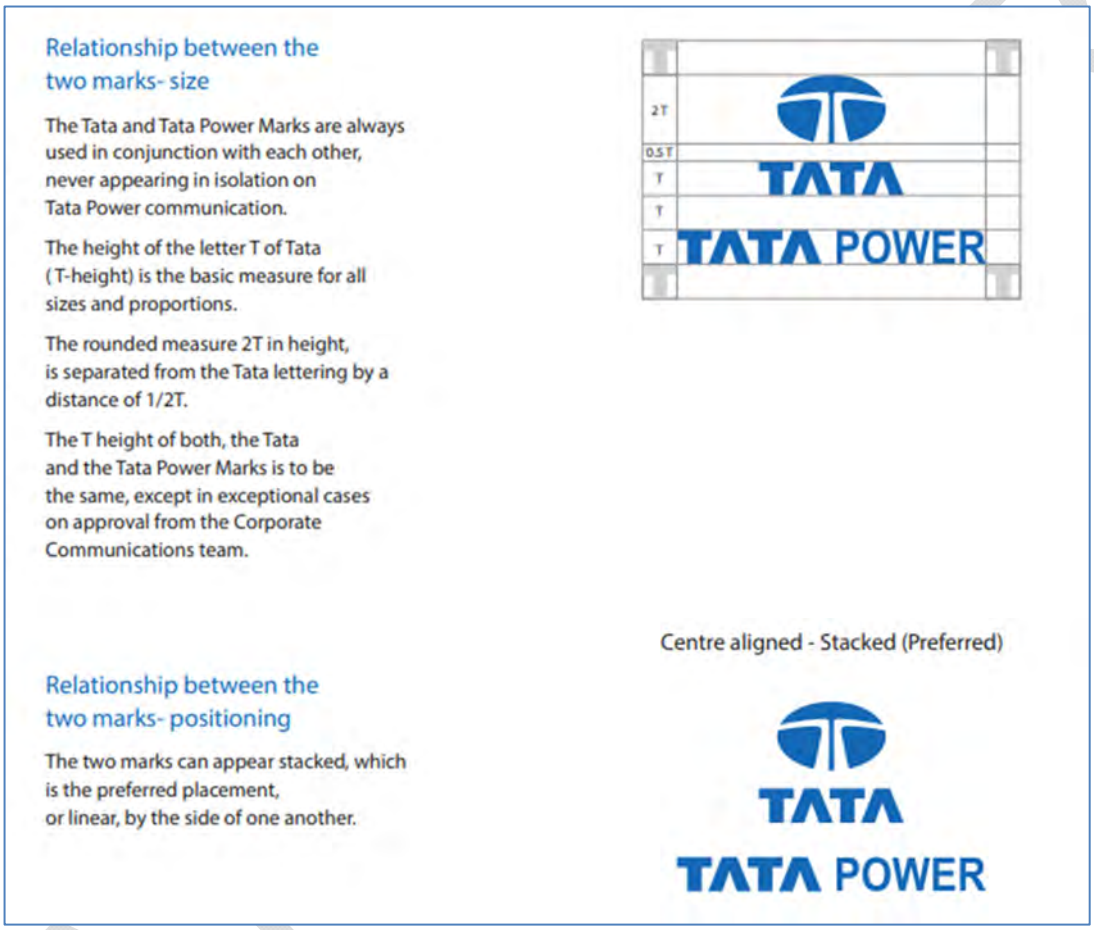


Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R01	Ketan S. Jadhav	Ravindra Pote	Vikas Koul
Date	07/05/26	07/05/26	07/05/26

Annexure – 4

Tata power Branding Name plate -

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



LOGO COLOUR

Annexture-5

The reference sample MIMIC used for earthing color identifications.

Annexture-6 HARTING plug configuration

	FRTU End	Pin no	For LBS 1
RMU 1 LBS 1	Harting plug 1	1	Negative
		2	LBS close command
		3	LBS open command
		4	LBS open status
		5	LBS closed status
		6	Positive
		7	LBS close command
		8	LBS open command
		9	E/F open status
		10	E/F close status
	FRTU End		
	FRTU End	Pin no	For LBS 2
RMU 1 LBS 2	Harting plug 2	1	Negative
		2	LBS close command
		3	LBS open command
		4	LBS open status
		5	LBS closed satatus
		6	Positive
		7	LBS close command
		8	LBS open command
		9	E/F open status
		10	E/F close status

	RMU	Pin no	
RMU 1 CB 1	Harting plug 3	1	CB Open
			CB Open
		3	CB Close
			CB Close
		5	CB ES Open
			CB ES Open
		7	CB ES Close
			CB ES Close
		9	VPIS
		10	VPIS

	RMU	Pin no	Description
Miscellaneous	Harting plug 4	1	FPI SC status LBS 1
			FPI SC status LBS 1
		3	VPIS LBS 1
			VPIS LBS 1
		5	SF 6 low
			SF 6 low
		7	FPI SC status LBS 2
			FPI SC status LBS 2
		9	VPIS LBS 2
		10	VPIS LBS 2

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION OF 11-22kV/415V DUAL RATIO PSS

The Tata Power Company Ltd.

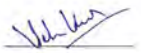
Engineering Services (ENSE),

Distribution Division, Senapati Bapat Marg,

Lower Parel, Mumbai – 400013 Maharashtra

Document No: ENSE-DS-2063-R00

Document Title: TECHNICAL SPECIFICATION OF 11-22kV/415V DUAL RATIO Package substation

00	For tender purpose (ENSE-DS-2063-R00)	25/05/26	KSJ		RRP		VK	
Rev No.	**Remarks**	**Date**	**Initials**	**Sign**	**Initials**	**Sign**	**Initials**	**Sign**
			Prepared By		**Checked By**		**Approved and Issued By**	

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

CONTENTS

1	**SCOPE**	1. This specification covers technical requirement of design, engineering, manufacture, testing at manufacturing work, painting, packing, forwarding, supply and performance of Package type substation comprising an enclosure containing high voltage switchgear, transformer, low voltage switch gear. 2. The Package Substation shall be suitable for operation on both 11 kV and 22 kV distribution systems. 3. The high voltage compartment shall comprise of a Ring Main Unit (RMU) suitable for 24 kV class insulation and operation on both 11 kV and 22 kV system. 4. The transformer shall be of 1000kVA/1600kVA Cast resin, the HV compartment shall comprise of RMU with dual primary voltage (11 kV / 22 kV) and the LV compartment shall include ACB along with MCCBs and auxiliary equipment's with interconnection inside the enclosure for efficient and trouble-free operation of the distribution network for Tata Power Company Ltd. at Mumbai. 5. It is not our intent to specify completely herein all details of design and construction of the equipment. However, the equipment shall conform in all respects to high standards of Engineering design and workmanship and shall be capable of performing in a manner acceptable to the purchaser (TPC) who will interpret the meaning of drawings and specification and shall be entitled to reject any work or material which in his judgement is not in full accordance therewith. 6. All the bought-out items shall be of reputed make and shall be subject to approval by the PURCHASER (TPC) after award of contract.
2	**APPLICABLE STANDARDS**	The equipment shall conform to this specification and latest revision of following codes with all amendments.

Sr. No.	Title	Standard
1	IEC 62271-202	HV switchgear and control gear- HV/LV Pre-fabricated substation.
2	IEC 62271-200	HV switchgear and control gear-AC metal enclosed switchgear and control gear for voltages above 1kV and up to and including 52kV
3	IEC 60694	Common specifications for high voltage switchgear and control gear standards
4	IS 8623	Specification for low voltage switchgear
5	IEC 60529	Degrees of protection provided by enclosures (IP code)

		6	IEC 62271-102	HV switchgear and control gear-Alternating current disconnectors and earthing switches
		7	IEC 62262	Degree of protection provided by enclosures for electrical equipment against mechanical impacts (IP Code)
		8	IEC 60060	High-voltage test techniques
		9	IEC 60947 / IS 13947	Low voltage switchgear and control gear
		10	IEC 60439-1	Low voltage switchgear and control gear assemblies-Type tested and Partially type tested assemblies
		11	IEC 60076 / IS 2026	Power Transformer
		12	IEC 60255-3	Electrical Relays – Part 3: Single input energizing quantity measuring relays with dependent or independent time
		13	IS 2705	Current transformers
		14	IS 3156	Voltage transformers
		15	IEC 60376	Specification of technical grade sulphur hexafluoride (SF6) for use in electrical equipment
		16	IEC 61958	High voltage prefabricated switchgear and control gear assemblies – Voltage presence indicating systems
		18	IS 2099: 1986	Specification for Bushings for Alternating Voltages above 1000 Volts
		19	IS 7421: 1988	Specification for porcelain bushings for alternating voltages up to and including 1000kV.
		20	IS 8603 (Part-1)	1977 Dimensions for Porcelain Transformer Bushings for Use in Heavily Polluted Atmospheres - Part I: 12 kV and 17.5 kV Bushings
		21	IS 26291985	Recommended practice for Hot dips Galvanizing of iron & steel
		22	IS 2633:1986	Test for Uniformity of Zinc Coating CEA guidelines dt August 2008 for energy efficient distribution transformer.
		23	IS 5	Color of ready mixed paints

		24 | IS 5082 | Wrought Aluminium & Al alloy plates & sheets for electrical application 25 | IS 2551 | Danger Notice plates
3	**CLIMATIC CONDITIONS OF THE INSTALLATION**	1 | Maximum ambient temperature | 43°C 2 | Max. Daily average ambient temp | 35°C 3 | Min Ambient Temperature | 07°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 dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

7. GENERAL TECHNICAL REQUIREMENTS

Sr. No	Item Description	Tata Power Requirement	
*	PSS rating	1000kVA	1600kVA
1	Application	Outdoor	
2	Rated voltage	11 kV/22kV (Selectable through off-circuit link)	
3	Service Voltage	24 kV (Suitable for both 11 kV & 22 kV operation)	
4	System Frequency	50 Hz	
5	Rated maximum power of substation	1000kVA Cast Resin (Ventilation Louvers)	1600kVA Cast Resin (Ventilation Louvers)
6	Degree of Protection for Enclosure	IP 54	
7	Internal arc test	IAC-AB as per IEC 62271-202 (20KA for 1sec)	
8	**Rated external mechanical impact Class of enclosure**	Class IK10 according to IEC 62262:2002	
9	Temperature rises for any accessible part of the enclosure	Maximum permissible temperature shall not exceed 70 deg C at an ambient temperature not exceeding 40 deg C	

10	**Rated thermal class of enclosure as per IS/IEC 62271-202 : 2022**	10K	
A	**HV Insulation Level**		
10	Rated Impulse withstand voltage	125 kVP	
11	Power Frequency Withstand voltage	50 kV RMS	
B	**HV Network and Bus Bar**		
12	RMU	3 way, Non-extensible (2nos isolator + 1no. Breaker) **RMU shall be 24 kV class and suitable for both 11 kV and 22 kV systems**	
13	Rated current of incomer Load break Switch	630 A	
14	Rated Current Of Circuit –Breaker	630 A	
15	Rated Short Time Current Withstand (3 Sec)	21kA for 3 Sec	
16	Rated Short Circuit Making Current	50 kA	
C	**LV Network**		
17	Rated LT voltage	415V	
18	**LV Incomer ACB**	**1no, 3 pole 1600A & 230V AC shunt Tripping coil**	**1no, 3 pole 2500A & 230V AC shunt Tripping coil**
19	**LV Outgoing MCCBs**	**6 nos., 630A**	**6 nos., 630A**

5.0	**General Construction**	
5.1	**ENCLOSURE**	1. The Enclosure shall be made of minimum 2-3 mm thick GI sheet with a base of 3 mm (min), tropicalized to meet Indian weather condition. The base of the enclosure shall ensure rigidity for easy transport and installation. The Structure of the substation should be provided with additional supporting beams capable of supporting the gross weight of all the equipment's. The roof of the substation compartments shall be designed to support adequate loads with a minimum clearance of 300 mm provided up to the top of any component installed inside the substation. There shall be provision of proper ventilation through louver apertures so as to allow circulation of hot air inside enclosure naturally. The complete design shall be compartmentalized. 2. The HV compartment shall comprise of one no. 3 way, non-extensible RMU suitable for 24 kV class insulation and operation on both 11 kV and 22 kV systems, RMU with 2 nos. incomer and one no. circuit breaker as outgoing. Termination bolts and boots for RMU shall be supplied by bidder. 3. The Transformer shall be with dual primary voltage 11kV / 22 kV and secondary voltage of 415 V, 1000kVA/1600kVA, Cast resin type, copper coil (As per tender requirement), naturally cooled (AN) construction with Taps on Primary side. The LV compartment shall

		comprise of one no. 1600A/2500A ACB with 6 nos. 630A each MCCBs and other auxiliary components with interconnection required for complete operation of substation. 4. The transformer shall be designed for off-circuit voltage selection between 11 kV and 22 kV using a suitable link arrangement or off-circuit changeover switch. The changeover arrangement shall be provided with necessary mechanical interlocks to prevent operation under energized conditions. 1. Degree of protection for over all the enclosure shall be **IP 54** with transformer compartment as IP23. There shall be no bolting arrangement on the doors and sides (periphery) so as to avoid access of dust and water inside. This would also ensure that the unit is well protected from outside nuisance owing to its being located in crowded and outdoor areas. 2. HV and LV compartment shall be accessible on the side of substation through doors with key lock and nitrile rubber seal. The doors shall have provision of pad locked to ensure theft prone locking arrangement. Heavy duty hinges shall be provided for each door such that they are not visible from outside and hence not removable. The outgoing of the distribution transformer shall be connected directly to incomer of LV distribution through busbars. Transformer shall be accessible from both sides of enclosure. HV, LV and transformer compartment should be isolated from each other internally. 3. There shall be an arrangement for internal lighting activated by associated switch on door for HV, Transformer and LV compartment separately. Space heater with thermostat shall be provided in both cable compartment. Suitable for lifting package type substation should be provided. 4. **External mechanical impact class of enclosure &** Ventilation aperture shall be as per class IK10 & substation shall be type tested for internal Arc withstand test as per IEC. The bidder shall provide provision for remote monitoring of status of RMU, fault passage indicator, LT ACB & MCCBs. 5. **All ventilation apertures, louvers, etc., part of the external enclosure shall have mechanical impact resistance of minimum IK10 in accordance with IS/IEC 62262.**The Transformer compartment doors shall have Limit switch with wiring to trip RMU breaker when the door is opened.
5.1.1	**EARTHING**	1. All metallic components of substation shall be earthed to a common earth conductor of size 50X6 tinned Cu or 65x10 mm GI strip running all long the periphery of package substation. 2. Four nos. earthing/studs shall be provided on the enclosure at each corner position which shall be internally connected to the common earth conductor /strips provided for entire substation. The diameter of stud shall be at least 12mm and shall be able to connect and terminate the external earth conductor. 3. The connecting point shall be marked with protective earth symbol as per IEC, separate earthing conductor /strips shall be provided for transformer neutral and the same shall be insulated from the body earth and suitably brought out from the enclosure for connecting to external system earth
5.1.2	**PAINT**	1. All paint shall be applied on clean, dry surfaces under suitable atmosphere condition by seven tank process and powder coating.

