

BSES YAMUNA POWER LIMITED

Contracts & Materials Department

NOTICE INVITING TENDER (NIT)

SUPPLY, INSTALLATION, TESTING & COMMISSIONING

OF

**11KV SMART PACKAGED SUBSTATION WITH OIL/DRY
TYPE TRANSFORMER OF VARIOUS TYPES**

NIT Reference No.	CMC/BY/26-27/RB/SkS/SV/25
RFx Number	2200000239
Date of Issue	14 August 2026
Pre-Bid Meeting	31 August 2026, 16:00 Hrs (Online)
Deadline for Queries	31 August 2026, 18:00 Hrs
Last Date for Submission	04 September, 15:00 Hrs (Online at https://srmpdrportal.bsesdelhi.com/irj/portal)
Submission Mode	BSES Delhi e-Procurement Portal (SRM); originals only if expressly requested by BYPL

**BSES YAMUNA POWER LIMITED (BYPL)
CONTRACTS & MATERIALS DEPT.,
SHAKTI KIRAN BUILDING, KARKARDOOMA,
DELHI-110032**

CIN: U40109DL2001PLC111525 | WEBSITE: www.bsesdelhi.com

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NIT INDEX

S No.	DOCUMENT DESCRIPTION	PAGE NO
VOLUME – I		
1	INFORMATION TO BIDDER (ITB)	1 To 17
1.00	APPENDIX I	1 To 22
1.01	BID INDEX FOR PART-A (TECHNICAL BID)	
1.02	BID FORM	
1.03	TENDER FEE DETAILS	
1.04	EMD DETAILS	
1.05	FORMAT FOR EMD BANK GUARANTEE	
1.06	COMMUNICATION DETAILS OF THE BIDDER	
1.07	MANUFACTURER AUTHORIZATION FORM	
1.08	QUALIFYING CRITERIA COMPLIANCE INDEX - TECHNICAL CRITERIA	
1.09	LIST OF PURCHASE ORDERS EXECUTED & DELIVERY DETAILS IN SUPPORT OF QUALIFYING REQUIREMENT	
1.10	LIST OF PERFORMANCE CERTIFICATES IN SUPPORT OF QUALIFYING REQUIREMENT	
1.11	SCHEDULE OF DEVIATIONS - TECHNICAL	
1.12	TYPE TEST REPORTS (SEQUENCE OF TESTS SHALL BE STRICTLY IN ACCORDANCE WITH RELEVANT IS/IEC)	
1.13	SAMPLE SUBMISSION DETAILS (IF APPLICABLE AS PER SPECIFICATION)	
1.14	QUALIFYING CRITERIA COMPLIANCE INDEX - COMMERCIAL CRITERIA	
1.15	UNDERTAKINGS	
1.16	SCHEDULE OF DEVIATIONS - COMMERCIAL	
1.17	ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT	
1.18	CODE OF CONDUCT FOR SUPPLIERS	
2	GENERAL CONDITION OF CONTRACT	1 To 37
2.00	APPENDIX II	1 To 7
2.01	FORMAT FOR PERFORMANCE BANK GUARANTEE	
2.02	BENEFICIARY'S BANK DETAILS WITH IFSC CODE	
2.03	FORMAT OF WARRANTY/GUARANTEE CERTIFICATE	
2.04	FORMAT OF UNDERTAKING GST	
2.05	SUMMARY OF COMMERCIAL TERMS AND CONDITIONS	
VOLUME – II - FINANCIAL BID (PRICE FORMAT)		1 To 4
VOLUME – III - SCOPE OF SITC & TECHNICAL SPECIFICATIONS		1 To 102 & 1 To 77

VOLUME – I: INFORMATION TO BIDDER (ITB)

SECTION – I: REQUEST FOR QUOTATION

1.00 EVENT INFORMATION

- 1.01 BSES Yamuna Power Ltd (hereinafter referred to as “BYPL”) invites **Open Tender** in the E-Tender Bidding Process on a “Single Stage: Two Parts” from interested as detailed below:

Tender Description	Tender Fee (₹)	Estimated Cost (₹)	EMD Amount (₹)	BYPL Delivery Location
Supply, Installation, Testing & Commissioning of 11kV Smart Packaged Substation with Oil/Dry Type Transformer of Various Types	1,180	4.00 Crore	8.00 Lakh	Delhi Store(s)/ Site(s)

The bidder must qualify for the requirements as specified in clause 2.0 stated below.

- 1.02 The tender document can be downloaded from our website www.bsesdelhi.com by navigating to → **BSES YAMUNA POWER LTD** → **Tender** → **Open Tenders** or access our e-tendering portal directly at <https://srmpdportal.bsesdelhi.com/irj/portal> to view and participate in the tender.
- 1.03 **Tender Fee:** The bidder must compulsorily submit the non-refundable tender fee of ₹ 1,180/- either as a demand draft or via online transfer through IMPS, NEFT, or RTGS to cover the cost of bid documents. Bids submitted without the Tender fee will be rejected.
- 1.04 **Earnest Money Deposit (EMD)** as specified in Table 1, must be valid for 120 days from the bid submission due date. It should be submitted in the form of BG, FD, or online transfer of the required amount through IMPS, NEFT, or RTGS. Bids submitted without the EMD will be rejected.
- 1.05 **Time Schedule**

The bidders should complete the following events within the dates specified as under:

S. No.	Events	Due date & Time
1	Date of availability of tender documents from BYPL Website & SRM	up to 04.09.2026, 15:00 Hours
2	Date & Time of Pre-Bid Meeting Pre-Bid Meeting will be done online, Register in advance for this meeting via, the Zoom Meeting link: https://zoom.us/j/95667161045?pwd=n25vVEn3MNW8ilcJ62VbBpENKYN9VB.1 After registering, you will receive a confirmation email containing information about joining the meeting.	31.08.2026, 16:00 Hours
3	Last Date of receipt of pre-bid queries, if any (Queries to be submitted via e-mail)	31.08.2026 up to 18:00 Hours
4	Last Date of replies to all the pre-bid queries as received	01.09.2026 up to 17:00 Hours
5	Last date and time of receipt of Complete Bids (Tender Fees, EMD, Part A & Part B)	04.09.2026, 15:00HRS
6	Date & Time of Opening of PART A - EMD and Technical Bid	04.09.2026, 16:00HRS
7	Date & Time of opening of Price/RA of qualified bids	Will be notified to the qualified bidders through our website/e-mail.

Note: In the event the last date specified for submission of bids and the date of opening of bids is declared as a closed holiday for the BSES office, the last date of submission of bids and date of opening of bids will be the following working day at the appointed times.

1.06 The Bid shall be submitted online in two (02) parts as detailed below:

- **Part A - Techno Commercial Bid**
- **Part B - Financial (Price) Bid**

Bids have to be mandatorily submitted only through the e-procurement portal of BSES Delhi. Bids submitted through any other form/route shall not be admissible.

However, documents that require original submission, such as the Tender Fee (in the form of DD), Earnest Money Deposit (EMD) (in the form of BG/FD/DD as applicable), samples (where applicable), and any other documents specified in the tender documents, must be delivered to the BYPL office at the address below on or before the bid submission deadline:

**Head of Department
Contracts & Materials Dept.
BSES Yamuna Power Ltd
Reception, Ground Floor
Shaktikiran Building, Karkardooma
Delhi 110032**

Opening of Bids:

- **Part A (Techno-Commercial Bid):** Shall be opened online.
- **Part B (Financial Bid):** Shall be opened online only for Techno-Commercially qualified bidders. The date and time of opening Part B will be communicated separately in due course.

It shall be the sole responsibility of the bidder to ensure that the bid documents are submitted online and/or reach the above office on or before the last date and time specified.

All envelopes shall be duly superscribed "**NIT NO: CMC/BY/XX-XX/XX/XX/XX/XX [RFx No: 2200000XXX]**" and "**NIT Description**".

1.07 BSES Yamuna Power Ltd reserves the right to accept or reject any or all tenders without assigning any reason thereof in the event of the following:

- Tender is received after the due date and time.
- Tender fee of requisite value is not submitted.
- Earnest Money Deposit (EMD) of requisite value & validity is not submitted.
- Financial Bid, as per the prescribed Price Schedule, is not submitted.
- The bid is incomplete in any respect.
- The required documents in support of the Qualification Requirements mentioned in Section 1, Clause 2.0 of this Tender Document are not furnished.
- Complete documents and details as per the Bid Index for Part-A (Technical Bid) at Appendix I – Annexure 1.01 are not enclosed.
- Filled in Schedule of Deviations as per Annexure is not submitted.

2.00 QUALIFICATION CRITERIA

The prospective bidder must satisfy all the following eligibility requirements to participate in the bidding process. Management reserves the right to disqualify any bidder who fails to meet any of the specified requirements.

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 3 of 17	Bidders seal & Signature
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2.01 **Technical Criteria:**

S. No.	Criteria	Documents to be submitted by the Bidder
1	The bidder must have its own established manufacturing or assembly facility in India for Package Substation with a rating of 11 kV, 1600 kVA or higher, operational for a minimum of 3 years.	i. OEM Valid Certificate of Incorporation & Factory (Manufacturing) Licence. ii. Authorization & backup warranty from OEM (If applicable) iii. Detailed list of manufacturing units, their locations, and the specific works from which supplies shall be made against this tender, submitted by the OEM.
2	The bidder must be the original manufacturer of at least one of the two principal components of Package Substations, namely, the 11KV RMU or the Distribution Transformer, and must include that component in their offer. Or Bidder may supply major equipment's (11kV RMU / Transformer / ACB) from BYPL approved make mentioned in Technical Specification	i. Confirmation and supporting documentary proof of the equipments offered by the manufacturer. Or ii. Self-Undertaking to supply major equipment's (11kV RMU / Transformer / ACB) from BYPL approved make mentioned in Technical Specification, if applicable.
2	The bidder must have successfully supplied at least Ten (10) units of Package Substations rated at 11 kV, 1,000 kVA or higher, within the last seven (7) years from the date of bid opening, to any Utility, State Electricity Board (SEB), Public Sector Undertaking (PSU), Government organization or other reputed organisation.	i. Summary list of executed Purchase orders (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.09) ii. Copies of the relevant Purchase Orders iii. Material delivery clearance certificate copy or Invoice Copies or Delivery completion/ Performance certificate
3	The bidder must provide performance certificates substantiating the satisfactory performance of Package Substations (11/0.415 kV, 1,000 kVA or higher) supplied within the last seven (7) years from bid opening, issued by any Utility, SEB, PSU, Government organization. In case of bidder has a previous association with BRPL/BYPL for similar product and service, the performance feedback for that bidder by BRPL/BYPL shall only be considered irrespective of performance certificate issued by any third organization.	Performance Certificates (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.10)
4	The bidder should have servicing, repairing, testing & refurbishment facility in Delhi-NCR with necessary spares and testing equipments for providing prompt after-sales service.	Relevant Details/Certificates/Undertaking (Details of the set-up available shall be brought out in the offer. the bidder shall also submit an undertaking along with the bid confirming the infrastructure details submitted)
5	The bidder must have an installed plant capacity to supply a minimum of 5 units of Package Substations per month.	Installed Manufacturing Capacity (Duly certified by the CE/CA/DIC/Self-Undertaking/Government Organization/others)
6	The bidder must possess valid ISO 9001:2015 certification or above.	Valid copy of Certification

2.02 **Commercial Criteria:**

S. No.	Criteria	Documents to be submitted by the bidder
7	The bidder must have an average annual sales turnover of not less than INR 10 Crore in the last three (3) financial years (i.e., FY 2022-23, 2023-24, and 2024-25).	i. Audited Balance Sheet and Profit & Loss Account Or ii. Duly certified CA certificate having UDIN to be submitted. (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
8	The bidder must submit an undertaking stating that “No Litigation” is pending with BYPL or any of its group/associate companies as of the date of bid opening.	Self-Undertaking (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
9	The bidder must submit an undertaking (self-certification) that they have not been blacklisted or debarred by any Central / State Government Institution or Electricity Utility in India as of the date of bid opening.	Self-Undertaking (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
10	The bidder must hold a valid PAN and GST Registration Number, and shall undertake to comply with all other applicable statutory laws and regulations prior to commencement of supply/work.	i. Copies of PAN and GST registration certificates ii. Self-undertaking confirming compliance with all statutory obligations (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)

Notwithstanding anything stated above, BYPL reserves the right to assess the bidder’s capability to perform the contract, assess the capability and installed capacity of the Bidder for carrying out the supplies, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final.

3.00 BIDDING AND AWARD PROCESS

Bidders are requested to submit their offer strictly in line with this tender document. Normally, the deviations to tender terms are not admissible, and the bids with deviations 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 “Annexure - Schedule of Deviations”, and the same shall be submitted as a part of the Technical Bid.

3.01 BID SUBMISSION

BIDS ARE INVITED THROUGH THE E-PROCUREMENT PORTAL:

BSES will carry out E-Procurement through its e-procurement portal (<https://srmpdrportal.bsesdelhi.com/irj/portal>).

Interested Non-registered bidders are requested to obtain the portal user name and password (if not available) for bid submission. For participating in e-Tenders of BYPL, please write a mail to

1. Mr Sumit Verma, E-mail: Sumit.Ra.Verma@reliancegroupindia.com

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 5 of 17	Bidders seal & Signature
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2. Mr Rakesh Sharma, E-mail: Rakesh.Ku.Sharma@reliancegroupindia.com, with your details as per below.

a) Existing Vendor Code with BYPL or its Group/Associates Companies (if available):

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b) Trade Name:

c) Address of Principal Place of Business:

d) Contact Person's Name:

e) Contact Person's Designation:

f) Contact Person's Mobile No.:

g) Contact Person's email ID:

h) Also, attach a valid copy of the Power of Attorney in favour of the above-mentioned Contact Person for being authorized to receive user ID and password on behalf of their organization.

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

Bids have to be mandatorily submitted only through the e-procurement portal of BSES Delhi. Bids submitted through any other form/route shall not be admissible.

However, documents that require original submission, such as the Tender Fee (in the form of DD), Earnest Money Deposit (EMD) (in the form of BG/FD/DD as applicable), samples (where applicable), and any other documents specified in the tender documents, must be delivered to the BYPL office at the address below on or before the bid submission deadline.

Please clearly mention the NIT Number: on the outer envelope and drop the same in the Tender Box placed at the **Reception, Ground Floor, BSES Yamuna Power Ltd, Shaktikiran Building, Karkardooma, Delhi-110032.**

The bid documents and the outer envelope shall be addressed to the following:

Head of Department

Contracts & Materials Dept.

BSES Yamuna Power Ltd, Shaktikiran Building, Karkardooma, Delhi 110032

Kindly Note:

- The bidder has to ensure that the tender document is dropped in the correct box designated for tender submission only.
- BYPL shall not be responsible for any wrong placement of tender documents by the bidder.

This is a two-part bid process. Bidders must submit their bids online in two parts – Part-A: Technical Bid & Commercial Terms & Conditions, and Part-B: Financial Bid – in the designated folder/location of the e-procurement portal before the due date and time specified in the tender. For detailed instructions, please refer to the user manual available at <https://srmpdportal.bsesdelhi.com/irj/portal> and enclosed with the tender documents.

PART A:: TECHNICAL BID comprising the following, do not contain any cost information whatsoever and shall be submitted within the due date:

S. No.	Descriptions	Type of Documents/Format
A.1	Bid Details	
1	Bid Index for Part-A (Technical Bid)	In the prescribed format enclosed at APPENDIX I ANNEXURE – 1.01
2	Cover Letter, if any	Standard Format
3	Bid Form (Unpriced) Duly Signed	Duly Signed Bid Form as per enclosed format at APPENDIX I ANNEXURE – 1.02
4	Tender Fee	Non-refundable demand draft or online transfer of the requisite amount through IMPS/NEFT/RTGS for Rs 1,180,

		Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.03
5	EMD	Online transfer of the requisite amount through IMPS/NEFT/RTGS or FD or BG in the prescribed stamp paper & format enclosed at APPENDIX I ANNEXURE – 1.05, EMD Details Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.04
6	Power-of-Authority/ Authorization Letter	In the standard stamp paper/letter
A.2 Technical Bid		
7	Communication Details of the Bidder	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.06
8	Manufacturer Authorization Form (as applicable)	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.07
9	Technical Qualifying Criteria Compliance Index & Documents	Documentary evidence in support of qualifying criteria mentioned in Section 1 Clause 2.00. Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.08, ANNEXURE – 1.09 & ANNEXURE – 1.10
10	Schedule of Deviations - Technical	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.11
11	Technical Details/Filled in Guaranteed Technical Particulars (GTP) as per specification	Bidder shall submit duly filled GTP with all Technical documents.
12	Technical Drawings as per specification	Bidder shall submit all Drawings as per the specification.
13	Type Test Reports	Bidders shall submit a copy of type test reports in their technical bids in support of technical specifications. Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.12
14	Sample Submission Details (if applicable as per specification)	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.13
15	Product Catalogue (If applicable)	Bidders shall submit a copy of the product catalogue in their technical bids in support of technical specifications.
16	Manufacturer's Quality Assurance Plan	Bidders shall submit a copy of MQP in their technical bids in support of technical specifications.
17	Other drawings/documents mentioned in technical specification	Bidders shall submit a copy of documents in their technical bids in support of technical specifications.
18	Testing Facilities	Bidder shall submit the details of testing facilities available at their works/factory.
A.3 Commercial Bid		
19	Company Profile, Organization Chart & Manpower Details.	Bidder shall submit the details of Organization & Manpower with qualifications and experience.
20	Commercial Qualifying Criteria Compliance Index & Documents	Documentary evidence in support of qualifying criteria mentioned in Section 1 Clause 2.00. Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.14
21	Undertakings	Duly signed self-undertakings as per enclosed format at APPENDIX I ANNEXURE – 1.15
22	Schedule of Deviations - Commercial	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.16

23	Acceptance Form for Participation in Reverse Auction Event	Duly signed Acceptance Form for Participation in Reverse Auction Event as per enclosed format at APPENDIX I ANNEXURE – 1.17
24	Commercial Terms and Conditions	Acceptance of Commercial Terms and Conditions viz. Delivery Schedule/Period, Payment Terms, PBG, etc. Duly filled and signed as per enclosed format at APPENDIX II ANNEXURE – 2.05
25	Unpriced Bid Duly Signed	Item wise marked as “Quoted” & Duly Signed Unpriced Bid as per enclosed format at VOLUME – II - FINANCIAL BID (PRICE FORMAT)
26	Signed Tender document	Original Tender documents duly stamped & signed on each page as a token of acceptance

PART B:: FINANCIAL BID comprising of

- Price strictly in the Format enclosed at VOLUME – II - FINANCIAL BID (PRICE FORMAT) indicating Break up of basic price, taxes & duties, etc.
- The Bidder has to submit the item-wise price bifurcation in the bid. An unpriced copy must be attached to Part A (Technical Bid).

This will be opened internally after techno-commercial evaluation and only of the qualified bidders.

REVERSE AUCTION CLAUSE: The Purchaser reserves the right to conduct a Reverse Auction through SAP-SRM as an integral part of the tendering process. All bidders who are declared techno-commercially qualified shall mandatorily participate in the Reverse Auction. The Reverse Auction shall be conducted either on an individual item-wise basis or on a package-wise basis, as decided by the Purchaser. Bidder is to submit their acceptance as per the format APPENDIX I ANNEXURE – 1.17.

Notwithstanding anything stated above, the Purchaser reserves the right to assess the bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final.

BIDS RECEIVED AFTER THE DUE DATE AND TIME MAY BE LIABLE FOR REJECTION

4.00 AWARD DECISION

- 4.01 Purchaser intends to award the business on the lowest bid basis, so Bidders are encouraged to submit the bid competitively. The decision to place an LOI/Purchase Order solely depends on the purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.
- 4.02 In the event of your bid being selected by the purchaser (and/or its affiliates) and your subsequent DEFAULT on your bid, you will be required to pay the purchaser (and/or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in NIT/RFQ.
- 4.03 If the performance of the awarded Bidder is found to be unsatisfactory during the execution or delivery period, the award may be cancelled, and BYPL reserves the right to reallocate the order to another Bidder considered suitable.
- 4.04 Rate Contract: Not Applicable.
- 4.05 Contract Price/Rate shall remain “FIRM” till the validity of the Contract.

- 4.06 Quantity Variation: The purchaser reserves the right to vary the quantity by (±) 30% of the tender quantity during the execution of the contract.
- 4.07 Quantity Splitting: The Purchaser reserves the right to distribute the procurable quantity among one or more eligible Bidders. In case of quantity splitting, the distribution shall be as follows:
a) If the quantity is split among 2 bidders, it will be done at 70:30 at the L1 price.
b) If the quantity is split among 3 bidders, it will be done at 50:30:20 at the L1 price.
Note: If quantity needs to be distributed and order splitting is required, quantity distribution shall be maximum among three (3) bidders.

5.00 MARKET INTEGRITY

- 5.01 We have a fair and competitive marketplace. The rules for bidders are outlined in the Terms & Conditions. Bidders must agree to these rules before participating. In addition to other remedies available, we reserve the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the Terms & Conditions. Bidders who violate the marketplace rules or engage in behaviour that disrupts the fair execution of the marketplace restrict a bidder to the length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:
- Failure to honour prices submitted to the marketplace.
 - Breach of the terms of the published in Request for Quotation/NIT.

6.00 BIDDER CONFIDENTIALITY

- 6.01 All information contained in this RFQ is confidential and shall not be disclosed, published or advertised in any manner without written authorization from BYPL. This includes all bidding information submitted.
- 6.02 All RFQ documents remain the property of BYPL and all Bidders are required to return these documents to BYPL upon request.
- 6.03 Bidders who do not honour these confidentiality provisions will be excluded from participating in future bidding events.

7.00 CONTACT INFORMATION

- 7.01 Any technical or commercial clarification pertaining to this RFQ shall be sought strictly in writing and forwarded by e-mail, post, or courier to the addresses specified below. Clarifications shall not be entertained through telephone communication.

Address	Name/Designation	E-mail Address
Technical		
CES Dept, 3 rd Floor, B-Block, BSES Yamuna Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Ashish Joshi GM (CES)	Ashish.K.Joshi@reliancegroupindia.com
	Puneet Duggal Asst. VP (CES)	puneet.duggal@reliancegroupindia.com
	Amit Tomer Asst. VP (HOD-CES)	Amit.As.Tomar@reliancegroupindia.com
Commercial		
C&M Dept, 3 rd Floor, A-Block, BSES Yamuna Power Ltd. Shaktikiran Building, Karkardooma, Delhi 110032	Sumit Verma Asst. VP (C&M)	Sumit.Ra.Verma@reliancegroupindia.com
	Santosh Singh Addl. VP (Head- Procurement)	Santosh.Kum.Singh@reliancegroupindia.com
	Rakesh Bansal VP (HOD-C&M)	Rakesh.Bansal@reliancegroupindia.com

SECTION – II: INSTRUCTION TO BIDDERS

A. GENERAL

- 1.00 BSES Yamuna Power Ltd (hereinafter referred to as "the Purchaser") intends to undertake various Load Growth, System Improvement, Repair & Maintenance works, etc., within its licensed distribution area in Delhi. Accordingly, the Purchaser has issued this tender for the procurement of materials as specified in the present bid document.

2.00 SCOPE OF SUPPLY/WORK

- 2.01 The scope broadly includes Design, Manufacture, testing at works conforming to the Technical Specifications/IS along with Packing, Forwarding, Transportation and Unloading and proper stacking of the materials at Purchaser's stores/site.

3.00 DISCLAIMER

- 3.01 This Document includes statements, which reflect various assumptions, which may or may not be correct. Each Bidder should conduct its own estimation and analysis and should check the accuracy, reliability and completeness of the information in this Document and obtain independent advice from appropriate sources in their interest.
- 3.02 Neither Purchaser nor its employees will have any liability whatsoever to any Bidder or any other person under the law or contract, the principles of restitution or unjust enrichment or otherwise for any loss, expense or damage whatsoever which may arise from or be incurred or suffered in connection with anything contained in this document, any matter deemed to form part of this Document, provision of Services and any other information supplied by or on behalf of Purchaser or its employees, or otherwise arising in any way from the selection process for the Supply.
- 3.03 Though adequate care has been taken while issuing the Bid document, the Bidder should satisfy itself that the Documents are complete in all respects. Intimation of any discrepancy shall be given to this office immediately.
- 3.04 This Document and the information contained herein are Strictly Confidential and are for the use of only the person(s) to whom it is issued. It may not be copied or distributed by the recipient to third parties (other than in confidence to the recipient's professional advisors).

4 COST OF BIDDING

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

B. BIDDING DOCUMENTS

5.00 BIDDING DOCUMENTS

- 5.01 The Scope of Supply/Work, Bidding Procedures and Contract Terms are described in the Bidding Documents.
- 5.02 The Bidder is expected to examine the Bidding Documents, including all Instructions, Forms, Terms and Specifications. Failure to furnish all information required by the Bidding Documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect may result in the rejection of the Bid.

6.00 AMENDMENT OF BIDDING DOCUMENTS

- 6.01 At any time before the deadline for submission of bids, the Purchaser may for any reason, whether at its initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by amendment.
- 6.02 The amendment shall be part of the bidding documents, pursuant to Clause 5.01, and it will be notified on the e-procurement portal or website www.bsesdelhi.com, and the same will be binding on them.
- 6.03 To afford prospective Bidders reasonable time in which to take the amendment into account in preparing their bids, the Purchaser may, at its discretion, extend the deadline for the submission of bids. The same shall be published as a corrigendum on the e-procurement portal or website www.bsesdelhi.com.
- 6.04 Purchaser shall reserve the rights to the following:
- a) Extend the due date of submission,
 - b) Modify the tender document in part/whole
 - c) Cancel the entire tender
- 6.05 **Bidders are requested to visit the e-procurement portal or website regularly for any modification/clarification/corrigendum/addendum of the bid documents.**

C. PREPARATION OF BIDS

7.00 LANGUAGE OF BID

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

8.00 DOCUMENTS COMPRISING THE BID

- 8.01 The Bid prepared and submitted by the Bidder shall comprise the following components:
- (a) All the Bids must be accompanied by the required Tender Fees and EMD as mentioned in the tender.
 - (b) PART A - Technical Bid and
 - (c) PART B - Financial Bid

9.00 BID FORM

- 9.01 The Bidder shall submit the Bid Form with the Bidding Documents.

10.00 EMD

- 10.01 Pursuant to Clause 8.0(a) above, the bidder shall furnish, as part of its bid, an EMD amounting to as specified in Section I. The EMD is required to protect the Purchaser against the risk of Bidder's conduct which will warrant forfeiture.

The EMD shall be denominated in any of the following forms:

- (a) Bank Guarantee drawn in favour of BSES Yamuna Power Ltd, payable at Delhi or
- (b) Fixed Deposit (lien marked in favour of BSES Yamuna Power Limited) payable at Delhi.

- (c) Online transfer of requisite amount through IMPS/NEFT/RTGS to BYPL account mentioned herein in **Appendix II - BYPL BANK DETAILS WITH IFSC CODE.**

EMD shall be valid for One Hundred Twenty (120) days after the due date of submission drawn in favour of BSES Yamuna Power Ltd.

The EMD may be forfeited in the case of the following:

- (a) the Bidder withdraws its bid during the period of specified bid validity
or
(b) the case of a successful Bidder, if the Bidder does not
(i) Accept the Purchase Order, or
(ii) Furnish the required performance security BG.

11.00 BID PRICES

- 11.01 Bidders shall quote for the entire Scope of Supply/Work with a break-up of prices for individual items. The total Bid Price shall also cover all the Bidder's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, and Transportation to the site, all in accordance with the requirement of the Bidding Documents. The Bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total Price.
- 11.02 The prices offered shall be inclusive of all costs as well as Duties, Taxes or Levies paid or payable during the execution of the supply work; a breakup of price constituents should be there.
- 11.03 Prices quoted by the Bidder shall be **"Firm"** and not subject to any price adjustment during the performance of the Contract. **A Bid submitted with an adjustable price/price variation clause will be treated as non-responsive and rejected.**

12.00 BID CURRENCIES

- 12.01 Prices shall be quoted in Indian Rupees Only.

13.00 PERIOD OF VALIDITY OF BIDS

- 13.01 Bids shall remain valid for 120 days from the due date of submission of the Bid.
- 13.02 Notwithstanding Clause 13.01 above, the Purchaser may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing and sent by post/courier.

14.00 ALTERNATIVE BIDS

- 14.01 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.

15.00 FORMAT AND SIGNING OF BID

- 15.01 The original Bid Form and accompanying documents must be received by the Purchaser at the

date, time and place specified pursuant to Clauses 15.0 and 16.0.

- 15.02 The original Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid. 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 the 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 words 'President', 'Managing Director', 'Secretary', 'Agent' or other designations without disclosing his principal will be rejected.

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

- 15.03 The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such corrections shall be initiated by the person or persons signing the Bid.

D. SUBMISSION OF BIDS

16.00 SEALING AND MARKING OF BIDS

- 16.01 Bid submission: Bids have to be mandatorily submitted only through the e-procurement portal of BSES Delhi. Bids submitted through any other form/route shall not be admissible.
- 16.02 However, documents that necessarily have to be submitted in originals, like EMD or Tender Fee (in the form of BG/DD/FD as applicable) and any other documents mentioned in the tender documents, have to be submitted at the BYPL office before the due date & time of submission. The Technical Documents and the EMD shall be enclosed in a sealed envelope, and the said envelope shall be superscribed with "Technical Bid & EMD". All the envelopes should bear the Name and Address of the Bidder and mark for the Original. The envelopes should be superscribed with "Tender No. & Due date of opening".
- 16.03 The Bidder has the option of sending the Bids in person. Bids submitted by Email/Telex/Telegram/Fax will be rejected. No request from any Bidder to the Purchaser to collect the proposals from Courier/Airlines/Cargo Agents etc. shall be entertained by the Purchaser.

17.00 DEADLINE FOR SUBMISSION OF BIDS

- 17.01 The Bid must be received by the Purchaser on or before the due date & time of submission.
- 17.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause 6.0, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

18.00 ONE BID PER BIDDER

- 18.01 Each Bidder shall submit only one Bid by itself. No joint venture is acceptable. A Bidder who submits or participates in more than one Bid will cause all those Bids to be rejected.

19.00 LATE BIDS

- 19.01 No Bid will be received by the Purchaser after the deadline for submission of Bids prescribed by the Purchaser, pursuant to Clause 17.0.

20.00 MODIFICATIONS AND WITHDRAWAL OF BIDS

- 20.01 The Bidder is not allowed to modify or withdraw its Bid after the Bid's due date & time of submission, subject to any corrigendum/addendum/modifications in the tender documents uploaded to the website.

E. EVALUATION OF BID

21.00 PROCESS TO BE CONFIDENTIAL

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

22.00 CLARIFICATION OF BIDS

- 22.01 To assist in the examination, evaluation and comparison of Bids, the Purchaser may, at its discretion, ask the Bidder for a clarification of its Bid. All responses to requests for clarification shall be in writing, and no change in the price or substance of the Bid shall be sought, offered or permitted.

23.00 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

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

24.00 EVALUATION AND COMPARISON OF BIDS

- 24.01 The evaluation of Bids shall be done based on the delivered cost competitiveness basis.
- 24.02 The evaluation of the Bids shall be a stage-wise procedure. The following stages are identified for evaluation purposes: In the first stage, the Bids will be subjected to a responsiveness check. The Technical & qualifying Proposals and the Conditional ties of the Bidders will be evaluated.

Subsequently, the Financial Proposals along with Supplementary Financial Proposals, if any, of Bidders with Techno-commercially Acceptable Bids shall be considered for final evaluation.

24.03 The Purchaser's evaluation of a Bid will take into account, in addition to the Bid price, the following factors, in the manner and to the extent indicated in this Clause:

(a) Delivery Schedule

(b) Conformance to Qualifying Criteria

(c) Deviations from Bidding Documents

Bidders shall base their Bid price on the terms and conditions specified in the Bidding Documents.

The cost of all quantifiable deviations and omissions from the specification, terms and conditions specified in the Bidding Documents shall be evaluated. **The Purchaser may make its own assessment of the cost of any deviation to ensure a fair comparison of bids.**

24.04 Any price adjustments that result from the above procedures shall be added for comparative evaluation only to arrive at an "Evaluated Bid Price". Bid prices quoted by Bidder shall remain unaltered.

F. AWARD OF CONTRACT

25.00 CONTACTING THE PURCHASER

25.01 If any Bidder wishes to contact the Purchaser on any matter related to the Bid, from the time of Bid opening to the time of contract award, the same shall be done in writing only.

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

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

26.01 Submission of bids shall not automatically construe qualification for evaluation. The Purchaser reserves the right to accept or reject any Bid and to annul the Bidding process and reject all Bids at any time prior to the award of the Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Purchaser's action.

27.00 AWARD OF CONTRACT

27.01 The Purchaser will award the Contract to the successful Bidder whose Bid has been Determined to be the lowest-evaluated responsive Bid, provided further that the Bidder has been determined to be qualified to satisfactorily perform the Contract. Purchaser reserves the right to award the order to other bidders in the tender, provided it is required for the timely execution of the project & provided he agrees to come to the lowest rate. Purchaser reserves the right to distribute the entire tender quantity at its own discretion without citing any reasons thereof.

27.02 The Purchaser reserves the right to issue either a single composite order or separate individual Purchase/Work Orders, which shall, inter alia, cover the Scope of Work as specified in the NIT, including:

a) Purchase Order for Supply

b) Work Order for Installation/Erection, Testing & Commissioning (wherever applicable)

c) Work Order for Civil (wherever applicable)

28.00 THE PURCHASER'S RIGHT TO VARY QUANTITIES

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

29.00 LETTER OF INTENT/NOTIFICATION OF AWARD

29.01 The Letter of Intent/Notification of Award shall be issued to the successful Bidder whose bids have been considered responsive, techno-commercially acceptable and evaluated to be the lowest (L1). The successful Bidder shall be required to furnish a letter of acceptance within 3 days of the issue of the letter of intent / notification of Award by Purchaser.

30.00 CONTRACT PERFORMANCE BANK GUARANTEE (CPBG)

30.01 To be submitted within twenty-eight (28) days from the date of issuance of the Letter of Intent/Award/RC. Bidder shall initially submit the performance bank guarantee (PBG) equivalent to 10% of the PO value (including GST) valid for a period of 24 months after commissioning or 30 months from the last date of receipt, whichever is earlier plus 3 months towards claim period.

31.00 CORRUPT OR FRAUDULENT PRACTICES

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

(a) Defines, for this provision, the terms set forth below as follows:

(i) "Corrupt practice" means behaviour on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or contract execution; and

(ii) "Fraudulent practice" means a misrepresentation of facts to influence a procurement process or the execution of a contract to the detriment of the Purchaser, and includes collusive practice among Bidders (before or after Bid submission) designed to establish Bid prices at artificial non-competitive levels and to deprive the Purchaser of the benefits of free and open competition.

(b) Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(c) Will declare a firm ineligible, either indefinitely or for a stated period, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing a contract.

31.02 Furthermore, Bidders shall be aware of the provision stated in the Terms and Conditions of the Contract.

32.00 STATUTORY GUIDELINES & REGULATIONS

32.01 The bidder shall make himself fully aware & familiarize himself with all applicable laws/guidelines/regulations.

33.00 SAFETY

33.01 Safety-related requirements as mentioned in our safety Manual put on the Company's website, which can be accessed at <http://www.bsesdelhi.com>. All bidders shall strictly abide by the guidelines provided in the safety manual at all relevant stages during the contract period.

34.00 PRIORITY OF CONTRACT DOCUMENTS

34.01 The several documents forming the Agreement are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies, the same shall be explained and adjusted by the company, who shall, accordingly, issue suitable instructions thereon to the Bidder. In such event, unless otherwise provided in the agreement or explained by way of instructions by the company, as mentioned above, the priority of the documents forming the Agreement shall be as follows:

i) Contract Agreement/Purchase Order.

(a) Special Conditions of Contract

(b) General Conditions of Contract

(ii) The Letter of Acceptance/ Intent

(iii) Agreed Minutes of the Tender Negotiation Meetings

(iv) Agreed Minutes of the Tender Technical Meetings

(v) The Priced Bill of Quantities

(vi) The Technical Specifications / Scope of work

(vii) The Tender document, including all Appendices and/or Addenda, Corrigendum the latest taking precedence.

In the event of any conflict between the above-mentioned documents, the more stringent requirement or conditions which shall be favourable to the company shall govern, and the decision of the company/BYPL shall be final and binding upon the parties. In case of ambiguity, interpretation shall be mutual and documented.

BID INDEX FOR PART-A (TECHNICAL BID)

(To be filled & submitted on Bidder Letter Head, Bidders document submission should have following main categories as outlined below and should have page numbers printed at the bottom of each page, with this page as page number 1. The page number should be in "Page X of Y" format. Separator with document description shall be provided before each document)

NIT & RFX No.:

Bidder's Name:

Bidder's Bid Reference No. & Date:

S. No.	Particulars	Bid Pdf Page No.	
		From	To
A.1	Bid Details		
1.	Bid Index for Part-A (Technical Bid) as per APPENDIX I ANNEXURE - 1.01	1	
2.	Cover Letter, if any		
3.	Bid Form (Unpriced) Duly Signed as per APPENDIX I ANNEXURE - 1.02		
4.	Tender Fee Details as per APPENDIX I ANNEXURE - 1.03		
5.	EMD Details as per APPENDIX I ANNEXURE - 1.04 & 1.05		
6.	Power-of-Attorney / Authorization Letter		
A.2	Technical Bid		
7.	Communication Details of the Bidder as per APPENDIX I ANNEXURE - 1.06		
8.	Manufacturer Authorization Form (as applicable) as per APPENDIX I ANNEXURE - 1.07		
9.	Technical Qualifying Criteria Compliance Index & Documents as per APPENDIX I ANNEXURE - 1.08, 1.09, 1.10		
10.	Schedule of Technical Deviations (along with soft editable Excel copy) as per APPENDIX I ANNEXURE - 1.11		
11.	Guaranteed Technical particulars (GTP) as per specification		
12.	All Drawings as per specification		
13.	Type Test Reports (Sequence of Tests shall be strictly in accordance with relevant IS/IEC) as per APPENDIX I ANNEXURE - 1.12		
14.	Sample Submission Details (If applicable as per Specification) as per APPENDIX I ANNEXURE - 1.13		
15.	Product Catalogue (If applicable)		
16.	Manufacturer's quality assurance plan (as applicable)		
17.	Other drawings/documents mentioned in technical specification		
18.	Testing Facilities		
A.3	Commercial Bid		
19.	Company Profile/Organogram/Organisation Chart & Manpower Details		
20.	Commercial Qualifying Criteria Compliance Index & Documents as per APPENDIX I ANNEXURE - 1.14		
21.	Undertakings as per APPENDIX I ANNEXURE - 1.15		
22.	Schedule of Commercial Deviations (along with soft editable Excel copy) as per APPENDIX I ANNEXURE - 1.16		
23.	Acceptance form for participation in reverse auction event as per APPENDIX I ANNEXURE - 1.17		
24.	Acceptance of Commercial Terms and Conditions as per APPENDIX II ANNEXURE - 2.05		
25.	Unpriced Bid Duly Signed (Volume - II Financial Bid (Price Format))		
26.	NIT Document complete Signed & Stamped		

BID FORM

To

Head of Department
Contracts & Material Dept.
BSES Yamuna Power Ltd
Shaktikiran Building, Karkardooma,
Delhi 110032

Sir,

1. We understand that BYPL is desirous of procuring.....
for it's licensed distribution network area in Delhi.
2. Having examined the Bidding Documents for the above-named works, we the undersigned, offer
to deliver the goods in full conformity with the Terms and Conditions and technical specifications
for the sum indicated in the Financial Bid or such other sums as may be determined in accordance
with the terms and conditions of the contract. The amounts are in accordance with the Price
Schedules attached herewith and are made part of this bid.
3. If our Bid is accepted, we undertake to deliver the entire goods as per the delivery schedule
mentioned in Section IV from the date of award of the purchase order/letter of intent.
4. If our Bid is accepted, we will furnish a performance bank guarantee for due performance of the
Contract in accordance with the Terms and Conditions.
5. We agree to abide by this Bid for 120 days from the due date of bid submission and it shall remain
binding upon us and may be accepted at any time before the expiration of that period.
6. We declare that we have studied the provision of Indian Laws for the supply/services of
equipments/materials and the prices have been quoted accordingly.
7. Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof,
shall constitute a binding contract between us.
8. We understand that you are not bound to accept the lowest or any bid you may receive.
9. There is provision for Resolution of Disputes under this Contract, by the Laws and Jurisdiction of
Contract.

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

Signature..... In the capacity of

.....duly authorized to sign for and on behalf of

(IN BLOCK CAPITALS)

TENDER FEE DETAILS

- a. Amount (Rs.) : **1,180/- (One Thousand One Hundred Eighty Only)**
- b. Mode of Payment : DD or online transfer through IMPS/NEFT/RTGS (select any one)
- c. DD /UTR No. (As applicable) :
- d. Dated :
- e. Bidders Bank Account No. :
- f. Name of the Bank :
- g. Address of the Bank :
- h. IFSC Code of the Bank :
- i. SWIFT Code of the Bank :

EMD DETAILS

- a. EMD Amount (Rs.) :
- b. Mode of Payment : BG/FD/online transfer through IMPS/NEFT/RTGS (select any one)
- c. BG/FD/UTR No. (As applicable):
- d. Dated :
- e. BG valid up to :
- f. BG Claim period up to :
- g. Bidders Bank Account No. :
- h. Name of the Bank :
- i. Address of the Bank :
- j. IFSC Code of the Bank :
- k. SWIFT Code of the Bank :

(FORMAT FOR EMD BANK GUARANTEE)

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

Whereas [name of the Bidder] (hereinafter called the "Bidder") has submitted its bid dated [date of submission of bid] for the supply of [name and/or description of the goods] (hereafter called the "Bid").

KNOW ALL PEOPLE by these presents that WE [name of bank] at [Branch Name and address], having our registered office at [address of the registered office of the bank] (hereinafter called the "Bank"), are bound unto BSES Yamuna Power Ltd., with its Corporate Office at Shaktikiran Building, Karkardooma, Delhi -110032, (hereinafter called - the "Purchaser") in the sum of Rs..... (Rupees..... only) for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents.

Sealed with the Common Seal of the said Bank this_____ day of_____ 20_____.

The conditions of this obligation are:

- 1 If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or
2. If the Bidder, having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity:
 - (a) fails or refuses to execute the Contract Form, if required; or
 - (b) fails or refuses to furnish performance security, In accordance with the Instructions to Bidders/Terms and Conditions;

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

This guarantee will remain in force up to and including One Hundred Twenty (120) days after the due date of submission bid, and any demand in respect thereof should reach the Bank not later than the above date.

(Stamp & signature of the bank)

Signature of the witness

APPENDIX I NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 5 of 22	Bidders seal & Signature
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COMMUNICATION DETAILS OF THE BIDDER

S. No.	Designation	Name	Mobile No.	E-mail ID
1	CEO / MD			
2	Sales / Marketing Head			
3	Sales Representative / Key Account Manager (KAM)			
4	Technical Head			
5	Manufacturer Plant / Operations Head			
6	Post Order Execution In Charge			
7	Authorized contact person (Primary responsibility for the Bid)			
8	Authorized contact person (Secondary responsibility for the Bid)			

MANUFACTURER AUTHORIZATION FORM
(To be submitted on OEM's Letter Head)

Date:
Tender No.:

To

Head of Department
Contracts & Material Dept.
BSES Yamuna Power Ltd
Shaktikiran Building, Karkardooma,
Delhi 110032

Sir,

WHEREAS M/s [name of OEM], who are official manufacturers of, having factories at [address of OEM] do hereby authorize M/s [name of bidder] to submit a Bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by usand to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty by the Conditions of the Contract or as mentioned elsewhere in the Tender Document, concerning the Goods offered by the above firm in reply to this Invitation for Bids.

We hereby confirm that in case, the channel partner fails to provide the necessary services as per the Tender Document referred above, M/s [name of OEM] shall provide standard warranty on the materials supplied against the contract. The warranty period and inclusion/exclusion of parts in the warranty shall remain the same as defined in the contract issued to our channel partner against this tender.

Yours Sincerely,
For

Authorized Signatory

QUALIFYING CRITERIA COMPLIANCE INDEX - TECHNICAL CRITERIA				
S No	Qualifying Criteria Description as per section 1, clause 2.00	Documentary Proof Description	Documentary Proof Enclosed on Bid Page No.	
			From	To
1				
2				
3				
4				
5				

LIST OF PURCHASE ORDERS EXECUTED & DELIVERY DETAILS IN SUPPORT OF QUALIFYING REQUIREMENTS													
S No	Item Details				PO & Execution Details					Customer Name	End User (shall be Utility/ SEB's/ PSU's) name and details	PO copy, MDCC /Delivery completion certificates/ Invoice Copies enclosed on Bid Page no.	
	Item	Model	Voltage Rating (kV)	Current Rating (A)	PO No	PO Date	PO Qty	Executed Qty	Execution Year			From	To
Total							Σ	Σ					

Note – Only items relevant as per qualifying requirements should be included in the list.

LIST OF PERFORMANCE CERTIFICATES IN SUPPORT OF QUALIFYING REQUIREMENT														
S No	Item Details				PO No	Supplied/ Commissioning		Performance Certificate Issue Date	Performance Certificate Issued By End User (Utility/SEB/Govt. Org.)	Contact Details of Issuing Person			Enclosed on Bid Page No.	
	Item	Model	Voltage Rating (kV)	Current Rating (A)		Qty.	Date			Name	Email	Mobile	From	To
Total						Σ								

Note –

1. Only items relevant to qualifying requirement should be included in the list.
2. Only Performance certificates issued by the end user (utilities/ SEB's/PSU's only) will be accepted as per qualifying requirement.

SCHEDULE OF DEVIATIONS - TECHNICAL

Vendor shall refrain from taking any deviations on this TENDER. Still, in case of any deviations, all such deviations from this tender shall be set out by the Bidder, Clause by Clause in this schedule and submit the same as a part of the Technical Bid.

Unless **specifically** mentioned in this schedule, the tender shall be deemed to confirm the BYPL's specifications:

Technical Deviations: -

S. No.	NIT Pdf Page No.	NIT Clause No.	NIT Clause Descriptions	Details of Clarification/deviation with justifications

Note – Please enclose detailed GTP and drawings as per specification after the technical deviation sheet.

Seal of the Bidder:

Signature:

Name:

TYPE TEST REPORTS (SEQUENCE OF TESTS SHALL BE STRICTLY IN ACCORDANCE WITH RELEVANT IS/IEC)								
S No	Test Description	Reference Standard	Reference Standard Clause No.	Name of Testing Lab	Test Report Reference Number	Date of Issue of Report	Report Enclosed on Bid Page No	
							From	To
1								
2								
3								
4								
5								
6								
7								

SAMPLE SUBMISSION DETAILS (IF APPLICABLE AS PER SPECIFICATION)		
S No	Description	Bidder's Response
1	Samples submitted with the bid	Yes/No
1	Sample Type -1	
1.1	Model Number	
1.2	Number of samples	
2	Sample Type -2	
2.1	Model Number	
2.2	Number of samples	

QUALIFYING CRITERIA COMPLIANCE INDEX - COMMERCIAL CRITERIA				
S No	Qualifying Criteria Description as per section 1 clause 2.00	Documentary Proof Description	Documentary Proof Enclosed on Bid Page No.	
			From	To
1				
2				
3				
4				
5				

UNDERTAKINGS
(To be submitted on Bidders Letter Head)

Date:

Tender No.:

To

Head of Department
Contracts & Material Deptt.
BSES Yamuna Power Ltd
Shaktikiran Building, Karkardooma,
Delhi 110032

Sir,

We *[name of bidder]*, , hereby undertake and confirm the following:

- *[name of bidder]* has "No Litigation" pending with the BYPL or its Group/Associates Companies as on the date of bid opening.
- *[name of bidder]* has not been blacklisted/debarred by any central/state government institution/Electricity utilities as on the date of bid opening.
- *[name of bidder]* shall comply with all the statutory compliances as per the laws/rules etc. before the start of the supply/work.
- All documents, certificates, and information submitted by us against this tender are genuine, true, and correct. Copies provided have been made from the original documents. In the event that any document, certificate, or information is found to be false, forged, or misleading, BYPL shall have the right, at its sole discretion, to take appropriate legal action, including forfeiture of EMD and disqualification from participation in future tenders of BYPL and its group companies, for an indefinite period or as decided by BYPL.

Yours Sincerely,

For

Authorized Signatory

Name : _____

Designation : _____

Seal : _____

APPENDIX I NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 15 of 22	Bidders seal & Signature
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SCHEDULE OF DEVIATIONS - COMMERCIAL

Vendor shall refrain from taking any deviations on this TENDER. Still, in case of any deviations, all such deviations from this tender shall be set out by the Bidder, Clause by Clause in this schedule and submit the same as a part of the Technical Bid.

Unless **specifically** mentioned in this schedule, the tender shall be deemed to confirm the BYPL's specifications:

Commercial Deviations: -

S. No.	NIT Pdf Page No.	NIT Clause No.	NIT Clause Descriptions	Details of Clarification/deviation with justifications

By signing this document we hereby withdraw all the deviations whatsoever taken anywhere in this bid document and comply with all the terms and conditions, technical specifications, scope of work etc. as mentioned in the standard document except those mentioned above.

Seal of the Bidder:**Signature:****Name:**

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder)

BSES Yamuna Power Ltd (hereinafter referred to as **"BYPL"**) intends to use the reverse auction through the SAP-SRM tool as an integral part of the entire tendering process. All the bidders who are found as techno commercial qualified based on the tender requirements shall be eligible to participate in the reverse auction event.

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

1. BYPL shall provide the user ID and password to the authorized representative of the bidder. (Authorization letter in lieu of the same be submitted along with the signed and stamped acceptance form)
2. BYPL will make every effort to make the bid process transparent. However, the award decision by BYPL would be final and binding on the bidder.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of BYPL, bid process, bid technology, bid documentation, bid details, etc.
4. The bidder is advised to understand the auto bid process to safeguard themselves against any possibility of non-participation in the auction event.
5. In case of bidding through internet medium, bidders are further advised to ensure availability of the entire infrastructure as required at their end to participate in the auction event. Inability to bid due to telephone line glitches, internet response issues, software or hardware hangs; power failure or any other reason shall not be the responsibility of BYPL.
6. In case of intranet medium, BYPL shall provide the infrastructure to bidders, further, BYPL has sole discretion to extend or restart the auction event in case of any glitches in infrastructure observed which has restricted the bidders from submitting the bids to ensure fair & transparent competitive bidding. In case an auction event is restarted, the best bid already available in the system shall become the start price for the new auction.
7. In case the bidder fails to participate in the auction event due to any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid as submitted by the bidder as a part of the tender shall be considered as the bidder's final no regret offer. Any offline price bids received from a bidder in lieu of non-participation in the auction event shall be outright rejected by BYPL.
8. The bidder shall be prepared with competitive price quotes on the day of the reverse auction event.
9. The prices as quoted by the bidder during the auction event shall be inclusive of all the applicable taxes, duties and levies and shall be FOR Landed Cost basis at the BYPL site.
10. The prices submitted by a bidder during the auction event shall be binding on the bidder.
11. No requests for time extension of the auction event shall be considered by BYPL.
12. The original price bids submitted by the bidders shall be proportionately reduced for each line item, based on the final all-inclusive prices determined at the conclusion of the auction event, to arrive at the final contract value.

Signature & seal of the Bidder

APPENDIX I NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 17 of 22	Bidders seal & Signature
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CODE OF CONDUCT FOR SUPPLIERS

BSES expects suppliers including their personnel (employees or sub-contractors) to support, embrace and enact the following Code of Conduct (CoC), apart from complying with all national and international regulations and laws that are applicable at any given time. BSES encourages its suppliers to go beyond compliance and embrace the principles of sustainability. BSES will support training and capacity-building programmes undertaken by suppliers, which promote awareness on sustainability and responsible business practices. BSES shall incorporate regulatory compliance and ESG performance as key criteria based on requirements as stated in the Code during evaluation of the suppliers.

A. Promote Environmental Sustainability

All suppliers support a precautionary approach to environmental issues and undertake initiatives to promote better environmental responsibility. To this end, suppliers will

1. Reduce resource consumption and conserve natural resources:
 - 1.1. Conduct all operations, sourcing, manufacture, distribution of products and the supply of services with the aim of protecting and preserving the environment.
 - 1.2. Use natural resources rationally and work towards reducing resource consumption (water, energy, fuel, electricity, other materials etc.) and GHG emissions.
 - 1.3. Identify environmental risks and set up appropriate prevention measures.
2. Prevent pollution and reduce waste generation
 - 2.1. Maintain all required official permits, licenses and registrations.
 - 2.2. Prevent contamination, limit waste generation, and avoid or minimise adverse impact on the environment and biodiversity by facilitating reusing and recycling material.
 - 2.3. Clearly monitor the precautions to be taken during operations & maintenance in case of emission of heat, vibrations, radioactive rays, noise or similar.
 - 2.4. Use only those chemicals and aerosols with very low or zero ODP (Ozone Depletion Potential), which are allowed as per the regulatory provisions.
 - 2.5. Ensure that all the chemical and hazardous substances are accompanied by the manufacturer MSDS (Material Safety Data Sheet) during transport, storage, use and disposal, and that instructions mandated be strictly followed. No chemical and hazardous substance shall be received without a MSDS document. All the applicable regulatory guidelines shall be adhered strictly for the procurement, transport, storage, use and disposal of such harmful and hazardous chemicals.
 - 2.6. Provide written instructions about handling and/or disposal of equipment and product during the life cycle if special handling is required.

B. Commitment to Human Rights, Labour and the Society

Suppliers shall support, respect and protect human and labour rights and make sure their organisation/entity is not complicit in any kind of abuses and/or violations. In this regard, the suppliers must:

1. Fair working conditions
 - 1.1. Provide and maintain healthy and safe working conditions and welfare facilities for the employees in its establishment.
 - 1.2. Ensure that wages and benefits of their employees and subcontractors are fair and comply with applicable national and local laws as well as with contractual agreements.
 - 1.3. Provide all workers, both permanent and non-permanent, with employment documents that are freely agreed to and which respect their legal and contractual rights.
2. Health & Safety

APPENDIX I NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 18 of 22	Bidders seal & Signature
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Ensure that the activities of suppliers do not harm the health and safety of their own employees, suppliers and subcontractors, local communities/population, and finally the users of its products and services, which is in accordance with the BSES's Mission Zero Harm in Health and Safety.

3. Child Labour

- 3.1. No person below 18 years shall be employed or permitted to work in any occupation or process.
- 3.2. Zero tolerance for any kind of child labour in their establishments and supply chain.

4. Forced Labour

- 4.1. Under no circumstance shall suppliers use forced labour¹, whether in form of compulsory or trafficked labour, indentured labour, bonded labour or other forms, through direct or indirect use of force and/or intimidation.
- 4.2. Any kind of slavery, mental and physical coercion, human trafficking and debt bondage in the supply chain shall not be tolerated.

5. Wages and Working hours

- 5.1. Ensure that all applicable regulations related to wages, overtime compensation and other legally mandated benefits of their employees and subcontractors are fair and comply with applicable national and local laws as well as with contractual agreements. Minimum wages are applicable as per applicable in central Act and State rules.
- 5.2. Ensure that maximum working hours laid down and are adhered to.

6. Freedom of Association and Collective Bargaining

- 6.1. Recognise and respect the rights of workers to freedom of association and collective bargaining. Workers are not intimidated or harassed in the exercise of their right to join or refrain from joining any organisation.
- 6.2. Ensure that all employees can communicate with the management regarding working conditions.

7. Non-Discrimination and Equal opportunity

- 7.1. Commit, within the scope of prevailing laws and statutes, to oppose all forms of discrimination².
- 7.2. Maintain a work environment free from any form of discrimination and harassment.
- 7.3. Refrain from discrimination in hiring and employment practices on grounds of skin colour, age, caste, gender, race, ethnicity, nationality, socio-economic background, physical or mental disability, religion, sexual orientation, marital status, pregnancy, dependants, political or religious opinion, ideology, union membership and personal or social circumstances. Special attention must be paid to the rights of workers most vulnerable to discrimination.

8. Zero Tolerance towards Harassment

- 8.1. Treat all employees with respect and dignity and furthermore ensure that their own suppliers treat their employees in the same manner.
- 8.2. No tolerance towards unacceptable treatment of employees, such as physical punishment or torture, sexual harassment³, or abuse, mental or physical coercion or verbal abuse, or the threat of any such treatment.
- 8.3. No worker should be subjected to any physical, sexual, psychological, or verbal harassment, abuse or other form of intimidation.

C. Ethical Integrity and Legality

Suppliers shall demonstrate the highest standard of integrity, ethics, and business conduct.

1. Compliance with Applicable laws and regulations:
 - 1.1. All activities must be carried out in compliance with the legislation that is applicable in the countries in which the suppliers operate.
 - 1.2. All other applicable international laws and regulations must be complied with, including those relating to international trade (such as those relating to sanctions, export controls and reporting obligations), data protection and antitrust/ competition laws.
 - 1.3. Avoid any conduct that could tarnish or damage the reputation of BSES.
2. Anti-Corruption & Anti Bribery
 - 2.1. All forms of bribery and corruption are prohibited
 - 2.2. Adequate measures and procedures should be in place to prevent bribery in all commercial dealings.
 - 2.3. Maintain a policy of 'Zero Tolerance' of any practice that may be deemed to be corruption, either active or passive.
 - 2.4. No tolerance for unacceptable conduct, which includes, but not limited to, non-compliance with anti- corruption laws and, directly or indirectly offering, promising, hiring or authorising payments in cash or in kind to any BSES employee, public official or any other person or entity, with intention of a) obtaining or retaining business b) Influencing business decisions; and/or c) securing an unfair advantage.
3. Conflict of Interest
 - 3.1. All and any conflict of interest in any business dealings with BSES, of which the suppliers are aware, should be declared to BSES so that appropriate action can be taken.
 - 3.2. Avoid a situation where there is a real or potential conflict of interest with BSES employees, or with their family or closely associated persons, that could affect the independence or objectivity of their professional actions or decisions. If avoidance is not possible, the suppliers should inform BSES of the situation so that appropriate action can be taken.
4. Insider Trading and Other Economic Crimes
 - 4.1. Ensure that all business and commercial dealings are transparently performed and accurately recorded in the books and records.
 - 4.2. Comply with applicable anti-money laundering laws, conduct business only with ethically responsible partners and receive funds only from legitimate sources.
 - 4.3. Avoid actual or attempted participation in economic offences, such as (but not limited to) money laundering, criminal breach of trust, counterfeiting, criminal misappropriation of properties, forgery, cheating, extortion, embezzlement and fraud.
 - 4.4. Refrain from insider trading. No confidential information regarding BSES is used to either engage, facilitate or support insider trading in BSES's shares.
 - 4.5. Take necessary measures to detect and prevent any illicit or suspicious forms of payment and inform and/or report through established channels if it has any suspicion or concern in this regard.
5. Gifts & Hospitality
 - 5.1. Any business entertaining/hospitality with BSES should be modest in value, appropriate, and compliant with the law and company policies, entirely for the purpose of maintaining good business relations and not intended to influence in any way BSES's decisions on future business relationship.
 - 5.2. Only gifts/honorarium of nominal value accepted or offered on festivals, at conferences, etc. will be permitted. Such gifts should comply with local laws and customs (including cultural and religious festivals) and should not be prohibited under applicable law and should not include cash or cash equivalents, gold or other precious metals, gems or stones.
 - 5.3. 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 BSES.

- 5.4. Neither directly or indirectly offer any gift, entertainment, trip, discount, service, or other benefit to any official of BSES or his/her close relations which would or be capable of compromising, influencing, liable to corrupt the integrity and objectivity of that person.

6. Competition, Confidentiality and Data Privacy

- 6.1. All market survey/other entities information must be obtained and used legitimately and in compliance with all applicable laws and regulations.
- 6.2. No attempt should be made to divulge to BSES any information about any other entity in violation of any law or agreement.
- 6.3. Likewise, BSES's confidential information must not be shared with any Supplier unless expressly permitted by BSES in writing by authorised signatory under the respective purchase order or agreement, as the case may be.

7. Transparency and Ethics

7.1 Fair competition

Avoid any action that may constitute an illegal practice of unfair competition and ensure compliance with applicable competition laws.

7.2 Corporate image and reputation

Suppliers must NOT:

- Make false statements or provide any misleading information regarding its products/services.
- Give the impression of representing or being the spokesperson of BSES while getting associated with any religious/political party or for activities in their personal capacity.

8. Protection of Intellectual Property and No Misuse or Improper use of BSES's assets/ property

- 8.1. Respect and protect all confidential information and intellectual property of BSES.
- 8.2. Do not misuse and share assets of BSES and employ them only for the purpose of conducting the business for which they are duly authorised by BSES. These include tangible assets such as equipment and machinery, systems, facilities, materials, and resources and intangible assets such as intellectual property rights, processes, know how & technology, proprietary information, etc.
- 8.3. Safeguard, secure, and protect BSES's assets and information technology from theft, destruction, misappropriation, wastage, and abuse.
- 8.4. Promptly report loss, theft or destruction of any intellectual property and data of the Company or that of any Supplier.

9. Financial Records and Accuracy in Books

- 9.1. Have accounting practices in place to ensure accuracy of its financial books and records.
- 9.2. Ensure accurate accounting and proper reporting of information pertaining to the business and financial results in accordance with applicable Accounting Standards [Generally Accepted Accounting Principles (GAAP)].
- 9.3. Ensure compliance to applicable laws and regulations with respect to accounting and taxation and timely discharge of tax liability.

10. Sanction Laws

- 10.1 Do not engage in any dealings or transactions with any person, or in any country or territory that are subject to global / regional sanctions as mentioned herein below in clause 10.2. BSES is vigilant of its suppliers who may be on a sanctions list or have a related company in a country subject to global/regional sanctions. In case of any concerns, the supplier should immediately report to BSES.
- 10.2 Do not be subject to or the target of any economic or financial sanctions or trade embargoes imposed, administered or enforced by the U.S. Government including without limitation by

the World Bank or by the United Nations Security Council, the European Union, the United Kingdom including by Her Majesty's Treasury or the Department of Business, Innovation and Skills, a relevant regulatory authority or the Minister of Foreign Affairs of Canada under the Special Economic Measures Act or the United Nations Act or legislation or regulations with similar purpose or effect or any other relevant sanctions authority of any other country (collectively, 'Sanctions Laws') nor is the Company or any of its subsidiaries / affiliates located, organised or resident in a country or territory that is the subject of the target of Sanctions Laws

10.3 Do not take any action which places or is likely to place BSES in violation of Sanctions Laws and/ or breaches affecting the reputation and/ or business interests of BSES

11. Responsible Sourcing

Ensure that goods and materials are not sourced in a suspicious or illegal way and implement measures for sustainable procurement practices³ to ensure compliance with laws and regulations.

12. Quality of Product and Services

Products and services should meet the specifications, quality, safety and environmental criteria specified in the relevant contract documents and required by applicable laws

13. Corporate Citizenship

Suppliers shall be committed to be good corporate citizens, not only in compliance with all relevant laws and regulations, but also by assisting and supporting initiatives to improve the quality of life of local communities/regions in which it operates. The activities may be, but not limited to, community health and family welfare, vocational training, education and literacy and employment.

¹ 'Forced Labour' or 'Involuntary Labour' refers to all work or service that is extracted under the menace of penalty. It also includes terms such as, bonded labour and modern slavery. It also includes any labour for which the worker receives less than the government stipulated minimum wage.

² 'Discrimination' refers to unjust or prejudicial treatment of people, especially on the grounds of, but not limited to, caste, creed, gender, race, ethnicity, age, colour, religion, disability, socio-economic status or sexual orientation.

³ Sustainability shall mean to devise a practice & procedure proactively to sustain resources of organisation and society at present levels with reasonable degradation. Sustainable procurement or sourcing is the process of making purchasing decisions that meet an organisation's needs for goods and services in a way that benefits not only the organisation but society, while minimising its impact on the environment. Organisation integrates the sustainability into business model as a resultant of ESG principles. This is achieved by ensuring that the working conditions of its suppliers' employees are decent, the products or services purchased are sustainable, where possible, and that socio- economic issues, such as inequality and poverty, are addressed

GENERAL CONDITIONS OF CONTRACT (GCC)

GENERAL CONDITIONS OF CONTRACT (GCC)

The General Condition of Contract shall form a part of specifications, contract document.

1. General Instructions & Applicability

- 1.1. All Bids shall be prepared and submitted strictly in accordance with these instructions. The Bidder shall be solely responsible for all expenses incurred in the preparation and submission of the Bid. Under no circumstances shall the Purchaser be held liable for such costs, regardless of the outcome of the bidding process.
- 1.2. The Purchaser reserves the right to seek clarifications or additional information from any Bidder at any stage of the evaluation process. The Purchaser may, at its discretion, reject any Bid that is incomplete, non-responsive, or fails to meet the requirements stated in the Bid Documents. The decision of the Purchaser regarding the responsiveness or rejection of any Bid shall be final and binding, without any financial or other obligation on its part.
- 1.3. The Bidder shall be deemed to have carefully examined, read, and fully understood all instructions, terms, conditions, and technical requirements specified in the Tender Documents prior to submission of its Bid.

2. Definitions and Interpretations

- 2.1. COMPANY / OWNER / PURCHASER / BUYER / CUSTOMER shall mean BSES Yamuna Power Limited (BYPL), a company incorporated under the Companies Act, 2013, having its registered office at Shakti Kiran Building, Karkardooma, Delhi – 110032. The expression shall include its authorized representatives, agents, successors, and permitted assigns.
- 2.2. BIDDER / SELLER / SUPPLIER / VENDOR / CONTRACTOR / AGENCY / MANUFACTURER shall mean the entity submitting a quotation or proposal in response to this bid enquiry issued by the Purchaser. The term Seller refers to the successful Bidder(s) whose bid has been accepted by the Purchaser and on whom the Letter of Acceptance or Letter of Award or Purchase Order is issued, and shall include the Seller's heirs, legal representatives, successors, and permitted assigns, wherever applicable.
- 2.3. OFFER SHEET shall mean the Bidder's formal and firm offer submitted to BYPL in accordance with the specifications set forth in the Bid Documents.
- 2.4. CONTRACT PRICE/RATE shall mean the price specified in the Letter of Intent, Letter of Award, Rate Contract, or Purchase Order, as applicable.
- 2.5. SITE shall mean the location(s) where the Works, Goods, or Services are to be delivered, installed, commissioned, or executed, as specified elsewhere in the Tender Documents.
- 2.6. STORE shall mean the designated area or location where goods and materials are stored, or as otherwise defined in the Contract.
- 2.7. ENGINEER IN CHARGE shall mean the Company's authorized or nominated representative responsible for supervising and administering the execution of the Works under the Contract.
- 2.8. APPLICABLE LAW shall mean the Constitution of India and all laws, rules, regulations, directives, notifications, codes, orders, or instructions having the force of law as issued by any competent legislative or governmental authority, including but not limited to laws relating to taxes, duties, assessments, expropriation, and compulsory acquisition, as amended from time to time. Any resulting implications shall constitute a Change in Law or Change in Permits, as applicable.