		2. The paint shall not be scale off or crinkle or be removed by abrasion during normal handling. 3. The enclosure for the substation shall be painted with shade Gray RAL 7032.
5.1.3	**GALVANIZING**	The 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 electrogalvanized 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 have galvanic bath, which could have a determine effect on the durability of the zinc coating. a) After galvanizing no drilling or welding shall be performed on the galvanized parts of equipment except that nuts may be threaded after galvanizing. b) 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 dip galvanization. The galvanized steel shall be subjected to test as per IS-2633/BS 729 amended to date.
5.2	**HV COMPARTMENT**	**Approved Makes: ABB, Siemens, Schneider** Ring Main Units shall be as under (All configurations shall have Motorised LBS compartment). 3 Way with 2 LBS + 1 VCB (For Indoor application): Non extensible 3 Nos. 630A Load Break Switches + Electronic Fault Passage Indicator in each LBS compartment (of TPC approved make).- **EKL8000, C&S, SICAM make to be considered with dual energy source-with self-powered inbuilt batter with protentional free contact for remote low battery indication.**
5.2.1	**MAIN TANK**	1. The switchgear and bus bar shall be contained in a stainless steel tank filled with SF6 gas and the outer body shall be made of GI high tensile steel/CRCA 2mm thick with thick gland plates as per IS 513. 2. The tank shall have SS sheet of 2.5 mm thickness minimum (or as per type tested design of bidder with undertaking on letter head) and meet the "sealed pressure system" criteria in accordance with the IEC 62271-200. This is a system for which no handling / refilling of gas shall be required throughout the expected operating life, i.e. 30 years. Sealed pressure systems are completely assembled, filled and tested in the factory. 3. The maximum leakage rate of SF6 gas shall be lower than 0.1% of the total initial mass of SF6 gas per annum from main tank. The filling pressure for the switchgear shall be just above the atmospheric pressure so as to prevent the tendency to leak. SF6 gas used for the filling of the RMU shall be in accordance with IEC 376. 4. It is mandatory to fit an absorption material in the tank to absorb the moisture from the SF6 gas and to regenerate the SF6 gas following arc interruption. The degree of protection for RMU tank (Indoor/Outdoor) shall be IP 67. 5. The RMU shall be complete with all connection and copper bus bar with continuous current carrying capacity of 630A. The bus bar shall be fully encapsulated by SF6 gas inside the steel tank.

		6. The tank shall have separate SF6 refilling valve and the filling pressure must be mentioned near the valve. And the refilling valve should be marked properly. 7. If same valve is used for pressure indicator or remote communication, then the procedure to refill to be mentioned near the NRV from with permanent sticker. 8. The SF6 tank shall be completely enclosed in the enclosure such way that any rodent entry on top or side of tank is deterred. 9. All configurations should be in one tank without any coupling/joint on main Busbar. 10. Tank explosion vent shall be at the bottom.
5.2.2	**GENERAL DETAILS**	1. The mimic board shall be provided with IP2X degree of protection for Indoor RMUs.). Cable compartment shall be IP54. 2. The RMU shall be suitable for mounting on plinth with trench below and shall have base frame on sides with mounting bolt accessibility from outside of RMU the mounting bolts provision shall be min. M12/M16 bolts on all four sides. The mounting bolts and nuts shall be of hot dip galvanized to avoid rusting. The provision for cabling shall be through base plate from bottom of RMU through trench below. The RMU shall be designed so that the position of the different devices is visible to the operator on the front face plate with permanent type indicators. 3. The RMU shall be identified by an appropriately sized permanent labels which clearly indicates the functional units and their operation directions etc. The ON or OFF shall be marked as words and only I/O labelling shall not suffice. 4. The RMU shall be designed to be tamper proof to prevent access to all live parts during operation without the use of special tools. 5. The earth bus bar shall be covered if passing through the cable chamber and enclosed in an enclosure housing to prevent theft/tampering. Only extension outside enclosure shall open for access. 6. There shall be continuity between the metallic parts of the RMU and cables so that there is no electric field pattern in the surrounding air, thereby ensuring the safety of people. The enclosure and cable compartment and tank shall be connected to common earthing. 7. All parts of main circuit to which access is required or provided shall be capable of being earthed prior to becoming accessible. This does not apply to removable parts which become accessible after being separated from the switchgear and control gear. The cables shall be earthed by an earth switch with short-circuit making capacity in compliance with IEC 62271-102. 8. The LBS /CB shall not be closed in case Earth Switch is closed. The earth switch shall be fitted with its own operating mechanism and manual closing shall be driven by a fast-acting mechanism, independent of operator action. Mechanical interlocking systems shall prevent access to the operating shaft to avoid all operator errors such as closing the earth switch when the Load break switch is closed or when cable is charged. 9. All panel covers shall be provided with anti-vandal screw bolts so that opening of panel covers is only possible with special tools, which shall be provided by the Bidder as mandatory spare/tool.

		10. The default design of cable compartment for TATA Power shall be suitable for **3Cx300 sq.mm cables of both 11kV & 22kV rating cable in feeder compartments** & in the breaker compartment **22kV, 3R, 1C, 240 sq.mm Copper** cables. 11. THE cable compartment design shall be suitable for both 11 kV and 22 kV system operation without requiring any modification. 12. The circuit breakers, Load break switches and earthing switches shall have pad lock provision & can be locked in the open or closed position by 1 to 3 padlocks 6 to 8mm in diameter. 13. Anticorrosive fasteners & components to be provided on switchgear. 14. The main bus bar current density shall be less than 2.7A/sq.mm. 15. The cable gland plate shall have split type design having two parts for removal of cable with termination. 16. The vacuum interrupter shall withstand 10-7 milli-bar Vacuum Pressure ensuring high quality vacuum for interruption and shall have Copper Chromium Arcing Contacts. The interrupter manufacturing unit shall have shall be single Shot brazing and have high First pass Yield. (Shall be part of Bidders own vendor evaluation criteria) 17. For each terminals bolt should be provided with Cup or Belleville Washer and flat washers. (Note- The cut spring washers are not accepted) 18. The CT secondary wires and Trip coil wires shall not have any joint in-between CT and TB or relay.
5.2.3	**INTERNAL ARC TESTING**	1. Any accidental over pressure inside the sealed chamber tank shall be limited by the opening of a pressure limiting device provided at the bottom part of the tank. Gas shall be released to the bottom without affecting cables and termination of the RMU with partition between cable chamber such way that gas releases away from the operator. Bidder shall provide type test report to prove compliance to the 'Internal fault IAC- A FL minimum for indoor as per IEC 62271-200 on main tank and cable chambers. 2. An anti-reflex mechanism on the operating lever shall prevent any attempts to reopen immediately after closing of the switch or earth switch. All manual operations shall be carried out on the front of the RMU. In case of SF6 gas leakage from gas tank or any kind of repair should be done at site or replacement of complete RMU to be done free of cost within guarantee period.
5.2.4	**Incomer Load Break Switches (LBS)**	1. Load break switches shall be maintenance-free. The position indicator shall provide positive contact indication in accordance with IEC 60265-1. In addition, manufacturer shall prove reliability of indication in accordance with the standard. The switches shall be of the "increased operating frequency" in accordance with IEC 60265-1. 2. The LBS shall have at least 3 positions, open-disconnected, closed, and earth (with making capacity) and shall be constructed in such a way that natural interlocking prevents unauthorized operations. 3. The disconnector should have the maximum 200 micro-ohm contact resistance. 4. Earthing of the cable shall be either through a three-position switch of a separate snap action type or Earth Switch having fault making capacity.

		5. The switches shall be fully mounted and inspected in the factory. Provision for future motorisation of LBS and CB should be kept in configuration while designing RMU. 6. The load break switch and earthing switch operating mechanism shall have mechanical endurance of at least 1000 (M0) operations. The type test reports to be submitted along with Bid. 7. Load break switch shall have mechanical switch operation counter and should be visible on front in horizontal alignment. The Load break switch should have minimum spare 3 NO+ 3 NC auxiliary contacts and 1NO+1NC for earth switch. The load break switch shall be compatible for remote operation without any modification of the operating mechanism and without de-energizing the RMU, The LBS shall be fitted with an electrical operating mechanism and can remotely open-disconnected, closed and earthed from a reserved location.
5.2.5	**Circuit Breaker For Transformer / Local Feeder Control**	1. The circuit breakers/ interrupter shall be of the maintenance free. 2. The circuit breakers shall have at least 2 positions: Open-disconnected and closed and shall be constructed in such a way that natural interlocks prevent all unauthorized operations. 3. In view of safety each VCB shall be assisted with disconnector having 3 positions, open-disconnected, closed, and earth (having fault making capacity) and shall be constructed in such a way that natural interlocking prevents unauthorized operations. 4. They shall be fully mounted and inspected in the factory. 5. Breaker contact resistance should be <=50 micro-ohms. The various circuit contact resistance should comply with provisions in IEC 62271-200. 6. The breaker should have minimum spare 2 NO + 2 NC auxiliary contacts. 7. An operating mechanism can be used to manually close and open the circuit breaker with single push on push buttons. It shall be fitted with a local system for manual tripping by an integrated push button. There will be no mechanical automatic re-closing. 8. The circuit breaker compartment shall have three current transformers, an electronic self-powered relay, a Series & Shunt trip coil for CB tripping. 9. CT shall be mounted on cables. The mounting arrangement shall be flexible to move to & fro, up and down based on site condition of cable terminations etc. The mounting arrangement shall ensure that the CT should not reach less tan 300mm from live part of bushing. The CT mounting shall be fixed at position while dispatch such that the cable entry, the bushing terminal bolt, and CT core hole are co-axial. 10. Fixing bracket to be provided for fixing CT on particular position without touching termination cores. Bolting arrangement to be provided for fixing CT on the mounting bracket. 11. In any mounting the CT shall be mounted in such a way that the secondary connection shall be accessible and visible form front side after opening cable compartment door 12. Breaker shall have mechanical endurance of at least 2000 (M1) operations. Relevant type test reports to be submitted along with bid. 13. Breaker operation counter should be provided and should be visible on front in horizontal alignment.

		14. In control cabinet the Terminal block shall have AC input wiring provision and MCB provision for incoming of LT AC supply. 15. The relay auxiliary power, communication ports and other required ports should be wired up on the TB. The breaker should have one series trip coil and one shunt trip coil. 16. The shunt trip coil shall be of 230V AC & wired up on TB 17. The touch proof cable termination Raychem RICS 5133 to be supplied with the 22 kV RMU by the vendor along with the cable termination bolt for termination 185 Sq. mm 22 kV 1C cable in breaker & 300 Sq. mm 11kV or 22 kV 3 C for isolator compartment. The touch proof cable termination suitable for both 11kV & 22kV 3C 300Sqmm cable. 18. Protection relay: • Electronic self-powered target latched by battery or capacitive unit. • There shall be Conformal Coating on relay PCB The protection relaying shall have following features: • Phase Protection: With Definite time/ IDMT element having standard characteristics of Standard Inverse, Very inverse, Extremely Inverse (as per IEC 255-3) or Fuse Characteristics. • Earth Fault Protection: With Definite time or IDMT element having standard characteristics of Standard Inverse, Very inverse, Extremely Inverse as per IEC 255-3 standard. • The CTs of 5P10 Class shall be employed. CT ratio shall be 100/1 (Further CT ratio may finalized during detailed engineering) The preferable make of relay is Ashida (ADR 241S), make relay. 19. Specific requirements of control & Protection circuits 20. The make of the vacuum bottle shall be same as that of the Type tested design 21. HT Breaker of RMU shall be wired to trip on followings: A) WTI B) Door switch of transformer compartment
5.2.6	**Bushings and Cable terminations**	1. Bushing should be of Epoxy resin. Each cable compartment shall be provided with three bushings of adequate sizes to terminate the incoming and outgoing cables. The termination bolt shall be M12/M16 for Tata Power supplies 2. The bushings shall be conveniently located for proper bend so as to allow easy working and termination of cables. The cable termination shall be done with Heat shrinkable /Push ON termination method so that adequate clearances are maintained between phases & cable shall be held by HDPE/Nylon (fire retardant) cleat. The Sizes of incoming and outgoing cable shall be as per clause no. 5.2.10. 3. Bidder should provide bimetallic washer for connection between copper bushing stud and Aluminium Lug. Necessary spring and flat washers to be provided on each terminal. The bimetallic washer shall be suitable M12/M16 bolt for supply and 630A rating in all compartments with minimum thickness of 2mm and sufficiently cover the completely copper bushing stud. The bidder can alternately offer tinned copper surface of bushing then bimetallic washer not required.