- 2.9. OTHER CLEARANCES shall mean all consents, approvals, permits, or authorizations required to be obtained from governmental or local authorities necessary for commencing or completing the work.
- 2.10. DEFECT LIABILITY PERIOD shall mean the period during which the Seller shall remain responsible for the repair or replacement of any defective part of the Works executed under the Contract, at no additional cost to the Purchaser.
- 2.11. TENDER SPECIFICATION shall mean the technical and commercial requirements, Indian Standard specifications, and description of works detailed in the Tender Documents, including all documents and references expressly or implicitly forming part of the Tender.
- 2.12. SPECIFICATIONS shall collectively mean all stipulations contained in the RFQ, Commercial Terms and Conditions, Instructions to Bidders, Technical Specifications, and any Amendments, Revisions, Deletions, or Additions issued by the Purchaser from time to time.
- 2.13. CODES AND STANDARDS shall mean all applicable codes and standards referred to or implied in the Specifications.
- 2.14. CHANGE OF WORK shall mean any addition, deletion, suspension, or modification to the scope, quality, functionality, or requirements of the Work as defined in the Contract, resulting in a corresponding change to the Technical Specifications and/or completion schedule.
- 2.15. GOOD INDUSTRY PRACTICE shall mean the level of skill, care, diligence, prudence, and foresight reasonably expected from a competent and experienced service provider engaged in similar activities under similar circumstances, in compliance with prevailing laws, regulations, and industry standards.
- 2.16. CONTRACT shall mean the agreement formed by the Letter of Award or Acceptance, Purchase Order or Work Order, Special Conditions of Contract (SCC), General Conditions of Contract (GCC), the Tender and its Annexures, and all addenda, corrigenda, and clarifications issued by the Purchaser.
- 2.17. EFFECTIVE DATE OF CONTRACT shall mean the date of issuance or award of the Contract, which shall also be deemed the Contract Commencement Date.
- 2.18. CONTRACT PERIOD shall mean the total duration agreed upon between the Seller and Purchaser for execution of the Contract, inclusive of any extended contract period for reason beyond the control of the Seller and/or Purchaser due to force majeure.
- 2.19. CONTRACT COMMENCEMENT DATE shall mean the date of issuance or award of the Contract, which shall be deemed the Effective Date of Contract.
- 2.20. CONTRACT COMPLETION DATE shall mean the date marking the expiry of the Guarantee or Defect Liability Period, which shall be deemed the Contract Completion Date.
- 2.21. ACCEPTANCE shall mean and deemed to include one or more of the following as will be stipulated in the specification:
- 2.21.1. Written approval by the Purchaser's Inspector authorizing dispatch of material from the Supplier's works.
 - 2.21.2. Acceptance of material at Purchaser site stores after its receipt and due inspection/ testing and release of material acceptance note.
 - 2.21.3. In case of supply and installation contracts, acceptance shall mean issuance of the Equipment/Material Takeover Receipt after successful installation, commissioning, and final acceptance.

3. Contract Documents Priority & Formation

- 3.1. The documents forming the Contract shall be read as mutually explanatory. In case of any ambiguity or discrepancy, the same shall be clarified and resolved by the Purchaser, whose interpretation shall be final. Unless otherwise provided, the order of precedence of Contract documents shall be as follows:
- 3.1.1. Contract Agreement/Purchase Order/Work Order
 - 3.1.2. Letter of Acceptance / Letter of Intent / Letter of Award
 - 3.1.3. Agreed Minutes of the Tender Negotiation Meetings
 - 3.1.4. Agreed Minutes of the Tender Technical Meetings
 - 3.1.5. Priced Bill of Quantities
 - 3.1.6. Technical Specifications, Drawings, and Scope of Work
 - 3.1.7. Tender Document including all Appendices, Addenda, and Corrigenda (latest revisions to take precedence)
 - 3.1.8. Applicable Codes and Standards
- 3.2. In the event of any inconsistency, the interpretation most consistent with achieving the Project's technical, legal, and statutory objectives shall prevail. No oral communication or instruction shall supersede the written Contract documents.

4. Governing Laws & Dispute Resolution

- 4.1. The Contract shall be governed by and interpreted in accordance with the laws of India.
- 4.2. Any dispute, controversy, or claim arising out of or relating to this Contract, or the breach, termination, or invalidity thereof, shall first be sought to be resolved amicably through mutual consultation between the Parties.
- 4.3. In the event that an amicable resolution is not achieved within a reasonable period, the dispute shall be referred to arbitration in accordance with the provisions of the Arbitration and Conciliation Act, 1996, or as amended. The Arbitral Tribunal shall consist of three (3) arbitrators — one to be appointed by each Party, and the third, who shall act as the presiding arbitrator, to be jointly appointed by the two arbitrators so nominated.
- 4.4. The seat and venue of arbitration shall be New Delhi, India, and the language of proceedings shall be English. The arbitral award rendered by the Tribunal shall be final and binding upon both Parties.

5. Change in Law

- 5.1. Change in Law shall mean the occurrence of any of the following events after the Effective Date of the Contract:
- 5.1.1. The enactment or coming into force of any new Applicable Law.
 - 5.1.2. Any amendment, modification, alteration, or repeal of an existing Applicable Law, or the issuance of any new or revised directive, regulation, or order thereunder.
 - 5.1.3. Any change or variation in the rate, nature, or applicability of taxes, duties, levies, or charges payable in connection with this Contract.
- 5.2. In the event of any Change in Law, the impacted Party shall promptly notify the other Party in writing with relevant details.
- 5.3. If such Change in Law results in any increase or decrease in the cost, expense, or liability of the Seller in performing its obligations under the Contract, an equitable adjustment shall be made to the Contract Price and/or the Schedule of Completion as mutually agreed between the Parties.

5.4. The Parties agree to negotiate in good faith to reasonably compensate or adjust obligations affected by such Change in Law to ensure the fair performance of the Contract.

6. Site Examination & Local Conditions

- 6.1. The Bidder shall be deemed to have visited and examined the site(s) of the Works and to have satisfied itself as to all existing site conditions and relevant information affecting the execution of the work.
- 6.2. Prior to submitting its Bid, each Bidder shall, at its own cost and expense, undertake or procure any additional investigations, explorations, tests, studies, and obtain any supplementary data relating to the physical conditions at or adjacent to the site which may influence the cost, duration, progress, or performance of the Works. The Bidder shall rely solely on such investigations and information in preparing its Bid and in fulfilling the Contract.
- 6.3. The Purchaser shall not entertain any claims or requests for adjustment in contract price, schedule, or any other terms arising from unforeseen or difficult site conditions, terrain, or local circumstances, once the Bid has been submitted.

7. Language, Measurement & Precedence

- 7.1. The Contract issued by the Company to the Seller, along with all related correspondence, documents, instructions, and communications, shall be prepared and maintained in the English language. In case of any translation of Contract documents, the English text shall prevail and govern in the event of any conflict or ambiguity.
- 7.2. All dimensions, units, quantities, and measurements shall be expressed and interpreted strictly in accordance with the Metric System (International System of Units - SI). Any deviation or alternative units must be clearly specified and mutually agreed upon in writing.

8. Scope of Supply & Services - General

- 8.1. The "Scope of Supply & Services" shall be on the basis of Supplier's responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.
- 8.2. Supplier shall have to quote for the Bill of quantities as listed in Volume - II of this RFQ.
- 8.3. Quantity variation and additional requirements if any shall be communicated to Seller during execution.
- 8.4. All relevant drawings, data and instruction manuals.
- 8.5. **Scope Of Services**

The scope of work shall be "Installation Testing and commissioning of PSS at site(s), Delhi, includes:

- Construction of RCC Foundation/Plinth:** Construction of RCC foundation/plinth for installation of the PSS as per the approved foundation/GA drawings and site requirements. The top of the RCC foundation/plinth shall be maintained at a minimum height of **600 mm above Finished Ground Level (FGL)**.
- Installation, Testing & Commissioning:** Installation, testing and commissioning of the complete PSS at site, including erection of all associated equipment and accessories and interconnection of all required **DI, DO, AI, status, protection and wireless sensor signals** with the FRTU.

3. **FRTU & SCADA Integration:** Configuration and integration of the FRTU with the existing SCADA system, including point-to-point checking, signal verification, status monitoring, alarm/event verification and functional testing, as applicable.
4. **Substation Earthing:** Construction of the complete substation earth mesh and provision of required earthing points, including all necessary excavation, laying, jointing, connections, backfilling and testing, as applicable to the vendor's scope.
5. **PSS Body Earthing:** Connection of the PSS/enclosure/body to the substation earth mesh at **two electrically independent points** using **50 × 10 mm GI strip**, including all required clamps, bolts, hardware and accessories.
6. **Transformer Neutral Earthing:** Connection of the transformer neutral to the substation earth mesh at **two electrically independent points** using **50 × 10 mm GI strip**, including all required clamps, hardware and accessories.
7. **Labour, Equipment & Supervision:** The vendor's scope shall include all required manpower, skilled and unskilled labour, cranes, hydras, tractors, trailers, tools, tackles, testing instruments, equipment and technical supervision necessary for complete execution of the work.
8. **End-to-End Commissioning Support:** The vendor shall provide end-to-end technical supervision and coordination until successful testing, commissioning and handover of the PSS.
9. **Testing & Documentation:** The vendor shall carry out all required tests and submit complete test reports, commissioning reports, test certificates and other relevant documentation as required by BYPL.
10. **Statutory/Inspection Approvals:** The vendor shall be responsible for obtaining the required statutory/electrical inspection approval, wherever applicable, and shall submit all necessary drawings, test reports, certificates and other documents required for obtaining such approval.
11. **Loading, Unloading & Handling:** All costs associated with loading, unloading, shifting, handling and erection of materials/equipment at site shall be included in the vendor's scope.
12. **Transportation:**
Transportation of the PSS and associated materials/equipment from the designated BYPL store/location to the installation site, including loading, transportation and unloading, shall be in the vendor's scope wherever required.
13. **Cranes/Hydras & Transportation Equipment:** All cranes, hydras, tractors, trailers and other lifting/transportation equipment required for shifting, erection and installation of the PSS shall be arranged by the vendor at its own cost.
14. **Transit Insurance:** Transit insurance for the PSS and associated materials/equipment during transportation from the designated store/location to the site shall be in the vendor's scope.
15. **Work Completion Period:** Individual framework orders/site intimations shall be issued as per BYPL's requirement. The complete work, including installation, testing, commissioning and submission of required documentation, shall be completed within **30 days from the date of the respective work order/site intimation**, unless otherwise specified by BYPL.

9. Specifications, Codes & Standards

- 9.1. All applicable codes and standards referred to in the Contract Document shall be strictly followed. Codes and standards not specifically mentioned in the Contract Document may be adopted with prior written approval of BYPL, provided that the materials, supplies, and equipment conforming to such standards are equal to or better than the corresponding standards specified in the Contract.
- 9.2. Product manufacturer or brand names cited in the Contract Documents are intended solely to indicate the required type and quality of products. No substitution or alteration of the specified brands or product quality shall be made without the prior written consent of BYPL. All products and equipment shall be used or installed strictly in accordance with the original manufacturer's guidelines, unless otherwise directed by BYPL.
- 9.3. In all cases, compliance with the relevant codes, standards, and requirements prescribed by applicable government authorities shall be ensured

- 9.4. In the absence of specific BSES standards, the relevant Indian Standards (IS) or International Electrotechnical Commission (IEC) standards, as applicable, shall be followed.

10. Representations and Warranties

- 10.1. It is hereby represented and warranted that full legal capacity, along with all valid licenses, permits, and approvals required to perform the obligations under this Contract, are in place.
- 10.2. It is warranted that all Goods supplied under this Contract:
- 10.2.1. Are brand new and free from any defects in design, materials, and workmanship.
 - 10.2.2. Fully conform to the specifications and requirements of the Contract.
 - 10.2.3. Are suitable and fit for the intended purpose as specified in the Contract Documents.
- 10.3. It is further warranted that all Services performed shall be executed with the highest degree of skill, care, and diligence, in accordance with Good Industry Practice and prevailing professional standards.

11. Ethics, Integrity & Code of Conduct

- 11.1. Full compliance shall be ensured with all anti-bribery, anti-corruption, conflict of interest, gifts and gratuities, and integrity policies issued or communicated by the Purchaser. For Contracts exceeding the specified thresholds, execution of an Integrity Pact shall be mandatory in accordance with the Purchaser's guidelines.
- 11.2. Any breach of these ethics and integrity obligations may result in disciplinary action, including but not limited to termination of the Contract, forfeiture of performance security deposits, recovery of losses incurred by the Purchaser, debarment from future procurement opportunities, and reporting to the relevant regulatory or enforcement authorities.

12. Sustainability, ESG & Legal Compliance

- 12.1. An Environmental, Social, and Governance (ESG) program appropriate to the scope of work shall be implemented, including but not limited to the following:
- 12.1.1. Compliance with applicable Extended Producer Responsibility (EPR), electronic waste, hazardous waste, plastic waste, and battery waste management regulations;
 - 12.1.2. Adherence to RoHS/REACH standards where applicable;
 - 12.1.3. Design and supply of energy-efficient products meeting prescribed star ratings or efficiency classes;
 - 12.1.4. Provision for take-back and responsible disposal or recycling of packaging and end-of-life equipment, where mandated;
 - 12.1.5. Implementation of Occupational health and safety management systems aligned with IS/ISO 45001;
 - 12.1.6. Social safeguards including prohibition of child labour, forced labour, assurance of fair wages, and provision of safe and dignified workplaces.
 - 12.1.7. Adoption of environmentally responsible practices such as waste minimization, recycling, and strict prohibition of hazardous materials usage, in accordance with relevant laws and regulations.
- 12.2. Support shall be extended to the Purchaser's Scope-3 greenhouse gas emissions tracking efforts by submitting quarterly reports detailing, where available, the embodied carbon content of supplied goods (where available) and associated logistics emissions. The Seller shall provide reasonable assistance in this regard at no additional cost.
- 12.3. Priority shall be given to the use of recycled or returnable packaging materials, and single-use plastics shall be minimized except where necessary for product protection. All wooden packaging shall be sourced from legally compliant entities. Pallets, drums, and similar packaging materials shall be collected and returned for reuse or recycling, wherever feasible.

- 12.4. Accurate records, documentation, and evidence of compliance with all ESG requirements shall be maintained and furnished to BYPL or relevant authorities as reasonably requested, in the prescribed format and frequency.

13. Data & Cybersecurity

- 13.1. For any scope involving software, firmware, or networking components, the following requirements shall apply:
- 13.1.1. Provide comprehensive cyber hardening guidelines;
 - 13.1.2. Maintenance of a vulnerability disclosure window of thirty-six (36) months from the date of delivery;
 - 13.1.3. Timely provision of security patches and firmware updates as and when they become available;
 - 13.1.4. Submission of a software Bill of Materials (SBOM) listing all included software components;
 - 13.1.5. Confirmation that no hard-coded credentials exist in delivered software or devices.
 - 13.1.6. Any connection to the Purchaser's network shall require prior written authorization before implementation.
- 13.2. Any personal data processed in relation to this Contract shall be handled in full compliance with applicable data protection laws, including the Digital Personal Data Protection Act, 2023, as amended from time to time. Appropriate technical and organizational security measures shall be implemented, and any data breach or security incident impacting Purchaser data shall be promptly notified to the Purchaser.

14. Local Content and Eligibility

- 14.1. Full compliance shall be ensured with the Public Procurement (Preference to Make in India) Order and related norms. This includes submission of accurate declarations of local content in goods and services, along with consent for verification and audit by the Purchaser or authorized agencies. Any false or misleading declaration shall entitle the Purchaser to disqualify the offer, terminate the Contract, and impose debarment in accordance with applicable regulations.
- 14.2. Entities originating from countries sharing land borders with India shall comply with the registration and eligibility criteria prescribed by the Government of India. Non-compliance with these requirements shall render the offer ineligible for consideration and may result in termination of the Contract if discovered after award.

15. Manufacturing Approvals & Clearances

- 15.1. Transmittal approval documents - including Guaranteed Technical Parameters (GTP), drawings, Quality Assurance Plans (QAP), and other relevant documents - shall be submitted within 15 days to the designated BYPL official for review and approval. BYPL shall provide approval or comments within seven (7) calendar days of the initial submission. Should resubmission be required, the Seller shall complete it within five (5) calendar days. Subsequent approvals or comments from BYPL on such resubmissions will be issued within five (5) calendar days. Repeated resubmissions are discouraged and may impact timelines.
- 15.2. Manufacturing activities shall commence only after the Seller receives formal transmittal approval and manufacturing clearance from BYPL.
- 15.3. All documents submitted for transmittal approval must reflect pre-award discussions and confirmations between BYPL and the Seller to ensure accuracy and compliance.

15.4. Post Order Transmittal Approval shall be completed within 04 weeks from the date of Rate Contract/Purchase Order. Delays in obtaining transmittal approval shall not be accepted as valid grounds for extension of delivery timelines or waiver of liquidated damages.

16. Errors, Omissions & Discrepancies

16.1. Sole responsibility shall rest for all discrepancies, errors, and omissions identified in the drawings, documents, or any other information submitted, irrespective of whether such submissions have been approved, reviewed, or accepted by BYPL. However, any design or drawing errors arising directly from inaccurate or incomplete data or written instructions provided by BYPL shall not be so attributed.

17. Free Issue Materials/Equipments

17.1. Materials and equipment provided as Free Issue by the Purchaser to the Bidder for fulfilling obligations under this Agreement shall remain the exclusive property of the Purchaser. The Bidder shall clearly label and identify such Free Issue Items as the Purchaser's property until the completed Goods are delivered in accordance with the Agreement terms.

17.2. Risk of loss or damage to all Free Issue Items shall transfer to the Bidder upon receipt and shall remain with the Bidder until the completed Goods are delivered to the Purchaser as per the Agreement.

17.3. The Bidder shall take all necessary measures to preserve and maintain the Free Issue Items in good condition and shall utilize them solely for the purposes stated in the Agreement.

17.4. Disposal or management of any surplus Free Issue Items shall strictly follow written instructions provided by the Purchaser.

17.5. The Bidder shall execute and submit an Indemnity Bond, in a format approved by the Purchaser, covering the custody, use, and return of Free Issue Items.

18. Quality Assurance, Inspection, Testing and Test Certificates

18.1. All equipment shall be procured solely from authentic sources approved by the Company and in accordance with Company specifications.

18.2. A detailed Quality Assurance Plan (QAP) and test procedures shall be prepared, identifying all stages of manufacturing, associated quality checks, raw material inspections, and Customer hold points. The document shall specify inspection methods, acceptance criteria, and applicable standards, and shall obtain Purchaser approval prior to commencement of manufacturing. The Purchaser reserves the right to review in-house inspection reports and quality checks at stages other than Customer hold points and may issue remarks requiring additional testing, rectification, or rejection, which shall be duly complied with.

18.3. Witness and Hold points represent critical inspections or tests during manufacturing, for which prior intimation shall be given to the Purchaser to facilitate witnessing. Final inspection shall constitute a mandatory hold point. No work shall proceed beyond any hold point without explicit clearance from the Purchaser or receipt of a witness waiver letter.

18.4. Any waiver by the Purchaser of a quality assurance activity at any stage shall not relieve responsibility for compliance with all Contract requirements, codes, and referenced standards, nor preclude the Purchaser from subsequently rejecting non-conforming materials or work.

18.5. All applicable test certificates and joint inspection reports related to equipment and materials shall be submitted.

- 18.6. Manufacture items shall not be dispatched without prior receipt of a Material Dispatch Clearance Certificate (MDCC) or explicit instructions from the Purchaser.
- 18.7. All in-house testing and inspections shall be conducted at no additional cost. Such inspections shall be overseen by the Purchaser or its authorized third-party inspection agency. Costs of futile or abortive inspection visits shall be deducted from invoices.
- 18.8. The Purchaser reserves the right to send any supplied material to recognized laboratories for testing at any time, with testing costs borne accordingly. In the event that materials fail to meet the specified technical requirements, all associated charges and penalties shall be borne as applicable. Wherever required, a representative shall be present to witness the sealing of materials at the storage site prior to dispatch for testing to avoid any dispute.

19. Inspection & Test Charges

- 19.1. The Goods shall be subjected to inspection by the Purchaser and/or a third-party inspection agency appointed by the Purchaser. Such inspections shall include stage-wise and final inspections as per the mutually agreed Quality Assurance/Quality Control (QA/QC) procedures. Additionally, inspections may be conducted at the Purchaser's site or storage facilities. Any damaged or rejected Goods shall be repaired or replaced to the satisfaction of the Purchaser at no additional cost.
- 19.2. Inspection charges are deemed to be included in the total Contract value, whereas third-party inspection fees shall be borne by the Purchaser. However, costs arising from futile or abortive visits by the Purchaser's inspectors to the premises shall be deducted from invoices.
- 19.3. No shipment of Goods, whether in whole or in part, shall be effected under this Purchase Order until a written Release for Shipment Notice has been received from the Purchaser or its authorized representative.
- 19.4. Requests for stage-wise or pre-dispatch inspections must be submitted to the Purchaser at least seven (7) days in advance, utilizing the official request format provided by BYPL.

20. Documentation

- 20.1. All materials and equipment shall be procured exclusively from BYPL-approved sources and shall strictly conform to BYPL specifications and Transmittal Approvals. Copies of all relevant Material and Type Test Certificates, Operation and Maintenance (O&M) Manuals, and approved as-built drawings for the supplied equipment shall be submitted. Compliance with BYPL specifications and Field Quality Procedures shall be mandatory and ensured throughout the execution of the project.

21. Packing, Handling, and Storage

- 21.1. Packing: All Commodities shall be packed in suitable crates, boxes, drums, containers, cartons, or other appropriate packaging to ensure safe transportation by road or rail to BYPL's Delhi/New Delhi stores or project site. The packaging shall provide adequate protection against damage during transit. Wherever feasible, biodegradable packaging materials shall be used in compliance with applicable environmental standards.
- 21.2. Packing List: Each package shall contain a detailed packing list itemizing the contents with exact weight, external dimensions (length, width, and height), Item SAP Code, Purchase Order number, and date. One copy of the packing list must be enclosed inside each package delivered.

- 21.3. Prior to commencement of supply, the Material Safety Data Sheet (MSDS), along with detailed handling and storage instructions or manuals (where applicable), shall be provided. Copies of these documents shall accompany the first lot of materials delivered and be maintained at the storage or project site location.

22. Delivery Terms & Address

- 22.1. The Goods shall be delivered to BYPL's designated Store(s) and/or Site(s). All shipments shall be made on a Free on Road (FOR) destination basis, inclusive of all applicable taxes and duties.
- 22.2. Responsibility for unloading of the Goods at the respective BYPL Store(s) or Site(s) shall rest accordingly.
- 22.3. Wherever applicable, all required transit documents, including E-Way Bills, shall be issued to ensure lawful transportation of the Goods. The logistics partner or transporter shall not be held liable for any loss, penalties, or confiscation arising from improper documentation or mis-declaration.

23. Transportation

- 23.1. Responsibility shall rest for arranging transportation of the Goods from the manufacturing works or warehouses to the Buyer's designated Store(s) or Site(s).
- 23.2. All charges related to transportation from the works to the Buyer's Store(s) or Site(s) shall be deemed included in the total Order value and shall not be claimed or billed separately

24. Transit Insurance

- 24.1. Transit Insurance shall be arranged for all materials and Goods.
- 24.2. In the event of damage to or loss of cargo during transit, coordination shall be undertaken with the relevant insurance company for obtaining coverage, lodging claims, and facilitating settlement. Irrespective of the insurance outcome, the damaged or lost Goods shall be replaced and delivered to the Purchaser within thirty (30) days of the incident, at sole cost and expense, including all associated costs of replacement and delivery.

25. Acceptance & Rejection of Goods

- 25.1. Goods shall be accepted only upon receipt of the Material Dispatch Clearance Certificate (MDCC).
- 25.2. The Purchaser shall not accept materials if LR / RR / Bilty and the Original Tax Invoice (Transporter Copy) are not handed over at store/site. The Seller shall draw all dispatch documents in favour of Purchaser as "Consigned to" and "Billed to".
- 25.3. The materials shall be supplied during working hours from 10AM to 5PM. No delivery shall be effected after this time unless prior intimation is given to the Purchaser.
- 25.4. Acknowledgement of receipt, duly signed by the authorized person at the store/site along with the Purchaser's seal, shall be obtained confirming receipt of materials and quantities. In the absence of such acknowledgement, payment shall not be processed.
- 25.5. Exact quantities shall be supplied as per the MDCC. In case of short supply, as verified at the store/site, the discrepancy shall be adjusted and payment shall be released on a net basis accordingly.

25.6. The Purchaser retains the exclusive right to reject any Goods that do not strictly comply with the terms and conditions of the Purchase Order.

26. Price Validity

26.1. The agreed prices shall remain firm and fixed for the entire duration of the Contract until its completion.

27. Prices/Rates/Taxes

27.1. Price basis for supply of Materials & Services:

27.1.1. The Contract price/rates finalized shall remain firm and fixed for the entire duration of the Contract and shall not be subject to any variation or escalation for any reason whatsoever.

27.1.2. The supply prices shall be inclusive of packing, forwarding, loading at the manufacturer's premises, payment of GST, freight, and all other applicable local charges. Octroi is presently not applicable in Delhi; however, if made applicable, it shall be reimbursed at actuals.

27.1.3. The supply prices shall also include unloading at BYPL Delhi/New Delhi stores/sites.

27.1.4. Transit insurance shall be arranged at no additional cost to the Purchaser.

27.1.5. GST is included in the total Contract price. GST payments shall be processed only upon submission of a valid GST registration certificate and a self-declaration on letterhead confirming compliance with GST provisions and deposit as per applicable laws. The GST registration number shall be provided.

27.1.6. Income Tax (IT) at applicable rates shall be deducted from invoices as Tax Deducted at Source (TDS), as per prevailing laws.

28. Taxes & Duties

28.1. All taxes, duties, turnover tax, labour cess, etc. (except GST) levied by State or Central Governments or local bodies shall be borne by the Seller. Any new taxes and duties levied by the government during the term of this Agreement shall be borne by BYPL. Income tax and TDS will be deducted at source from the Seller's invoices as applicable. The Seller must furnish their GST registration number.

28.2. GST on actuals will be paid upon submission of GST registration and a self-declaration on the Seller's letterhead confirming that the tax has been or will be deposited as per applicable tax laws.

28.3. As per Notification No. 39/2021 # Central Tax dated 21st December 2021, effective from 01/01/2022, a registered person (i.e., Recipient/Purchaser) can claim input tax credit only for invoices reflected in GSTR2A or GSTR2B (which requires 100% matching of invoices). Sellers must deposit GST by filing GSTR-1 and GSTR-3B.

28.4. In case of non-compliance resulting in the Recipient/Purchaser being unable to avail input tax credit due to non-filing or non-compliance of GSTR-1 and GSTR-3B for the relevant month/quarter of supply, the Recipient/Purchaser reserves the right to withhold 100% of the GST amount from subsequent payments until such default is rectified.

28.5. For release of withheld payments under the GST Act, proof of tax payment shall be submitted through GST Portal screenshots reflecting the Recipient/Purchaser's name, along with copies of the relevant GSTR-1 and GSTR-3B returns for the applicable period. Payments shall not be released until such proof is furnished.

- 28.6. The Recipient/Purchaser further reserves the right to recover any financial loss incurred (including tax, interest, penalties, and loss of input tax credit) arising from non-compliance or non-filing of GSTR-1 and GSTR-3B.
- 28.7. For goods delivered on an FOR site basis, compliance with all applicable provisions relating to issuance of E-way Bills shall be ensured. Any violation may result in penalties and seizure of goods during transit. All penalties, pre-deposits, and related expenses arising from such violations shall be borne accordingly. Timely release of seized goods shall also be ensured. Any delay in supply due to such seizure shall attract liquidated damages as per Contract provisions.
- 28.8. For goods not covered under GST, applicable Excise Duty (ED), VAT, or CST shall be payable extra at prevailing rates.
- 28.9. BYPL Tax Details:
28.9.1. GSTIN: 07AABCC8569N1Z0
28.9.2. CST No.: 07740254593
28.9.3. TIN No.: 07740254593
28.9.4. PAN No.: AABCC8569N
- 28.10.A detailed statement of invoices and corresponding amounts shall be submitted to the concerned officer within seven (7) days after the end of each month pertaining to the supply period. Failure to submit the same shall be construed as no reconciliation requirement.

29. Variation in Taxes, Duties & Levies

- 29.1. The total order value shall be adjusted for any variations in statutory levies imposed by competent authorities through fresh notifications issued within the stipulated delivery period. In the event of any reduction in taxes, duties, or levies, such benefits shall be passed on to the Buyer.
- 29.2. No other taxes, duties, or levies beyond those specified shall be payable by the Buyer, except for new levies, taxes, or duties imposed by competent authorities via fresh notifications after the issuance of the purchase order but within the stipulated delivery period.
- 29.3. Any changes in taxes, duties, or levies shall only apply to the portion of the purchase order remaining unexecuted on the date of such notification. Changes occurring after the scheduled delivery date shall not affect the terms or value of the purchase order.
- 29.4. The purchase order value shall remain unaffected by any variations in exchange rates.

30. Taxes & Duties on Raw Materials and Bought-Out Components

- 30.1. Taxes and duties applicable to raw materials and bought-out components shall be deemed included within the total order value and shall not be subject to any escalation or variation for any reason throughout the duration of the contract.

31. Building and Other Construction Workers (BOCW) Act (Applicable for All Civil and Construction Works)

- 31.1. The Building and Other Construction Workers (BOCW) Act shall apply to any establishment employing or having employed ten (10) or more building workers at any time during the preceding twelve months in connection with any building or construction work. Where applicable, registration with the Registering Officer under Section 7 of the BOCW Act, along with compliance with relevant State Government rules, shall be obtained and the Registration Certificate issued by the concerned State Labour Department shall be submitted.

- 31.2. In accordance with the Act, cess at the rate of 1% of the cost of construction work shall be payable and shall be deducted from each interim bill. The cost of materials, when billed separately as a distinct schedule item, shall be excluded from the cess calculation. Full compliance with all applicable provisions of the BOCW Act shall be ensured.

32. Tax Indemnity Clause

- 32.1. The Seller (including its affiliates in India or overseas, agents, third-party Sellers, or any other persons appointed by such affiliates for this Agreement) shall bear sole responsibility for compliance with and payment of all taxes—direct or indirect—including but not limited to income tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess, customs duty, excise duty, Research and Development Cess, cesses, interest, penalties, or any other tax/duty/amount/charge/liability arising under laws or regulations applicable in India or overseas, or from demands or recoveries initiated by any revenue authority.
- 32.2. If any tax liability (including but not limited to income tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess, customs duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties, or other charges become payable by the Purchaser due to the Seller's or its affiliates' failure to comply with relevant laws or regulations, the Seller undertakes to indemnify the Purchaser for such amounts.
- 32.3. Furthermore, the Seller agrees to indemnify and keep indemnified the Purchaser against all actions, proceedings, claims, losses, damages, costs, and expenses directly or indirectly arising from any failure by the Seller or its affiliates to comply with applicable legal obligations.
- 32.4. The parties agree to the following procedure in the event the Purchaser receives any demand or notice relating to non-compliance by the Seller or its affiliates with tax laws:
- 32.4.1. The Purchaser shall notify the Seller in writing within five (5) common working days of receipt of such communication, or as soon as reasonably possible if the response time is shorter.
- 32.4.2. Upon receipt of notification, the Seller shall either accept the demand and reimburse the Purchaser within five (5) working days of payment or propose disputing the demand.
- 32.4.3. If the Seller opts to dispute the demand and the Purchaser agrees, the Purchaser will contest the demand following due legal process, refraining from paying the tax demand during litigation. The Seller shall reimburse all litigation costs incurred, including counsel fees and filing charges. Should any coercive recovery measures be initiated, the Purchaser may pay the sum and recover it from the Seller within five (5) working days.
- 32.4.4. If the demand is finally determined by a tribunal or authority and payment was made by the Purchaser, the Seller shall reimburse the amount within ten (10) days of payment. Conversely, if no amount is payable and a refund arises, the Purchaser shall pass the refund to the Seller within ten (10) days of receipt.

33. Invoicing Instructions

- 33.1. Invoices shall be prepared in triplicate - (1) Original for the recipient, (2) Duplicate for the transporter, and (3) Triplicate for the Seller - and delivered to: BSES YAMUNA POWER LIMITED, SHAKTI KIRAN BUILDING, KARKARDOOMA, DELHI - 110032. Separate Material Dispatch Clearance Certificates (MDCC) shall be issued for Capex and Opex, and invoices shall be submitted accordingly
- 33.2. GST registration shall be obtained in the State from which the supply is made. A valid GST registration number shall be maintained, and GST tax invoices along with supporting documents shall be issued in compliance with the SGST Act, CGST Act, IGST Act, UTGST Act, GST Compensation Cess Act, and applicable Rules. Failure to submit GST-compliant invoices

shall result in withholding of applicable tax components (SGST, CGST, IGST, UTGST, GST Compensation Cess) during payment processing.

- 33.3. Invoices shall be issued in the name of BSES YAMUNA POWER LIMITED, with the Store/Site address as specified in the MDCC. All invoices must comply with GST requirements relating to Invoices, Debit Notes, and Credit Notes, including details such as GSTIN, HSN/SAC codes, item description, tax rates, and other particulars as prescribed under applicable regulations and the GST INV-01 template.
- 33.4. Applicable CGST, SGST, UGST, IGST, and GST Compensation Cess shall be charged correctly, as per prevailing laws.
- 33.5. Timely Issuance of Invoices/Debit/Credit Notes:
- 33.5.1. Invoices and debit/credit notes shall be issued promptly to enable the Purchaser to claim input tax credit within prescribed timelines under GST laws. All adjustments (credit notes, purchase returns, debit notes) shall be processed within statutory time limits.
- 33.5.2. In case of advance payments, a tax invoice shall be raised as per GST provisions. Upon payment of advance, a payment voucher shall be issued by the Purchaser as per applicable GST rules. Four copies of invoices shall be provided, including the Electronic Reference Number where mandated. Persons in charge of conveyance shall carry all required documents and devices as prescribed under law.
- 33.6. Transit Documents and E Way Bills: Wherever applicable, all required transit documents/E-Way Bills shall be issued in compliance with statutory provisions for movement of goods. Logistics partners or transporters shall not be held liable for losses or confiscation arising from improper documentation or misdeclaration. Compliance with all E-Way Bill regulations shall be ensured. Any violation may attract penalties and seizure of goods, and all such penalties, pre-deposits, and related costs shall be borne accordingly. Timely release of seized goods from authorities (CGST/SGST, etc.) shall be ensured. Delays arising from seizure shall attract liquidated damages as per Contract provisions.
- 33.7. All Suppliers/Service Providers must include the following minimum details in invoices to be submitted:
- 33.7.1. Invoice/Credit Note number and date
- 33.7.2. Supplier/service provider address and GSTIN
- 33.7.3. Customer name and address as per GST registration and GST registration number
- 33.7.4. 'Shipped to' and 'Billed to' addresses
- 33.7.5. Place of supply
- 33.7.6. Description of goods/services with units of measurement
- 33.7.7. HSN/SAC codes
- 33.7.8. Taxable value (gross and discount detailed separately if applicable)
- 33.7.9. Tax rate and amount for CGST, SGST, and IGST separately
- 33.7.10. Authorized signature (for e-invoices, a physical signature is not required)
- 33.7.11. Indication of reverse charge applicability, if any.

34. Bill Submission Procedure

- 34.1. All monitoring, measurement, billing & payment processes shall be on IT enabled platform of BYPL as per Company's guidelines issued from time to time and bidders to ensure adherence. The company may modify the procedure for the submission of bills. The Contractor shall be obliged to submit its bill as per the procedure stipulated by the company from time to time.
- 34.2. All bills must be uploaded to BYPL portal (BTS - Bill Tracking System) for certification by the Engineer In-Charge or Package Engineer.

- 34.3. Further the contractor shall also submit original bill (hard copy) along with supporting documents at Vendor Support Cell of BYPL. The bills shall be made in favour of BSES Yamuna Power Ltd, Shakti Kiran Building, Karkardooma, New Delhi - 110032.
- 34.4. Each bill shall be complete in all respects, including compliance with ESI, HR, Quality, HSE, Stores, and Finance requirements. The site follows an established procedure for bill processing. Incomplete bills or invoices will not be processed for payment.

35. Terms of Payment and Billing

35.1. For Supply of Equipment/Materials

Part 1) 90% of the basic value with 100% taxes and duties shall be made within 45 days from the date of receipt & acceptance of material at store(s)/site(s) on against submission of following documents against dispatch of each consignment at our Vendor Support Cell (VSC):

- Signed copy of accepted Rate Contract / Purchase Order (for first payment)
- PBG equivalent to 1% of RC Value (including GST) valid till RC validity period, as applicable
- LR / RR / BL as applicable
- Challan, as applicable
- One (01) copy of the detailed tax invoice showing commodity description, quantity, unit price, total price, and basis of delivery, covering 100% of the consignment value claimed
- One (01) copy of the transporter's invoice duly receipted by BYPL Store and original certificate issued by BYPL confirming receipt and acceptance of the material at Store/Site as per Contract provisions
- One (01) copy of Packing List / Detailed Packing List
- Approved Test Certificates / Quality Certificates, wherever applicable
- Certificate of Origin, wherever applicable
- Material Dispatch Clearance Certificate (MDCC)
- Warranty / Guarantee Certificate, wherever applicable
- Checklist for bill submission

Part 2) Balance of 10% of basic value shall be paid in 45 days from the date of successful testing, commissioning and handing over of the entire installation duly certified by BYPL Engineer-in-Charge.

In case of receipt of material at site/store and not erected or commissioned within 6 months from the date of receipt of material at site/store, Balance 10% of basic value shall also be released.

35.2. For Services of equipment/item:

Payment shall be made as under (PSS wise):

- 100% payment shall be due after 45 days of submission of your bills, from the date of successful testing, commissioning and handing over of the entire installation along with work completion certificate at our office. The work completion certificate shall be issued by Engineer-In-Charge by certifying that the work has been completed to full satisfaction.

All bills shall be submitted to the Engineer In charge / Package Engineer for certification. Bills shall be complete in all respect including ESI / HR compliance, Quality compliance, HSE compliance, Store compliance, Finance compliance etc. An established procedure is followed at site. Incomplete bills / invoices will not be considered for processing payments.

- 35.3. The Purchaser reserves the right to recover any tax loss, interest, or penalty suffered due to non-compliance with tax laws. In the event input tax credit is denied due to any shortcoming (which otherwise would have been available in the normal course), such shortcoming shall be rectified at own cost and effort. If rectification is not possible, the financial loss suffered by the Purchaser on account of denied tax credit shall be made good. In such cases, any amount paid shall first be appropriated towards the GST component charged in the invoice, and the balance shall be treated towards the value of supply of goods/services.

- 35.4. The Purchaser shall deduct Tax Deducted at Source (TDS), wherever applicable, at rates prescribed under GST laws or any other applicable Indian law, and remit the same to the Government. Necessary TDS certificates shall be issued as per statutory provisions.
- 35.5. Any liability arising out of disputes relating to tax rate, HSN classification, calculation, or payment of tax to the Government shall be borne accordingly.
- 35.6. Where supply of Goods is liable to GST under the Reverse Charge Mechanism (RCM), the applicable category of registration shall be clearly indicated, along with a declaration stating that "the liability of payment of GST is on the Recipient of Supply."

36. Performance Guarantee

- 36.1. To be submitted within twenty-eight (28) days from the date of issuance of the Letter of Intent/Award/PO. Bidder shall submit PBG equivalent to 10% of the PO value (including GST) valid for a period of 24 months from the date of Commissioning or 30 months from the date of receipt, whichever is earlier plus 3 months claim period.
- 36.2. All Bank Guarantees shall be issued in favour of BSES Yamuna Power Ltd. and shall strictly conform to the format prescribed by BYPL.
- 36.3. Performance Guarantee Forfeiture: Each Performance Bank Guarantee furnished under Clause 34.1 shall contain a provision for automatic and unconditional forfeiture, without recourse, upon presentation by BYPL to the issuing bank along with a simple statement that there has been failure to comply with any term or condition of the Contract.
- 36.4. The Performance Bank Guarantee shall be liable for automatic and unconditional forfeiture, without recourse, if BYPL, at its sole discretion, determines non-compliance with any term or condition of the Contract.
- 36.5. Performance Guarantee Release: All Performance Bank Guarantees shall be released without interest within seven (7) days after expiry of the validity period specified under Clause 34.1, except in cases covered under Clause 34.4.

37. Defects Liability Period/ Warranty / Guarantee

- 37.1. The materials/items supplied shall be guaranteed against any defect or failure arising from faulty materials, workmanship, or design for the entire Defects Liability Period. The Defects Liability Period shall be 60 months from the date of commissioning or 66 months from the date of delivery at store(s)/site(s), whichever is earlier.
- 37.2. If, during the Defects Liability Period, any goods are found to be defective, they shall be promptly replaced or rectified at own cost, including dismantling and reinstallation, as directed by the Purchaser. Where removal from site is required, the goods shall be returned at own cost within the agreed timeline from receipt of intimation.
- 37.3. In case of emergencies, service personnel shall be deputed within forty-eight (48) hours, and adequate manpower and spares shall be ensured throughout the warranty period.
- 37.4. If, in the sole discretion of BYPL, the situation warrants emergency restoration, BYPL reserves the right to take immediate action to identify the fault and restore the system using available resources, materials, or through any third-party agency, under due intimation. All associated costs of replacement, substitution, shipping, labour, taxes, levies, and other related expenses, along with 15% of the expenses as administrative overheads, shall be borne accordingly. BYPL may recover such costs by charging the same, setting off against any amounts payable, or deducting from the Performance Bank Guarantee (PBG). The recoverable amount shall be paid within thirty (30) days of intimation.

37.5. Fault root cause analysis shall be conducted jointly by BYPL's CES, O&M, OET, OEM teams, and concerned representatives. In cases where faults are attributable to reasons other than defective material, design, or workmanship, further liability or cost shall not arise.

38. Support beyond the Guarantee Period

38.1. Availability of spare parts and necessary technical support shall be ensured for a minimum period of ten (10) years after completion of the equipment guarantee period under the Contract. At least twelve (12) months' prior notice shall be given to BYPL before declaration of End of Life (EOL) support for the supplied product or technology.

39. Return, Replacement or Substitution

39.1. BYPL shall promptly notify upon identification of any defective commodity. At its sole discretion, BYPL may return such defective commodities for replacement at no cost to BYPL or reject the commodities and procure the same or similar items from a third party. In the event of third-party procurement, proof of the replacement purchase cost shall be provided.

39.2. All costs associated with replacement, substitution, shipping, labour, and other related expenses incurred in connection with return, replacement, or third-party procurement of the commodity shall be borne accordingly. BYPL reserves the right to deduct such costs from any payments due or recover the same from the Performance Bank Guarantee.

39.3. Where the cost of the substitute commodity exceeds the quoted price, the differential amount shall be reimbursed to BYPL.

39.4. At BYPL's sole discretion, materials or goods rejected and not collected within forty-five (45) days from the date of rejection notification may be disposed of by BYPL at the associated risk and cost.

40. Effective Date of Commencement of Contract

40.1. The Contract shall be deemed to commence on the date of issuance of the Letter of Intent, Letter of Acceptance, or Purchase Order, whichever is earlier, and this date shall be considered as the effective commencement date for all contractual obligations.

41. Time - The Essence of Contract

41.1. The date specified for completion of the "Project" in the Letter of Intent/Acceptance or Purchase Order shall be deemed to be the essence of the Contract. Completion of the Project shall be ensured on or before the stipulated schedule and completion date.

42. Delivery Completion Timelines

42.1. The contractual delivery for the Goods or Services shall adhere strictly to the defined schedule.

43. Extension of Time and Time Overrun

43.1. Extension of time may be granted at the Company's discretion in cases where delays are not attributable to reasons within control, subject to submission of detailed justification within ten (10) days of occurrence of the delay. Grant of such extension shall not entitle any increase in the Contract price and shall not prejudice the Company's right to recover liquidated damages, wherever applicable.

44. Liquidated Damages

GENERAL CONDITIONS OF CONTRACT (GCC) NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 18 of 37	Bidders seal & Signature
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- 44.1. In the event of delay in supply of items/equipment beyond the schedule stipulated in the Purchase Order, liability shall arise to pay, as penalty for delay, a sum equivalent to 1% (one percent) of the basic (ex-works) price of the undelivered units, or part thereof, for each week of delay against the respective milestone deliveries.
- 44.2. The total penalty for delay under the Contract shall be subject to a maximum of ten percent (10%) of the basic (ex-works) price of the total undelivered units.
- 44.3. The Purchaser may, without prejudice to any other method of recovery, deduct such damages from any amount due or becoming due, recover the same from the Performance Bank Guarantee, or initiate appropriate claims.
- 44.4. Where penalty is levied in accordance with the Order terms and conditions, BYPL shall raise an invoice for the penalty amount along with applicable GST. After adjustment of the penalty invoice amount, the net payment shall be released accordingly.

45. Recoveries

- 45.1. Whenever any sum becomes recoverable under this Contract, the Purchaser shall be entitled to recover such amount by appropriating, in whole or in part, any sums due or that may become due under the Contract. In the event such sums are insufficient to cover the total recoverable amount, the outstanding balance shall be paid to the Purchaser upon demand.

46. The Micro, Small and Medium Enterprises (MSME)

- 46.1. Where the establishment falls within the scope of the Micro, Small and Medium Enterprises Development Act, 2006 and its amendments, such status shall be declared at the time of submission of the bid. Failure to declare the same shall be deemed as confirmation of non-MSME status. A copy of the Udyog Aadhaar (UA) and Udyam Registration Number, along with the PAN number, shall be submitted as applicable.

47. Transfer and Subcontracting

- 47.1. The Contract or any part thereof shall not be subcontracted, transferred, assigned, or otherwise parted with, whether directly or indirectly, without the prior written approval of the Purchaser.
- 47.2. Notwithstanding any approved subcontracting, full responsibility shall remain for the execution, completion, and satisfactory performance of the Work in strict compliance with the Purchase Order, specifications, approved drawings, and data sheets. Complete accountability shall also extend to any acts, omissions, defaults, or negligence of any subcontractor.

48. Intellectual Property Rights and Royalties

- 48.1. Indemnity shall be provided to the Purchaser and the Purchaser's Representative against all claims and proceedings arising from infringement or alleged infringement of any patent rights, registered designs, copyright, trademarks, trade names, know-how, or other intellectual property rights (collectively referred to as "Intellectual Property Rights") in relation to the Works, equipment, machinery, methods, plant, materials, or any item required for execution of the Works. In the event of infringement, the infringing item shall, at own cost, be rectified, modified, or replaced so that the infringement ceases, or necessary rights/licences shall be procured from the concerned third party.
- 48.2. Prompt notice shall be given of any such claim. At own cost, negotiations for settlement and any litigation or arbitration arising therefrom shall be undertaken. The Purchaser or the Purchaser's Representative shall not make any admission prejudicial to such defence unless there is failure to assume conduct of negotiations, litigation, or arbitration within a reasonable

time after request. In the event of inaction, the Purchaser shall have full liberty to deduct the claimed amount from any sums due under this or any other contract, and any remaining balance shall be treated as a debt recoverable.

- 48.3. Intellectual Property Rights in any plant, materials, drawings, designs, plans, documents, specifications, data, know-how, charts, or information provided by the Purchaser shall remain the sole property of the Purchaser. Usage rights shall be limited strictly to execution of the Works.
- 48.4. Intellectual Property Rights in any plant, materials, drawings, designs, plans, calculations, documents, know-how, or information proprietary in nature ("Proprietary IPR") shall continue to vest with the respective owner and/or third-party licensors. A worldwide, perpetual, royalty-free, non-exclusive licence (including the right to sub-license) shall be granted and/or procured, at own cost, in favour of the Purchaser for use, operation, maintenance, and repair of the Works.
- 48.5. If any patent, trademark, trade name, registered design, or software is specifically developed for execution of the Works, all Intellectual Property Rights therein shall vest absolutely with the Purchaser and shall not be utilized or retained for any other purpose without prior written consent of the Purchaser.
- 48.6. Where proprietary software (customized or off-the-shelf) is used for storing or utilizing records relating to the Works, a worldwide, perpetual, royalty-free licence or sublicense (including the right to sub-license) shall be obtained at own expense in favour of the Purchaser. Such licence may restrict usage to purposes connected with design, construction, reconstruction, manufacture, installation, completion, reinstatement, extension, repair, and operation of the Works or any part thereof.
- 48.7. Where software used in execution of the Works is subject to pre-existing rights held by any party, a worldwide, perpetual, royalty-free licence shall be obtained in favour of the Purchaser for the right to use and apply such software, including any modifications, improvements, or developments thereof.

49. Vendor Code of Conduct

- 49.1. Seller acknowledges having reviewed the BYPL policy on legal and ethical code required to be followed by Sellers encapsulated in the "Vendor/Supplier Code of Conduct" displayed on the official website of BYPL (www.bsesdelhi.com) also, which shall be treated as a part of the agreement/contract/PO/WO.
- 49.2. Seller undertakes that he shall adhere to the Supplier Code of Conduct and also agrees that any violation of the Supplier Code of Conduct shall be treated as breach of the agreement/contract/PO/WO.
- 49.3. In event of any such breach, irrespective of whether it causes any loss/damage, company (BYPL) shall have the right to recover loss/damage including liquidated damages from Seller.
- 49.4. The Seller hereby indemnifies and agrees to keep indemnified the company (BYPL) against any claim/litigation/liability/penalty including litigation cost arising out of any violation of Supplier Code of Conduct by the Seller or its officers, agents & representatives etc.

50. Limitation of Liability

- 50.1. Except in cases of willful misconduct, fraud, or gross negligence, neither Party shall be liable to the other for loss of use of any works, loss of profit, loss of contracts, or any other indirect or consequential damages arising out of or in connection with the Contract. The total liability under this Contract shall not exceed the Contract Value.

- 50.2. Notwithstanding the above, the limitation of liability shall not apply in the following cases:
- 50.2.1. Fraud, willful misconduct, or unlawful acts
 - 50.2.2. Acts or omissions that violating fundamental rules of diligence expected under similar circumstances
 - 50.2.3. Intellectual property infringement
 - 50.2.4. Breach of confidentiality or data security obligations
 - 50.2.5. Tax and statutory dues liabilities
 - 50.2.6. Recovery of liquidated damages
 - 50.2.7. Third-party death or personal injury

51. Liability of Suppliers/Contractors

- 51.1. Subject to due discharge of obligations under the Contract and except in cases of willful misconduct, fraud, or gross negligence, liability for any loss or damage caused to the Purchaser's property or the Site shall be limited as follows:
- a) No liability shall arise for any indirect or consequential loss or damage; and
 - b) Liability for direct loss or damage shall not exceed:
 - i. The total payments made and expected to be made under the Contract, including reimbursements, if any; or
 - ii. The insurance claim proceeds receivable under any insurance policy obtained to cover such liability, whichever is higher.
- 51.2. This limitation of liability shall not affect the supplier's liability, if any, for damage to third-party property or injury or death of a person due to negligence of the Contractor or any Person or firm acting on behalf of the supplier in executing the order.
- 51.3. Notwithstanding anything contained in the Contract, the Supplier shall not be liable for any gross negligence or willful misconduct on the part of the Purchaser or any of its affiliates, any vendor, or any party, other than Supplier and/or, its directors, officers, agents or representatives or its affiliates, or SubSupplier, or the vendor or any third party engaged by it.
- 51.4. Notwithstanding anything contained in the Contract, including but not limited to approval by the Purchaser of any drawings, documents, vendor list, supply of information or data or the participation of the Purchaser in any meeting and/or discussion or otherwise, shall not absolve the Supplier from any of its liabilities or responsibilities arising in relation to or under the Contract.

52. Indemnification

- 52.1. The Supplier shall indemnify and hold harmless the Company from and against any and all liabilities, claims, damages, losses, or expenses arising out of or resulting from:
- 52.1.1. any breach non-observance or non-performance by Supplier or its employees or agents of any of the provisions of this Work Order.
 - 52.1.2. any act or omission of Supplier or its employees or agents.
 - 52.1.3. any negligence or breach of duty on the part of Supplier, its employees or agents including any wrongful use by it or them of any property or goods belonging to or by COMPANY.
 - 52.1.4. Any damages or loss related to free-issued materials, for which the Supplier shall submit an Indemnity Bond.
- 52.2. The Supplier shall at all times indemnify the Company against all liabilities to third parties, including employees or agents of the Company or the Supplier, for bodily injury, property damage, or any other loss arising out of or in connection with the execution or completion of the Works. This includes all costs, charges, and expenses incurred by the Company due to claims from such persons.

53. Events of Default

- 53.1. Each of the following events or occurrences shall constitute an event of default under the Contract:
- 53.1.1. The Supplier fails or refuses to pay any amounts due under the Contract;
 - 53.1.2. The Supplier fails or refuses to deliver Commodities conforming to this RFQ/specifications, or fails to deliver Commodities within the period specified in P.O. or any valid extension thereof;
 - 53.1.3. The Supplier becomes insolvent or unable to pay its debts when due, or commits any act of bankruptcy, such as filing any petition in any bankruptcy, winding-up or reorganization proceeding, or acknowledges in writing its insolvency or inability to pay its debts; or the Supplier's creditors file any petition relating to bankruptcy of Supplier;
 - 53.1.4. The Supplier fails to complete the works in accordance with the approved schedule of works.
 - 53.1.5. The Supplier fails to comply with any reasonable instructions or directions issued by the Company in connection with the execution of the works.
 - 53.1.6. The Supplier otherwise fails or refuses to perform or observe any term or condition of the Contract and such failure is not remediable or, if remediable, continues for a period of 30 days after receipt by the Supplier of notice of such failure from BYPL specifying the failure.

54. Consequences of Default

- 54.1. If any Event of Default occurs and continues, BYPL may, by written notice, terminate the Contract forthwith.
- 54.2. Upon occurrence of an Event of Default, BYPL may, without prejudice to any other rights or remedies available under law or the Contract, exercise one or more of the following remedies;
- 54.2.1. Invoke and present the Performance Bond for payment;
 - 54.2.2. Procure the same or equivalent Commodities from any third-party source; and/or
 - 54.2.3. Recover from the Supplier any losses, damages, or additional expenses incurred as a result of the Supplier's default.

55. Force Majeure

- 55.1. An "Event of Force Majeure" shall mean any event or circumstance not within the reasonable control directly or indirectly, of the affected Party, but only if and to the extent that:
- 55.1.1. Such event or circumstance materially and adversely affects the ability of the affected Party to perform its obligations under this Contract, and the affected Party has taken all reasonable precautions, due care and reasonable alternative measures to prevent or avoid the effect of such event on the affected party's ability to perform its obligations under this Contract and to mitigate the consequences thereof.
 - 55.1.2. For the avoidance of doubt, if such event or circumstance would not have materially and adversely affected the performance of the affected party had such affected party followed good industry practice, such event or circumstance shall not constitute force majeure.
 - 55.1.3. Such event is not the direct or indirect result of the failure of such Party to perform any of its obligations under this Contract.
 - 55.1.4. Such Party has given the other Party prompt notice describing such events, the effect thereof and the actions being taken to comply with the above clause.

55.2. Specific Events of Force Majeure

- 55.2.1. Subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements:

- 55.2.1.1. Natural elements or other acts of God, such as storms, floods, earthquakes, lightning, cyclones, landslides, or other natural disasters.
- 55.2.1.2. Explosions or fires.
- 55.2.1.3. Epidemics, pandemics, or plagues.
- 55.2.1.4. Declared war by the Government of India.
- 55.2.1.5. Dangers of navigation or perils of the sea.
- 55.2.1.6. Cyber security incidents impacting grid operations.
- 55.2.1.7. Pandemic-related lockdowns.
- 55.2.1.8. Climate change events beyond traditional natural disasters.
- 55.2.1.9. Embargoes.
- 55.2.1.10. Supply chain or industrial disturbances beyond reasonable control.

55.2.2. Note: Force Majeure shall not apply to financial inability, labour shortages, power failures, strikes, accidents, or subsupplier defaults.

55.3. Notice of Events of Force Majeure

- 55.3.1. If a force majeure event prevents a party from performing any obligations under the Contract in part or in full that party shall:
 - 55.3.1.1. Immediately notify the other party in writing of the force majeure events within 7(seven) working days of the occurrence of the force majeure event
 - 55.3.1.2. Be entitled to suspend performance of the obligation under the Contract which is affected by force majeure event for the duration of the force majeure event.
 - 55.3.1.3. Use all reasonable efforts to resume full performance of the obligation as soon as practicable
 - 55.3.1.4. Keep the other party informed of all such efforts to resume full performance of the obligation on a regular basis.
 - 55.3.1.5. Provide prompt notice of the resumption of full performance or obligation to the other party.

55.4. Mitigation of Events of Force Majeure

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

55.5. Burden of Proof

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

55.6. Termination for Certain Events of Force Majeure

55.6.1. If any obligation of any Party under the Contract is or is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 3 months, the Parties shall promptly discuss in good faith how to proceed with a view to reaching a solution on mutually agreed basis. If a solution on mutually agreed basis cannot be arrived at within a period of 30 days after the expiry of the period of three months, the Contract shall be terminated after the said period of 30 days and neither Party shall be liable to the other for any consequences arising on account of such termination.

55.6.2. The Purchaser may terminate the contract after giving 7 (seven) days' notice if any of the following occurs:

55.6.2.1. Supplier fails to complete the execution of works within the approved schedule of works, terms and conditions.

55.6.2.2. In case the Supplier commits any Act of Insolvency, or is adjudged insolvent

55.6.2.3. Has abandoned the contract

55.6.2.4. Has failed to commence work or has suspended the progress of works

55.6.2.5. Has failed to proceed with the works with due diligence and failed to make such due progress

55.7. Limitation of Force Majeure event

55.7.1. The Supplier shall not be relieved of any obligation under the Contract solely because the cost of performance is increased, whether as a consequence of adverse economic consequences or otherwise.

55.8. Extension of Contract Period due to Force Majeure event

55.8.1. The Contract period may be extended by mutual agreement of Parties by way of an adjustment on account of any period during which an obligation of either Party is suspended due to a Force Majeure event.

55.9. Effect of Events of Force Majeure

55.9.1. Except as otherwise provided herein or may further be agreed between the Parties, either Party shall be excused from performance and neither Party shall be construed to be in default in respect of any obligations hereunder, for so long as the failure to perform such obligations shall be due to an event of "Force Majeure".

56. Suspension or Extension

56.1. The Purchaser reserves the right to suspend or reinstate execution of the whole or any part of the Works without affecting the validity of the Contract provisions. Any orders for suspension or reinstatement shall be provided to the Supplier in writing. The completion time for the Works will be extended by a period equivalent to the duration of the suspension.

56.2. For any aggregate suspension period less than six (6) months, the Supplier shall not be entitled to claim reimbursement. If the suspension of the Works extends beyond six (6) months, the Purchaser will reimburse the Supplier only for necessary and demonstrable direct costs incurred, subject to satisfactory substantiation. Overheads, incidentals, and profit shall not be considered. The Purchaser's decision regarding such claims will be final and binding. The Purchaser shall bear no liability for suspension or delay arising from any default on the part of the Supplier or its sub-Suppliers; the Purchaser's decision in this respect shall also be final and binding.

57. Protection of Property

57.1. The Contractor shall be fully responsible for any damage caused by its operations. The Contractor shall ensure the protection of all persons, including members of the public, employees of the Purchaser, employees of the Contractor and subcontractors, and safeguard all public and private property, including structures, buildings, plants, equipment, and utilities-whether located above or below ground.

57.2. The Contractor shall provide and maintain all necessary safety measures, such as barriers, signboards, warning lights, and alarms, to ensure adequate protection of persons and property. The Contractor shall give reasonable notice to the Purchaser and any affected parties regarding public or private property and utilities that may be subject to damage during the execution of the works, and shall coordinate all necessary arrangements for the removal, replacement, or protection of such property and utilities with the concerned authorities.

58. Severability

58.1. If any provision of this Agreement is found to be invalid, illegal, or unenforceable by a court of competent jurisdiction, such invalidity or unenforceability shall not affect the remaining provisions of the Agreement, which shall continue to be valid and enforceable to the fullest extent permitted by law.

59. Waiver of Rights

59.1. No failure or delay by either Party in enforcing any provision of this Agreement shall be deemed a waiver of that provision or of any subsequent breach. Any waiver granted must be expressly made in writing and shall apply only to the specific instance and shall not constitute a waiver of any other rights or breaches occurring thereafter.

60. Patent Rights and Royalty

60.1. In the event that the Supplier, during the course of performing its obligations under this GCC, acquires, invents, or develops any proprietary knowledge, information, process, or invention which qualifies, or may qualify, as a trademark, copyright, patent, trade secret, geographical indication, or any other intellectual property right, the Supplier shall promptly disclose such creation to BYPL. All title, interest, and rights to such intellectual property shall vest exclusively in BYPL, and the Supplier shall execute all documents necessary to ensure BYPL's sole ownership without delay.

60.2. The Supplier warrants that, in performing its obligations, no intellectual property rights of any third party shall be infringed, whether by violation of statute, passing off, or otherwise. The Supplier shall bear sole responsibility for any infringement claims, and shall fully indemnify and hold BYPL harmless from and against any and all losses, damages, liabilities, costs, or expenses (including reasonable legal fees) incurred as a result of any such infringement. Any compensation, damages, or expenses paid by BYPL to third parties in connection with such infringement shall be recoverable in full from the Supplier.

61. Confidentiality/Secrecy

61.1. The Supplier shall not, without the Company's prior written consent, disseminate, publish, or otherwise utilize in any form of advertising, publicity, sales release, or media any photograph, reproduction, or description of the Items/Works under this Contract, nor disclose the site details, dimensions, quantities, or other related information concerning the Items/Works.

61.2. The Supplier, along with its employees and representatives, shall maintain strict confidentiality regarding all information encountered in the execution of the Contract, as detailed below.

61.2.1. Documents: All maps, plans, drawings, specifications, schemes, and other documents or information related to the Contract/Project, including any material supplied to the Supplier by BYPL for contract execution, shall be treated as

confidential and remain the property of BYPL. Such documents shall be used solely for purposes of the Contract and shall not be disclosed or used for any other purpose. Disclosure to third parties is permitted solely where such disclosure is necessary for the execution of the Work, and only upon the third party's execution of a confidentiality agreement acceptable to BYPL, explicitly committing to uphold confidentiality obligations equivalent to those set forth herein.

61.2.2. Geographical Data: Maps, layouts, site photographs, and regional imagery depicting installations of national or BYPL significance shall not be published, disclosed, or exported without BYPL's prior written approval. Any necessary disclosure to third parties shall be subject to confidentiality agreements satisfactory to BYPL, executed prior to disclosure.

61.2.3. Violation: In the event of any breach of these confidentiality provisions, the Supplier shall indemnify and hold the Company harmless from any loss, cost, damage, or claim (including claims asserted by third parties) arising as a result of such breach. Any actual or suspected data breach or cyber incident must be promptly notified to BYPL and investigated at the Supplier's expense.

61.3. Furthermore, the Supplier shall be liable for compensation or damages as determined by the competent authority of BYPL.

62. Progress Reports of Work Execution and Information

62.1. Throughout the manufacturing and dispatch stages of the Items/Equipment under this Contract, periodic progress reports shall be submitted at own cost, as reasonably required by the Purchaser. Such reports shall include relevant supporting documents such as production schedules, inspection status, test certificates, photographs of critical manufacturing stages, and dispatch details. The format, content, and number of copies of such reports shall be as specified by the Purchaser.

62.2. Quantitative progress reports shall be aligned with the agreed delivery schedule and shall provide sufficient detail to enable the Purchaser to assess manufacturing progress, plan inspections/witness dates, and review dispatch forecasts, including status of key bought-out components, wherever applicable. Review meetings may be convened within seven (7) days of report submission, or at other times as reasonably required by the Purchaser, to discuss progress.

62.3. Weekly or periodic progress reports (as applicable) shall include, but not be limited to:

62.3.1. Executive summary of manufacturing and supply status.

62.3.2. Description of manufacturing activities completed during the reporting period and materials/components procured.

62.3.3. Photographs of critical stages of manufacture and testing, as and when required by the Purchaser, clearly indicating date, description, and stage of manufacture.

62.3.4. Updated delivery schedule showing percentage completion against milestones, planned inspection dates, and dispatch targets for the subsequent period.

62.3.5. Identification of any anticipated delays or constraints that may impact manufacturing or delivery schedules.

62.3.6. Any other information or supporting documentation reasonably required to verify timely manufacture, inspection, testing, and delivery in accordance with the Contract.

62.4. The Purchaser shall specify the number of copies (hard/soft) of progress reports to be submitted and, where relevant, the communication matrix indicating recipients. The format of monthly progress reports shall also be communicated by the Purchaser.

62.5. In addition to the above, all reports, records, and information as may be requested shall be furnished promptly in the format and frequency prescribed. The Purchaser reserves the right

to revise reporting requirements, and compliance with such revised obligations shall be ensured.

63. Dispute Resolution & Arbitration

- 63.1. The Parties shall make all reasonable efforts to resolve amicably, through mutual discussions, any disputes or differences arising out of or in connection with this Contract. In the event that such disputes remain unresolved for thirty (30) days from the date either Party notifies the other in writing of the dispute, either Party may refer the matter to arbitration.
- 63.2. Arbitration shall be conducted by a tribunal comprising two arbitrators - one to be appointed by each Party. The two arbitrators thus appointed shall mutually select a third individual to act as the presiding arbitrator prior to entering upon reference, if and when required. The arbitration proceedings shall be undertaken in accordance with the provisions of the Indian Arbitration and Conciliation Act, 1996 or its amendments. The seat and venue of arbitration shall be New Delhi, India. The language of all proceedings, documents, and communications shall be English. The arbitral process shall be completed within a maximum period of three (3) months from constitution of the arbitral tribunal.
- 63.3. Reference to negotiation and/or arbitration may proceed regardless of whether the Supply/Works have been completed, provided that the contractual obligations of both the Purchaser and the Supplier shall remain unaffected during pendency of arbitration. Under no circumstances shall the Supplier suspend execution of the Supply/Works, in whole or in part, on account of ongoing arbitration. Payments due to the Supplier shall continue to be made as per the terms of the Contract.
- 63.4. All disputes arising out of or in relation to this Contract that require recourse to judicial proceedings shall be subject to the exclusive jurisdiction of the courts at Delhi, India.