		4. The Terminal bolt shall have arrangement for fixing the cable test rod through cable boot opening. Cable boot should have opening for test rod insertion. 5. The bolt tightening pressure must be written inside each cable chamber with permanent sticker. 6. Cable boot for cable termination should be as per IS 13573-2. Boot should be easy to install. 7. The cable compartment must be without any holes or gaps and properly vermin proofed before inspection. 8. The cable compartment doors shall have interlocks such that doors can be opened only with earth switch in closed position. 9. Termination boots shall be as per type tested design. And should have a proper opening to facilitate the testing. The opening in boot shall be covered by means of removable protection cap. 10. All cable compartments shall have front door opening. The cable cover door shall be pad lockable and shall be Tamper and Arc proof. The circuit breaker and earth switch shall be lockable in the open or closed positions by 1 to 3 padlocks. 11. RMU door should have pad lock provision and cable door shall have interlock so that it shall not be opened by external forces. Also it shall not be possible to operate the load break switch / isolator or breaker from outside once door closed. This is required to prevent pilferage. 12. Locking provision of cable compartment door to be provided in case of any switch/CB is at earth position to avoid pilferage. Note: Supply of touch proof cable termination is part of RMU supply.
5.2.7	**Earthing:**	1. The RMU outdoor metal clad switchgear enclosure, load Break Switch, VCB, SF6 tank etc. shall be equipped with an copper earth bus throughout all compartments and securely fixed along the base of the RMU with cover. 2. The extension of this earth bus shall be taken out minimum 50mm outside the enclosure on both sides for fixing of the Tata Powers GI earth flat of 50mm width. The extension coming out of enclosure shall be properly sealed such a way to ensure vermin proofing of the cable compartment. 3. The size of copper earth bus-bar should be Min.105 sq.mm inside the enclosure to withstand short time current carrying capacity as per IEC. 4. Two nos. body earthing bolts of M12X70 mm to be provide on the extended bus-bar. 5. The mother earth needs to be extended up to 250mm periphery of cable entry hole so that the cable termination earthing can be connected easily to the main mother earth with 12mm bolt and washers. This arrangement needs to be provided in each compartment of RMU. 6. The main tank must be connected to mother earth at least two positions with proper contact. 7. In outdoor type compact design bidders should ensure the earthing from mother earth is provided inside the cable compartment for earthing of the cable terminations. that TATA POWER shall provide only two main earthing on switchgear

		8. Bidder to ensured that the earth bus shall be single conductor/bus suitable for taking specified fault current and both main earthing are interconnected by earth bus and not through thank or enclosure. 9. If bolt are provided as current carrying path then the bolt material shall be brass and size shall be suitable to carry specified fault current. 10. Two nos. body earthing bolts of M12X70 mm to be provide on the extended bus-bar. Bolts must be hot dipped galvanized.
5.2.8	**Voltage indicator lamps and phase comparators**	1. Each compartment of RMU shall be equipped with a fixed type voltage indicator lamps having dip ports for insertion of phase comparators or line tester to check the phase sequence or presence of charge in cable. This is to be fixed on the front face plate to indicate presence of voltage in the cables. The capacitive dividers will supply low voltage power to the indicator lamps. Three inlets can be used to check the synchronization of phases with phase comparator or other device. These devices shall be in compliance with IEC 62271-206:2011 standard. The VPIS without dip ports are not accepted. 2. All the VIPS installed on compartments shall have auxiliary contacts wired up to the terminal block of respective compartment which shall be further used for remote status indication at SCADA. The auxiliary contacts in VPIS shall be wired for electrical interlock of cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS.
5.2.9	**Front Cover**	3. The front cover shall provide a clear mimic diagram that indicates the different functions. This shall be permanent in nature throughout the useful life of the RMU. 4. The position indicators shall give a true reflection of the position of the main contacts. Position Indicators shall be clearly visible to the operator. 5. The lever operating direction shall be clearly indicated in the mimic diagram. 6. The bidder shall provide a operating sequence process on each compartment with permanent type arrangements. So that all data shall be self-explanatory. 7. The mimic shall have clear Words for “CLOSE/OPEN/EARTH’ at each desired place. 8. All status indicators shall be marked appropriately with permanent labels as Earth On/OFF, Disconnector/LBS On/OFF, CB On/OFF. 9. All operating ports shall have marking like spring charging provision, three position disconnector port and Shutter operator for interlocking, Operation allowed along with arrow indication and labelled as earth operation or disconnector operation. 10. For better clarity of earthing related operations shutters and ports shall be painted in Green (TPCL) background such way that the persons should get clear indication that if operating in yellow region means he is performing earthing related operation. The details shall be as per annexture-2 of this specification. 11. There shall be one label for SF6 gas pressure indicator and a clear message must be fixed near pressure indicator that region of safe operation and Alert message stating ‘If GAS pressure not OK. Do not operate any switchgear and report to OEM (name) customer care/engineer in charge’ this message should be clearly visible in front with suitable background and shall be with permeant marked.

		12. For gas pressure indication a dial type manometer to be provided with will show actual pressure. Gas pressure shall have SCADA compatible contacts and wired up on TB with labelling. 13. All the other accessories and boxes shall be properly labelled with permanent marking/printing such a way that the product is self-explanatory for user. 14. The mimic plate or cover should be separate for each module/feeder of the RMU in view of safety. In case of any work to be done on mechanism of any one feeder then operation staff shall have only access to particular feeder via opening feeder mimic pate or cover plate.
5.2.10	**Fault Passage Indicators**	1. Fault Passage Indicators shall be installed on the Ring Main Unit. These devices shall be electronic devices with dual energy source – with self-powered inbuilt battery, **low battery indication contact** and with provision of 24V DC aux supply. It must be connected to Single 3 phase Split Core CTs for O/C. These shall be provided with bright LED s / flag Indicators, which shall be clearly visible in the daytime. These shall have the following resetting facilities: a. Manual reset b. Resetting after a set time duration c. Electrically reset from remote with at least 2-spare potential free contacts. d. Resetting on restoration of LV 2. The unit shall have Short Circuit adjustable to different settings with separate Current transformer. They shall be fully field-programmable and shall have at least and 5 settings for Phase fault or over current. 3. The preferred range is – O/C setting range 200-1000A. 4. The default setting shall be and 800A for overcurrent. This shall be ensured before inspection call in each RMU. 5. It shall be possible to Test these indicators at site thru “Test” push button. The Fault Passage Indicators shall also be provided with a SCADA output contact. 6. The process of fixing the FPI shall be fixed on the wall of the incomer LBS cable compartment along with pictorial view. 7. FPI connecting wires should be properly dressed and covered in insulated sleeve and tied to the side walls with help of cable ties. If sticking type arrangement is provided, then it must be with good quality permanent adhesive from reputed makes like 3M and should not come out with force of 10kN. 8. These shall confirm to the following standards: IEC 60068-2-6, IEC 60068-2-9 : Environmental testing – For Vibration, solar radiations IEC 60950 : Information Technology equipment – Safety IEC 1000-2 : Electromagnetic compatibility for low-frequency conducted disturbances and signaling in public low power supply systems IEC 1000-4 : EMC – Testing & Measurement

		IEC 1000-6 : EMC- Immunity for Residential, Commercial and light industrial environments.
5.2.11	**Remote Control of the RMU:**	LV Box at top (accessible from front side only) For motorized RMU- The motors to be fitted in LBS sections only. The fitting of the motors to the mechanism must not in any way impede or interfere with the manual operation of the switches. An auxiliary contact to prevent motorized operation of the mechanism while the operating handle is inserted into the operating point shall also be provided. Harting plug arrangement to be provided on each feeder of RMU. All the pins not used in harting plugs needs to be provided separately as spare**. 4 nos quantity of 10 pin harting plugs to be considered. Refer Annexure-6 for harting pin configuration.** Preferred communication protocol for FRTU shall IEC-60870-5-104. **Supply of FRTU is not in bidder scope.** All Close-Open coils / signaling contacts shall be rated for 24 V DC. Following signaling contacts are essential for remote operation of RMU: A) Aux. contact for Line Isolator (Status) B) Aux. contact for all earthing switch (Status) C) Aux. contact for Breaker (Status) D) Aux. contact for FPI indication E) Aux. contact for Protection trip (Breaker module) F) Aux. Contact for Low Gas Pressure 2 Nos. spare relay tripping NO, NC contacts to be provided. Flag Indications on RMU when tripped should be on shunt trip. A provision for physical disconnection of motor supply (like fuse) of line isolator must be provided in RMU unit itself. (A flag is required for series and shunt coil actuation). There should be harting plug arrangement for individual Isolator as well as breaker motor connections, which will be fitted on the RMU body itself. Also the PCB of motor should be covered by anti-tracking agent. There should be relay with timer instead of only relay, which is used in the latching circuit. Suitable unlatching system to be provided to prevent mal operation of motor in case of any latched command/ non executed command at RMU (case like fuse failure etc.) The separator between terminals to be provided to avoid any tracking etc. Signal requirement for field RTU (which shall be mounted near RTU) is attached (refer Annexure-1).
5.2.12	**Paint**	1. All paint shall be applied on clean dry surfaces under suitable atmospheric conditions by seven tank process and powder coating. The overall paint thickness shall not be less than 70 microns. 2. The paint shall not scale off or crinkle or be removed by abrasion during normal handling. 3. The enclosure of the RMU shall be painted with shade light Grey, i.e. RAL 7032. If any damage observed after delivery same need to be touch-up painted after delivery at site.

5.2.13	**Control Cabinet**	1. Control cabinet with a terminal block (TB) located at convenient accessible location so as to wire all inputs & outputs (IOs) up to the terminal block (TB). All the cable secondary wiring should be rooted through marshalling box separately for relay, CT etc. 2. The wiring of the relay to be done on the TB for its terminals along with communication terminals. 3. All terminals wires shall have proper identification ferrules and the identification marking provided on TB. 4. Control cabinet shall have control cable entry arrangement on both sides of the RMU top control cabinet with proper grommet such that the opening is sealed in normal installations when not used for our door extension box arrangement to be provided any other arrangement to be explained in drawing during tender.
5.3	**DISTRIBUTION TRANSFORMER:**	**Approved Makes:** TMC, HITACHI, Raychem. 1. The transformers shall be Cast resin type, copper coil, naturally cooled (AN), dual primary voltage 11kV / 22 kV and secondary voltage of 415 V, 1000kVA or 1600kVA, 50 Hz,. The transformer shall be suitable for service with fluctuations in supply voltage upto plus 12.5% to minus 12.5%. The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. 2. The transformer shall be designed for off-circuit voltage selection between 11 kV and 22 kV using a suitable link arrangement or off-circuit changeover switch. 3. The power transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the prefabricated substation enclosure. The enclosure class (10K) as per IS/IEC 62271-202 shall limit the additional temperature rise caused by the enclosure but shall not permit exceeding the transformer insulation temperature-rise limits. 4. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment.
5.3.1	**CORE**	1. Transformer core shall be stack type, constructed from high grade cold rolled, non-ageing, grain oriented, silicon steel lamination which shall be properly annealed (under inert atmosphere, if required) to relieve stresses. 2. The core shall have low loss and good grain properties. It should be coated with hot oil proof insulation, bolted together with frames to prevent vibration and noise. 3. The core thickness should be 0.23mm or less and grade should be 23HP85[d] as per IS 3024 or better. 4. All core clamping bolts (if any) shall be effectively insulated. 5. Only one grade and one thickness of core shall be accepted and mixing of different grades shall not be allowed. 6. Core lamination shall be coated with insulation inorganic coating equivalent to C5 type as per ESTM A976 or IS 3024 like carlite-3. 7. The complete design of the core must ensure maximum permanency of the core losses without continuous working of the transformers. 8. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated. The vendor shall submit the calculations in support of the same. 9. The transformer shall be suitable for continuous service without damage under 'over fluxing' where the ratio of voltage over frequency exceeds the corresponding ratio at rated voltage and rated frequency up to 12.5% and the core shall not get saturated.

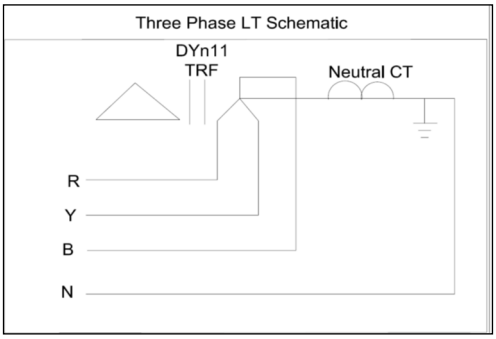
		10. The No Load current shall not exceed 2% of the Full Load current and will be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no-load current by 5% maximum of full load current. 11. The core shall be visibly grounded to the enclosure frame by means of a removable flexible copper grounding strap.
5.3.2	**WINDING CONNECTIONS**	1. The conductor used in the windings shall be high grade electrolytic solid drawn copper encapsulated winding. The high voltage and low voltage windings shall be vacuum cast in epoxy in a metal mould utilizing a proven casting process that ensures the absence of voids & minimise the partial discharge. The winding shall be designed for better voltage regulation and mechanical strength. 2. All Inter turn and inter layer insulation both for HV & LV winding coils shall be suitable for Class H or better as per IS 1271-1985. Bidder to submit relevant test report. There shall be uniform insulation on the HV and LV side. 3. Copper Strips to be considered for HV winding with suitable grade insulation for handling high voltages. 4. However, enamelled conductors shall not be acceptable for any winding. 5. All turns of windings shall be adequately supported to prevent movement. In cases where turns are spaced out, a suitable inter- turn packing shall be provided. All leads from the windings to the terminal board and bushings shall be rigidly supported to prevent injury from vibration or short circuit stresses. 6. Neutral connection shall be brazed on neutral copper busbar. 7. The current density for HV and LV winding shall not be more than 2.5 Ampere per sq.mm. 8. The insulation between core and bolts and core and clamps shall withstand 2.5 kV for one minute. The bidder shall submit characteristics of insulation paper with the offer. The transformer shall have vibration pads installed between core coil assembly and enclosure base structures to prevent the transmission of structure borne vibration. 9. Guide tube shall be used wherever practicable. The core and coil assembly shall be securely fixed in position so that no shifting or deformation occurs during movement of transformer. The core and coil assembly shall be capable of withstanding without injury, thermal and mechanical effects of short circuit at the terminals of any winding as per IS 2026 with latest amendments thereto. 10. Tolerance for the winding resistance measured from different phases but at the same Taps shall be limited to 2 %. 11. Both HV & LV windings shall be resin casted. 12. The winding shall have minimum 2 RTD pocket embedded inside resin cast on LV winding & 2 RTD/coil to be fixed in LV winding & properly wired up on junction TB placed on core-coil assembly. Then it should be further wired up to marshalling box from junction TB. The core RTD shall also wired through junction TB. 13. Hydrophobic anti tracking coating shall be applied on resin casted winding inside & outside. Bidder to provide details of the same during technical evaluation. 14. Insulated sleeves to be provided on connecting links of HV delta formation. End link of delta formation should be rounded off.
5.3.3	**LOSSES**	1. The bidder shall guarantee the total loss at 50% and 100% load condition (at rated voltage and frequency and at 145ºC) and these should be within the limits of maximum total losses declared by Tata Power for both 50% and 100% loading values (as per table below). **Description** | **1000kVA** | **1600kVA**

		<table><tr><td>Maximum Losses at 50% loading at 145ºC (Watts)</td><td>**4820**</td><td>**6760**</td></tr><tr><td>Maximum Losses at 100% loading at 145ºC (Watts)</td><td>**12840**</td><td>**17980**</td></tr></table> 2. No positive tolerance shall be allowed on the losses as mentioned above. However, bidder can offer losses less than specified but no consideration in cost will be given for the same. 3. The guaranteed losses shall be applicable for both 11 kV and 22 kV operating configuration. 4. The successful bidder shall guarantee the quoted losses for at least five years. If at any point of time during operation if it is found that the total losses at 50% and 100% load are more than the values given in specifications, then bidder shall be liable to pay a fine of Rs 250 per watt to the amount by which losses at 50% loading and 100% loading increase the values given in specifications. 5. During testing at Bidder's works if it is found that the actual measured losses are more than the values quoted by the Bidder, TATA POWER shall reject the transformer and shall have the right to reject the complete lot. 6. During testing at Bidder's works, if the temperature rise exceeds the specified values, the entire lot shall be rejected by TATA POWER. 7. During testing at Bidder's works, if the impedance values differ from the guaranteed values including tolerance, the transformer shall be rejected by TATA POWER.
5.3.4	**TERMINAL ARRANGEMENT FOR INCOMING & OUTGOING:**	RMU: The default design of cable compartment for TATA Power shall be suitable for 3Cx300 sq.mm cables of both 11kV & 22kV rating cable in feeder compartments & in the breaker compartment 22kV, 3R, 1C, 240 sq.mm Copper cables. THE cable compartment design shall be suitable for both 11 kV and 22 kV system operation without requiring any modification. LT ACB : For LT side termination, with AL bus bar of **1600A (for 1000kVA) and 2500A (for 1600kVA)** capacity for connecting. Colour sleeves to be provided on busbars for easy identification.
5.3.5	**TRANSFORMER – DUAL VOLTAGE OPERATION:**	The selection between 11 kV and 22 kV operation shall be achieved through a tap link arrangement provided on the high voltage winding & shall be designed for off-circuit operation only.
5.3.6	**TAPS**	1. Tap changing shall be carried out by means tinned brass links when the transformer is in de-energised condition. The link should be rounded off at end terminals. 2. The taps shall be provided in HV winding and each tap change shall result in voltage variation of 2.5%. 3. Switch position no.1 shall correspond to the maximum tapping (+10%) and position 9 shall correspond to minimum tapping (i.e,-10%). 4. Suitable plate shall be fixed for tap changing switch to know the position number of tap.
5.3.7	**EARTHING CONNECTION:**	**NEUTRAL EARTHING:**

		1. Separate LV neutral bushing to be provided on side of LV box for neutral earthing. Neutral bushing should have provision of connection of 2 runs of 65X10 GI strip. **<u>BODY EARTHING:</u>** **2. Two body earthing terminals, located on the lower side of the transformer, diagonally opposite to each other of M12 size (taken 100mm out) shall be provided on Transformer with Bolt.**
5.3.8	**RADIO INTERFERENCE:**	When operated at voltages up to 12.5% in excess of the normal system rating, transformers shall be substantially free from partial discharges (i.e. corona discharges in either internal or external insulation) which are likely to cause interference with radio or telephone communication.
5.3.9	**TEMPERATURE INDICATORS**	Winding Temperature Indicator (WTI) for measuring the hot spot temperature of the winding shall be provided. It shall be suitable for control room as well as marshalling box installation and is built for long and trouble-free operation under extreme conditions of service associated with the Cast resin Dry type transformers. It shall comprise of the following devices/features: a) Resistance Temperature Detector (RTD) sensors shall be suitable to allow the user to monitor max. Six Critical Temperature parameters on the Transformer & 1 no on Core. Routing of cable shall be done through cable turf with necessary tying through nylon tie belts. b) It shall be programmable to display, store and note maximum temperature such that the same can be recalled even after the power for the device is interrupted. c) It shall be compatible for communication with Computer. d) It shall be provided with settable set-points – i. To warn the user of high temperature ii. To trip the transformer in case of excessive heating. e) The temperature indication range shall be -25 to 300 deg C. f) The display shall be seven segment LED type for displaying temperature and channel number. g) The enclosure shall be of M.S. sheet box, powder coated, with acrylic viewing window and minimum degree of protection shall be IP52. h) It shall be operated by the supply voltage of 240 V AC. i) It shall not consume power more than 5 VA during operation. j) It shall be suitable for operation under maximum ambient temperature conditions. k) It should have inbuilt rechargeable & replaceable cell/battery provision. **Following make of WTI to be considered with back-to-back warranty with OEM:** **Embelink Technologies - Model TPR-108-RC with 8 channel RTD PT-100 inputs and 1no 4-20mA+ 1no RS485 outputs with inbuilt rechargeable battery**
5.3.10	**<u>TERMINAL MARKING:</u>**	1. All transformers shall have the primary and secondary terminal markings plainly and indelibly marked on the transformer adjacent to the relevant terminal. (Vendor to specify the type of marking in the GTP. It should be such that if it comes out should not cause reduction in clearances). 2. High voltage phase windings shall be marked both in the terminal boards inside the tank and on the outside with capital letter 1U, 1V, 1W and low voltage winding for the same phase marked by corresponding small letter 2u, 2v, 2w. The neutral point terminal shall be indicated by the letter 2n.

		3. Sequence of marking should be 1U, 1V, 1W and 2n, 2u, 2v, 2w). Colour codes to be marked in addition to 1U,1V, 1W & 2u, 2v, 2w and 2n. 4. R , Y, B identification marking shall be provided on RMU Cable compartment & similarly R,Y, B, N marking to be done on Outgoing MCCB cable compartment.
5.3.11	**FASTENERS**	All bolts, studs, screw threads, pipe threads, bolt heads and nut bolts shall comply within the appropriate Indian standards for metric threads. Bolts or studs shall not be less than 6mm in diameter except when used for small wiring terminals. All nuts and pins shall be adequately locked. Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt shall remain in position. All ferrous bolts, nuts and washers shall be hot dip galvanized**,** except high tensile steel bolts and spring washers which shall have electrolytic action between dissimilar metals. Each bolt shall project at least one thread but more than three threads through the nut. The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members. All bolts of current carrying part shall have taper washers. Protective washers of suitable material shall be provided on front and back of the securing screws.
5.3.12	**Surge Arrestor**	Approved makes: Raychem, LAMCO, CG, Oblum 1. The HT side of the transformer shall have polymeric surge arresters of DH class inside the main body. 2. The bidder shall supply and install 18 kV rated, 10 kA surge arresters suitable for operation on 22 kV system. 3. In addition, the bidder shall supply one complete set of 9 kV rated, 10 kA surge arresters as spare, suitable for 11 kV system operation. 4. The arrangement shall be such that replacement of surge arresters (18 kV to 9 kV) can be carried out at site as per system voltage requirement. Necessary mounting provisions, clearances, and terminal compatibility shall be ensured for interchangeability. 5. Connection to LA shall be through insulated cable of rating equal to HV voltage of TRF. 6. Surge arrestor common grounding provision to be provide inside of the enclosure. 7. Insulation terminal cap to be provided over the terminal connection of surge arrestor.
5.3.13	**Transformer Neutral Current Transformer**	The Neutral CTs window type, resin cast of protection class for E/F shall be provided for transformers on the LT side. The Protection LT CTs shall be cast resin type. The Current transformer shall be mounted with suitable clamping arrangement. The current transformer shall comply with IS 2705. The terminals shall have shorting facility. The CT should not get saturated up to 200% of rated current. The CTs shall have following parameters. CT terminal box for secondary of CT shall be provided of suitable size on the side of transformer. Box shall have droppable terminal blocks with shorting link. Secondary of CTs shall be stud type with lock nut. Colour coded wires shall be used for control and CT wiring.

Parameter	Neutral CT
Type	Cast Resin
Accuracy class	5P20

		<table><tr><td>Burden</td><td>15 VA</td></tr><tr><td>Application</td><td>Protection E/F</td></tr><tr><td>ISF</td><td><=5</td></tr><tr><td>CT ratio for 1000 KVA Transformer</td><td>1600/5</td></tr><tr><td>CT ratio for 1600 KVA Transformer</td><td>2500/5</td></tr></table> 
5.4	**LV COMPARTMENT:**	**Approved Makes:** Schneider/ L&T/ Siemens/ C&S/ ABB/ Eaton The complete arrangement of ACB & MCCBs shall be provided on framework of channel with adequate strength to support the weight of ACB & MCCBs. Each outgoing shall be compartmentalized with MS sheet with adequate space/clearance. The framework shall be covered from the front with GI sheet of thickness not less than 2mm.such that no live part is accessible at any time during the operation or testing period. All mechanism shall be made of such material as to prevent corrosion due to sticking of dust. Cast iron shall be used for any part of equipment which may be subjected to mechanical stresses. All connections and contacts shall be of ample section and surfaces for carrying continuously the specified current without undue heating and shall be secured rigidly & locked in position. All apparatus shall be so designed and constructed as to obviate the risks or short circuit of the live parts by lizards/rodents. Corresponding parts of similar apparatus shall be mutually interchangeable. All apparatus to minimize risks of fire and any damage which might cause in the event of fire.
5.4.1	**ACB & MCCBS WITH BUSBAR:**	1. The bus bar shall be of electrolytic grade aluminium, duly sleeved with shrinkable coloured sleeves and maximum current density of 1.0A/sq mm. 2. The bus bar from transformer secondary shall enter the LV compartment and suitably terminated at incoming of the 3 pole LT ACB. 3. The ACB shall be mounted at a height to accommodate mounting of 6 nos. MCCBs (3 pole, 630A each) directly below the ACB with sufficient space for cable termination. Phase barriers shall be provided suitably at the terminals. 4. The outgoing from the ACB should be connected to bus bar which in turn are connected to the incoming bus bar of MCCBs. 5. All LV bus bar shall be supported on the LV compartment frame with suitable bus support insulators of 1.1KV class. 6. The minimum clearance between phase to phase shall be 25 mm and between phase to earth 20mm.

7. ACB termination shall be with tinned copper or tinned aluminium Bus Bar. Wherever required bimetallic washer to be provided if bare copper terminal is provided.
8. Busbars shall be of aluminium with Bakelite shrouding, rated for

    a) 1000kVA: 1600A, 50 kA for 1 sec and shall have 2000 sq mm cross section to carry the rated continuous and short time current.

    b) 1600kVA: 2500A, 50 kA for 1 sec and shall have 3000 sq mm cross section to carry the rated continuous and short time current.

9. Main Bus bar should be continuous/ without any joint. All bus bars, bus taps and joints shall be PVC taped. Neutral bus bar shall be rated as main bus bar rating.

10. **The ACBs shall be mechanical operated fixed type 3 Pole with shunt trip coil without any microprocessor protection release. Ashida make (A22F) relay to be provided for tripping the breaker with Overcurrent & earth faut protection. Spare ACB contacts for shunt trip should be provided.**
11. The entire mechanism of breakers along with framework shall be suitably earthed 25 x 6 sq mm tinned copper or equivalent Aluminium earth conductor at two distinct points and further connected to the common earth conductor provided for the entire sub-station.
12. Each MCCB should have ON & OFF indication lamp. LOTO lock arrangement to be done for LT ACB ON & OFF push button switch & Spring charging Handle.
13. LT ACB should have additional 230V AC Shunt Tripping coil for tripping of LT ACB through Remote.
14. The control terminals shall be as follows:
    a. Stud type with disconnecting facilities for CT circuits
    b. Stud type for voltage and other circuits.
15. Incomer shall be provided with resin cast CTs for metering & protection.

1000kVA PSS	MFM CT & For Ashida make O/C+E/F relay	3 nos. of dual core CT-1600/5A Core 1: 0.5 Cl, Core 2: 5P20, 15 VA
	Energy Metering	3 nos. of single core CT-1600/5A 0.5 Cl, 15 VA
	Neutral unbalance protection	1 no single core CT 1600A/5A, 5P20, 15 VA

1600kVA PSS	**MFM CT & For Ashida make O/C+E/F relay**	**3 nos. of dual core CT-2500/5A Core 1: 0.5 Cl, Core 2: 5P20, 15 VA**
	Energy Metering	**3 nos. of single core CT-2500/5A 0.5 Cl, 15 VA**
	Neutral unbalance protection	**1 no single core CT 2500A/5A, 5P20, 15 VA**

16. All CT termination should be round plug type.
17. Secondary wiring shall be carried out with 1.1KV grade PVC insulated stranded copper conductor of 2.5 Sq. mm for CT circuits and 2.5 Sq. mm for PT and other circuits. All wires will be colour coded.