64. Termination for convenience of Purchaser

- 64.1. Purchaser at its sole discretion may terminate the contract by giving 30 days prior notice in writing or through email to the Supplier. Purchaser shall pay the Supplier for all the supplies/ services rendered till the actual date of contract termination against submission of invoice by the Supplier to that effect.
- 64.2. Payment of such compensation is the sole and exclusive remedy of the Supplier for termination of this Agreement by Purchaser hereunder and the Supplier shall not be entitled to, and hereby waives, claims for lost profits and all other damages and expenses.
- 64.3. Supplier hereby agrees that substantiation for settlement of any claims submitted by Supplier shall be complete and in sufficient detail to allow Purchaser's evaluation. Terminate all sub-contracts except those that have been/ to be assigned to the Purchaser all rights, titles and benefits of the Suppliers/Vendor as the case may be.

65. Commissioning & Acceptance Test

- 65.1. After completion of the work, the Contractor shall conduct trial run/ operation in the presence of the Engineer In charge. During such trial run the system shall be operated under the supervision of the Contractor. If any rectification/modification is required during this period the Contractor shall do all necessary measures.
- 65.2. On satisfactory completion of the above, the system shall be deemed to have energized and placed in commercial operation. The Engineer In Charge will issue an acceptance certificate.

66. Work Completion Certification, Handing Over

GENERAL CONDITIONS OF CONTRACT (GCC) NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 27 of 37	Bidders seal & Signature
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- 66.1. The work carried out by the Contractor under this order has to be certified by Engineer In-charge for satisfactory completion of work allotted to the contractor with respect to specifications / Field Quality Procedures as per applicable standards. In case of modification/correction to be carried out, contractor shall carry out the said modifications/correction without additional cost. The Contractor shall remain in close contact with Engineer In-Charge at site to report the general findings of the fieldwork during the initial as well as later stages of the work at the site.

67. Safety Code

- 67.1. The Contractor shall ensure adequate safety precautions at site as required under the law of the land and shall be entirely responsible for the complete safety of their workman as well as other workers at site and premises. The contractor shall not deploy any worker below the age of 18 years.
- 67.2. Safety-related requirements as mentioned in our safety Manual put on the Company's website which can be accessed at <https://www.bsedelhi.com>.
- 67.3. All contractors shall strictly abide by the guidelines provided in the safety manual at all relevant stages during the contract period.
- 67.4. The contractor shall observe the safety requirements as laid down in the safety manual/contract and in case of sub-contract (only after written approval of company), it shall be the responsibility of main contractor that all safety requirements are followed by the employees and staff of the sub-contractor.
- 67.5. The contractor employing two hundred employees or more, including contract workers, shall have a safety coordinator to ensure the implementation of safety requirements of the contract and a contractor with lesser number of employees, including contract workers, shall nominate one of his employees to act as safety co-ordinator who shall liaise with the safety officer on matters relating to safety and his name shall be displayed on the notice board at a prominent place at the work site.
- 67.6. The contractor shall be responsible for non-compliance of the safety measures, implications, injuries, fatalities and compensation arising out of such situations or incidents.
- 67.7. In case of any accident, the contractor shall immediately submit a statement of the same to the owner and the safety officer, containing the details of the accident, any injury or casualties, the extent of property damage and remedial action is taken to prevent recurrence and in addition, the contractor shall submit a monthly statement of the accidents to the owner at the end of each month.

68. Statutory Obligations

- 68.1. The Contractor shall take all steps as may be necessary to comply with various Acts, Rules, including but not limited to The Child Labour (Prohibition & Regulation) Act, 1986, The Contract Labour (Regulation & Abolition) Act, 1970. The Employees Pension Scheme, The Employees Provident Funds and miscellaneous provisions Act, 1952, The Employees State Insurance Act, 1948, The Equal Remuneration Act, The Industrial Dispute 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, The Workmen's Compensation Act, 1923, Building and Other Construction Workers (Employment and Regulations) Act 1996, Building and Other Construction Workers (Cess) Act 1996, The Employers Liability Act, 1938, Indian Electricity Act, 2003 and Indian Electricity Rules, VAT and Service tax etc., and all other applicable laws as amended and rules framed there under including any statutory approval required from the Central/State Govt. Ministry of Labour. Broadly, the compliance shall be as detailed below, but not limited to:

- a) An Electrical license.
- b) PF Code No. and all employees to have PF A/c No. under PF every Act, 1952.
- c) All employees to have a temporary or permanent ESI Card as per ESI Act.
- d) ESI Registration No.
- e) Sales Tax registration number, if applicable.
- f) PAN No.
- g) Work Contract Tax Registration Number/ VAT Registration.
- h) Labour License under Contract Labour Act (R & A) Act 1970. (Bidder responsible for execution of the job should obtain a copy of Labour License before start of the work by the contractor.)
- i) Delhi Building and Other Construction Worker (Regulation of Employment and Conditions of Services) Rules, 2002(B.O.C.W.)
- j) The Contractor must follow:
 - a) Third party Insurance Policy before start of work.
 - b) To follow Minimum Wages Act prevailing in the state.
 - c) The Salary/wages to all deployed manpower is to be distributed through ECS only into the bank accounts of all individuals and not later than 7th of succeeding month. In case of unavoidable circumstances the payment may be made through crossed cheques in the name of the individual and information of all such cases need to be submitted to HR(CMC).
 - d) To maintain Wage- cum - Attendance Register.
 - e) To maintain First Aid Box at Site.
 - f) Latest P.F. and E.S.I. challans pertaining to the period in which work was undertaken along with a certificate mentioning that P.F. and E.S.I. applicable to all the employees has been deducted and deposited with the Authorities within the time limits specified under the respective Acts. (Before commencing the work it would be mandatory for the Contractor to furnish the Company the permanent PF code no and ESI of the employees.)
 - g) Workman Compensation Policy. {If applicable}.
 - h) Labour license before start of work. {If applicable}.

69. Workman Compensation

- 69.1. The Contactor shall take insurance policy under the Workman Compensation Act to cover such workers who are not covered under ESI and PF by the Contractor however engaged to undertake the jobs covered under this order and a copy of this insurance policy will be given to Company for reference and records. This insurance policy shall be kept valid at all times. In case there are no worker involve other than those who are covered under ESI and PF by the Contractor, the Contractor shall certify for the same.
- 69.2. The contractor shall keep the company indemnified at all times, against all claims of compensation under the provision of Workmen Compensation Act 1923 and as amended from time to time or any compensation payable under any other law for the time being workman engaged by the contractor/sub-contractor/sub-agent in carrying out the job involved under this work order and against costs and expenses, if any, incurred by the company in connection therewith and without prejudice to make any recovery.
- 69.3. The company shall be entitled to deduct from any money due to or to become due to the Contractor, moneys paid or payable by way of compensation as aforesaid or cost or expenses in connection with any claims thereto and the Contractor shall abide by the decision of the Company as to the sum payable by the Contractor under the provisions of this clause.

70. Staff And Workman

- 70.1. It shall be the responsibility of the Contractor to:

GENERAL CONDITIONS OF CONTRACT (GCC) NIT NO: CMC/BY/26-27/RB/SkS/SV/25 [RFx Number: 2200000239]	Page 29 of 37	Bidders seal & Signature
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- 70.1.1. Obtain the necessary Contract Labour License from the relevant authorities and maintain liaison with them. The Company shall provide required forms for obtaining such licenses. However, the Contractor shall bear all associated expenses, including registration with the Provident Fund Department relevant to the scope of work. The Contractor shall ensure monthly PF deposits for all staff and labor and furnish all related documentation to the Company.
- 70.1.2. Obtain and maintain workman insurance coverage for all deployed workers.
- 70.1.3. Maintain proper records for all employed workers in the form of various registers, including but not limited to:
 - 70.1.3.1. Register of workmen
 - 70.1.3.2. Register of muster rolls
 - 70.1.3.3. Register of overtime
 - 70.1.3.4. Register of wages
 - 70.1.3.5. Any other registers required by the latest amendments to labour laws
- 70.1.4. Maintain all records in the prescribed formats.
- 70.1.5. Disburse monthly wages to workers and supervisors promptly and in the presence of Company representatives or as directed by labour authorities.
- 70.1.6. Maintain proper liaison with Project authorities, local police, and all other relevant governmental or local bodies.
- 70.1.7. Pay all workmen no less than the minimum wages prescribed under applicable State or Central labour laws. The Contractor shall ensure full compliance with the Minimum Wages Act, PF Act, ESIC Act, Workmen Compensation Act, Contract Labour Regulation and Abolition Act, and all related rules. In case of statutory non-compliance, the Company reserves the right to act at the risk and cost of the Contractor.
- 70.1.8. Employ the required number of skilled, semi-skilled, and unskilled workers as per site requirements to complete the project on schedule. The Contractor shall provide necessary safety equipment such as safety shoes, helmets, belts, and gloves to all workers and staff during erection and other works.
- 70.1.9. Employ adequate engineering and supervisory staff to ensure timely project completion. The day-to-day management and supervision of site works shall be the responsibility of the Contractor's Engineer-in-Charge, who will report to the Company's Engineer-in-Charge and assist in overall project execution.

71. Third Party Insurance

- 71.1. Before commencing the execution of the work the Bidder shall take third party insurance policy to insure against any damage or loss or injury which may occur to any property / public property or to any person or any employee or representative of any outside Agency/ the company engaged or not engaged for the work of the company, by or arising out of the execution of the work or temporary work or in carrying out of this Agreement. For third party insurance policies, the Bidder shall be responsible for settlement of claims with the underwriters without any liability on the purchaser / owner and will arrange replacements / rectification expeditiously without a waiting settlement by insurance claim at Bidder's own cost.

72. Environmental, Health & Safety Plan

- 72.1. Contractor will make ensure that the Environment, Health & Safety (EHS) requirements are clearly understood and faithfully implemented at all levels at site as per instruction of Company. Contractors must comply with these requirements:
 - a) Comply with all of the elements of the EHS Plan and any regulations applicable to the work.
 - b) Comply with the procedures provided in the interests of Environment, Health and Safety.
 - c) Ensure that all of their employees designated to work are properly trained and competent.

- d) Ensure that all plant and equipment they bring on to site has been inspected and serviced in accordance with legal requirement and manufacturer's or suppliers' instructions.
- e) Make arrangements to ensure that all employees designated to work on or visit the site present themselves for site induction before the commencement of work.
- f) Provide details of any hazardous substances to be brought onsite.
- g) Ensure that a responsible person accompanies any of their visitors to site.

All contractor's staff are accountable for the following:

1. Use the correct tools and equipment for the job and use safety equipment and protective clothing supplied, e.g. helmets, goggles, ear protection, etc. as instructed.
2. Keep tools in good condition.
3. Report to the Supervisor any unsafe or unhealthy condition or any defects in plant or equipment.
4. Develop a concern for safety for themselves and for others.
5. Prohibit horseplay.
6. Not to operate any item of plant unless they have been specifically trained and are authorized to do so.

73. Test Certificate & Quality Assurance

- 73.1. The Contractor shall procure all equipment from genuine sources as approved by the Company and as per Company specifications. The Contractor shall submit all the test certificates and joint inspection reports related to major equipment wherever applicable. The contractor shall ensure for the strict compliance with the specifications and Field Quality Procedures issued by company / Engineer in-charge.

74. Guidelines Regarding Inspection & Maintenance of Pits/Dugs

- 74.1. The contractor shall ensure strict compliance of the following directions:
 - 74.1.1. The sites of all manholes, pits, holes, tanks or any other opening in the ground of any kind shall be regularly inspected and maintained.
 - 74.1.2. Schedule and protocols of inspections and maintenance shall be drawn up and notified to BYPL.
 - 74.1.3. These sites shall be cordoned off to render them inaccessible to the public.
 - 74.1.4. The existence of these sites shall be clearly & visibly marked by the display of signboards/ signages.
 - 74.1.5. If they are required to be covered, it shall be ensured that the covers are in place.
 - 74.1.6. If required, as per law, prior permission from authorities shall be secured before the commencement of work.
 - 74.1.7. Bidder shall follow all laws of the land and prevailing borders issued by various Govt departments like Dept of Power / DERC /NGT/ Dept of Forest/Dept of Environment/DPCB/Court Orders etc.

75. Measures Related To the Tree Pruning, Excavation near Tree and Construction & Demolition

- 75.1. Notwithstanding anything stated in the tender document, work contract or any other communication issued related to the performance of the work order awarded, it is clarified that the vendor and its associate/employees/worker, during the performance of work under this tender, shall ensure full compliance of the provisions of all environment laws/rules/directions by any authority including judicial authority/ regulation related to excavation near tree and construction & demolition activity, and shall mandatorily comply the following instructions:

A. Tree Pruning, Planning, Installation and Maintenance of Utility Apparatus in proximity to trees shall be done mandatorily by ensuring the following prescribed measures:

- 1) No excavation work shall be done within two (2) meters of the Tree Trunk.
- 2) Any exposed roots beyond 2 meters of the tree trunk, should be protected with dry sacking and backfilling must be done with a suitable manure mixture and/or the compost material mix as soon as possible on the completion of the works.
- 3) For any excavation to be carried out beyond the **prescribed distance of 2 meters but within 3 meter** from the tree trunk, **manual methods (by use of hand)** or by using trenchless techniques shall be preferred over use of a mechanical excavation.
- 4) No roots shall be cut during the excavation work.
- 5) Not to lean any materials against or chain mechanical plants to the trunk of the trees.
- 6) Avoid any soil contamination from oil, gasoline, paint and paint thinner or other chemicals.
- 7) No concrete or construction or repairing work shall be done at least within two (2) meter radius of the trunk of trees.
- 8) All the electric wires and high tension cables and other apparatus relating to supply of electricity shall permanently be removed from the trees branches.

Records to be maintained by the supervisor to demonstrate adherence to the guidelines for excavation in Proximity to the Trees:

- 1) Ensure pre and post photography and videography of the site demarcated for the excavation work and the same shall not be deleted/removed until securing the prior permission of the Circle head O&M.
- 2) While digging and upon exposure to the roots– take immediate photographs of the same and report the matter to senior officers for further guidance.
If any unauthorized layering of other cables is being carried out at the digging site by some other agency/person, then immediately capture photographs of the same and inform the seniors, who shall take suitable legal actions, if required, which includes intimating to tree officer about such unauthorized laying of wires by such agency.

B. DUST MITIGATION MEASURES FOR CONSTRUCTION & DEMOLITION ACTIVITIES

Any construction/demolition/excavation related activity performed in furtherance of the performance of work under award, be undertaken only after ensuring the Dust Mitigation Measures prescribed as follows:

- 1) Dust/wind breaking walls of appropriate height around the periphery of the construction site.
- 2) Installation of Anti Smog Gun(s) (for >20,000 m2 built up area).
- 3) Tarpaulin or green net on scaffolding around the area under-construction and the building.
- 4) All vehicles including carrying construction material and construction debris of any kind should be cleaned and wheels washed.
- 5) All vehicles carrying construction material and construction debris should be fully covered and protected.
- 6) All construction debris and construction material of any kind should be stored on the site and not dumped on public roads or pavements.
- 7) No loose soil or sand or Construction & Demolition Waste or any other construction material which may cause dust, shall not be left uncovered.

- 8) No grinding and cutting of building materials in open area. Wet jet should be used in grinding and stone cutting.
- 9) Unpaved surfaces and areas with loose soil should be adequately sprinkled with water to suppress dust.
- 10) Roads leading to or at construction sites must be paved and blacktopped i.e., metallic roads (for >20,000 m² built up area).
- 11) Construction and demolition waste should be recycled on-site or transported to authorized recycling facility and due record of the same should be maintained.
- 12) Every worker working on construction site and is involved in loading, unloading and carriage of construction material and construction debris should be provided with dust-mask to prevent inhalation of dust particle.
- 13) Arrangement should be provided for medical help, investigation and treatment to workers involved in the construction of building and carry of construction material and debris relatable to dust emission.
- 14) Dust mitigation measures shall be displayed prominently at the construction site for easy public viewing.
- 15) Ensure the compliance of all dust control measure.

It is clarified that BYPL has zero tolerance with respect to the non-compliance/breach of environment laws/rules/directions by any authority including judicial authority/ regulation. Accordingly, in case of breach by the vendor/its associate/employee/worker to the laws/rules as detailed above, shall be termed as serious breach to the terms of work order and BYPL shall be free to take all actions against vendor for such breach of contract including the termination of the said contract. Additionally, the vendor shall also be liable to indemnify BYPL/its Directors/Officers/Employees/Associates in full including the payment of all loss/penalties/compensation including environment compensation as imposed by any judicial/quasi-judicial citing/alleging such breach.

The vendor shall also be under a mandate to provide an Undertaking to BYPL, which includes that the excavation, tree pruning, construction and demolition work, if performed by such vendor, the same shall be in strict adherence of all environment laws/rules/directions by any authority including judicial authority/ regulation and all the measures provided in work order/tender under the head/title **"Measures related to the Tree Pruning, excavation near tree and construction & demolition"**.

76. Construction & Demolition (C&D) Waste Management

- 76.1. The Contractor shall comply with the provisions of the Environment (Construction and Demolition) Waste Management Rules, 2025, as amended from time to time, and all applicable orders, guidelines, circulars and directions issued by MoEF&CC, CPCB, DPCC/SPCB, Urban Local Bodies, Development Authorities and other statutory authorities during the currency of the contract.
- 76.2. This clause shall be applicable to all activities covered under the contract including construction, dismantling, demolition, excavation, trenching, cable laying, pole foundation works, substation civil works, road cutting/restoration, renovation, repair, reconstruction and all other allied civil and utility works executed under the contract.
- 76.3. The contractor shall be solely responsible for:
 - a) Collection, segregation, storage, transportation, recycling, reuse, and scientific disposal of all construction and demolition waste generated during execution of the work.

- b) Ensuring that no C&D waste/debris is dumped on roads, drains, vacant land, public places, or unauthorized locations.
- c) Disposal of waste only at authorized collection centres, recycling plants, or designated disposal facilities approved by the concerned local authority/municipal body.
- d) Compliance with all statutory requirements related to dust mitigation, transportation, environmental protection, and waste tracking/documentation.
- e) Obtaining necessary permissions/approvals, maintaining disposal records/receipts, and producing the same to the Employer/Engineer-in-Charge whenever required.

76.4. The Contractor shall maximize the use of recycled C&D products/materials, wherever technically feasible and approved by the Engineer-in-Charge, in line with the provisions of the C&D Waste Management Rules, 2025 and Government directions issued from time to time. Such usage may include non-structural and allied applications such as backfilling, road restoration, paving blocks, kerbs, sub-base materials, bedding and similar works.

76.5. The Contractor shall maintain complete records regarding:

- a) quantity of C&D waste generated;
- b) transportation and disposal details;
- c) weighbridge slips/challans;
- d) recycling/disposal certificates;
- e) invoices and proof of procurement/use of recycled C&D materials;
- f) reconciliation statements for waste generated and disposed/recycled.

76.6. The above records/documents shall be submitted along with each Running Account (RA) Bill and Final Bill. The Employer reserves the right to withhold payment in the absence of satisfactory documentary proof regarding disposal/recycling/utilization of C&D waste and recycled products.

76.7. The Contractor shall comply with all dust mitigation, environmental protection and safety requirements during handling, transportation and disposal of C&D waste and shall ensure that no public nuisance or environmental hazard is caused during execution of the work.

76.8. Any environmental compensation, penalty, damages, prosecution, cost or liability imposed by any statutory authority due to non-compliance of C&D Waste Management Rules or improper disposal/handling of waste shall be borne solely by the Contractor. The same shall be recoverable from the Contractor's pending bills/security deposit/other dues without prejudice to any other contractual or legal remedy available to the Employer.

76.9. The Contractor shall comply with all instructions issued by the Employer/Engineer-in-Charge from time to time regarding implementation, monitoring and reporting of C&D waste management requirements under this contract.

77. Work Completion Certification, Handing Over

77.1. The work carried out by the Contractor under this order has to be certified by Engineer In-charge for satisfactory completion of work allotted to the contractor with respect to specifications / Field Quality Procedures as per applicable standards. In case of modification/correction to be carried out, contractor shall carry out the said modifications/correction without additional cost. The Contractor shall remain in close contact with Engineer In-Charge at site to report the general findings of the fieldwork during the initial as well as later stage of the work at site.

77.2. Upon the successful completion of all testing and commissioning of the items and works under the package, and subject to the Purchaser's/Owner's satisfaction, the Purchaser shall issue a "Taking Over Certificate" to the Contractor. This certificate shall serve as the final acceptance of the package and shall only be issued after the Purchaser receives the corresponding certificate from the Owner.

78. Cleanliness & Precautions at Site

- 78.1. All debris shall be removed and disposed of at assigned areas on daily basis. Surplus excavated earth shall be disposed of in an approved manner. In short, the contractor shall be fully responsible for keeping the work site clean at all times. In case of non-compliance, company shall get the same done at Contractor's risk and costs.
- 78.2. While carrying out any civil work including road/ pit digging, plinth/ fence making, road restoration etc. contractor shall adhere to below mentioned guidelines:
- 78.2.1. No construction material/ debris shall be stored on metalled road.
 - 78.2.2. Windbreakers of appropriate height on all sides of earmarked area using CGI sheets shall be raised to ensure that no construction material dust fly outside earmarked area.
 - 78.2.3. The construction material i.e. coarse sand, stone aggregates, excavated earth, cement and any other material to and from the site shall be transported under wet and covered condition to ensure their non-slippage en-route to avoid air contamination.
 - 78.2.4. The contractor shall provide mask and helmet to every worker working on the construction site and involved in loading/unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.
 - 78.2.5. Overloading of vehicles shall be strictly prohibited.
 - 78.2.6. The construction material at site shall be stored under wet and covered conditions.
 - 78.2.7. The dumping sites for temporarily storing the excavated earth shall be properly levelled, watered and rehabilitated by plantation to avoid flying of dust.
 - 78.2.8. The worker at the site shall be sensitized to adopt/observe the dust-controlled measures in true spirit.
 - 78.2.9. If any C&D waste is generated at site the same will be transported to the C&D waste site only and the record for the same will be maintained by the agency.
 - 78.2.10. Wet jet in grinding and stone cutting is being permitted at site.
 - 78.2.11. The necessary record for dust control is being maintained by the department on day to day basis and being monitored regularly.
 - 78.2.12. Bidder shall ensure that no tree shall be harmed and no tree roots shall be destroyed/cut while performing the task under contract.
 - 78.2.13. Contractor shall comply the provisions of The Delhi Preservation of Trees Act 1994.
 - 78.2.14. The Execution Contractors shall be responsible for all the preventive and protective environmental steps as per guidelines. Any violations from the above guidelines have been viewed very seriously by the authorities. Concerned agency is liable for the penalties / other actions by the authorities, The Agency shall indemnify BYPL from all liabilities on this account.

79. Entire Agreement & Amendment

- 79.1. This Agreement constitutes the entire understanding between BYPL and the Supplier regarding the subject matter herein and supersedes all prior agreements, whether written or oral, that relate to such matters. Any modification, amendment, or alteration to this Agreement shall be valid only if documented in writing and duly executed by authorized representatives of both BYPL and the Supplier.

80. Notice & Communication

- 80.1. Any notice or other formal communication under this Agreement shall be in writing, signed by or on behalf of the party issuing it, and shall be sent by registered post with acknowledgement due (A.D.) to the addresses of the Supplier or BYPL as stated herein, or to such other addresses as may be mutually agreed upon in writing by the Parties from time to time.

- 80.2. Notices and formal communications may also be transmitted via the official email addresses of the authorized representatives of the Supplier or BYPL. Such electronic communications shall be deemed duly delivered upon successful transmission and acknowledgement by the recipient.
- 80.3. All communications, correspondence, and documentation pertaining to the Purchase Order shall be directed strictly as specified in this Agreement.

81. Acceptance

- 81.1. The Supplier hereby acknowledges and confirms review of BYPL's Policy on legal and ethical standards for Suppliers, as set forth in the "Vendor/Supplier Code of Conduct" displayed on BYPL's official website (www.bsesdelhi.com). The Supplier agrees that the Supplier Code of Conduct shall form an integral part of the Contract, Purchase Order (PO), or Work Order (WO). The Supplier undertakes to fully comply with the Vendor/Supplier Code of Conduct, and acknowledges that any violation shall constitute a breach of the Contract/PO/WO. In the event of such breach, whether or not it causes any actual loss or damage, BYPL reserves the right to recover any loss or damage from the Supplier. The Supplier shall indemnify and hold harmless BYPL against any claims, litigation, or other consequences arising out of any breach or violation of the Supplier Code of Conduct by the Supplier, its officers, agents, or representatives.
- 81.2. Acceptance of the Contract includes acceptance of all terms and conditions referenced therein, including technical specifications, drawings, general conditions, detailed scope of supply/work, and any equipment drawings provided to the Supplier.
- 81.3. The contractual obligations of BYPL and the Supplier are strictly limited to the terms and conditions set forth in the Contract. No amendment, modification, or alteration to the Contract shall be valid unless made in writing and signed by authorized representatives of both Parties.
- 81.4. All services and supplies under this Contract are expected to be fully aligned with BYPL's Vision, Mission, and Values. These can be reviewed at <https://www.bsesdelhi.com/web/bypl/about-bses>.

QUANTITY AND DELIVERY REQUIREMENTS

Sl. No.	BYPL SAP Code	Item Description	Specification	Total Qty. (Nos)	Tentative Completion Schedule	Destination
1	-	Supply, Installation, Testing & Commissioning of 11kV Smart Packaged Substation with Oil/Dry Type Transformer of Various Types	SP-PSSE-216-R0 – 11 kV Oil Type Smart Package Substation & BSES-TS-122-SPSS-R0 – 11 KV Dry type Smart Packaged Substation	4	To be completed within 06 Months from the LOI/PO date.	BYPL Sites Delhi

The delivery schedule shown above is tentative. PO(s) will be released as per the actual requirement. However, the Supplier has to deliver the material within the delivery schedule provided.

Schemes may be executed in a phased manner.

**ENVIRONMENT, HEALTH & SAFETY CONDITIONS FOR SCHEME BASED CONTRACTS/
SERVICE LEVEL AGREEMENTS INVOLVING SITE WORK**

1. General Requirements

- 1.1 The contractor shall ensure that safety of all the workers, materials, Installation and equipments belonging to him or to others and working at the site is ensured through effective and practicable safety management systems.
- 1.2 The contractor shall be responsible for compliance to provisions of all safety requirements under various notices, acts, rules and relevant applicable legislations.
- 1.3 The contractors shall comply with all health & safety requirements as deemed necessary by BYPL from time to time.
- 1.4 Works shall be carried out by the contractor after taking necessary "Permit to work". Also the work shall not be carried out without use of Protective equipments like shoes, safety belts, helmets etc. adhering to safety compliance.
- 1.5 All the equipments being used shall be timely calibrated.

2. QEHS Policy

The contractor as per requirement of CEA Measures Relating to Safety and Electric Supply Regulations, 2010 shall follow the Quality, Environment, Health & Safety Policy of BYPL. The contractor shall implement quality, health & safety management systems in accordance to BYPL EHS policy and ensure that intentions of such policy are met.

3. Health & Safety Plan

3.1 The contractor shall document a detailed and comprehensive Contract specific health & safety plan incorporating HIRA (Hazard Identification & Risk Analysis) to BYPL. This plan shall necessarily include detailed policies, procedures, method statement for each activity to be performed and regulations which, when implemented, will ensure compliance of the contract provisions stated herewith.

3.2 The contractor shall provide health & safety plan for such activities required to be carried out under the awarded contract as deemed necessary by BYPL.

4. EHS Organization & Responsibility

4.1 The contractor supervisor will play the role of safety supervisor. The safety supervisor shall hold a diploma degree from a recognized institute or university as per CEA Regulations, 2010. Also simultaneously contractor has to ensure their competency in safety or EHS with 40 hours training from reputed agency (like RLI/Allied Boston/ National Safety Council) or trainer, which should be verified earlier by BYPL safety department accordingly. 4.2 The training certificate should not be more than one year old.

4.3 Apart from above, as an owner of the company the contractor & their other key persons are also responsible for safety compliance and related issues.

5. First Day at Work –Induction Training and Issuance of ID-Card

5.1 The contractor shall ensure that all his workers have undergone the safety induction and have been issued with a valid ID card prior to start work at BYPL site.

5.2 All contractor workers shall undergo above as per the BYPL site specific procedure issued from time to time.

5.3 The contractor shall ensure that no worker is in any O&M activities until the valid ID card is issued and the same is available by each worker at site including that of sub contractor(s).

5.4 In case any worker lost the ID card issued to him, the contractor shall ensure that such incidences are promptly reported to BYPL and duplicate or new ID card is issued immediately after completing formalities as deemed necessary by BYPL.

6. Provision of Safe Working Conditions

6.1 Proper barricading shall be created during height work, excavation/civil work, cable laying work, working on pole, etc. During civil/excavation work usage of safety net shall be ensured. Dimensions of barricading while cable laying work- Height- 2 mtr, Length- 1.5 mtr. There shall not be any gap in

between two barricades. LED Bacon light shall be placed at 1st and every 4th barricade. However, while working on pole during supply maintenance work there should be a barricading cone and caution tape . In narrow lanes, where proper barricading as per rules is not possible, use barricading as per the approval of respective safety circle head_ in writing and copy forwarded to safety and uploading in QMS.

6.2 PPE' REQUIREMENT

6.2.1 The contractor shall ensure all the required PPEs given in clause 6.2 and shall allow their workers to start work at site only after proper verification of adequacy of safety gears/PPE required for the specific job at site by the Safety personnel/Site Engineer of BYPL. Any other PPE apart from the list mentioned as deemed necessary as per the work shall also be provided like boots during excavation work, etc.

Contractor has to ensure the quantity and quality of PPEs during procurement and continuous usage of following PPE's by his staff.

S.NO.	NAME OF THE PPEs	LINEMAN / FITTER/SKILLED	HELPER/UNSKILLED	SUPERVISOR
1	SAFETY HELMET	✓	✓	✓
2	SAFETY FULL BODY HARNESS (POSITIONING BELT)	✓	X	X
3	ELECTRICAL HAND GLOVES (for electrical works)	✓	✓	X
4	SAFETY SHOES	✓	✓	✓
5	SAFETY GOGGLES	✓	✓	✓
6	REFLECTIVE JACKET	✓	✓	✓

6.2.2 Contractor has to ensure for proper procurement and distribution of required PPE's among their workers with receiving in attached format (Annexure- 1) which will be verified by the safety department during inspection.

6.2.3 If any of the contractor staff found without PPEs, the said PPE's will be issued to them from BYPL store with immediate effect. And the 20% extra amount with procurement cost will be recovered from their next monthly bill cycle.

Note: PPEs shall strictly be as per the brand mentioned in clause 6.2.4

6.2.4 Technical Specification of the PPEs

6.2.4.1. Safety Shoes – With Composite / Fiber toes (CE approved / IS 15298) – Mandatory for all personnel working at BYPL O&M. The safety shoes shall meet the following features:

1. Electric Shock Resistant Sole
2. Impact Resistant
3. Scrap/Heat Resistant
4. Slip Resistant
5. Oil and Acid Resistant
6. Rubber PU Sole
7. Anti puncture

Lead MAKE: BATA/HONEYWELL/KARAM

6.2.4.2 Safety Helmets: (IS 2925 - 1984 or DGMS) with chin strap – Mandatory for all personnel working at BYPL O&M. The specification of safety helmet shall be as given below:
V-GARD HDPE Yellow With 4 Point Fas Trac Ratchet Suspension

Shell Material	UV stabilized HDPE, Non vented
Suspension	• With 4 Point Fas Trac Ratchet Suspension sewn headband • Textile straps made from polyester Suspension • point fixing: good positioning, ...stability, better air circulation due to ...limited contact areas with the head • Easy clean sweatband
Size	52-62 cm
Accessory slot	Standard 30 mm with removable HDPE dead plugs suitable to leak proof fitting
Approvals	ANSI/ IEC Z89.1 Class E (electrical)
Additional	Low temperature -10°C (acc. to GB2811), High temperature +50°C
Colours	Yellow
weight	360 g

Lead MAKE: 3M / KARAM / UFS

6.2.4.3 Full Body positioning Harness: (CE approved / IS 3521 / EN 361 / EN 355) – Shall be used while work is in progress at height more than 1.8 meter or where from a person may fall and get injured. The specification of the Full body harness shall be as given below:

Anchorage	Adjustable two chest attachment D-rings and A dorsal attachment D-ring
Adaptability	Adjustable shoulder and thigh straps
Convenience	Shoulder and thigh straps differentiated by a dual color scheme.
Ergonomics	Ideally. Positioned sit strap for extended comfort.
Size	Standard
weight	1200GMS
ENERGY ABSORBING FORKED LANYARDS :	
Spec.	44mm wide polyamide webbing.
Length	1.5 Meter

There should not be any metallic part in the full body harness.