<table>
<tr><td></td><td></td><td>
18. Test terminal box for Energy Metering should be Front Connection, Screw Type (4SF), 50 A to be provided and the convention of the wiring in the TTB should be Incoming from the bottom side and outgoing to Meter from top side. No lugs shall be provided for wires to meter, TTB, and Fuses (PT secondary). Sealing arrangement to be provided for Energy Meters. Inspection glass (Transparent Toughened Glass) to be provided for viewing of meter.
19. Provision to be provided for mounting the energy meter with max dimensions as L x B x D: 360 x 200 x 200 mm (Energy meter will be supplied by TPC).
20. Makes of various bought out items shall be limited to the following:
<table>
<tr><td>Sr. No.</td><td>Items</td><td>Approved Make</td></tr>
<tr><td>1</td><td>ACB</td><td>Schneider/ L&T/ Siemens/ C&S/ ABB/ Eaton</td></tr>
<tr><td>2.</td><td>CT</td><td>Reco/Newtek/Pragati/Kappa/ECS/Adcon</td></tr>
</table>
21. Neutral bus shall be connected with earth bus. All control cable should be multi stranded and FRLS. CT ISF should be less than or equal to 5. Close and Open status of the breaker should be available on SCADA through spare auxiliary contact and on LT side through LED Lamp.
22. The LT ACB shall have neutral E/F (NEF) with Alstom Make CDG11 self-powered relay for earth fault protection. The relay type is normal inverse with 3 sec with E/F setting of 0.5 to 2 A.
23. Fault diagnostic kiosk is required with suitable battery, battery charger, latching relay & indicating LEDs. The latching relay contacts to be wired for tripping RMU & indication LED. The wiring diagram is attached for reference in annexures.
</td></tr>
<tr><td>5.5</td><td><u>PAINT:</u></td><td>All paint shall be applied on clean, dry surfaces under suitable atmospheric conditions by seven tank process and powder coating. The paint shall not be scale off or crinkle or be removed by abrasion during normal handling. The Enclosure body shall be painted with shade RAL 7032.</td></tr>
<tr><td>6.0</td><td colspan="2">NAME PLATE AND MARKING</td></tr>
<tr><td>6.1</td><td>PSS enclosure</td><td>
i. Manufacture’s Name
ii. Rated Voltage
iii. System Frequency
iv. Rated Short time withstand current for 1 Sec
v. Rated Impulse withstand Voltage
vi. Degree of Protection
vii. Rated thermal class of enclosure.
viii. Rated external mechanical impact class of enclosure.
ix. “Don’t open the Door Transformer will Trip” Name plate to be pasted on the PSS Transformer compartment Door.
x. “Transformer Check Meter “Name plate to be pasted on the PSS LV Compartment Door.
</td></tr>
</table>

		Name plates shall be suitably embossed with “PO no. with date” “PROPERTY OF TATA POWER” & “CODE NUMBER” along with the following information. All supplied Units shall be fitted with engraved metallic logo of Tata Power on the front side as per Annexure 2.
6.2	**RMU**	1. Manufacture’s Name 2. Type Designation or serial no. 3. Year of manufacture 4. Application Rated values 5. Mass of unit 6. SF6 gas filling pressure
6.3	**TRANSFORMER**	A stainless-steel rating plate, of at least 1 mm thickness, shall be fitted to each transformer in a visible position and shall carry all the information as specified in the standards. The letters on the rating plate shall be engraved black on the white/silver background. Fixing screws for outdoor use shall be of stainless steel or any other corrosion resistant metals. Danger notice shall have red lettering on a white background, or they may be pictorial as approved by the Purchaser. The name plate shall contain following information: 1. Type of transformer 2. Relevant standard. 3. Manufacturer’s Name 4. Manufacturer’s Serial No. 5. Year of Manufacture 6. No. of phases 7. Rated kVA 8. Rated frequency 9. Rated Voltage 10. Rated current 11. Connection symbol 12. Percentage impedance voltage at rated current 13. Total mass 14. BIL 15. **Material code as mentioned in PO.** 16. **Winding material** In addition to the above information the rating plate shall also contain the following: 1. Guaranteed values of no load losses and full load losses at 50% & 100 % load 2. Temperature rise 3. Table giving the tapping voltage, tapping current and tapping power of each tap. 4. Indication of winding which is fitted with tapping’s 5. Value of short circuit impedance on extreme tapping and on principal tapping and Indication of winding to which impedance is related. 6. Actual losses of transformer 7. Overall dimensions

6.4	**LV ACB AND MCCBs**	1. Manufacturer name 2. Type Designation or serial no. 3. No of the relevant standard 4. Utilization category 5. Rated voltage 6. Rated Current 7. Rated Frequency 8. Rated service Short breaking capacity (Ics) 9. Rated Ultimate short circuit breaking capacity (Icu) 10. Indication of open and closed position 11. Terminal marking on O/G MCCB 12. Indication lamp for MCCB ON / OFF
7.0	**TESTS**	Bidder shall furnish the type test certificates of the PSS for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/International accredited laboratory as per relevant standards. The test shall have been conducted in certified test laboratories during the period not exceeding 5 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. Following Type test to be conducted on equipment as below :
7.1	**Type Test**	
7.1.1	Total package substation assembly as per IEC62271-202	a. Dielectric tests - Lightning impulse voltage test - Power Frequency voltage withstand test b. Temperature rise test **with all components (Verification of enclosure class 10K)** c. Short time withstand current & peak withstand current test on main and earthing circuits **d. Internal arc type test** **e. Noise level package substation assembly** **f. Insulation Resistance (IR) test** g. Verification of ingress protection
7.1.2	RMU	

Sr. No.	Type Tests stipulated as per Tender Spec.	Applicable st andard	Acceptance Clause as per IS / IEC
1	PF withstand voltage test & Lightning Impulse voltage withstand test for Switches	IEC62271-103	Cl 6.2 0f IEC62271-103, Cl 7.2.7.2 & 7.2.7.3 of IEC62271-1
2	PF withstand voltage test & Lightning Impulse voltage withstand test for CB	IEC 62271-200	Cl 6.2.6.1 & 6.2.6.2-IEC 62271-200
3	Measurement of contact resistance & Temperature rise test LBS & CB combined unit (if individual then two separate reports required)	IEC 62271-200	Cl 6.4 & Cl 6.5 of IEC 62271-200

		4	Short Time current and Peak current withstand tests Main Circuit	IEC 62271-200	Cl 6.6 a & b -IEC 62271-200
		5	Short Time current and Peak current withstand tests Earthing Circuit	IEC 62271-200	Cl 6.6 a & b -IEC 62271-200
		6	Short Circuit Breaking current tests LBS	IEC 62271-103	Cl 6.101, Table 3 of IEC 62271-103
		7	Short Circuit Making current test on LBS	IEC 62271-103	Cl 6.101.1.2, Table3 of IEC 62271-103
		8	Short Circuit Making test on Earth Switch	IEC 62271-102	Cl 7.101 of IEC 62271-102
		9	Short circuit making & Breaking tests on CB – three phase fault	IEC 62271-100	Cl 6.112.1 of IEC 62271-100
		10	Single Phase test on CB	IEC 62271-100	Cl 6.108 of IEC 62271-100
		11	Double Erath Fault test on CB	IEC 62271-100	Cl 6.108 of IEC 62271-100
		12	Mechanical operation tests on LBS	IEC 62271-200	Cl 6.102.2 - IEC62271-200
		13	Mechanical operation tests on CB	IEC 62271-200	Cl 6.102.2 - IEC62271-200
		14	Mechanical Endurance tests on LBS	IEC 62271-103	Cl 6.102.2. - IEC 62271-103
		15	Mechanical Endurance tests on CB	IEC 62271-100	Cl 6.101.2.4 of IEC 62271-100
		16	Mechanical Endurance tests on DS	IEC 62271-102	Cl 7.102.3 of IEC 62271-102
		17	Partial Discharge test on CB & LBS	IEC 62271-200	Annex BB , Procedure B of IEC 62271-200
		18	Pressure withstand test of gas filled compartment/Tank	IEC 62271-200	Cl 6.103.1 of IEC62271-200
		19	IP67 of Gas compartment/Tank	IEC 62271-200	Cl 6.7.1 of IEC62271-200
		20	IP54 for outdoor RMU	IEC 62271-200 & IEC- 60529	Cl 6.7.1 of IEC62271-200
		21	IAC on Cable Compartment	IEC 62271-200	Cl 6.106 IEC62271-200
		22	IAC on Gas Compartment	IEC 62271-200	Cl 6.106 IEC62271-200
		23	Cable charging current breaking test	IEC 62271-100	Cl 6.102, 6.105 of IEC 62271-100
		24	Capacitive current switching test	IEC 62271-100	Cl 6.111 of IEC 62271-100

Note: The bidder can submit the test report with combination of above listed tests. The test of CB & LBS to be done on combined unit. If bidder submits individual unit CB/LBS tests then both units test detailed test reports are to be submitted.

7.1.2	**Transformer**	a. Temperature rise test for determining the maximum temperature rise after continuous full load Run. The ambient temperature and time of test should be stated in the test certificate. b. Impulse voltage test: with chopped wave of IS 2026 (part-III). c. Short-circuit test – Thermal and dynamic ability. d. Noise level measurement. e. Measurement of Zero-phase sequence impedance. f. Measurement of Harmonics of no-load current. Note: - Out of the above-mentioned type tests, the tests under sl. no. a, b, c shall be conducted at CPRI/ERDA labs and the balance shall be acceptable as in- house NABL accreditation test lab.
7.1.3	**ACB & MCCM**	As per relevant IS type test documents to be submitted.
7.2	**Routine Test**	
7.2.1	RMU	1. Power Frequency Withstand Test. 2. Dimensional & Visual Checks 3. Operational & Interlock Tests of breaker & isolator switches 4. Measurement of Circuit Resistance 5. SF-6 chamber pressure withstands/leakage test. 6. HV withstand test across isolator distance. 7. HV withstand test of control and auxiliary circuits. 8. Voltage Indication Tests. 9. Breaker Contact Resistance Test 10. Total Trip Time Check Test through Current Injection in primary. 11. IR Value.
7.2.2	**Transformer**	1. Measurement of Winding Resistance at each tap [As per IS 2026 (Part 1)]. 2. Measurement of voltage ratio, check of voltage displacement, polarity, phase sequence and vector group [As per IS 2026 (Part 1)]. 3. Measurement of short circuit impedance (principal tapping, when applicable) and load loss at 50% and 100% load [As per IS 2026 (Part 1)]. 4. Measurement of insulation resistance [As per IS 2026 (Part 1)]. 5. Induced over voltage withstand test [As per IS 2026 (Part 3)]. 6. Separate Source voltage withstand test [As per IS 2026 (Part 3)]. 7. Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 112.5% of rated voltage. [As per IS 2026 (Part 1)]. 8. Neutral current measurement: The value of the zero sequence current in the neutral of the star winding shall not be more than 2% of the full load current 9. CORE IR at 500 V. 10. Calibration of WTI as RTD 11. 2 kV withstand test for all secondary windings. 12. Partial discharge measurement
7.3	**Acceptance Test**	
7.3.1	RMU	All the tests specified in below tableshall be carried out as acceptance test on RMU. Random samples as per sampling plan under IEC/IS for each lot or OEM test reports shall

be verified at discretion of Tata Power.

Sr. No.	Tests details	Applicable standard	Acceptance Criteria
1	PF withstand voltage test on LBS and CB combined with switches closed position	IEC62271-103 & IEC 62271-200	Cl 6.2 0f IEC62271-103, Cl 7.2.7.2 & 7.2.7.3 of IEC62271-1 Cl 6.2.6.1 & 6.2.6.2-IEC 62271-200 Should withstand 28kV for 1minute
2	HV withstand test across isolator distance with opened contact of VCB	IEC 62271-200	Should withstand 28kV for 1minute
3	Voltage Indication Tests on VPIS	-	VPIS indication should lit up when voltage applied in all phases
4	Measurement of contact resistance on LBS & CB combined with all switches in closed condition	IEC 62271-200	Cl 6.4 & Cl 6.5 of IEC 62271-200 Total resistance limit shall be maximum 350micro ohm with busbar & switches closed.
5	Dimensional & Visual Checks	-	As per approved drawing and technical compliance document for tender
6	Operational & Interlock Tests of breaker & isolator switches	As per specification	All interlock shall operate without fail in any operation
7	Leak Detection Test at bushing terminals after RMU assembly	IEC 62271-1 clause 8.5	For gas-filled systems tested in factory, the probing test using a sniffing device to be done. The sensitivity of the sniffing device shall be at least 10-8 Pa × m3/s.
8	HV withstand test of control and auxiliary circuits of motorised and Smart RMU		Should withstand 2kV for one minute
9	Insulation resistance test		With open contacts and closed contacts of switches. Should be in Giga-ohms.
10	Other components, as per applicability, the RTC as per relevant IS/IEC from Original Equipment manufacturer (OEM) to be shared for		OEM reports as per IS and IEC.

		a. cable boot b. Relay c. CT d. motor
		11 Relay testing- Relay testing should be done with primary injection kit on installed relay. — Total tripping time with relay & without relay (Without relay shall be done at trip coil directly) timing shall be within specified in specification.
		Bidder should have all the requisite testing equipment's to carry out routine and acceptance test mentioned above including: 1. Facility for primary current injection up to 1000amp. 2. Facility to check total trip timing of breaker along with breaker main contacts through primary current injection
7.3.2	**Transformer**	1. Temperature Rise Test (on one unit of every lot offered for inspection for each rating). 2. Each transformer of the offered lot shall be subjected to all the tests mentioned under the section Routine Test Clause 7.2.2 in presence of Tata Power representative at the place of manufacture before dispatch without any extra charges.
7.3.3	**ACB & MCCB**	As per relevant IS/IEC following test to be conducted and OEM test report verification. **a. Operational checks** **b. Insulation Resistance (IR) test** **c. High voltage test** **d. Primary current inspection & breaker stability check**
7.3.4	**Total Package substation**	**a. Temperature rise test of enclosure along with transformer for verification of temperature category of enclosure. ((on one unit of every lot offered for inspection for each rating). The transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the package substation enclosure** **b. Operational & functional checks** **c. Insulation Resistance (IR) test** **d. Dielectric test** **e. High voltage test** **f. Verification of the auxiliary and control circuits**
8.0	**TYPE TEST CERTIFICATE**	The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. Type Test to be conducted on similar Design/ rating panel. All the tests shall be conducted at CPRI / ERDA/ International accredited laboratory as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid.

		Type tests shall have been conducted in certified Test laboratories during the period not exceeding 5 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.
9.0	**PRE-DISPATCH INSPECTION**	The Material shall be subject to inspection by a duly authorized representative of the TATA POWER COMPANY. Inspection may be made at any stage of manufacture at the discretion of the Purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TATA POWER COMPANY `s representatives when the work is in progress. Inspection by the TATA POWER COMPANY or its authorized representatives shall not relieve the Bidder of his obligation of furnishing equipment in accordance with the specifications. TATA POWER COMPANY authorized representatives shall have the right to inspect the design, materials and workmanship and to report thereon, at any stage of manufacture, if found necessary. All facilities shall be extended to our representatives for witnessing the tests. Due notice shall be given to us to enable us to depute our representatives for stage inspection. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TATA POWER COMPANY. Five certified copies of all test certificates including type tests, sample test certificates shall be sent to us for our approval prior to dispatch of materials. Following documents shall be sent along with material a) Test reports b) MDCC issued by TATA POWER COMPANY c) Invoice in duplicate d) Packing list e) Drawings & catalogue f) Delivery Challan g) Other Documents (as applicable).
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPC, Mumbai store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection or any other parameters observed after delivery. The material should be delivered at TPC, Mumbai stores & same shall be checked during delivery and overdue material shall not be accepted. Bidders to plan the delivery accordingly. Bidders to attend and rectify the defect if any at his own cost. The material shall be accepted in stores only after rectification of any observed flaw. The delay in rectification shall lead to any contractual penalty. Billing shall be processed only after acceptance of the material.
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 TATA POWER COMPANY up to a period of at least 36 months from the date of commissioning or 48 months from the date of last supplies made under the contract whichever is later, (the time scale of 36/48 months could be enhanced subject to mutual agreements) 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 TATA POWER COMPANY 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 the item covered under this specification shall be packaged for rail/road transport in a manner so as to protect the equipment from damage in transit. 1) Packing protection- Against shocks, vibration & corrosion, damages during transportation 2) Packing identification labels, to show purchaser name, PO number, Manufacturer serial number 3) Handling instruction- To be marked on packing boxes. 4) Bidders should prefer to use recyclable & environmentally friendly materials for packing. 5) No single use plastic to be used. 6) Packing should be done with environment friendly recyclable materials.
13.0	**TENDER SAMPLE**	Not Applicable
14.0	**QUALITY CONTROL**	The Bidder shall submit with the offer Quality 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 bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TATA POWER COMPANY shall reserve the sole rights for the type test of a random sample from the lot and in case of any discrepancy or deviation from the Type test certificates submitted along with the Bid; the complete Lot shall be rejected. TATA POWER COMPANY representative or its nominated representative shall have free access to the Bidder's works to carry out inspections. If anything missing in QAP and required as per other clauses of this document, bidder is liable to perform the same without cost implication.

15.0	**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 and as specified above.
16.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit first GTP & Drawing with 7 days from placement of outline agreement for approval and complete the approval process within 14 days of outline agreement. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable).
17.0	**SPARES, ACCESSORIES, AND TOOLS**	Bidder shall provide a list of recommended spares with quantity and unit price for 5 year of operation after commissioning. The purchaser may order all of any of the spare parts listed at the time of contract award and the spare parts so ordered shall be supplied as part of the definite works. The purchaser may order additional spares at any time during the contract period at the rate stated in the contract document. The bidder shall provide one SF6 gas leak indicator & one no. phase comparator. A list of complete set special tools and gauges required for erection & maintenance and installation procedure shall be submitted. Bidder shall give an assurance that spare parts and consumable items will continue to be available through the life of the equipment which shall be 25 year minimum. However the purchaser shall give a minimum of 12 month notice in the event that the bidder or any sub vendor plans to discontinue manufacture of any component use in this equipment. Any spare apparatuses, parts or tools shall be subjected 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 identifications. **Bidder shall provide following spares as commissioning spares strictly as per specification along with PSS.**

SL. No.	Name of Spare Parts	Required spares up to 5 No. of PSS
A	For RMU	
1	Breaker Mechanism	1 No's
2	Isolator Mechanism	1 No's
3	Trip Coil	2 No's
4	CT – 100/A for ADR241S relay	1 Set (1 Set = 3 Nos.)
5	Bolt (For cable connection)	1 Set (1 Set = 3 Nos.)
6	"L" Key (All Size)	2 nos
7	VPIs	4
8	Manometer	2
9	24V DC Motor for Isolator	2

		10	RMU PCB Card with Contactors	2
		11	FPI CT	1 Set
		12	FPI	2 nos'
		13	ADR241S relay	1 No
		14	For Schneider FBX RMU: Control Card for Isolator Function Motorization	2
		B	For Transformer	
		15	RTD sensor	6 no's RTD sensors
		16	Surge Arrestor	1 no
		C	For LT compartment	
		17	A22F relay	1 NO
		18	CDG11 relay	2 Nos
		19	MFM	1 No.
		20	1600/5A(1MVA) / 2500/5A(1.6MVA), 5P20 & 15 VA for Neutral unbalance protection	1 No

18.0	DRAWING AND DOCUMENTS	Following drawings and documents shall be prepared based on TATA POWER COMPANY specifications and statutory requirements and shall be submitted with the bid. All the documents & drawings shall be in English language 1) Completely filled in Technical Particulars 2) General description of the equipment and all components including brochures. 3) General arrangement drawing 4) Single Line Diagram. 5) Bill of material 6) Experience List 7) Type test certificates 8) Foundation Plan & Loading Details 9) HV and LV Compartment Layout 10) Schematic Diagram 11) Earthing Plan 12) Installation Instruction 13) Instruction for Use & Maintenance 14) QA & QC Plan 15) Transport/Shipping Dimension Drawing 16) Any other technical document, if required
19.0	GAURANTEED TECHNICAL REQUIREMENTS	

A. ENCLOSURE FOR PSS	

Sr. No	Descriptions	Unit	As Specified By Tata Power	As Furnished By Bidder
1	Application		Outdoor	
2	Rated voltage	KV	24 kV (Suitable for both 11 kV & 22 kV operation)	
3	Service Voltage	KV	11/ 22 (Selectable through off-circuit link)	
4	System Frequency	Hz	50	
5	Rated impulse withstand voltage	KVP	125	
6	Rated power frequency withstand voltage	KV rms	50	
7	Rated LT voltage	V	415	
8	Degree Protection for Enclosure		IP54	
9	Internal Arc Test		IAC-AB as per IEC 62271-202 (20 KA for 1 s)	
10	Max. Permissible Temperature for accessible part of the enclosure.	◦C	Maximum permissible temperature shall not be exceeded 70 deg C at an ambient temperature not exceeding 40 deg C	
11	Dimension of Enclosure (Overall PSS) (LxWxH)	mm x mm x mm	To be provided by bidder	
12	Thickness of sheet for enclosure – For base		2-3mm (min) GI sheet steel 3mm (min) GI sheet steel	
13	Control wiring	Colour code	To be provided by bidder	
	a) Type of insulation		PVC	
	b) Voltage grade	KV (Max)	1.1	
	c) Conductor Material with PVC colour coded sleeves.		Copper	
	d) Conductor Size & insulation wiring	Sq. mm	1.5 & 2.5	
	e) CT wiring wiring	Sq. mm	4	
	f) Wiring identification mark & Accessories as per specification		To be provided by bidder	
14	**Rated external mechanical impact Class of enclosure & Ventilation aperture**		**Class IK10**	
15	**Rated thermal class of enclosure as per IS/IEC 62271-202 : 2022**		**10K**	

16	Locking arrangement		The doors shall be padlocked As well as protected.	
17	Earthing to be provided -PSS -RMU -Trf body and neutral -LV ACB & MCCB		To be provided by bidder	
18	Accessories like Heater, Lamps, door switch, etc.		To be provided by bidder	
19	Paint		RAL 7032	
20	Guarantee-from date of taking over by Tata Power		36 Months from the date of commissioning or 48 months from the date of last supplies made under the contract whichever is later	
21	Availability of spares		Assurance by bidder for 25 years	
22	Total weight	Kg	To be provided by bidder	
23	HT and LT connection between Trf ,RMU & LT ACB		HT RMU Breaker to Transformer: 1 C Al cable LT Transformer to LV bus: Al busbar	

B	**GTP OF RMU**		
S.N.	**Description**	**As specified by TATA Power (Options defined in specs)**	**As furnished by Bidder**
1.0	RMU Category	3Way - 1CB & 2 LBS	
2.0	RMU application	Outdoor	
3.0	Offered Model nos. and OEM type	To be provided bidder	
4.0	Dielectric medium	SF6	
5.0	Interrupting medium	Vacuum- for CB SF6 for LBS and earth switch	
6.0	System Frequency	50 Hz	
7.0	Rated Voltage	24 KV as mentioned in tender	
8.0	Service Voltage	Suitable for both 11 KV or 22 KV operation	
9.0	Rated current -Line Switches	630 A	
10.0	Rated Current-CB and LBS	630 A for all type	
11.0	Rated Short time current withstand	21kA for 3 Sec	

12.0	Rated Short time Making capacity	50 KA	
13.0	Rated cable charging interrupting current of incomer load break switch	10 A	
14.0	Rated load interrupting line current	630 A	
15.0	Rated cable charging breaking current of breaker	25 A	
16.0	No. of operations at rated short circuit current on line switches, earthing switches should be E2	LBS- 5 close ES- 5 close The ES in line with CB	
17.0	Opening time of breaker (max.) Without relay time	3 cycle	
18.0	Closing time of breaker (max.)	3 cycle	
19.0	Breaker Duty Cycle	O – 3min - CO - 3min - CO	
20.0	i. Mechanical endurance for Isolator & Earth Switch	Min 1000 (M0) Operations	
	ii. Mechanical endurance for Circuit Breaker	Min 2000 (M1) Operations	
21.0	Electrical operations of at rated current a. LBS/Disconnector b. Earth Switch	To be provided by bidder	
22.0	Temp rise above ambient of +40 deg.	+40 Deg C. (Type Tested as per IEC and complying to requirements)	
23.0	Min Gas pressure in bar	To be provided by bidder based on type tested design	
24.0	SF6 Gas pressure manometer with indicating bars/scale to measure the actual gas pressure (indirect method RFS etc. not accepted)	Dial type Manometer to be provided for gas pressure indication Contacts to be provided and wires up on the TB for SCADA communication of gas status	
25.0	Enclosure	The RMU metal parts shall be greater than 2mm thickness high tensile steel/CRCA. The overall paint thickness shall be not less than 70 microns.	
26.0	Guaranteed SF6 leakage per annum	Less than 0.1% from main tank	
27.0	Degree of protection	a. IP 67 for the tank and b. IP2X for the front cover / mimic board and c. IP 54 (Main door closed) for Outdoor RMUs. d. IP 54 for cable compartment	
28.0	Internal Arc rating	IAC AFL or better	
29.0	Internal Arc test	20kA for 1 Sec.	
30.0	Lightning Impulse withstand Voltage	125 KVp as mentioned in tender	
31.0	Power Frequency withstand voltage	50 KV rms mentioned in tender	

32.0	SF6 Tank design	Hermetically/robotically sealed unpainted stainless-steel enclosure with SF6 Gas. Sealed pressure system by Laser welding so that no refilling of gas is required for 30 years. No gas work at site. Complete body shall be tamperproof to prevent access to live parts. No gaskets shall be used. No bolts shall be provided.	
32.1	Tank material and grade of SS 304 and welding	Should be of SS 304 and non-corrosive, offered grade of SS to be mentioned. The welding shall be such that there shall be no corrosion of welding for useful life of equipment.	
33.0	Earth bus bars	In enclosure to prevent tampering.	
34.0	Material & size of earth bus bar	Copper earth bus-bar should be Min.105 sq.mm	
35.0	Earthing of main CCT Cables shall be earthed with earth switch with S/C making capacity as per IEC 129. closing shall be possible only when Isolator is open	To be provided by bidder	
36.0	Incomer Load Break switch: Shall be SF6 insulated with least maintenance. Shall have at least 3 positions, Open, Close & earth with natural interlocks. Fitting of motor at site shall be possible & shall have mechanical interlock	To be provided by bidder	
37.0	Circuit Breakers: a. With VCB interrupter and SF6 insulated bus with minimum maintenance and shall have at least 2 positions I.e. Open & Close, Manual operation & fitting of motor at site shall be possible if required. b. In view of safety each VCB shall be assisted with disconnector having 3 positions, open-disconnected, closed, and earth (having fault making capacity) and shall be constructed in such a way that natural interlocking prevents unauthorized operations.	To be provided by bidder as per specs.	