Lead MAKE: KARAM /LIFEGEAR/UFS/HONEYWELL

6.2.4.4 Flex Chem Full View Safety Goggles – Shall be used to protect workers eyes from foreign materials and flying particles. Mandatory for all personnel working at BYPL O&M. Safety goggles shall meet the following feature:

1. Acetate lens for special applications requiring superior chemical resistance.
2. Industrial version of tough and popular first responder goggles.
3. SoftFlex low profile frosted frame for increased comfort.
4. Comfortable headband with length adjustment.
5. Indirect venting for comfortable, long lasting wear can be worn with safety helmets and over prescription spectacles.
6. Sightgard + premium anti-fog coating (EN 166 "N") with good anti-scratch properties.

Technical Specification:

Weight	95g.
Lens thickness	1.0mm
Overall width	173mm
Overall length	90mm
Bridge	47.6mm
Lens base	5.5 curve
Lens size	86.1mm verticle, 174mm diagonal
Headband	Adjustable length at max.440mm(long enough to fit together with helmets)
Material & colors	
Lens	Acetate clear, coating, Sightgard + anti-fog according to EN 166 "N" & anti scratch.
Body	PVC smoke
Headband holder	Nylon
Headband	Adjustable grey elastic fixed on frame side parts
Marking / Approvals	
Standard number	EN 166
Frame marking	MSA EN 166 34-FT CE
Lens marking	2C-1.2 MSA 1 FT N CE
Filter class	2C (Ultra violet radiation with enhanced color recognition)
Scale number	1.2: luminous trasmittance-89%
Optical class	1 (best class, for permanent wear)
Mechanical resistance	F (low energy impact 45m/s) T (at extreme temperature -5 to +55° C)
Resistance to	N(distorted vision due to lens fogging)
UV filter	99.9%
Ordering information	10145578-FlexiChem Sightgard + clear , 6x

Lead MAKE: MSA / UVEX/ UFS/3M/KARAM

6.2.4.5 Electrical Insulating Hand Gloves – Shall be used to prevent electric shock based upon the hazards/risks involved in a particular activity. Safety goggles shall meet the following features:

- Breakthrough manufacturing process for exception dry grip.
- Soft and flexible for enhanced tactility, high dexterity and wearer comfort.
- Ergonomic design featuring tapered fingers to reduce hand fatigue.
- Relaxed wrist for easy on/off.

	For LT work	For HT work
Length	360mm	360mm

Class	2	0
Thickness	3.6mm	1mm
Proof test voltage	20000	5000
Maximum use voltage	11000	1000
Tensile strength	>16mpa[Mega Pascal]	
Puncture resistance	>18N/mm [Newton per mili meter]	
Elongation at break	>600% [Stretching length]	
Tension set	<15%	

- It should be resistant to oil, acid, ultra violet rays and very low temperature.
- Each pair of glove should be marked with class, category, month & year of manufacturing, CE logo, batch no. and certified laboratory no.
- EN certified to electrical and thermal hazards,
- EN certified to thermal & electrical hazards to confirm EN 60-903,
- EN certified to mechanical hazard to EN-388

Lead MAKE: Honeywell / ANSELL/CATU

6.2.4.6 Arc Protection Face Shield

- ATPV value is 10 cal/cm²
- It shall have a slotted hard hat and chin guard
- Visible light transmission (VLT) shall be 70%
- It should have anti fog lens
- It should have a provision for replacement of lens and brackets.
- It should cover the complete face and the complete neck region.
- It must not hinder the work. Must be comfortable for the height jobs as well as in the ground.
- Carry bag for the kit.

Lead MAKE: Oberon/Honeywell

6.2.4.7 Certificates required for all PPEs:

- Manufacturer Certificate
- Test Certificate
- Authorization of Dealership/Distribution ship

7. Integrated Management System & Audits

7.1 The Contractor shall work in the framework of Integrated Management System (IMS) and shall maintain documentation as prescribed in the IMS Manual of BYPL. IMS Manual can be obtained directly from site engineer/Division Head/Respective Head.

7.2 All contractors during their currency of contract shall strive to continuously improve and demonstrate strict compliance to ISO 9001, 14001 & 45001 standards of BYPL.

7.3 To verify compliance and to continually improve the management system, all contractors shall be subjected to both internal & external audits.

8. Medical Examination

8.1 The contractor shall arrange a medical examination of all his employees including his sub-contractor employees like lineman, ALM, supervisor, Fitter, welders, gas cutters, drivers and all the workers supposed to work at height (and any other trade specified deemed necessary by BYPL at the time of deployment then annually) before employing, after illness or injury, if it appears that the illness or injury might have affected his fitness and, thereafter, once in every year as per the provisions of applicable laws or as prescribed by BYPL with proper record.

8.2 Records of medical examination as described above shall be maintained at the contractor premises. 8.3 No person about whom the Contractor knows or has reason to believe that he is a deaf or he has a defective vision or he has a tendency to giddiness shall be required or allowed to work in any O&M operation or other construction work which is likely to involve a risk of any accident either to the worker himself or to any other person.

9. Working at Height

9.1 The Contractor shall ensure that all works carried out at a height of 2 Meter or more shall only be started after obtaining a permit to work at height, which shall be issued as per the procedure of BYPL by authorized personnel.

9.2 The contractor shall ensure that all control measures mentioned and agreed through above work permit or as deemed necessary by BYPL are enforced and complied all the time during activities carried out at height.

9.3 Safety full body harness and ladder along with the required PPEs shall be used during height work.

9.4 Barricading cone and tape shall be used along with creation of proper safety zone.

9.5 Proper scaffolds and/or temporary work platforms shall be provided for working at height at elevations 1.5 meters or more where no permanent work platform is available to work safely. The elevated work platforms shall have guardrails and provided with ladders for access/egress. Ladders shall not be used as work platforms.

9.6 Whenever it is required to carry out work at height where scaffolding cannot be provided, use of safety net is must. All safety net systems shall meet the requirements of Indian Standard (IS: 5175).

9.7 No working at height shall be carried out without supervision.

10. Reporting of Near Miss/ Incidents / Dangerous Occurrences

10.1 In case of any incident/ accident occurs during the O&M activities undertaken by the Contractor thereby causing a dangerous occurrence or near miss or any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be sole responsibility of the Contractor to promptly inform the same to Department Head in prescribed form and also to all authorities envisaged under the applicable laws.

11. Suspension of Work

11.1 BYPL shall have the right at its sole discretion to suspend the work till compliance of safety norms, if in its opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipments.

11.2 In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury /accident and he shall comply to remove all shortcomings promptly. Decision of BYPL shall be conclusive and binding on the Contractor in such aspects.

11.3 The contractor shall not be entitled to damages / compensation for suspending of work due to safety reasons and the period of such stoppage of work will not be taken as an extension of time for completion of the facilities as per the work order and will not be the ground for waiver of levy of liquidated damages.

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

12. OHS Appreciation Policy

12.1 If the contractor observes all the safety rules and codes, statutory laws and rules during the period of the contract awarded by the BYPL and no accident occurs then BYPL may consider the performance of the contractor and safety score card will be prepared. The best contractor will be

appreciated by suitable "SAFETY AWARD" as per scheme as may be announced separately from time to time.

13 Guidelines for Penalty Policy Implementation

13.1 Total penalty shall be calculated by multiplying the number of safety violations and the penalty amount specified for such violations in Appendix - 1. (Example – If at first offence persons are found working without safety helmet at 3 locations, the penalty would be $3 \times 2000 = \text{Rs.}6000/-$)

13.2 The amount of penalty can be increased or decreased based upon the seriousness of safety violations. The decision of recommending authority shall be final one.

13.3 Recommending authority shall send his factual observations to Department Head and Safety Head who in turn shall either reject or approve it. If approved, he shall send it to Finance & Accounts for execution. Finance Accounts shall execute the penalty and confirm the same & shall send it back to Department Head and Safety Head.

13.4 Recommending Authority means the Department Head, HODs, Site Safety officer / Supervisor, representatives from OHS and other personnel authorized jointly by O&M.

13.5 Penalties will be imposed for non-documentation and non-compliance of EHS related requirements/documents mentioned in the contract. The contractor shall maintain all the mentioned documentation at his premises.

13.6 Safety Head may impose penalty for serious violations directly.

13.7 All penalties shall be imposed directly on the concerned contractors. No penalty shall be imposed on individuals.

Appendix – 1

Penalty Policy on Safety Violation

Class	Type of Offense	Penalty Detail	Execution Channel
A	Not Wearing Safety Helmets Safety shoes/ Safety Goggles / Electrical insulating hand gloves/ reflective jacket/Not using (electrically) safe tools and equipments. (Poor quality or damaged item means noncompliance)	# First Offence - Warning Note & Rs.2000/- # Second Offence - Warning Note & Fine of Rs.5000/- # Third Offence- Action for termination of contract & Fine of Rs.15000/-	Recommendation by OHS-Representative/Department Head Approval by Safety Head Deduction by Finance & Account
B	Not wearing Full Body Harness/fall arresters while working at a height more than 1.8 meter or where from a person may fall. Not using Safety Net to arrest falling objects and personnel. Not using Arc Protection Face Shield /proper ladder. Not using barricading cone and tape. (Poor quality or damaged item means noncompliance)	# First Offence -Warning Note & Fine of Rs.5000/- # Second Offence - Warning Note for dismissal and a Fine of Rs.10000/- # Third Offense - -Action for termination of contract and a fine of Rs.25000/-	Recommendation by OHS-Representative/Department Head Approval by Safety Head Deduction by Finance & Account
C	Any other unsafe work practices or condition which is considered having potential for fatality or injury.	# First Offence - Warning Note & Fine of Rs.10000/- # Second Offence - Action for termination of contract and fine of Rs.20000/-.	Recommendation by OHS-Representative/Department Head Approval by Safety Head Deduction by Finance & Account

Notes:

- # If there are 03 violations by an individual employee, his services will be terminated.
- # If there are 03 violations in one quarter under any category, will be recommended for termination of contract order.

Appendix – 2

Penalty Policy on non- submission of EHS related requirements

Record of following EHS related requirements shall be maintained at contractor's premises.		
Requirement	Penalty Detail	Execution Channel
1. Contract specific health & safety plan and HIRA (Hazard Identification & Risk Analysis) 2. Safety supervisor training records on EHS (40 hrs training) 3. Bills/challan of PPE's along with test certificates (if procured by the contractor) 4. PPE's receipt by worker (as per Annexure #1) 5. Medical examination record of workers 6. ID card of workers 7. Calibration Certificates of equipments	Warning Note & a Consolidated Fine of Rs.5000/- on non-availability of proof of any of these mentioned 7 types of documents	Recommendation by OHS-Representative Approval by Safety Head Deduction by Finance & Account

Annexure-1

Format for PPE's Receipt by workers

Name of Site -----

Division-----

Name of Contractor -----

S. NO	NAME	DESI.	Safety Helmet	Electrical Insulating Hand gloves	Full Body Harness	Safety Shoes	Safety Goggle	Reflective Jacket	SIGNATURE

Signature of Contractor / Date.....

APPENDIX II

ANNEXURE – 2.01

FORMAT OF PERFORMANCE BANK GUARANTEE
(To be executed on a Non-Judicial Stamp Paper of appropriate value)

This Guarantee made at _____ this [____] day of [____] 20XX

1. WHEREAS M/s BSES Yamuna Power Limited, a Company incorporated under the provisions of Companies Act, 2013 having its Registered Office at Shaktikiran Building, Karkardooma, Delhi 110032, India hereinafter referred to as the " Owner ", (which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns).
2. AND WHEREAS the Owner has entered into a contract for _____ (Please specify the nature of contract here) vide Contract No. _____ dated _____ (hereinafter referred to as the "Contract") with M/s. _____, (hereinafter referred to as "the Supplier", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include each of their respective successors and assigns) for providing services on the terms and conditions as more particularly detailed therein.
3. AND WHEREAS as per clause ____ of Conditions of Contract, the Suppliers are obliged to provide to the Owners an unconditional bank guarantee for an amount equivalent to ten percent (10%) of the total Contract Value for the timely completion and faithful and successful execution of the Contract from [_____] pl. specify the name of Bank) having its head/registered office at [_____] through its branch in _____ (pl. specify the name of Branch through which B.G is issued) hereinafter referred to as "the Bank", (which expression shall unless it be repugnant to the context or meaning thereof be deemed to include its successors and permitted assigns).
4. NOW THEREFORE, in consideration inter alia of the Owner granting the Suppliers the Contract, the Bank hereby unconditionally and irrevocably guarantees and undertakes, on a written demand, to immediately pay to the Owner any amount so demanded (by way of one or more claims) not exceeding in the aggregate [Rs.]..... (in words) without any demur, reservation, contest or protest and/or without reference to the Supplier and without the Owner needing to provide or show to the Bank, grounds or reasons or give any justification for such demand for the sum/s demanded.

5. The decision of the Owner to invoke this Guarantee and as to whether the Supplier has not performed its obligations under the Contract shall be binding on the Bank. The Bank acknowledges that any such demand by the Owner of the amounts payable by the Bank to the Owner shall be final, binding and conclusive evidence in respect of the amounts payable by the Supplier to the Owner. Any such demand made by the Owner on the Bank shall be conclusive and binding, notwithstanding any difference between the Owner and the Supplier or any dispute raised, invoked, threatened or pending before any court, tribunal, arbitrator or any other authority.
6. The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor without proceeding against the Suppliers notwithstanding any other security or other guarantee that the Owner may have in relation to the Supplier's liabilities.
7. The Bank hereby waives the necessity for the Owner first demanding the aforesaid amounts or any part thereof from the Suppliers before making payment to the Owner and further also waives any right the Bank may have of first requiring the Owner to use its legal remedies against the Suppliers, before presenting any written demand to the Bank for payment under this Guarantee.
8. The Bank's obligations under this Guarantee shall not be reduced by reason of any partial performance of the Contract. The Bank's obligations shall not be reduced by any failure by the Owner to timely pay or perform any of its obligations under the Contract.
9. The Bank further unconditionally and unequivocally agrees with the Owner that the Owner shall be at liberty, without the Bank's consent and without affecting in any manner its rights and the Bank's obligation under this Guarantee, from time to time, to:
- (i) vary and/or modify any of the terms and conditions of the Contract;
 - (ii) Forebear or enforce any of the rights exercisable by the Owner against the Suppliers under the terms and conditions of the Contract; or
 - (iii) Extend and/or postpone the time for performance of the obligations of the Suppliers under the Contract;

and the Bank shall not be relieved from its liability by reason of any such act or omission on the part of the Owner or any indulgence shown by the Owner to the Suppliers or any other reason whatsoever which under the law relating to sureties would, but for this provision, have the effect of relieving the Bank of its obligations under this Guarantee.

10. This Guarantee shall be a continuing bank guarantee and shall not be discharged by any change in the constitution or composition of the Suppliers, and this Guarantee shall not be affected or discharged by the liquidation, winding-up, bankruptcy, reorganization, dissolution or insolvency of the Suppliers or any of them or any other circumstances whatsoever.
11. This Guarantee shall be in addition to and not in substitution or in derogation of any other security held by the Owner to secure the performance of the obligations of the Suppliers under the Contract.
12. NOTWITHSTANDING anything herein above contained, the liability of the BANK under this Guarantee shall be restricted to _____ *(insert an amount equal to ten percent (10%) of the Contract Value)* and this Guarantee shall be valid and enforceable and expire on _____ *(pl. specify date)* or unless a suit or action to enforce a claim under this Guarantee is filed against the Bank on or before the date of expiry.
13. On termination of this Guarantee, all rights under the said Guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities hereunder.
14. The Bank undertakes not to revoke this Guarantee during its validity except with the prior written consent of the Owner and agrees that any change in the constitution of the Bank or the Suppliers shall not discharge our liability hereunder.
15. This Guarantee shall be governed by the laws of India. Any suit, action, or other proceeding arising out of, connected with, or related to this Guarantee or the subject matter hereof shall be subject to the exclusive jurisdiction of the courts of **Delhi**, India.

Dated this day of 20XX at

(Signature)

.....
(Name)

.....
(Designation with Bank Stamp)

Attorney as per

Power of Attorney No.....

Date.....

BYPL BANK DETAILS WITH IFSC CODE:

1. Name of the Bank: State Bank Of India
2. Branch Name & Full Address: 14-15th Floor, Jawahar Vyapar Bhawan, 1, Tolstoy Marg, Janpath,
New Delhi 110001
3. Bank Account No: 10277791808
4. IFS Code: SBIN0009601
5. MICR Code: 110002188
6. Swift Code: SBININBB132
7. Email ID: sbi.09601@sbi.co.in

FORMAT OF WARRANTY/GUARANTEE CERTIFICATE

BSES YAMUNA POWER LIMITED Shaktikiran Building, Karkardooma, Delhi -110032.

Ref. Purchase Order No. :

Dear Sir,

We hereby confirm that the.....dispatched to BSES YAMUNA POWER LTD vide invoice no.....

DT.....is exactly of the same nature and description as per above mentioned Purchase Order.

We further confirm that we will replace/repair our.....free of cost if any manufacturing defect during.....months from the date of dispatch of material or.....months from the date of commissioning whichever is earlier.

Supplier Name & Signature

GST UNDERTAKING

The Supplier shall give an undertaking in the following words on each invoice in the absence of which tax payment as on the Supplier's invoice may be withheld.

"The tax component as mentioned in the invoice shall be deposited with the GST Department as per law by way of actual payment or by way of legal set off as per law. The turnover billed shall be duly declared in my GST returns a copy of which shall be filed with the Purchaser. Should the input tax credit to the Purchaser be denied by way of any lapse on the part of the Supplier, the same shall be paid on demand and in any case the Purchaser is authorized to deduct the tax equivalent amount from the amount payable to the Supplier"

SUMMARY OF COMMERCIAL TERMS AND CONDITIONS - SITC

SL NO	PARTICULARS	CLAUSE AS PER TENDER	BIDDER'S CONFIRMATION
1	Validity	Bid submitted shall remain valid for 120 days from the date of offer Submission.	
2	Price Basis	"Firm" on FOR Delhi store/sites basis . Prices must be inclusive of all applicable taxes and duties, freight, packing, forwarding, and all charges up to delivery at BYPL's designated site(s)/store(s) in Delhi. All tax components are to be computed in accordance with the prevailing GST regulations in India.	
3	Unloading	Unloading at stores/sites shall be in vendor's scope	
4	Transit Insurance	Transit insurance shall be in the vendor's scope.	
5	Payment Terms	Supply: Part 1) 90% of the basic value with 100% taxes and duties shall be paid in 45 days from the date of receipt and acceptance of GOODS at the store(s)/site(s) against submission of documents. Part 2) Balance of 10% of basic value shall be paid in 45 days from the date of successful testing, commissioning and handing over duly certified by BYPL Engineer-in-Charge. Services: 100% payment shall be due after 45 days of submission of your bills, from the date of successful testing, commissioning and handing over of the entire installation along with work completion certificate at our office.	
6	Delivery Schedule	- Vendor shall submit Transmittal Approval Documents (GTP/Drawings/QAP/etc.) within 15 days from the LOI/PO to the concerned BYPL officials. - BYPL shall review and either approve or provide comments on the submitted documents within 7 days of the initial submission. - If resubmission is required, vendor shall complete the resubmission within 5 days from the receipt of the comments. - For subsequent resubmissions, BYPL shall respond within 5 days. - Repeated rejections due to non-compliance is not desirable. - Delivery shall be completed within 05 Months from the LOI/PO date or completion as per the schedule provided by BYPL. - ITC at each site shall be completed within 01 Month from the date of issue or order / intimation of site	
7	Defect Liability Period	60 months after commissioning or 66 months from the last date of dispatch, whichever is earlier.	
8	Penalty For Delay	1% (One) of the basic value (ex-works value) of undelivered units per week of delay or part thereof, subject to maximum of 10% (Ten) of the total basic value (ex-works value) of undelivered units.	
9	Performance Bank Guarantee	To be submitted within twenty-eight (28) days from the date of issuance of the Letter of Intent/Award/PO. Thereafter Supplier shall submit PBG on Purchase Order (PO) basis equivalent to 10% of the PO value (including GST) valid for 24 months after commissioning or 30 months from the last date of receipt, whichever is earlier plus 3 months towards claim period. Upon receipt of the PBG by BYPL against RC/PO, the EMD shall be released.	
10	Reverse Auction	Acceptance for participation in Reverse Auction event	

Seal of the Bidder:

Signature:

Name:

VOLUME – II

FINANCIAL BID (PRICE FORMAT)

SUMMARY SITC

ALL PRICES IN INR (₹)

Package Name	Total Supply Prices (A)	Total Installation, Testing and Commissioning Prices (B)	Total Package Cost (C=A+B)
Supply, Installation, Testing & Commissioning of 11kV Smart Packaged Substation with Oil/Dry Type Transformer of Various Types			
In words			

NOTE: Cost of all tests as per technical specification is to be included. No separate/extra charges will be paid.

The Un-priced bid should be marked as **"Quoted"** and be submitted with Part – A

We declare that the following are our quoted prices in INR for the entire package.

Date:

Bidders Name:

Place:

Bidders Address:

Signature:

Designation:

Printed Name:

Common Seal:

PRICE FORMAT – SUPPLY

S. No.	DESCRIPTION OF GOODS	HSN	UoM	QTY (A)	UNIT BASIC PRICE OF EQUIPMENT INCL. FREIGHT (₹) (B)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (₹) (C)		UNIT LANDED COST (All Inclusive) (₹) (D = B+C)	TOTAL LANDED VALUE (₹) (E = AXD)
						%	AMT		
1	Supply of 11kV Packaged Substation (PSS) with 1000kVA Oil Type Transformer Type-9		Nos	1					
2	Supply of 11kV Packaged Substation (PSS) with 1600kVA Oil Type Transformer Type-5		Nos	2					
3	Supply of 11kV Packaged Substation (PSS) with 1000kVA Dry Type Transformer Type-9		Nos	1					
TOTAL LANDED VALUE (₹)									
In words									

ITEM DESCRIPTION/WORK	SAC	UoM	QTY (A)	UNIT RATE (B)	UNIT GST AS APPLICABLE (C)	UNIT LANDED RATE (All Inclusive) (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
I/T/C of 11kV Packaged Substation (PSS) with 1000kVA Oil Type Transformer Type-9		Nos	1				
I/T/C of 11kV Packaged Substation (PSS) with 1600kVA Oil Type Transformer Type-5		Nos	2				
I/T/C of 11kV Packaged Substation (PSS) with 1000kVA Dry Type Transformer Type-9		Nos	1				
TOTAL LANDED VALUE (₹) (B)							
In words							

OPTIONAL RATE:

S. No.	DESCRIPTION OF SERVICES	SAC CODE (8 Digit Mandatory)	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (₹) (C)		UNIT LANDED RATE (All Inclusive) (₹) (D = B+C)	TOTAL LANDED VALUE (₹) (E = DXA)
						%	AMT		
1	Transportation of PSS from stores to site may also be furnished in case the site is not ready (i.e., Loading, Transportation & Unloading)		01	PU					

NOTE

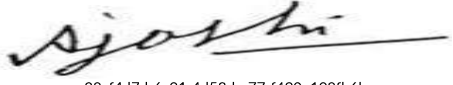
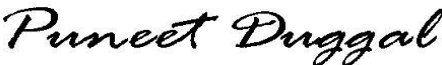
- 1) Item-wise cost for Installation, erection, testing & Commissioning for the items indicated in BOQ-SUPPLY and as per Scope of Work
- 2) In addition, Unit Rates shall be submitted as indicated in BOQ-ERECTION

VOLUME – III
**SCOPE OF SITC AND TECHNICAL
SPECIFICATIONS**



**Specification of
11 kV Oil Type Smart Package Substation**

Specification no – SP-PSSE-216-R0

Rev		
Date:		13/06/2025
Prepared by	Ashish Joshi	 28cf4d7d-6c91-4d53-be77-f490e198fb6b
Reviewed by	Puneet Duggal	 404db803-a91f-4234-85f0-0b2b5098ec32
Approved by	Gaurav Sharma	 23dc2de2-95de-4472-99a7-dea873f472b6

Technical Specification of 11 kV Oil Type Smart Packaged Substation**Index**

Record of Revision.....	3
1 Scope.....	4
2 Codes & standards.....	4
3 Electrical Distribution System Data.....	6
4 PSS Configuration.....	7
5 PSS Enclosure	8
6 11KV Ring Main Unit.....	10
7 11KV XLPE Cable & termination kit.....	27
8 Oil Type Transformer:	27
9 LV Switchgear Panel	41
10 Automatic Power Factor Correction system	50
11 Energy Meter Box.....	53
12 Other Provisions: illumination, Hooter & Fire extinguisher	54
13 PSS Enclosure Earthing.....	55
14 Labels & painting.....	56
15 Approved makes.....	57
16 Quality assurance Inspection & testing.....	58
17 Shipping, Handling and Site support.....	62
18 Deviations.....	63
19 Drawings Submission.....	63
Annexure A - Service Conditions.....	66
Annexure B - Guaranteed Technical Particulars (Data by Supplier)	66
Annexure C - MCCB Double Termination Details.....	87
Annexure D - Technical Specification for transformer oil.....	88
Annexure E - Specification of 4G Ethernet Modem for FRTU	89
Annexure F - Specification for Feeder Remote Terminal Unit for RMU	91
Annexure G - Recommended spares (Data by supplier).....	102



SP-PSSE-216-R0

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Record of Revision

Revision No	Item / clause no.	Nature of Change	Approved By

Technical Specification of 11 kV Oil Type Smart Packaged Substation**1 Scope**

- 1.1 Design, manufacture, testing at manufacturer works before dispatch, packing, and delivery of Packaged Substation (PSS) as per this specification
- 1.2 Supply of all installation/ commissioning accessories for PSS.
- 1.3 Submission of documentation of PSS with operating manuals of each equipment.
- 1.4 FRTU Licensed software for programming, configuration, troubleshooting and diagnosis of FRTU shall be provided.
- 1.5 If any item not specifically mentioned in scope but necessary for successful operation of substation shall be deemed to be included in bidder's scope.

2 Codes & standards

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

S.no	Standard	Title
2.1	Indian electricity act	IE act 2003
2.2	CEA Regulations	Latest amendments
2.3		CBIP manual on transformers
2.4	IEC 60076	Power transformers
2.5	IEC:60616	Terminal and Tapping Markings for Power Transformers
2.6	IEC: 60529	Degrees of Protection Provided by Enclosures (IP Code).
2.7	IEC 60694	Specification for high voltage switchgear
2.8	IEC 60439-1	Low voltage switchgear & control gear assemblies
2.9	IEC 60529	Degree of enclosures provided by enclosures
2.10	IEC 60664-1	Insulation coordination for low voltage systems
2.11	IEC 62262	Degree of protection provided by enclosure against mechanical shocks
2.12	IEC 62271-202	High voltage switchgear & control gear - prefabricated substation
2.13	IEC 60044	Instrument transformers - Current & voltage transformers
2.14	IEC 60225	Electrical relays
2.15	IEC 60625	High voltage switches

Technical Specification of 11 kV Oil Type Smart Packaged Substation

2.16	IEC 60502	Power cables
2.17	IEC 60947-2	Low-voltage switchgear and control gear :Circuit breakers
2.18	IS 1180 Part 3	Outdoor type oil immersed distribution transformer upto and including 2.5MVA, 33kV. Part 3 Natural/Synthetic Organic Ester oil Liquid Immersed
2.19	IS 16081/ IEC 61099	Unused Synthetic esters for transformers and similar electrical equipment
2.20	IS 2026	Loading of power transformers
2.21	IS 13947	Low voltage switchgear & control gear
2.22	IS 2099	Bushings for voltages above 1000V
2.23	IS 3156	Voltage transformers
2.24	IS 2705	Current transformers
2.25	IS 1554	PVC cables
2.26	IS 7098	XLPE cables
2.27	IS 2629	Recommended Practice for Hot-Dip Galvanizing of Iron and Steel
2.28	IS 4759	Hot-dip zinc coatings on structural steel and other allied products
2.29	IS 13585	Shunt capacitors
2.30	IS 13340	Shunt capacitors
2.31	IS 3043	Code of practice for Earthing
2.32	IS 8130	Conductors for insulated cables
2.33	IS 5	Ready mixed paints

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

- i. Guaranteed Technical Particulars (GTP)
- ii. Specification including applicable codes & standards
- iii. Approved Vendor Drawings
- iv. Other documents

Technical Specification of 11 kV Oil Type Smart Packaged Substation**3 Electrical Distribution System Data**

3.1	HT supply System	3 phase AC, 3 wire
3.2	Voltage	11000 volt $\pm 10\%$
3.3	Frequency	50 Hz $\pm 5\%$
3.4	Fault level	350MVA – 18.5kA
3.5	System neutral	Solidly Earthed at upstream 11kV source
3.6	LT supply system	3 Phase, 4 Wire AC
3.7	Rated voltage	415V $\pm 10\%$
3.8	Rated frequency	50 Hz $\pm 5\%$
3.9	Fault level	35MVA – 50kA

Technical Specification of 11 kV Oil Type Smart Packaged Substation**4 PSS Configuration**

S.no	PSS type	DT rating, kVA	RMU	LT Panel						APFC rating, kVAr @400 V
				Incomer, ACB		Bus coupler, ACB		Outgoing, MCCB		
				Rating, (A)	Qty, no's	Rating, (A)	Qty, no's	Rating, (A)	Qty, no's	
4.1	Type 1	2000	3Way	3200	1	NA	NA	800	10	NA
4.2	Type 2	2000	4Way	3200	1	NA	NA	800	10	NA
4.3	Type 3	2000	3Way	3200	1	3200	1	800	10	NA
4.4	Type 4	2000	4Way	3200	1	3200	1	800	10	NA
4.5	Type 5	1600	3Way	3200	1	NA	NA	800	10	NA
4.6	Type 6	1600	4Way	3200	1	NA	NA	800	10	NA
4.7	Type 7	1600	3Way	3200	1	3200	1	800	10	NA
4.8	Type 8	1600	4Way	3200	1	3200	1	800	10	NA
4.9	Type 9	1000	3Way	2000	1	NA	NA	630	7	300
4.10	Type 10	1000	4Way	2000	1	NA	NA	630	7	300
4.11	Type 11	1000	3Way	2000	1	2000	1	630	5	300
4.12	Type 12	1000	4Way	2000	1	2000	1	630	5	300
4.13	Type 13	630	3Way	1250	1	NA	NA	630	5	200
4.14	Type 14	630	4Way	1250	1	NA	NA	630	5	200
4.15	Type 15	630	3Way	1250	1	1250	1	630	5	200
4.16	Type 16	630	4Way	1250	1	1250	1	630	5	200
4.17	Type 17	400	3Way	800	1	NA	NA	630	3	200
4.18	Type 18	400	4Way	800	1	NA	NA	630	3	200
4.19	Type 19	400	3Way	800	1	800	1	630	3	200
4.20	Type 20	400	4Way	800	1	800	1	630	3	200

Technical Specification of 11 kV Oil Type Smart Packaged Substation**5 PSS Enclosure**

5.1	Service conditions	PSS should designed to operate in outdoor environment mentioned in annexure 'A'.
5.2	Material for enclosure	Galvanised Sheet steel 2mm thick
5.3	Enclosure construction	Frame supported construction with all doors, covers welded with steel channel ribs at every 1000mm minimum
5.4	Lifting lugs for site handling / lifting by crane	Four numbers on top to enable lifting of total package unit.
5.5	Doors	a. Doors to be provided for all LT, HT and Transformer compartment. b. The door arrangement should be folded type design, the width of each folding section door is limited to 600mm. c. The doors should have internal/concealed anti-theft, minimum 03 no's hinges of minimum opening angle of 120°, with lockable handle & padlocking facility d. The door limits switch to be provided for status of door.
5.6	Top & other side walls of package substation enclosure	Welded sheet metal to main frame
5.7	Removable canopy above top cover	2mm thick sheet metal with 10° slope
5.8	Enclosure integral steel base frame	'I' section of suitable size to support total static and dynamic load
5.9	Base frame bottom support pads for fixing by bolt to foundation	Minimum six numbers to rest on foundation
5.10	Enclosure compartments	Separate compartments for RMU, transformer & LV switchgear/APFC
5.11	Separation between RMU & transformer compartment	By sheet steel 2mm thick

Technical Specification of 11 kV Oil Type Smart Packaged Substation

5.12	Separation between transformer compartment & LV compartment	By sheet steel 2mm thick
5.13	Degree of ingress protection against solids & water as per IS 62059	a. IP53 for RMU compartment b. IP23 for transformer compartment c. IP33 for LV compartment
5.14	Louvers on side covers of transformer compartment & side walls of LV compartment	To be provided with steel wire mesh welded from inside so as to meet IP requirement
5.15	Louver area on cover / side wall	1500 mm height x 1500mm desirable
5.16	Exhaust Fans	a. Mounted in LV compartment to discharge air in transformer compartment & Controlled by SPMCB & thermostat to operate above 35 deg C, 2x150 CFM, 220V DC. b. Rectifier to be provided for exhaust fan supply.
5.17	Gland plate for RMU compartment	3 mm thick MS plate suitable for 3x 3CX 400sqmm AYFY 11 kV cable
5.18	Gland plate for LV compartment	a. 3 mm thick MS plate suitable for rated LT outgoing as per the PSS type. b. Each LT outgoing is suitable for 2X 4CX 400 sq mm cable.
5.19	Class of enclosure as per IEC 62271-202	10 K Class
5.20	Internal Arc classification	IAC AB 20 KA, 1s
5.21	Limiting dimensions of package enclosure	
5.22	Type 1 to Type 8 configuration	4200(L) x 3000(W) x 3200(H)
5.23	Type 9 to Type 20 configuration	3400(L) x 2600(W) x 2600(H)

Technical Specification of 11 kV Oil Type Smart Packaged Substation**6 11KV Ring Main Unit**

6.1	RMU Configuration	As per the PSS type,
6.1.1	3 Way RMU	All modules should be Vacuum Circuit Breaker
6.1.1.1	Cable feeder 1	a. Motorized VCB with manual operation facility. b. FPI and CBCT to be provided.
6.1.1.2	Cable feeder 2	a. Motorized VCB with manual operation facility. b. FPI and CBCT to be provided.
6.1.1.3	Transformer feeder	a. Motorized VCB with manual operation facility. b. Self-power relay with protection CTs to be provided.
6.1.2	4 Way RMU	All modules should be Vacuum Circuit Breaker
6.1.2.1	Cable feeder 1	a. Motorized VCB with manual operation facility. b. FPI and CBCT to be provided.
6.1.2.2	Cable feeder 2	a. Motorized VCB with manual operation facility. b. FPI and CBCT to be provided.
6.1.2.3	Transformer feeder 1	a. Motorized VCB with manual operation facility. b. Self-power relay with protection CTs to be provided.
6.1.2.4	Transformer feeder 2	a. Motorized VCB with manual operation facility. b. Self-power relay with protection CTs to be provided.
6.2	Extensibility	Non extensible type
6.3	Insulation Medium	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

6.3.1	For panel	SF6 gas in sealed metallic tank
6.3.2	Breakers	Vacuum type (with dis-connector & earth switch)
6.1.4	Arc interruption chamber for breaker	Arc interruption chamber of breakers shall be separate from the main insulated tank.
6.1.5	Maximum dimensions of RMU	1250 mm(W) X 800 mm (D) X 2000 mm (H)
6.4	RMU Panel Construction	
6.4.1	Panel type	Metal enclosed, framed, Compartmentalized panel construction
6.4.2	Service Location	Indoor, non-air conditioned environment
6.4.3	Mounting	Free Standing
6.4.4	Overall Enclosure Protection	a. IP4X minimum, b. Vermin proof
6.4.5	Doors	a. Front access b. Internal/concealed, anti-theft at-least 03 no's hinge with minimum opening angle of 120°.
6.4.6	Covers	a. Bolted for rear access, with handles. b. Support for handle shall be provided at suitable place on RMU body. c. All the accessible bolts / screws shall be vandal proof. d. One set of required Special tools per RMU (if any) shall be in the scope of supply.
6.4.7	Construction	Sheet metal 2 mm thick CRCA
6.4.8	Base frame	a. Made of CRCA steel b. Base frame height should be 300 mm.
6.4.9	Power Cable Clamping Arrangement	a. Shall be provided for each power cable along-with HDPE cable clamps (to suit the cable size from 150 sq mm to 400 sq mm XLPE cable).