38.0	Electrical interlock for cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS	To be provided by bidder.	
39.0	Make of self-powered Relay & offered model	Ashida,241S	
40.0	Paint thickness	Minimum 80 microns	
41.0	The cable compartment doors shall have interlocks such that doors can be opened only with earth switch in closed position	To be provided by bidder	
42.0	Protection against theft	Design of RMU shall be tamper & arc proof. Anti vandal screws shall be provided. Cable covers shall be pad lockable. All live parts and internal parts etc. shall be covered with antitheft covers.	
43.0	Doors	Hinged Main doors shall be provided for outdoor type RMU. The hinges for the doors need to be riveted and shall not have any access from outside. Bolted shall not be acceptable.	
44.0	Voltage indicator box shall be fixed type-This device shall be in compliance with IEC 62271-206:2011 standard only	Capacitive dividers type which will supply low voltage to power the lamps AND 3 inlets can be used to check phase sequence or presence of voltage in cable	
45.0	Cable cleats (full circle)	HDPE/Nylon (Fire Retardant)	
46.0	Cable compartment suitability shall be	Suitable for cable sizes In the isolators compartment suitable for both 11kV or 22kV , 3C X 300 sq. mm	
47.0	The cable compartment	All cable compartments shall be bottom entry and front opening type only	
48.0	Size of bimetallic washer in all compartments	Must be suitable for M12 for TPC bolt and bushing sizes with min. 2mm thick.	
49.0	Height of bushing terminal from base plate	Minimum 550mm for proper termination space.	
50.0	Fault passage indicator	One per RMU in all LBS compartments	
51.0	Operating handle	To be provided by bidder as a part of RMU with each RMU and to be placed on front or on door	
52.0	Non removable MIMIC Diagram on Front of panel	To be provided by bidder with detailed descriptions as mentioned in specs. And earth switch marking background shall be Green for TPC, Mumbai background. As per annexture-2	

53.0	Main Bus bar Material	Copper	
53.1	Bus bar Cross Section	Copper earth bus-bar should be Min.105 sq.mm	
54.0	Opening & Closing times with relay	125 ms maximum	
55.0	Current Transformer for CB compartment	Shall be epoxy resin casted and mounted on cables. The CTs around the cables shall be supported on the sheet steel bracket and should be fixed with bolts. The mounting frame should be moveable up and down or to and fro but shall be fixed at co-axial position with base plat holes and bushing terminal bolts. 75/1 (further finalization in detailed engineering), 5P10	
56.0	Motorization and SCADA Compatibility	To be provided	
57.0	Guarantee	As per specification	
58.0	Dimension (LxWxH) (mm x mm x mm)	To be provided by bidder	
59.0	Total weight	To be provided by bidder	
60.0	Paint	Light Gray shade RAL 7032	
61.0	Type test of product	To be provided by bidder as per specification	
62.0	Availability of spares	Assurance by bidder for 25 years, list of spares as mentioned in specification to be provide along with RMU lot.	
63.0	VPIS auxiliary contact	a) The VPIS shall have auxiliary contact such that it can be configured with SCADA for remote status indication of cable charged. The auxiliary contact to be wired up in TB. b) the auxiliary contacts in VPIS shall be wired for electrical interlock of cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS.	
63.1	VPIS	In all compartments	
64.0	Breaker operation counter	To be provided by bidder	
65.0	LBS operation counter	To be provided by bidder	
66.0	Moisture absorption material in SF6 tank	Bidder should provide the detail of the moisture absorption material.	
68.0	Making of earthing operations	All earth operation to be marked with green back ground and permanent in nature.	
69.0	Auxiliary contacts (total numbers and spare numbers)	LBS Earth Switch	

		CB CB Disconnector - CB earth switch-	
70.0	Control cable entry provision	To be provided	
71.0	Shunt trip coil 24V DC/ 230V AC	230V AC shunt trip coil to be provided. Trip coils to be wired up on TB.	
72.0	MCB for LT AC incomer and TB connection of all CT, Aux switches and relay wiring	To be provided	
74.1	Cable termination	suitable for both 11kV & 22kV, 3C 300sqmm cable	
a	Type	Heat Shrinkable	
b	System Voltage	24 KV	
c	AC High voltage	50 kV for 1 min	
d	Impulse withstand voltage	125 KVp	
e	Type	Raychem RICS 5133	
75	Type test reports	Bidders to provide detailed list of tests conducted at lab name, conducted dates, report number along with full reports.	
For motorized RMU			
1	SCADA Compatibility-Remote operation of RMU shall be possible by using motors fitted to operating mechanism of isolators & CB etc.	To be provided	
2	Harting Plug arrangement for individual isolator as well as breaker motor connections, which will be fitted on RMU body itself.	To be provided	
3	Details of I/O	As per Annexure-IO list of this specs	
4	System to prevent mal operation in case of latch command	Bidder to provide inbuilt system to prevent any mal operation in case of	

		latch command at RMU in case of any fuse failure or DC fail situation	
5	**Technical Details of motors**		
a	Operating Voltage	24 V DC	
b	Max. power rating	240 Watts	
c	Max current drawn	9 Amp (±10%)	
d	Operating time	4-8 seconds	
e	Power Supply	There shall be provision of 230 V AC (maximum 5 Amp current) & 24 V DC	

C	**DRY TYPE TRANSFORMER GTP**			
Sl. No.	**Description**	**Unit**	**As Specified by TATA POWER**	**As furnished by Bidder**
1	Application		Indoor	
2	Continuous Rating	kVA	1000/1600	
3	Type of Transformer		Cast Resin	
4	Name of Manufacturer		To be furnished by Bidder	
5	Place of Manufacture		To be furnished by Bidder	
6	Voltage ratio	kV	**11-22/0.415 dual ratio**	
7	Vector group		Dyn-11	
8	Type of cooling		AN	
9	Class of Insulation(Over all)		Class H	
10	Winding Material		Copper	
11	Core material used and Grade			
	a) Thickness		0.23 or less	
	b) Grade		23HP85d or better grade to be mentioned as per IS 3024	
	c) Flux Density at normal voltage	Wb/mm^2	1.6	
	d) Over fluxing without saturation (Curve to be furnished by the Manufacture in support of his claim)	Wb/mm^2	**1.8**	
12	Maximum temperature rise of:			
	a) Windings by resistance method	Deg.C	**115**	
13	Magnetizing (no-load) current at:			

	a) 90% Voltage	%	To be furnished by Bidder	
	b) 100% Voltage	%	2	
	c) 112.5% Voltage	%	5	
14	Resistance of windings at 20 deg.C			
	a) HV windings	Ohms/Ph	To be furnished by Bidder	
	b) LV windings	Ohms/Ph	To be furnished by Bidder	
15	No load losses		To be furnished by Bidder	
16	Load Losses @50% loading at 145 deg C		To be furnished by Bidder	
17	Load Losses @ 100% loading at 145 degC		To be furnished by Bidder	
18	Total losses@50% load at 145°C	W	As per specification	
19	Total Losses@100%load at 145°C	W	As per specification	
20	**Winding insulation class (The transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the package substation enclosure)**		**Class H**	
21	**Winding construction details**			
21.a	**Insulation material for HV (Inter turn/inter layers)**		To be furnished by Bidder	
21.b	**Insulation material for LV (Inter turn/inter layers)**		To be furnished by Bidder	
21.c	**HV coils fully resin casted/ not**		To be furnished by Bidder	
21.d	**LV coils fully resin casted/ not**		To be furnished by Bidder	
22	Current density used for :			
	a) HV winding	Amp./sq. mm	≤ 2.5 for copper &	
	b) LV winding	Amp./sq. mm	≤ 2.5 for copper &	
23	Clearances :			
	a) Core and LV	mm	To be furnished by Bidder	
	b) LV and HV	mm	To be furnished by Bidder	
	c) HV Phase to phase	mm	To be furnished by Bidder	
24	Efficiency at 75°C			
	a) Unity P.F	%	To be furnished by Bidder	
	1) 125% load	%	To be furnished by Bidder	
	2) 100% load	%	To be furnished by Bidder	

	3) 75% load	%	To be furnished by Bidder	
	4) 50% load	%	To be furnished by Bidder	
	5) 25% load	%	To be furnished by Bidder	
	b) 0.8 P.F.	%	To be furnished by Bidder	
	1) 125% load	%	To be furnished by Bidder	
	2) 100% load	%	To be furnished by Bidder	
	3) 75% load	%	To be furnished by Bidder	
	4) 50% load	%	To be furnished by Bidder	
	5) 25% load	%	To be furnished by Bidder	
25	Regulation at :			
	a) Unity P.F.	%	To be furnished by Bidder	
	b) 0.8 P.F. at 145°C	%	To be furnished by Bidder	
26	% Impedance at 145°C	%	To be furnished by Bidder	
27	Power frequency voltage withstand test:			
	a) HV for 1 minute	kV	50	
	b) LV for 1 minute	kV	3	
28	a) Over potential Test (Double voltage and double frequency for 1 minute)	V	830	
	b) Impulse voltage withstands test (HV)	kVP	125	
29	Mass of :			
	a) Core lamination (minimum)	Kg	To be furnished by Bidder	
	b) Windings (minimum)	Kg	To be furnished by Bidder	
	c) Total weight	Kg	To be furnished by Bidder	
30	Transformer Overall length × Breadth × Height	mm × mm × mm	To be furnished by Bidder	
31	Inter layer insulation provided in design for :			
	a) In between all layer	mm	To be furnished by Bidder	
32	Insulation materials provided			
	a) For conductors			
	1. HV		To be furnished by Bidder	
	2. LV		To be furnished by Bidder	

	3. Core		To be furnished by Bidder	
33	Material and size of the wire used			
	1) HV Strip	mm /SWG	To be furnished by Bidder	
	a) Total area of cross section	sq.mm	To be furnished by Bidder	
	2) LV	mm /SWG	To be furnished by Bidder	
	a) Strip size/Foil	mm	To be furnished by Bidder	
	b) No. of conductors in parallel	Nos.	To be furnished by Bidder	
	c) Total area of cross section	sq.mm	To be furnished by Bidder	
34	Painting as per Specifications	YES/NO	To be furnished by Bidder	
35	Whether the danger plate provided as required in Specifications	YES/NO	To be furnished by Bidder	
36	Whether the name plate gives all particulars as required in Specifications	YES/NO	To be furnished by Bidder	
37	Whether the offer conforms to the limits of impedance mentioned in the specification	YES/ NO	To be furnished by Bidder	
38	Whether the offer conforms the limits of temperature rise mentioned in the specification	YES/NO	To be furnished by Bidder	
39	Whether the losses of the transformers offered are within the limits specified.	YES/NO	To be furnished by Bidder	
40	Whether the transformer offered is already type tested for the design and test reports enclosed.	YES/NO	To be furnished by Bidder	
41	Hydrophobic anti tracking coating shall be applied on resin casted winding inside & outside	YES/NO	To be furnished by Bidder	
42	Climatic, Environmental, Fire Class compliance certificates	YES/NO	To be furnished by Bidder	

D	**LTP**			
Sr. No	**Descriptions**	**Unit**	**As Specified By Tata Power**	**As Furnished By Bidder**
1	Thickness of sheet for the frame	Mm	2-3mm (min) GI	
2	Max. Current Density of bus bar	A/sq mm	1.0	

3	Max, permissible temperature		80 deg C at terminal with an amb. Temp not exceeding 40 deg C	
4	Min. clearance between phases	Mm	25	
5	Min. clearance between phase to earth	Mm	20	
	ACB			
6	Application		Indoor	
7	Rated voltage	V	415	
8	Rated current	A	1600A / 2500A	
9	Relay		Ashida A22F with 4 Element	
10	Current Transformers (Approved Make of CTs: Reco/Newtek/Pragati/Kappa/ECS/Adcon)		7 Nos. Single resin cast.	
10.A			a) 3 nos dual core CT's of ratio 1600/5A(1MVA) / 2500/5A(1.6MVA) Core 1: Class 0.5 & 15VA burden – For MFM Core 2: 5P20 & 15VA – For Ashida make O/C+E/F relay	
10.B			b) 3 nos single core CTs of ratio 1600/5 A(1MVA) / 2500/5A(1.6MVA), Class 0.5 & 15 VA forEnergy meter (Energy meter is not in bidder scope)	
10.C			c) 1 no single core CT of ratio 1600/5A(1MVA) / 2500/5A(1.6MVA), 5P20 & 15 VA for Neutral unbalance protection	
11	Rated insulation with colour coded sleeves.	V	690	
12	Rated impulse-Withstand voltage	kV	8	
13	No of poles		3	
14	Rated short time withstand capacity Icw	KA RMS	50 kA	
15	External Shunt trip release coil to be provided		230 V AC	
16	Main LV Busbar size	Sq mm	2000 / 3000	

17	Earth Fault protection relay (NEF)		Alstom make CDG11 self-powered. Relay type is normal inverse with 3 Sec with E/F setting of 0.5 to 2 A	

D	MCCB GTP			
Sr. No	**Descriptions**	**Unit**	**As Specified By Tata Power**	**As Furnished By Bidder**
1	Application		Indoor	
2	Rated Voltage	V	415	
3	Rated Current	A	630	
4	No of MCCBs		6 nos. 630A, 3P with LSIG release	
5	No of poles		3	
6	Rated insulation voltage	V	690	
7	Impulse-Withstand voltage	kV	8	
8	Rated operation voltage	V	415	
9	Rated short time withstand capacity Icw	KA RMS	36 kA	
10	Overload release setting		50-100%	
11	Thermal shrouds		To be provided	
12	Phase barriers		To be provided	

20.0 SCHEDULE "B"DEVIATIONS

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

All the tests specified in below shall be carried out as acceptance test on each RMU.

Sr. No.	Tests details	Applicable standard	Acceptance Criteria
1	PF withstand voltage test on LBS and CB combined with switches closed position	IEC62271-103 & IEC 62271-200	Cl 6.2 0f IEC62271-103, Cl 7.2.7.2 & 7.2.7.3 of IEC62271-1 Cl 6.2.6.1 & 6.2.6.2-IEC 62271-200 Should withstand 28kV for 1minute
2	HV withstand test across isolator distance with opened contact of VCB	IEC 62271-200	Should withstand 28kV for 1minute
3	Voltage Indication Tests on VPIS	-	VPIS indication should lit up when voltage applied in all phases
4	Measurement of contact resistance on LBS & CB combined with all switches in closed condition	IEC 62271-200	Cl 6.4 & Cl 6.5 of IEC 62271-200 Total resistance limit shall be maximum 350micro ohm with busbar & switches closed.
5	Dimensional & Visual Checks	-	As per approved drawing and technical compliance document for tender

6	Operational & Interlock Tests of breaker & isolator switches	As per specification	All interlock shall operate without fail in any operation
7	Leak Detection Test at bushing terminals after RMU assembly	IEC 62271-1 clause 8.5	For gas-filled systems tested in factory, the probing test using a sniffing device to be done. The sensitivity of the sniffing device shall be at least 10-8 Pa × m3/s.
8	HV withstand test of control and auxiliary circuits of motorised and Smart RMU		Should withstand 2kV for one minute
9	Insulation resistance test		With open contacts and closed contacts of switches. Should be in Giga-ohms.
10	Other components, as per applicability, the RTC as per relevant IS/IEC from Original Equipment manufacturer (OEM) to be shared for a. cable boot b. Relay c. CT d. motor		OEM reports as per IS and IEC.
11	Relay testing- Relay testing should be done with primary injection kit on installed relay.		Total tripping time with relay & without relay (Without relay shall be done at trip coil directly) timing shall be within specified in specification.