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		b. Exact size shall be provided during drawing approval stage.
6.4.10	Lifting lugs	Four numbers
6.4.11	Cable Entry	Bottom
6.4.12	Gland plate	a. Separate for control cable & power cable. b. 3mm thick, metallic, removable type & split type in two parts, with 1 no ,90mm diameter knockout punch/ hole in the centre.
6.4.13	Cable termination	
6.4.13.1	Cable type & size	3C X 150/ 300/ 400 sq mm Aluminium conductor XLPE cable with armour & PVC outer sheath
6.4.13.2	Terminals for 11kV cable termination	.
6.4.13.3	Terminals	a. M16 size Set of required size of stud suitable for b. M 16 size Ring type lug & bimetallic washers. c. Bolt spring washers and washers shall also be provided.
6.4.13.4	Bimetallic washers	Required
6.4.13.5	Right angled boots	a. Minimum 20mm spacing between boots preferred. b. Test plug cap shall be fixed with main body of boot. c. Type test reports, maintenance replacement plan shall be submitted.
6.4.13.6	Cable Test Plug	Cable test plug shall be provided facility, without opening of cable compartment.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

6.4.13.7	Termination type	Suitable for heat shrinkable type
6.4.13.8	Termination height	700mm minimum, from gland plate
6.4.14	Bus bar	Tinned copper with sleeve (Sizing Calculation to be submitted in support of its Guaranteed S.C. rating / Capability)
6.4.14.1	Bus bar continuous rated current	630amp
6.4.14.2	Bus bar short time withstand capacity	20 KA for 3 sec
6.4.14.3	Bus bar support insulator material	SMC / DMC resin
6.4.14.4	Maximum temperature rise above reference ambient	In line with Table 3 of IEC 60694
6.4.15	Earth bus bar	Aluminum / Copper sized for rated fault duty for 1 sec
6.4.15.1	Earth bus internal connection to all noncurrent carrying metal parts	a. By 2.5 sq mm copper flexible wire. b. Earth connection point maximum 1 meter away from cable test facility
6.4.15.2	Earth bus external connection to owners earth	Studs on both sides with holes for M10 bolt + hardware to readily receive purchaser earth connection
6.4.16	Cooling arrangement	By natural air without fan
6.4.17	Panel internal wiring	a. Multi strand flexible color coded PVC insulated Cu wire 1 sq mm (SCADA) b. 1.1kV, PVC insulated 2.5 sq mm cu cable for CT connection. c. Colour of wire (R phase - Red, Y phase – Yellow, B phase – Blue, AC- black, DC – grey, Earth – green) with crossed ferrules at both ends. d. All the internal control / auxiliary wiring shall be routed through proper conduit.
6.4.18	Hardware (Nut, bolts & handle)	Stainless steel (Except termination nut-bolts which are Brass / Tinned Copper)

Technical Specification of 11 kV Oil Type Smart Packaged Substation

6.4.19	Gasket	Neoprene rubber
6.4.20	Marshalling terminal blocks	a. Terminal block size should be suitable for 2.5 Sq mm, b. Nylon 66 material, c. screw driver operated type d. 20% spare shall be provided in each row of TB.
6.4.21	Panel cover fixing bolts	Allen head 6mm with hexagonal slot
6.4.22	Padlock facility	Required for all earth switches & all handles
6.4.23	Internal Arc classification	
6.4.23.1	Explosion vents	a. To ensure operator's safety, design should ensure that gases / flames generated during flash over / blast in any of the compartment, must not come out from the front of RMU as well shall not go to adjacent cable compartment. b. Internal arc test report (for Cable compartment & other compartments) must be submitted to support above, along with RMU GA drawing indicating these vents. c. There shall not be any type of holes, gaps etc on the walls of cable termination compartment.
6.4.23.2	Internal Arc rating	20 kA for 1s
6.4.23.3	Internal arc classification	a. Shall comply to the requirements of IEC 62271-200, Accessibility type AFLR. b. Operators of equipment shall be protected against the effects of an arcing fault in any of the MV compartment at all times , including while carrying out the maintenance works on other

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		compartments
6.4.23.4	SF6 Gas Annual Loss	a. < 0.1% of total mass. b. Pressure of SF6 gas shall be above the operating limit throughout the life of the equipment.
6.5	Circuit breaker	
6.5.1	Type	Three pole, operated simultaneously by a common shaft
6.5.2	Arc interruption medium	Vacuum Bottle
6.5.3	Operating mechanism	Motorized spring charged stored energy type with facility for manual charging
6.5.4	Motor rated voltage	24V DC
6.5.5	Emergency trip / open push button	On panel front with Protective flap to prevent any accidental tripping of breaker.
6.5.6	Continuous rating	630amp
6.5.7	Short time withstand capacity	20 KA for 3 sec
6.5.8	Minimum number of operations at rated current (as per IEC 62271-100)	Mechanical Endurance – Class M1(2000 operations) Electrical Endurance – Class E2
6.5.9	Fault making capacity	50 KA peak
6.5.10	Fault breaking capacity	20 KA Minimum
6.5.11	Maximum number of operations at rated Fault current (as per IEC 62271-100)	Electrical Endurance – Class E2. To be guaranteed by manufacturer with authorized lab test reports
6.5.12	Breaker status auxiliary contact	2NO + 2NC wired to terminal block
6.6	Earth switch	
6.6.1	Type	Three Pole, operated simultaneously by a common shaft for each Circuit breaker.
6.6.2	Dielectric medium	SF6 gas
6.6.3	Operating mechanism for close & open	Manual

Technical Specification of 11 kV Oil Type Smart Packaged Substation

6.6.4	Fault making capacity	50 kA (Desirable)
6.6.5	Auxiliary contacts	1NO+1NC wired to terminal block
6.6.6	Disconnect switch (if provided in series with vacuum bottle)	Desirable to be located on purchaser cable connection side of vacuum bottle
6.6.7	Minimum number of operations at no load (as per IEC 62271-102)	Mechanical Endurance – Class M0 (1000 operations)
6.6.8	Making capacity endurance of earth switch (as per IEC IEC 62271-102)	Class E2 (Min 10 operations)
6.7	For Cable Feeder circuit breaker module	
6.7.1	Protection Relay	Not required
6.7.2	Fault passage indicator (FPI)	a. To be provided on each cable feeder for RMU. FPI shall be earth fault protection type. b. Digital type and shall operate as the current exceeds the set value. c. Flash indication for identifying faults with red LED with one flash for every one sec. Test & reset button 1 NO + 1 NC potential free contact for remote indication FPI power supply unit shall use lithium battery with minimum life of 1000 blinking hours, so that FPI shall continue to function even after main feeder has tripped. d. FPI shall be powered with 24V DC
6.7.2.1	CBCT	a. CBCT – Split open type suitable for mounting without disconnection of cable for Earth Fault. b. Cable connection of FPI with CBCT shall be of pre moulded type on the CBCT side.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		c. Cable shall be 2.5 sq.mm cu cable or fiber cable.
6.7.2.2	Earth Fault Settings	
6.7.2.2.1	Sensing Current	50 to 400A
6.7.2.2.2	Sensing Time	30 to 100 ms in steps of 10ms.
6.7.2.2.3	Reset Time	0.5 -1-2-3-4 hr
6.7.2.2.4	Resetting Facility	a. Self rest after reset time b. Self rest after restoration of voltage c. Manual d. Remote resetting
6.7.2.2.5	Contact Rating	1A at 230 V
6.7.2.2.6	Degree of Protection	IP 54
6.7.2.2.7	Mounting Arrangement	Surface or Flush Mounting
6.7.2.2.8	Ambient Temperature	-20 to 55 Deg C
6.7.2.3	Data by Purchaser	Following system data shall be considered while offering FPI.
6.7.2.3.1	System Fault Level	2kA – 8.75kA
6.7.2.3.2	Type of Grounding	Solidly Grounded
6.7.2.3.3	Fault clearing time	100ms
6.7.2.3.4	Cable Type	XLPE , 70 sq.mm to 400 sq.mm
6.8	For Transformer circuit breaker module	
6.8.1	Current transformer	a. 75-150-400 / 1 amp b. Accuracy class: 5P10 minimum c. Burden: CT burden should be 20% higher than the connected relay burden. d. Resin Cast Ring type e. Considering three core cable terminations, mounting flexibility shall be provided for CT's (in horizontal & vertical direction both). Additionally, CAUTION

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		marking (by sticker/ paint) shall be provided to avoid CT's installation above the screen of cable. (i.e. earth potential point.) f. Disconnecting type terminal block shall be provided for CT Circuit. g. Change in CT ratio shall be possible from the disconnecting type TB. Any change in CT ratio from CT secondary will not be acceptable.
6.8.2	Protection relay	a. Dual-powered (Self powered and Auxiliary 24V DC powered), Microprocessor based Numerical relay with backlit LCD display, manual reset type, flush mounted on panel front. b. IDMT over current and earth fault protection with high set element. c. The relay should record at-least 10 faults on FIFO basis. d. In addition to faults, relay should have event recorder. e. RS-485 Port to be provided on the Relay for communication with SCADA through FRTU on Modbus RTU protocol. f. All relay parameters including fault records should be accessible from SCADA. g. Necessary internal wiring also shall be done between Relay and FRTU. h. Licensed software for programming shall be provided for Relay communication.
6.8.2.1	Protections Required	Over current, Instantaneous & earth fault
6.8.2.2	Tripping characteristic	Inverse definite minimum time

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		characteristics for Over current and earth fault protection
6.8.2.2.1	Over current relay setting	10% - 250% of I_n , steps of 1%.
6.8.2.2.2	Overcurrent Setting time delay	25ms – 1500ms in steps of 10 ms
6.8.2.2.3	Instantaneous Over current setting	100% - 2500% of I_n & OFF
6.8.2.2.4	Instantaneous over current Setting time delay	0 ms- 100 s in steps of 10 ms
6.8.2.2.5	Earth fault setting	5%- 250 % of I_n , steps of 10%
6.8.2.2.6	Earth fault setting time delay	25 ms – 1500 ms in steps of 10 ms
6.8.3	Shunt trip 24V DC (for WTI trip & door limit switch & for remote trip from SCADA.)	To be wired to terminal blocks
6.9	FRTU Panel	a. To be integral part of RMU with all the items as per mentioned in subsequent clauses. b. FRTU enclosure should be 2.0 mm thick GI sheet. c. The cabinet shall have adequate space for installation of other hardware's like modem, battery charger and battery as well as shall have at least 10% spare space. d. The component and accessories to be mounted on mounting plate of FRTU. e. Enclosure should have proper illumination, universal type socket and laptop stand and Drawing pocket.
6.9.1	Battery	a. Battery Type: Li-ion battery b. Battery Rating: 24V DC, 26AH c. Location: Battery shall be kept in shielded compartment in FRTU panel and fixed with rivet and nut bolt. Battery

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		enclosure should be concealed and not visible. d. Individual battery terminal shall be wired upto terminal blocks mounted in FRTU cabinet.
6.9.2	Battery Health Monitoring Unit (BHMU)	a. BHMU will have Auto / Manual test facility. In Auto Mode it ensures battery automatic discharge at preset period with 100W discharge resister along with suitable algorithm to check the healthiness based on rate of discharge. b. In manual Mode PB to be provided for battery testing. c. Provision for Bypass mode of BHMU shall also be provided. d. Output contacts :230V/24V DC -5A • Battery Fail: 1 CO • Test in process e. Indications: • BHMU healthy • Battery Fail • Battery Low • Test On f. Remote monitoring of Battery voltage and current on Modbus RTU protocol
6.9.3	Battery charger	2 no's chargers with auto change over using 10A diodes. Maximum 55 deg C above ambient of 40 deg C
6.9.3.1	MCBs at charger input & output supply	a. Required 2nos DP MCB for AC Incoming supply b. All the MCBs shall be easily accessible for operation, with proper labeling.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		c. MCB location shall be preferably away from Battery charger location.
6.9.3.2	Charger temperature rise at heat sink at full load for 2 hours	Maximum 55 deg C above ambient of 40 deg C
6.9.3.3	Battery charger cooling method	Natural without any fans
6.9.3.4	Individual CBs DC control	Required with MCB
6.9.4	FRTU	a. FRTU shall be provided and integrated with RMU and LV compartment with completely wired along with modem suitable for communicating over GSM network and also have facility to communicate with fiber network. b. Bidder shall demonstrate the data communication of FRTU modem with MCC/BCC for the proposed modem for approval of owner in the Pre Order technical evaluation stage. c. For detailed specification of FRTU, I/O requirements, refer standard specification of Annexure F.
6.9.5	Modem	a. Modem should be dual sim 4G and shall also have compatibility of 3G/2G network. b. For detailed technical specification of modem, please refer Annexure E.
6.9.6	Transducer	DC voltage transducer (4-20mA) for monitoring of DC battery bus voltage.
6.9.7	Surge Protection Devices (SPDs)	c. Type 3 Pluggable Surge Protection Device in accordance with IEC 61643 with KEMA & UL approval must be installed at the incoming power supply of FRTU. d. DIN Rail Mounted Suitable Surge

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		Protection must be installed on all communication lines (i.e. on Ethernet/RS 485 lines)
6.9.8	Interfacing of FRTU system with RMU	a. RMU signal connections should be terminated in RMU module wise and extension of the signals from the each equipment TB (Terminal Block) to FRTU TB through cable connectors, module wise. b. Separate multi-core cable for Interconnection of FRTU with RMU with suitable size and length. c. Male and female connector with cable for interconnection should be provided in FRTU panel. d. Minimum 2.5/ 4 sqmm multi-strand copper wire/ cable of suitable length for connecting the battery bank and battery charger placed in FRTU cabinet. e. Supply and dressing of inter-connecting cables through suitable size PVC duct are in the supplier scope. f. Interconnections should have proper lugs, crossed ferrules etc. g. 1 Meter Standard Ethernet (Straight) data cable with metallic connector (SS/MS) to and Ethernet SPD
6.10	Requirements of sealed housing live parts (RMU SF6 gas chamber)	
6.10.1	Enclosure	Stainless steel enclosure suitable for IP67
6.10.2	SF6 gas pressure low alarm	To be given
6.10.3	Provision for SF6 gas filling	To be given (For 'sealed for life' design of RMU, this is not applicable)
6.10.4	Provision for SF6 gas pressure	Manometer with non return valve

Technical Specification of 11 kV Oil Type Smart Packaged Substation

	indication	
6.10.5	Arc interruption method for SF6 breaker / Load break switch	Puffer type / rotating arc type
6.10.6	Potential free contacts for SF6 gas pressure low	1NO + 1NC (Desirable)
6.11	RMU operation interlocks	
6.11.1	Circuit breaker & respective earth switch	Only one in 'close' condition at a time
6.11.2	Prevent the removal of respective cable covers if circuit breaker is 'ON'	Electrical / Mechanical
6.11.3	Prevent the closure circuit breaker if respective cable cover is open	Electrical / Mechanical
6.11.4	Cable test plug for CB accessible only if Earth switch connected to earth	Mechanical
6.11.5	Prevent motorized operation of CB during manual operation	Electrical / Mechanical a. Electrical signal shall cut-off completely during manual operation. b. If CB fail to operate, the supply to motor shall be disconnected after certain time period to prevent burning of motor due to continuous supply.
6.11.6	Prevent motorized operation of more than one CB at a time	Necessary feature (Electrical)
6.12	Indication & signals	Local
6.12.1	Operation counter on front / Inside the RMU LT chamber	To be provided for each Circuit breaker, with minimum four digits & non resettable type
6.12.2	Cable charge status indication for all CB	Capacitor type voltage indicators with LED on all the phases (Shall be clearly visible in day light)

Technical Specification of 11 kV Oil Type Smart Packaged Substation

6.12.3	Spring charge status indication	On front for breaker
6.12.4	Circuit breaker On/OFF indication	Green for OFF / Red for ON
6.12.5	Earth switch closed indication (For Each CB)	On front
6.12.6	Circuit breaker protection relay operated on fault	Flag
6.12.7	Fault passage indication on CB	Flag
6.13	Status signals to SCADA-to be wired to marshalling terminal block	2NO + 2NC
6.13.1	CB close / open	potential free contacts
6.13.2	CB Earth Switch close /open	potential free contacts
6.13.3	Battery charger Fail	potential free contacts
6.13.4	CB close / open	potential free contacts
6.13.5	Protection relay operated	potential free contacts
6.13.6	FPI operated	potential free contacts
6.13.7	SF6 gas pressure low	potential free contacts
6.13.8	Ready to close signal to control centre to indicate all interlocks are OK	Potential free contacts. Signal to indicate Ready for remote operation from SCADA required for entire closing and entire tripping ckt. with all interlocks accounted for (Make : Gogate with P Card / Eqvt after approvals)
6.13.9	Local / Remote Switch	a. A manual Local / Remote selector switch shall be provided for each FRTU to disable all control outputs by breaking the power supply connection to the control outputs. b. When in the "Local" position, the Local/ remote switch shall allow testing of all the control outputs of FRTU without activating the control outputs to field

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		devices. A status input indication shall be provided for the Local/ Remote switch to allow the SCADA system to monitor the position of the switch. c. The status of Local/ Remote switch should be wired and configured in FRTU.
6.13.10	Commands from SCADA- to be wired to marshalling terminal block	Cable feeder close / open
		Cable feeder close / open
		FPI Reset
		Transformer feeder Trip
6.14	Mimic diagram, labels & finish	a. Mimic diagram (Shall not be accepted with Stickers) b. On panel front with description of function & direction of operation of handles/buttons
6.14.1	Operating Instructions	Operating instruction chart and Do's & Don'ts in Hindi / local language to be displayed on left / front side of panel enclosure on anodized Al Sheet 16SWG, duly affixed on panel.
6.14.2	Name plate on panel front	Fixing by rivet only
6.14.2.1	Material	Anodized aluminum 16SWG / SS
6.14.2.2	Background	SATIN SILVER
6.14.2.3	Letters, diagram & border	Black
6.14.2.4	Process	Etching
6.14.2.5	Name plate details	Month & year of manufacture, equipment type, input & output rating, purchaser name & order number, guarantee period
6.14.3	Labels for meters & indications	Anodized aluminum with white character on black background OR 3 ply lamicoid
6.14.4	Danger plate on front & rear side	Anodized aluminum 16 SWG with white letters on red background

Technical Specification of 11 kV Oil Type Smart Packaged Substation

6.14.5	Painting surface preparation	Shot blasting or chemical 7 tank process
6.14.6	Painting external finish	Powder coated epoxy polyester base grade A, shade -RAL 7032, uniform thickness 60 micron minimum
6.14.7	Painting internal finish	Powder coated epoxy polyester base grade A, shade -white, uniform thickness 60 micron minimum
6.15	Cyber Security	a. Integration should comply all the cyber security guidelines issues by CEA, NCIIPC and CERT-IN. b. he FRTU shall comply to IEC62351- 3 for cyber security in communication between FRTU and master station and IEC62443-4-2 for cyber security for product including testing requirement as per MoP order no 12/34/2020-T&R dtd 08.06.21 & CEA /PLG/R&D/MII/2021 dtd 11.6.21 and any amendment from time to time. c. All the eligible equipment's should complied to requirement of Mandatory Testing and Certification of Telecom Equipment (MTCTE) vide MoP order No. 14/02/2021-UR&SI-II-Part(1)(E-258136).

Technical Specification of 11 kV Oil Type Smart Packaged Substation**7 11KV XLPE Cable & termination kit**

The 11kV XLPE cable connection from RMU to distribution transformer shall be conforming to IS 7098 and shall have all the following features –

7.1	Cable type & size	XLPE insulated armoured / un armoured cable 3C x 150 sqmm Aluminium conductor
7.2	Cable voltage grade	11KV
7.3	XLPE insulation thickness	3.14 mm minimum
7.4	Aluminium conductor no of strands	As per Table 2 of IS 8130
7.5	Insulation screen	With semi conducting extrusion, copper tape & water swellable tape
7.6	Type of armour	GI flat as per table 4 of 7098 part 2
7.7	11KV end termination at RMU	By 11kv grade end termination kit, heat shrink type
7.8	11KV end termination at Distribution transformer	By 11kv grade end termination kit, heat shrink type
7.9	Cable support from RMU to transformer HT side cable box	GI cable tray 300mm wide

8 Oil Type Transformer:

8.1	Major Design Criteria	
8.1.1	Voltage variation on supply side	+ / - 10 %
8.1.2	Frequency variation on supply side	+/- 5 %
8.1.3	Combined variation of voltage and frequency	- 20 % or + 10 %
8.1.4	Service Condition	Refer Annexure A
8.1.5	Insulation level	
8.1.5.1	One minute power frequency withstand voltage	3KV for 415V system & 28KV for 11KV system
8.1.5.2	Lightning impulse withstand voltage	75KV peak for 11KV system
8.1.6	Short Circuit withstand level	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.1.6.1	Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side	For 3 sec				
8.1.7	Overload capability	As per IS 2026				
8.1.8	Noise level	Shall not exceed limits as per NEMA TR-1 with all accessories running measured as per IEC 551 / NEMA standard running measured as per IEC 551 / NEMA standard				
8.1.9	Radio Influence Voltage	Maximum 250 microvolt				
8.1.10	Harmonic currents	Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances.				
8.1.11	Partial Discharges	Transformer to be free from partial discharge up to 120% of rated voltage as the voltage is reduced from 150% of rated voltage i.e. there shall be no significant rise above background level.				
8.1.12	Parallel operation with existing transformer	Shall be designed to operate in parallel				
8.2	Major Parameters					
8.2.1	Rating	400kVA/630kVA/1000KVA/1600kVA/2000kVA				
8.2.2	Voltage Ratio	11kV / 415 V				
8.2.3	Vector Group	Dyn11				
8.2.4	Impedance at 75 deg C	a. 4.5% for 400kVA & 630kVA tolerance as per IS b. 5% for 1000 kVA tolerance as per IS c. 6.25% for 1600kVA& 2000kVA tolerance as per IS				
8.2.5	Losses at 75 deg C	With KNAN cooling				
8.2.5.1	Total Loss –Max in KW at 50% Load	400 kVA	630 kVA	1000 kVA	1600 kVA	2000 kVA

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		1.225	1.86	2.79	4.2	5.05
8.2.5.2	Total Loss –Max in KW at 100% Load	400	630	1000	1600	2000
		kVA	kVA	kVA	kVA	kVA
		3.45	5.30	7.70	11.8	15
8.2.6	Temperature rise top oil – without enclosure	45 Deg C max over ambient 40 Deg C				
8.2.7	Temperature rise winding – without enclosure	50 Deg C max over ambient 40 Deg C				
8.2.8	Flux density	1.6 Tesla at 100% rated voltage 1.9 Tesla at 112.5% rated voltage				
8.2.9	Current density	3 amp / sqmm for HV & LV winding				
8.2.10	Tapping on HV winding	Off circuit + 10% to -10% in 2.5% step				
8.2.11	Design Clearances	Design Clearances	Phase – phase	Phase – earth		
		11kV system	180mm	120mm		
		415V system	25mm	25mm		
8.3	Transformer construction					
8.3.1	Type	Double Copper wound, three phase, oil immersed, with ONAN cooling				
8.3.2	Tank	Type tested design				
8.3.2.1	Design	a. Completely sealed type with corrugated fins and without conservator b. Completely oil filled or N2 cushion at top filled with positive pressure. N2 shall be technical grade in accordance with IS:1747 c. With bolted / welded cover				
8.3.2.2	Plate / Corrugated fin / tank features	a. Adequate for meeting mechanical & electrical withstand requirements, as per applicable standard. b. The tank and its sealing (gaskets, o-rings, etc.) shall be of adequate				

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		strength to withstand positive and negative pressures built-up inside the tank while the transformer is in operation. The maximum pressure generated inside the tank should not exceed 40kPa, positive or negative. c. Corrugated fins shall be built up of CRCA sheets of minimum 1.2mm thick. d. The corrugated tank wall shall ensure sufficient cooling of the transformer and compensate for the changes in the oil volume during operation. e. The transformer shall be capable of giving continuous rated output, without exceeding the specified temperature rise. f. Internal clearance of tank shall be such that, it shall facilitate easy lifting of core with coils from the tank and HV & LV bushings mounted on Top cover. g. All joints of tank and fittings shall be oil tight. The tank design shall be such that the core and windings can be lifted freely with cover. The tank plate shall be of such strength that the complete transformers when filled with oil may be lifted bodily by means of lifting lugs. h. Tanks with corrugations & without conservator shall be tested for leakage at a pressure as per the applicable standard.
8.3.2.3	Material of Construction	Mild steel plate with low carbon
8.3.2.4	Plate Thickness	To meet the requirements of pressure and

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		vacuum type tests as per CBIP manual
8.3.2.5	Welding features	a. All seams and joints shall be double welded b. All welding shall be stress relieved for sheet thickness greater than 35 mm c. All pipes, stiffeners, welded to the tank shall be welded externally d. All corrugated fins or expansion bellows provided shall be double welded.
8.3.2.6	Tank features	a. Bottom with stiffeners & adequate space for collection of sediments b. No external pocket in which water can lodge c. Tank bottom provided with welded skid base d. Strength to prevent permanent deformation during lifting, jacking, transportation with oil filled. e. Minimum disconnection of pipe work and accessories for cover lifting f. Tank to be designed for oil filling under vacuum g. Tank cover should be fitted with lifting lug
8.3.3	Inspection cover for bushing & Core / Wind	As per manufacturer standard
8.3.4	Fittings and accessories on main tank	As per clause 8.8
8.3.5	Core	
	Material	High grade , non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel lamination

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.3.5.1	Grade	Minimum M3 or better
8.3.5.2	Core Design Features	a. Magnetic circuit designed to avoid short circuit paths within core or to the earthed clamping structures. b. Magnetic circuit shall not produce flux components at right angles to the plane of lamination to avoid local heating. c. Least possible air gap and rigid clamping for minimum core loss and noise generation. d. Adequately braced to withstand bolted faults on secondary terminals without mechanical damage and damage/displacement during transportation and positioning. e. Percentage harmonic potential with the maximum flux density under any condition limited to avoid capacitor overloading in the system. f. All steel sections used for supporting the core shall be thoroughly sand blasted after cutting, drilling, welding. g. Provision of lifting lugs for core coil assembly. h. Supporting framework designed not to obstruct complete drainage of oil from transformer i. Core shall be in the form of step and stack in three limb format. j. Note: No wound core shall be acceptable
8.3.6	Winding	
8.3.6.1	Material	Electrolytic Copper

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.3.6.2	Max Current Density allowed	Maximum 3 amp / sqmm
8.3.6.3	Winding Insulating material	Thermally Upgraded Paper (TUP) on winding conductor of Insulation Class B (130 Deg C)
8.3.6.4	Winding Insulation	Uniform
8.3.6.5	Design features	a. Type of winding : - LV: Spiral/Helical - HV: Crossover/Disc Note: No foil winding shall be acceptable b. Stacks of winding to receive adequate shrinkage treatment. c. Connections braced to withstand shock during transport, switching, short circuit, or other transients. d. Minimum out of balance force in the winding at all voltage ratios. e. Conductor width on edge exceeding six times its thickness. f. Transposed at sufficient intervals. g. Coil assembly shall be suitably supported between adjacent sections by insulating spacers + barriers. h. Winding leads rigidly supported, using guide tubes if practicable. i. Winding structure & insulation not to obstruct free flow of oil through ducts. j. Delta connection shall be done using Flexible cable.
8.3.7	Transformer Oil	a. Synthetic Ester oil b. Oil should be in accordance with specification as per Annexure D of this document
8.3.8	Bushings and Terminations	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.3.8.1	Type of HV side bushing	Epoxy cast bushing, 630 Amp, interface type 'C' as per EN50180 and EN50181.
8.3.8.2	Type of LV side bushing	Outdoor, Porcelain type, 1kv voltage class and creepage 31mm/KV
8.3.8.2.1	Essential provision for LV side line bushing	It shall be complete with copper palm suitable for tinned copper bus bar of size 100x12 mm
8.3.8.2.2	Essential provision for LV side neutral bushing	In case of neutral bushing the stem and bus bar palm shall be integral without bolted, threaded, brazed joints. Bus bar size shall be 100x12 mm
8.3.8.3	Arcing Horns	Not required
8.3.8.4	Support insulators inside HV cable box if provided	Epoxy resin cast, 12KV rated voltage
8.3.8.5	Termination on HV side bushing	Cable connection by screened separable connector kit.
8.3.8.6	Termination of LV side bushing	Bus bar connection
8.3.8.7	Minimum creepage distance of all bushings and support insulators.	31mm/kv
8.3.8.8	Protected creepage distance	At least 50 % of total creepage distance
8.3.8.9	Continuous Current rating	Minimum 20 % higher than the current corresponding to the minimum tap of the transformer
8.3.8.10	Rated thermal short time current	26.3kA for 3 sec
8.3.8.11	Atmospheric protection for clamp and fitting of iron and steel	Hot dip galvanizing as per IS 2633
8.3.8.12	Bushing terminal lugs in oil and air	Tinned copper
8.3.8.13	Sealing washers /Gasket ring	Nitrile rubber/ Expanded TEFLON (PTFE) as applicable
8.3.9	HV cable box	N.A
8.3.9.1	Material of Construction	N.A
8.3.9.2	Cable entry	As per design

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.3.9.3	Cable size for HV	3C X150sqmm A2XWY 11KV
8.3.9.4	Connection on LV phase	Bus bar 100x12mm copper
8.3.9.5	Bus bar size for LV Neutral	Same as phase bus
8.3.9.6	Detachable Gland Plate material for HV cable box	N.A
8.3.9.7	Gland plate thickness for HV	N.A
8.3.9.8	Cable gland for HV	N.A
8.3.9.9	Cable lug for HV	Suitable for cable 3CX150 mm ² 11KV
8.3.9.10	Essential parts for HV cable box	N.A
		a. Flange type removable front cover with handles min two no's b. Tinned Cu Bus bar c. Earthing boss for the HV cable box. d. Earthing link for the gasketed joints at two point for each joint e. Earthing provision for cable Armour/Screen f. Drain plug g. Danger / caution plate
8.3.9.11	Terminal Clearances HV phase – phase & phase -earth	180mm / 120mm
8.3.9.12	Termination height required for cable termination	750mm
8.3.10	Current Transformers	
8.3.10.1	Requirement	All three phases and neutral on LV side
8.3.10.2	Mounting	LV side bushings on all three phases and neutral with the help of fibre glass mounting plate affixed to main tank by nut bolt arrangement
8.3.10.3	Maintenance requirements	Replacement should be possible by removing fixing nut of mounting plate without disturbing LT bushing