Bidder should have all the requisite testing equipment's to carry out routine and acceptance test mentioned above including:

3. Facility for primary current injection up to 1000amp.
4. Facility to check total trip timing of breaker along with breaker main contacts through primary current injection

Temperature Rise Test (on one unit of every lot offered for inspection for each rating).
Each transformer of the offered lot shall be subjected to all the tests mentioned under the section Routine Test Clause 7.2.2 in presence of Tata Power representative at the place of manufacture before dispatch without any extra charges.

Total Package substation

a. Temperature rise test of enclosure along with transformer for verification of temperature category of enclosure. (on one unit of every lot offered for inspection for each rating). The transformer shall comply with the temperature-rise limits corresponding to its insulation class when operating inside the package substation enclosure
b. Operational & functional checks

c. Insulation Resistance (IR) test
d. Dielectric test
e. High voltage test
f. Verification of the auxiliary and control circuits

ACB & MCCB

As per relevant IS/IEC following test to be conducted and OEM test report verification.

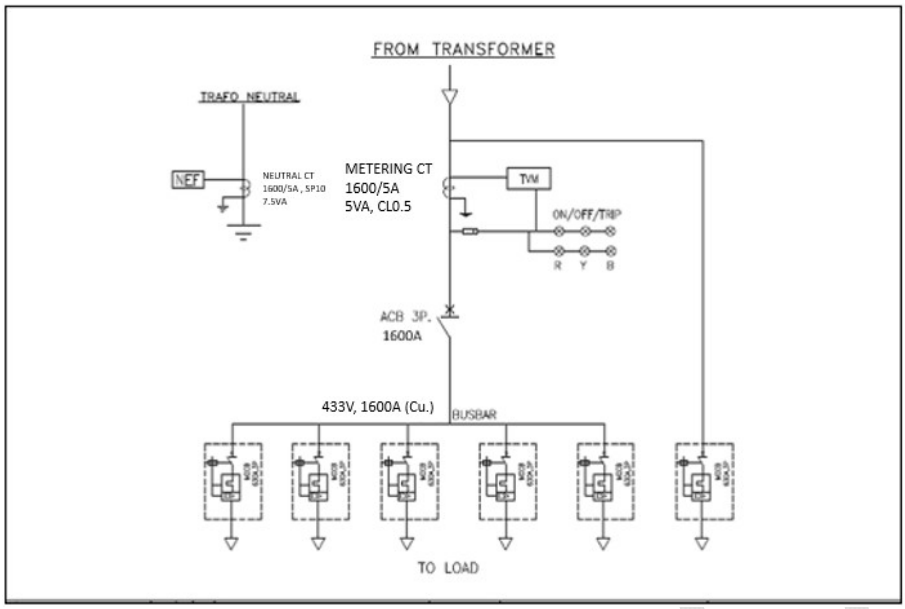
a. Operational checks
b. Insulation Resistance (IR) test
c. High voltage test
d. Primary current inspection & breaker stability check

Overall

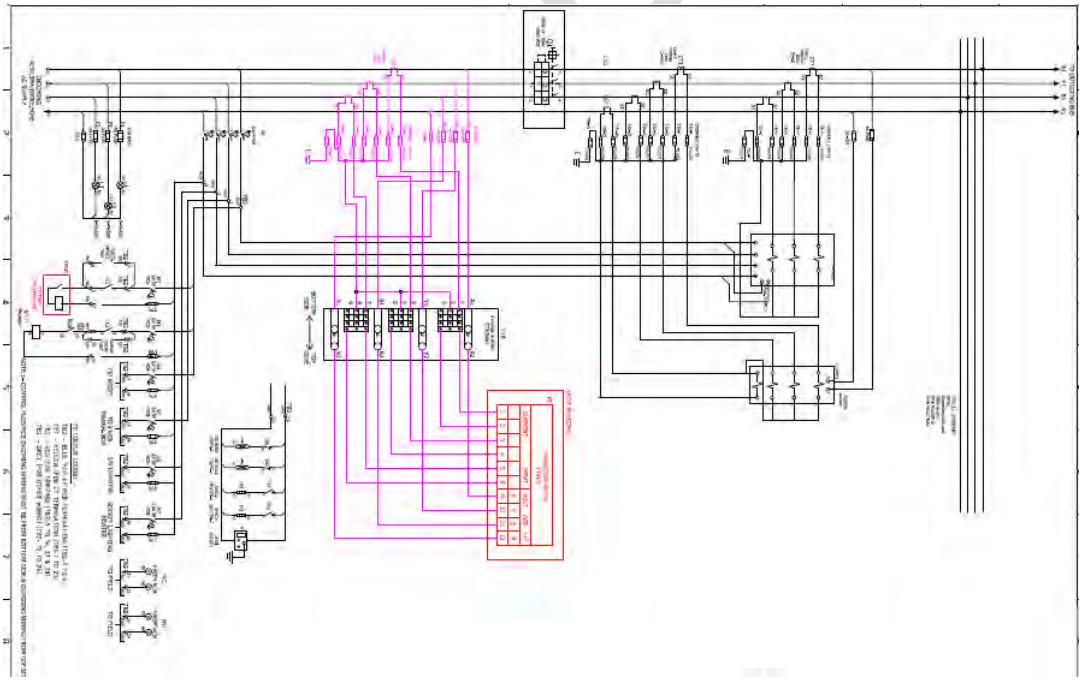
1) Physical & Dimensional checks
2) Control wiring & functional checks
3) Tripping checks

Annexure – 2

Reference drawings



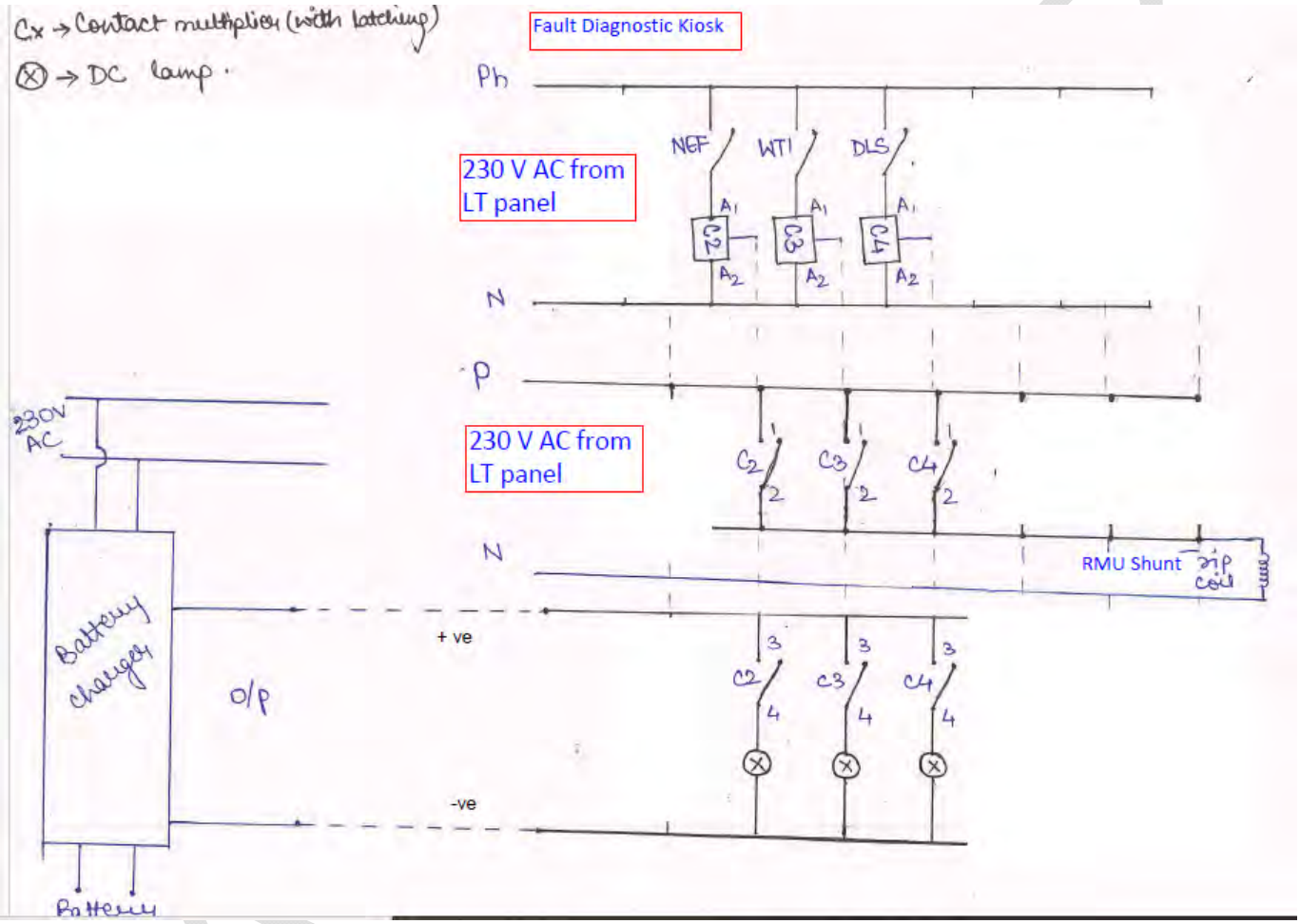
Control Wiring Diagram



Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	Ketan S. Jadhav	Ravindra Pote	Vikas Koul
Date	25/05/26	25/05/26	25/05/26

Annexure – 3

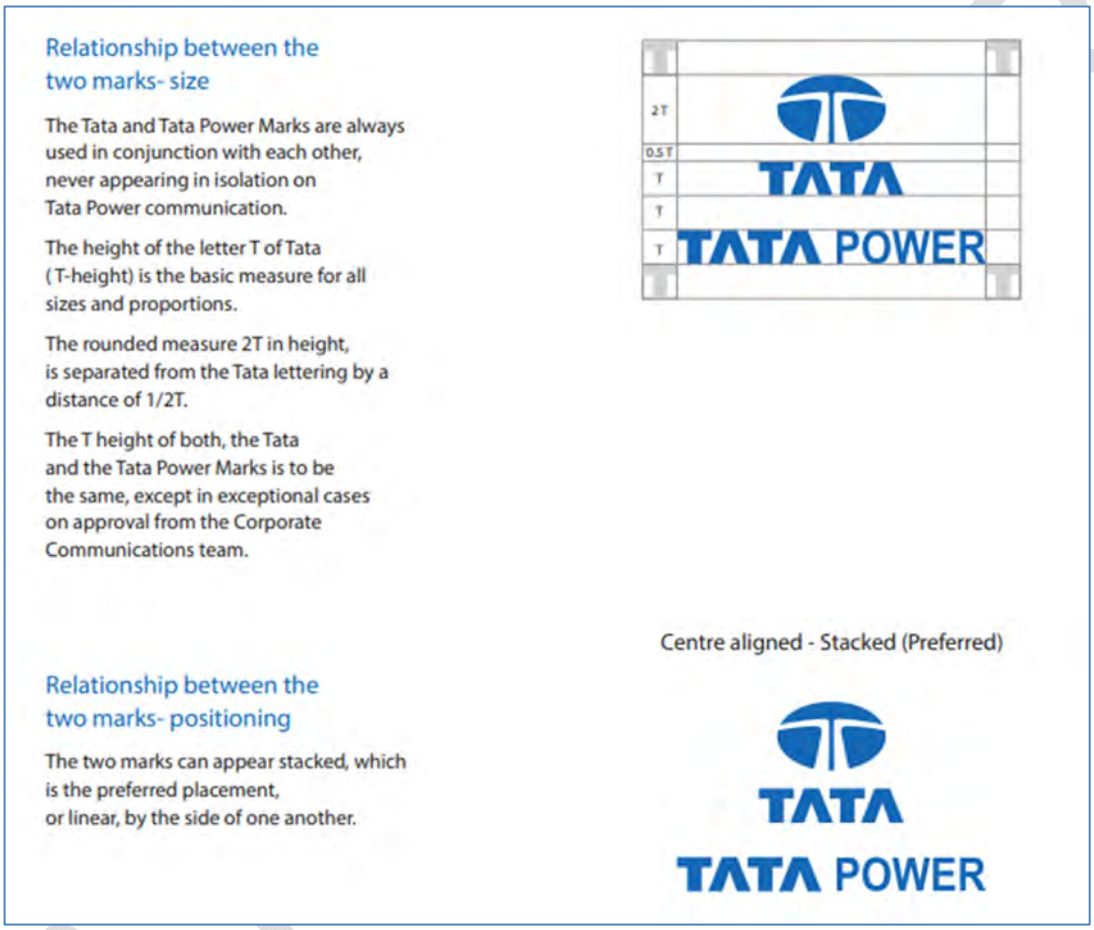
Fault Diagnostic kiosk reference drawing



Annexure – 4

Tata power Branding Name plate -

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



LOGO COLOUR

Annexture-5

The reference sample MIMIC used for earthing color identifications.

Annexture-6 HARTING plug configuration

	FRTU End	Pin no	For LBS 1
RMU 1 LBS 1	Harting plug 1	1	Negative
		2	LBS close command
		3	LBS open command
		4	LBS open status
		5	LBS closed status
		6	Positive
		7	LBS close command
		8	LBS open command
		9	E/F open status
		10	E/F close status
	FRTU End		
	FRTU End	Pin no	For LBS 2
RMU 1 LBS 2	Harting plug 2	1	Negative
		2	LBS close command
		3	LBS open command
		4	LBS open status
		5	LBS closed satatus
		6	Positive
		7	LBS close command
		8	LBS open command
		9	E/F open status
		10	E/F close status

	RMU	Pin no	
RMU 1 CB 1	Harting plug 3	1	CB Open
			CB Open
		3	CB Close
			CB Close
		5	CB ES Open
			CB ES Open
		7	CB ES Close
			CB ES Close
		9	VPIS
		10	VPIS

	RMU	Pin no	Description
Miscellaneous	Harting plug 4	1	FPI SC status LBS 1
			FPI SC status LBS 1
		3	VPIS LBS 1
			VPIS LBS 1
		5	SF 6 low
			SF 6 low
		7	FPI SC status LBS 2
			FPI SC status LBS 2
		9	VPIS LBS 2
		10	VPIS LBS 2