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.3.10.4	Accuracy Class & ISF	0.5s / 10
8.3.10.5	Burden	5 VA
8.3.10.6	Type	Resin Cast Ring type suitable for outdoor use
8.3.10.7	CT ratio	a) 400/630KVA -1000/5 Amps b) 1000KVA -1500/5 Amp c) 1600kVA- 2500/5 amp d) 2000kVA-3000/5 amp
8.3.11	Off Circuit tap Switch	On HV winding
8.3.11.1	Range /Step	+ 10 % to -10% in steps of 2.5 %
8.3.11.2	Type	Rotary type, 3 pole gang operated,
8.3.11.3	Operating Voltage	11kV
8.3.11.4	Rated Current for tap Switch	a. 60 amps for 400KVA b. 100amp for 1000KVA /630KVA c. 150amp for 1600kVA/2000kVA
8.3.11.5	Operating Handle	External at suitable height to be operated from ground level.
8.3.11.6	Tap position indicator	With direction changing facility, locking arrangement, caution plate metallic fixed by rivet.
8.3.12	Pressure Relief Device	Required
8.4	Hardware	
8.4.1	External	Stainless Steel
8.4.2	Internal	Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design
8.5	Gasket	
8.5.1	For Transformer, surfaces interfacing with oil like inspection cover etc.	Nitrile rubber based / cork
8.5.2	For Cable boxes, Marshalling box, etc.	Neoprene rubber
8.6	Valves	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.6.1	Material of construction	Brass / gun metal
8.6.2	Type	Both end flanged gate valve / butterfly valve depending on application
8.6.3	Size	As per manufacturer's standard
8.6.4	Essential provision	Position indicator, locking rod, padlocking facility, valve guard, cover plate.
8.7	Painting of transformer.	
8.7.1	Surface preparation	By shot blasting method
8.7.2	Finish on internal surfaces of the transformer	Bright Yellow heat resistant and oil resistant paint two coats. Paint shall neither react nor dissolve in hot transformer insulating oil.
8.7.3	Finish on outer surface of the transformer-frame parts	Battle ship Grey shade 632 Poly urethane paint two coats, minimum dry film thickness 80 microns
8.8	Fittings & accessories	
8.8.1	Rating and Diagram Plate	Required
8.8.1.1	Material	Anodized aluminium 16SWG
8.8.1.2	Background	SATIN SILVER
8.8.1.3	Letters, diagram & border	Black
8.8.1.4	Process	Etching
8.8.1.5	Rating and Diagram Plate details	a. Following details shall be provided on rating and diagram plate as a minimum. b. BIS license c. BEE star level d. Type/kind of transformer with winding material. e. IS/IEC standard to which it is manufactured. f. Manufacturer's name. g. Transformer serial number. h. Month and year of manufacture. i. Rated frequency in HZ.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		j. Rated voltages in KV. k. Number of phases. l. Rated power in KVA. m. Type of cooling (ONAN). n. Rated currents in Amp. o. Vector group connection symbol. p. 1.2/50μs wave impulse voltage withstands level in KV. q. Power frequency withstands voltage in KV. r. Impedance voltage at rated current and frequency in percentage at principal, minimum and maximum tap s. Load loss at rated current. t. No-load loss at rated voltage and frequency u. Continuous ambient temperature at which ratings apply in deg c v. Top oil and winding temperature rise at rated load in deg c; w. Winding connection diagram with taps and table of tapping voltage, current and power x. Transport weight of transformer y. Weight of core and windings z. Total weight - aa. Volume of oil - bb. Weight of oil - cc. Name of the purchaser - dd. PO no and date - ee. Guarantee period
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Technical Specification of 11 kV Oil Type Smart Packaged Substation

8.8.2	Terminal marking Plate for Bushing, anodized aluminium black lettering on satin silver background both inside cable boxes near termination and on cable box cover (all fixed by rivet)	Required
8.8.3	Company Monogram Plate fixed by rivet	Required
8.8.4	Lifting Lug to lift complete transformer with oil	Required
8.8.5	Lifting lug for top cover	Required
8.8.6	Lashing Lug	Required
8.8.7	Jacking Pad with Haulage hole to raise or lower complete transformer with oil	Required
8.8.8	Detachable Bidirectional flat roller Assembly	Required
8.8.9	Pockets for ordinary thermometer on tank cover with metallic identification plate fixed by rivet.	Required
8.8.10	Drain valve (gate valve) for the main tank with cork above ground by 150mm minimum with padlocking and valve guard with metallic identification plate fixed by rivet.	As per manufacturer design
8.8.11	Filter valve (gate valve) at top with padlocking and valve guard with metallic identification plate fixed by rivet.	As per manufacturer design
8.8.12	Air Release Plug on tank cover with metallic identification plate	As per manufacturer design

Technical Specification of 11 kV Oil Type Smart Packaged Substation

	fixed by rivet.	
8.8.13	Oil level indicator with low level switch	As per manufacturer design
8.8.14	Earthing pad on tank for transformer earthing complete with non ferrous nut bolt, washers, spring washers etc. with metallic identification plate fixed by rivet	Required
8.8.15	Rain hood for vertical gasket joints	Desirable
8.8.16	Earthing bridge by copper strip jumpers on all gasket joints at at least two points for electrical continuity	Required
8.8.17	Skid base welded type with haulage hole	Required
8.8.18	Core , Frame to tank Earthing	Required
8.8.19	Danger plate made of Anodized aluminum with white letters on red background on Transformer, cable boxes (all fixed by rivet)	Required
8.8.20	Caution plate for Off Circuit tap changer fixed by rivet.	Required
8.8.21	Pressure Relief Device	Required

Technical Specification of 11 kV Oil Type Smart Packaged Substation**9 LV Switchgear Panel**

9.1	LV busbar system	Configuration of LV system shall be as per clause no 4 of this specification.
9.1.1	Type of connection on transformer	By flexible copper link rated size as per the transformer size.
9.1.2	Busbar material	High conductivity electrolytic grade aluminium
9.1.3	Main Bus bar	a. Suitable for carrying rated continuous current depending upon the incomer ACB rating. Current density should be less than 1A per sqmm. b. Busbars shall be continuous throughout the panel. c. Size of neutral busbar should be same as phase busbar.
9.1.4	Vertical/ Dropper Busbar	a. Bus bars rating should be same as the rating of respective ACB/MCCB. Current density should be less than 1A per sqmm. b. Size of neutral busbar should be same as phase busbar. c. Bus bars shall be colour coded with heat resistant colour tapes. d. Flexible tinned copper braid / flexible strips with terminal lug to be provided for connection of ACB / MCCB terminal with aluminum dropper/riser of main busbar.
9.1.5	Busbar Joints	a. Shall be silver plated. Adequate contact pressure shall be ensured b. Bimetallic connectors shall be provided, as necessary c. Length of overlap shall be more than the width of Busbar
9.1.6	Temperature Rise	20 degrees over ambient (maximum)

Technical Specification of 11 kV Oil Type Smart Packaged Substation

9.1.7	Insulation	a. Bus bar shall be provided with colour coded PVC insulating heat shrinkable sleeves rated for maximum operating voltage b. Insulating shroud should be provided on all joints
9.1.8	Bus insulator	Non-hygroscopic, Flame retardant, Track resistant type with high creepage surface (25 mm/kV), epoxy resin insulators
9.1.9	Phase barrier	All cable termination shall be provided with phase barriers.
9.1.10	Neutral link	Bolted disconnecting links shall be provided for all incoming and outgoing feeders for isolation of neutral, if necessary
9.1.11	Outgoing Cable Termination Compartment	a. Cable Termination should be provided on front side of the panel b. Cable entry should be from bottom c. Detachable 3mm MS gland plate with appropriate arrangement for sealing unused cable entries d. Bakelite/FRP sheet to be provided for segregation between phase to phase, phase to neutral, phase to panel body and neutral to panel body e. Front Cover shall be provided on the compartment f. Cable termination shall be suitable for 2R x 4C x 400 sqmm cable. Back to back cable termination on one busbar dropper is not acceptable. Two separate busbar dropper shall be provided in each phase and neutral for cable termination. Busbar Droppers shall be of 100 mm

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		(minimum) in length. Busbar droppers shall be staggered such that the bottom dropper shall be atleast 100mm longer than the top dropper. Appropriate clearances shall be maintained between droppers for ease of cable termination. Please refer annexure C for details. g. Appropriate clamping arrangement shall be provided in base frame for all outgoing cables to avoid any stress on the switchgear assembly. Shape of cable clamps shall be such that clamping should not damage the outer sheath of cable. h. Material of Cable Clamps shall be Nylon/HDPE. i. Cable termination height should be 450 mm from gland plate of the compartment j. Termination Nut, bolt, plain washer and spring washer shall be provided for two hole lug.
9.1.12	Phase sequence shall be RYB	a. Left to Right, when viewing from Front b. Top to bottom c. Front to rear
9.1.13	Minimum clearances	25mm between phases and phase to earth for the entire run of horizontal and vertical bus bars
9.1.14	Outgoing Feeder Earthing	Provision for connection of earthing braids of all incoming and outgoing cables shall be provided.
9.2	Air Circuit Breaker	
9.2.1	General Features	
9.2.1.1	Rated Current at 40 deg C	Rating of ACB as per the configuration table. De-rating @50 deg C shall be mentioned

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		separately.
9.2.1.2	Number of Poles	4 Pole ACB
9.2.1.3	ACB mounting	Fixed type
9.2.1.4	Line-Load Reversibility	Required
9.2.1.5	Terminals	Suitable for connection with aluminium busbars with phase barriers & shrouds
9.2.1.6	Operating mechanism	Electrical and manual spring charging, stored energy type
9.2.1.7	Operation counter	4 digit minimum, non-reversible
9.2.1.8	Operating handle	Required
9.2.1.9	ACB indications	Separate ON / OFF / TRIP, L/R in remote & spring charge status
9.2.1.10	Closing coil	Closing coil shall operate correctly at all values of voltage between 85% & 110% of the rated voltage.
9.2.1.11	Tripping coil	Shunt trip shall operate correctly at all values of supply voltage between 70% & 110% of rated voltage.
9.2.1.12	ACB auxiliary contacts	6 NO + 6 NC minimum
9.2.1.13	ACB operating knob sealing	Possible in OFF condition
9.2.1.14	CT Requirement	All phase and neutral
9.2.1.15	Access to releases, coils & add on type replaceable parts to ACB	From front only
9.2.1.16	ACB indications	a. Separate ON / OFF / TRIP b. Spring charge status
9.2.1.17	ACB ingress protection (without enclosure)	IP2X minimum
9.2.1.18	Pollution degree as per IS	2 – non conductive pollution
9.2.1.19	ACB temperature rise limits	As per table 2 & 3 of IS 60947-1
9.2.2	Operation Features	
9.2.2.1	Number of phases	Three phase & neutral
9.2.2.2	Rated Operational Voltage(V)	415V

Technical Specification of 11 kV Oil Type Smart Packaged Substation

9.2.2.3	Rated Insulation Voltage (V)	1000V
9.2.2.4	Rated Impulse Voltage	8 kV for main circuit
9.2.2.5	Category of utilization	B
9.2.2.6	Rated Ultimate breaking capacity at rated voltage	a. Icu = 50kA minimum (up to 2000A rating ACB) b. Icu = 65kA minimum (above 2000A rating ACB)
9.2.2.7	Rated Service breaking capacity at rated voltage Ics	Ics = 100% Icu
9.2.2.8	Rated short term withstand current for 1 sec at rated voltage – Icw	Icw = 100% Icu
9.2.2.9	Rated making current capacity – Icm	Icm = 220% Icu
9.2.2.10	Number of operating cycles at rated current (open + close) without changing arcing contact	5000
9.2.2.11	Number of mechanical operating cycles (open + close)	20000
9.2.2.12	Product Information marking on ACB	As per clause 5 of IS 60947 Part-I. In addition name of purchaser shall be marked on front of device
9.2.2.13	Measurement and Protection Requirement	
9.2.3	Microprocessor release	a. Microprocessor based release with true RMS based sensing. b. Self powered, tapped from incoming side of supply, setting panel with locking arrangement
9.2.3.1	Protections Required	Overload, short-circuit & earth fault
9.2.3.2	Tripping characteristic	Inverse definite minimum time characteristics for Short circuit and earth

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		fault protection
9.2.3.3	Overload setting	40% -100% I_n , steps of 10%.
9.2.3.4	Overload setting time delay	2.5 s to 40 s minimum three settings
9.2.3.5	Short Circuit Setting	100% - 800% of I_n , steps of 10%.
9.2.3.6	Short Circuit Setting time delay	50 ms - 400 ms in steps of 50ms
9.2.3.7	Instantaneous setting	200% - 1500% of I_n & OFF
9.2.3.8	Earth fault setting	10- 100 % of I_n , steps of 10%
9.2.3.9	Earth fault setting time delay	50ms - 400 ms in steps of 50ms
9.2.3.10	Neutral unbalance	Earth fault function should not operate during neutral unbalance. Same will be verified during inspection.
9.2.3.11	Measurements required in release	a. Phase wise current b. Phase wise voltage c. Power factor d. Maximum current with date and time e. Instantaneous Power: Active, Reactive and apparent power f. Power Demand g. Energy
9.2.3.12	Metering measurement accuracy	a. 1% for current and voltage b. 2% for Power and energy
9.2.3.13	Other release requirements	a. Release should have backlit display. b. Release should be plug-in type and easily replaceable in field. c. Separate fault indication shall be provided for each protection stage i.e overload, short circuit and earth-fault d. Release should store 10 fault records on FIFO basis with date and time stamp. e. Release should have 2 Digital Inputs. CB On and Off status shall be wired to DIs through auxiliary switch. f. Release should have RS485 port for

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		SCADA communication on open Modbus protocol. It should be able to transmit all measured, monitored and recorded data to SCADA including status of DIs. g. Remote time synchronization through SCADA should be possible
9.3	MCCB	
9.3.1	General Features	
9.3.1.1	Standard current rating at 40 deg C	As per the PSS configuration (De-rating @50 deg C shall be mentioned separately)
9.3.1.2	Construction	The MCCBs shall comprise of Four poles in a single construction. All the parts shall be enclosed in a moulded insulating material housing.
9.3.1.3	Type	The MCCBs shall be trip free type with quick make and break design.
9.3.1.4	Terminals	Suitable for connection with aluminium busbars with phase barriers & shrouds
9.3.1.5	CT Requirement	All phase and neutral
9.3.1.6	Access to releases, coils & add on type replaceable parts to MCCB	From front only
9.3.1.7	Indications	MCCBs shall be provided with mechanical position indicator with shrouded terminals. MCCB's shall have ON/OFF/trip positions.
9.3.1.8	MCCB ingress protection (without enclosure)	IP2X minimum
9.3.1.9	Pollution degree as per IS	2 – non conductive pollution
9.3.1.10	MCCB temperature rise limits	As per table 2 & 3 of IS 60947-1
9.3.2	Operation Features	
9.3.2.1	Number of phases	Three phase & neutral
9.3.2.2	Rated Operational Voltage(V)	415V
9.3.2.3	Rated Insulation Voltage (V)	1000V

Technical Specification of 11 kV Oil Type Smart Packaged Substation

9.3.2.4	Rated Impulse Voltage	8 kV for main circuit
9.3.2.5	Category of utilization	B
9.3.2.6	Rated Ultimate breaking capacity at rated voltage	Icu = 50kA minimum
9.3.2.7	Rated Service breaking capacity at rated voltage Ics	Ics = 100% Icu
9.3.2.8	Rated short term withstand current for 1 sec at rated voltage – Icw	Icw = 100% Icu
9.3.2.9	Rated making current capacity – Icm	Icm = 220% Icu
9.3.2.10	Number of operating cycles at rated current (open + close) without changing arcing contact	5000
9.3.2.11	Number of mechanical operating cycles (open + close)	20000
9.3.2.12	Product Information marking on MCCB	As per clause 5 of IS: 13947 Part-I. In addition name of purchaser shall be marked on front of device
9.3.3	Measurement and Protection Requirement	
9.3.3.1	Microprocessor release	a. Microprocessor based release with true RMS based sensing. b. Self powered, tapped from incoming side of supply, setting panel with locking arrangement
9.3.3.2	Protection	Overload, short-circuit & earth fault
9.3.3.3	Tripping characteristic	Inverse definite minimum time characteristics for Short circuit and earth fault protection
9.3.3.4	Overload setting	40% -100% In, steps of 10%.
9.3.3.5	Overload setting time delay	2.5 s to 40 s minimum three settings
9.3.3.6	Short Circuit Setting	100% - 800% of In, steps of 10%.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

9.3.3.7	Short Circuit Setting time delay	50 ms - 400 ms in steps of 50ms
9.3.3.8	Instantaneous setting	200% - 1500% of I_n & OFF
9.3.3.9	Earth fault setting	10- 100 % of I_n , steps of 10%
9.3.3.10	Earth fault setting time delay	50ms - 400 ms in steps of 50ms
9.3.3.11	Neutral unbalance	Earth fault function should not operate during neutral unbalance. Same will be verified during inspection.
9.3.3.12	Measurements required in release	a. Phase wise current b. Phase wise voltage c. Power factor d. Maximum current with date and time e. Instantaneous Power: Active, Reactive and apparent power f. Power Demand g. Energy
9.3.3.13	Metering measurement accuracy	a. 1% for current and voltage b. 2% for Power and energy
9.3.3.14	Other release requirements	a. Release should have backlit display. b. Release should be plug-in type and easily replaceable in field. c. Separate fault indication shall be provided for each protection stage i.e overload, short circuit and earth-fault d. Release should store 10 fault records on FIFO basis with date and time stamp. e. Release should have 2DIs for MCCB On and Off status shall be wired to DIs through auxiliary switch. f. Release should have RS485 port for SCADA communication on open Modbus protocol. It should be able to transmit all measured, monitored and recorded data to SCADA including

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		status of DIs. g. Remote time synchronization through SCADA should be possible
9.3.3.15	Common RS 485 port	a. Communication ports of all MCCBs and ACBs shall be looped and connected to a common RS485 port provided in the panel for interfacing with SCADA on open modbus protocol. b. If any additional communication device is required for looping/combining of ACB and MCCB data is to be provided.
9.3.3.16	Serial Port surge protection device	To be provided

10 Automatic Power Factor Correction system

The APFC equipment shall be located in LV compartment of package enclosure either as a separate panel or integrated along with LV Switchgear and shall have all the following features

10.1	APFC Output	a. As per the PSS configuration clause 4.0 b. APFC should be rated at 440V. c. Manufacturer need to specify the rated output at 440V.
10.2	APFC mounting	All components mounted in shelf type arrangement on package substation enclosure LV compartment wall or RMU compartment wall or Part of LT Panel
10.3	APFC relay & data logger	Mounted on base plate supported on compartment wall by three hinges
10.4	APFC system bus bar power connection to transformer LT side	a. By 4CX300sqmm AYFY 1100V grade cable to or Bus Bars for 200kVAR/300kVAR APFC rating b. By 2X4CX300sqmm AYFY 1100V grade cable to or Bus Bars for 600kVAR/800kVAR APFC rating

Technical Specification of 11 kV Oil Type Smart Packaged Substation

10.5	APFC system bus bar size	a. 50x10mm tinned copper mounted on SMC insulators 1100V grade for 200kVAR/300kVAR APFC rating b. 100x10mm tinned copper mounted on SMC insulators 1100V grade for 200kVAR/300kVAR APFC rating
10.6	APFC system CT input signal	From CT on transformer LV side by 7CX2.5sqmm YY 1100V grade cable
10.7	APFC capacitor modules	As per the requirement
10.8	Capacitor duty contactor for each capacitor module	Utilization category 6b as per IS
10.9	MCCB for each capacitor module	100amp, Three Pole, Ics=Icu=35kA
10.10	Connection to each MCCB from APFC system bus	By 35sqmm copper wire double insulated with tinned copper lugs
10.11	APFC control supply	Through 415/240v transformer, 2amp / 6amp SP MCB
10.12	APFC relay	Microprocessor based relay for automatic control of minimum 12 capacitors in sequential or cyclic switching fashion with settable time delay 0 -180 sec.
10.13	APFC relay LCD display with self monitoring feature	To show no. of capacitors energized, actual PF & target PF, voltage & current
10.14	Target power factor setting range	0.8 lag to 0.9 lead in steps of 0.1
10.15	APFC relay sensing	3 phase CT input 5 amp to sense max load current
10.16	No volt protection in relay	To switch OFF all capacitors
10.17	Capacitor unit 25KVAR type	Double layer All Poly Propylene (APP) or Mixed Poly Propylene (MPP)
10.18	Capacitor unit construction	1.5mm thick sheet metal welded tank or Al cylindrical construction
10.19	Capacitor unit impregnant	Dry type filler or non PCB liquid

Technical Specification of 11 kV Oil Type Smart Packaged Substation

10.20	Capacitor unit conducting layer	Al foil or metalized film
10.21	Capacitor sealing	Hermetic sealing after vacuum process
10.22	Capacitor unit safety	Pressure sensitive dis-connector or internal fuse for each element
10.23	Discharge resistor	Between all three phases of capacitor unit, to reduce the voltage across the capacitor to 50V or less in one minute
10.24	Terminal bushings	For rated voltage class 1 KV Suitable wires / terminals brought out from capacitor unit is also acceptable.
10.25	Earth connection for individual capacitor container	To be done & connected to main earth bus bar of the panel
10.26	APFC Operational features	
10.26.1	Automatic power factor correction	To achieve target lagging power factor without hunting
10.26.2	Operation for rated output	At continuous rated voltage (440 V) & frequency (50 Hz)
10.26.3	Operation with over voltage	115% of rated voltage for 12 hours in a day
10.26.4	Operation with harmonic distortion	THD voltage – 5% & THD current 3%
10.26.5	Maximum permissible over current	1.3 times rated current, continuous
10.26.6	Dielectric loss	0.2 watt per KVAR maximum
10.26.7	Temperature Category & Maximum temperature rise	- 5 / 60 deg C Not exceeding 10 deg C over 60 deg C.
10.26.8	Residual voltage after disconnection from mains	50 volts maximum after 60 seconds
10.26.9	Design life of capacitor unit	Minimum 10 years
10.26.10	Data Logger	
10.26.11	General	Accuracy class 0.5, microprocessor based with LCD display, with 3 CTs for measurement of cumulative KWH, power factor, voltage &

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		current of transformer secondary, THD of voltage.
10.26.12	Data logging and Software	Data logging of KWH value at every 30 minutes to give cumulative reading of KWH for 45 days minimum, data downloadable in ASCII-II or MS Excel format. Software for downloading the data from data logger to be provided by data logger vendor.
10.26.13	Display and communication	Display of DATE, TIME, station ID -Display & log power parameters phase wise & total (load current, kVA, kW & PF). -Display & log kVAr phase wise & total. -Display TDH V or current. - The logger shall be with built in communication facility of RS485 to down load all parameters on demand. Integration of APFC relay with FRTU for SCADA monitoring and control.

11 Energy Meter Box

11.1	Energy meter	In the scope of purchaser
11.2	Location	To be provided mounted on enclosure wall in LV compartment.
11.3	Energy meter box Size	650 mm height x 450 mm width x 275 mm depth.
11.4	Box door design	With antitheft hinge, padlock facility, door fixed by stainless steel Allen screw M6 size.
11.5	Fixing of energy meter within box	On slotted horizontal channel 40 x 12 mm size, channel shall be movable on vertical slotted angle 40 x 40 mm size at two ends.
11.6	Meter reading window	Front door shall be with acrylic sheet for viewing the energy meter.
11.7	Sealing arrangement	02 no's sealing arrangement shall be provided on meter box's door.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

11.8	Data downloading port	Slot shall be provided on door of meter box for fixing 9 pin DB connector.
11.9	Test Terminal Block	No Test terminal block shall be provided.
11.10	Cables and wires	PVC insulated, extruded PVC inner sheathed, armored, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sq mm for PT and 4 sq mm for CT with multi strand copper conductor.
11.11	Cable Glands	Nickel plated brass double compression weatherproof cable gland.
11.12	Wiring diagram	To be fixed on the back of door along with CT spec. etched on Anodised Aluminium plate fixed by rivet.
11.13	CT Secondary/VT wires	All CT secondary wire and VT wires shall be routed through metallic conduit. All secondary wires shall be bunched and kept for termination without any terminal/ TTB in between.

12 Other Provisions: illumination, Hooter & Fire extinguisher

12.1	RMU, transformer & LV compartment illumination	By 36w CFL fixture controlled through SPMCB & door limit switch
12.2	RMU, transformer & LV compartment power socket	5/15amp 3 pin socket through 32 amp SPMCB
12.3	Smoke Detector in each compartment	Minimum 02 no's Smoke Detectors in each LV, HV and Transformer compartment , wiring to be provided for RMU tripping and SCADA indication.
12.4	Energy meter box	To be provided on transformer LT side along with wiring.
12.5	Portable Modular Fire Extinguisher for HV, LV and Transformer compartment	a. The Portable modular FE, ABC (Stored Pressure) shall conform IS 13849. b. The powder in the extinguisher must be

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		MAP 90%. c. The Dry powder used in FE shall conform IS 4308. d. The internal and external surface of the body shall be epoxy powder coated of minimum 0.050mm thickness. e. The wall thickness shall be as per IS 13849 f. All Internal and external surface of the body shall be completely coated with lead-tin alloy (tin not less than 10%) by means of hot dipping or by electrolytic process to a thickness not less than 0.012 mm. The thickness of the coating shall be measured as given in IS 3203:1982. Epoxy powder coating can also be used for anti-corrosive treatment with 0.050 mm thickness. g. The extinguisher body and valve assembly shall be capable of withstanding the Internal hydraulic pressure of 3 0 MN/m² (30 kgf/cm²) without rupture, leakage or visible distortion for a period of 2 minute".
12.6	Other requirements	Substation internal cabling, lighting & earthing system along with required hardware, gaskets, gland plates etc.

13 PSS Enclosure Earthing

13.1	Earth bus connection brought out of package substation enclosure to earth pad for connection to earth pit	a. Two earth pads for RMU, transformer & LV compartment each. b. Two earth pads for transformer neutral
13.2	Earth bus size	a. 50x6 GI flat up to 1000kVA rating of PSS b. 2X50x6 GI flat for 1600kVA and 2000kVA rating of PSS

Technical Specification of 11 kV Oil Type Smart Packaged Substation

13.3	Earth bus fault current capacity	a. 26.3kA for 1 sec up to 1000kVA rating b. 43KA for 1 sec up to 1600kVA rating and 2000kVA rating of PSS
13.4	Earth connection of all covers, doors & structural parts to GI bus	By metallic jumper connection
13.5	Earth connection of RMU, ACB & transformer body parts to GI bus	By two numbers of 50x6mm GI flat per equipment
13.6	Earth bus identification	Shown by letter 'E'

14 Labels & painting

14.1	Name plate on package enclosure	Fixing by rivet only
14.1.1	Material	Anodized aluminum 16SWG / Stainless Steel (SS)
14.1.2	Background	SATIN SILVER
14.1.3	Letters, diagram & border	Black
14.1.4	Process	Etching
14.2	Name plate details	a. Month & year of manufacture b. transformer rating c. Purchaser name & order number d. Guarantee period e. Ref. IS / IES No. Shall be provided inside enclosure as well as outside enclosure.
14.3	Labels for meters & indications	Anodized aluminium with white character on black background OR 3 ply Lamicoid
14.4	Danger plate on doors of RMU compartment & LV compartment	Etched on 16 swg anodised aluminium / SS plate with white letters on red background
14.5	BSES Insignia	a. 02 no's b. HV and LV side of PSS enclosure. c. Shall be etched on anodized aluminium

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		16SWG / SS plate. d. Details shall be finalized during drawing approval.
14.6	Enclosure painting surface preparation	Shot blasting or 7 tank chemical process
14.7	Enclosure painting external finish Powder coated epoxy polyester base	Hot dip galvanizing – 80 micron thick grade A, shade - RAL 7032, uniform thickness 60 micron minimum .
14.8	Enclosure painting internal finish	Powder coated epoxy polyester base grade A, shade -white, uniform thickness 80 micron minimum

15 Approved makes

15.1	RMU	ABB/Schneider/Siemens/C&S
15.2	Transformer	ABB/Raychem/TMC/Voltamp
15.3	FRTU	ABB/Schneider/Siemens/Phoenix
15.4	FPI	EASI/ EMG/Siemens/C&S
15.5	Protection Relay	Ashida ADR241S -761/ C&S-CSPR-V2-500
15.6	Battery charger and BHMU	Allan/Gagate
15.7	Oil type transformer	ABB/ Schneider/Danish/kotson/Toshiba
15.8	Bushings make	Baroda bushing / CJI / Jaipur
15.9	Winding Temperature Indicator	Precimeasure/ Pecon
15.10	ACB	L&T / Schneider-MG /Siemens / ABB
15.11	MCCB	GE / ABB/Schneider/Siemens
15.12	APFC	ABB/Schneider/Epcos
15.13	Switch	ABB / Siemens / L&T (Salzer)
15.14	HRC Fuse Links	Alstom / Siemens / L&T / GE
15.15	Load manager	L&T / Enercon / AE / DUCATI / Phasetrac M-40 / TAS POWERTECH
15.16	APFC relay	Beluk / ABB / Fraco / Ducati/ TAS / POWERTECH
15.17	AC Contactors	ABB / Schneider
15.18	Push buttons / Actuator	L&T / Teknic / Siemens

Technical Specification of 11 kV Oil Type Smart Packaged Substation

15.19	MCCB	ABB / L&T / Siemens/Schneider –MG
15.20	Capacitors	FRACO / DUCATI/ABB/shrim
15.21	Fans	EBM Nadi
15.22	Terminals	Connectwell / Elmex
15.23	Transformer Bushings (HV side)	Baroda/CJI/ any other make approved by BSES
15.24	Termination kits for RMU	3m/ Raychem/ Denson
15.25	Termination kits for Transformer	3M/ Raychem/ Denson / any other make approved by BSES
15.26	Cold applied cable boots	3M/ Raychem/KD joshi
15.27	Interposing relay	ABB / Tyco/OEN
15.28	Modem	Niseva/Lantronix/Pheonix
15.29	CT and Aux PT	Narayan Power Tech (NPT)/Gilbert Maxwell, Pragati, Nortex
15.30	CBCT (Both for Earth fault and Over current protection)	EMG/Schneider/SIEMENS/C&S
15.31	Battery	HBL/Exide
15.32	Protocol converter	ABB/Tyco/OEN
15.33	DC power connector	Wago/Havells/Connectwell
15.34	Surge protector	Phoenix
15.35	Vacuum Interrupter	CG/ABB/Schneider/BEL

Note- Any other make of component offered by the bidder shall be subject to approval of BSES.

16 Quality assurance Inspection & testing

16.1	Vendor quality plan	To be submitted for purchaser approval for all components listed in clause 4.0 For transformer, RMU & APFC panel sub vendor quality plan to be submitted.
16.2	Inspection points in quality plan	To be mutually identified & agreed
16.3	Quality – Process Audits	BSES shall carryout vendor process audits.
16.4	Type test as per IS / IEC	a. Only type tested quality equipment(s) shall be offered.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		b. Type test certificates shall be submitted along with offer for scrutiny. c. The test reports should not be more than 5 years old.
16.4.1	Package substation assembly	All type tests to be provided as per as per IS 62271-202
16.4.2	11 kV RMU, ACB, MCCB, APFC system and capacitor units	All type tests to be provided as per as per relevant IS/ IEC
16.4.3	Transformer	a. All type tests to be provided as per IS 1180 Part 3 including short-circuit withstand test. b. If identical rating type test reports for transformers with synthetic ester oil are not available, vendor shall carryout type tests as per IS 1180 Part 3 including short-circuit withstand tests without any additional cost.
16.5	Routine tests	
16.5.1	Routine tests of PSS	As per IEC 62271-202
16.5.2	Routine tests of transformer, RMU, LT panel & APFC	As per relevant IS/ IEC
16.6	Inspection and acceptance testing	a. Purchaser reserves the right to inspect /witness all tests at manufacture's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests during inspection. All the testing equipment should be calibrated. c. Stage and / or final inspection call intimation shall be given at least 15 days in advance to the purchaser.
16.6.1	Stage inspection of transformer	Purchaser shall inspect transformers at the core and coil assembly stage at the manufacturer's

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		premises.
16.6.2	Final inspection of transformers	The sequence of testing shall be as follows - Visual and dimension check for completely assembled transformer. - Measurements of voltage ratio. - Measurements of winding resistance at principal tap and two extreme taps. - Vector Group and polarity test. *Measurements of insulation resistance and polarization index. - Separate sources voltage withstand test. - Measurement of iron losses and exciting current at rated frequency and 90%, 100% and 110% rated voltage. - Induced voltage withstand test. - Load losses measurement. - Impedance measurement of principal tap (HV and LV) of the transformer. - Measurement of Iron loss (to be repeated if type test are conducted). - Measurement of capacitance and Tan Delta for HV and LV bushings and Tan Delta for transformer oil (for all transformers). - Oil leakage test on assembled transformer - Magnetic balance test. - Power frequency voltage withstand test on all auxiliary circuits - Measure of zero seq. impedance (Cl. 16.10 IS 2026 Part I). - Measurement of acoustic noise level (Cl. 16.12 of IS 2026 Part I). - Measurement of harmonic level on no load current.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		s. Partial discharge test *Insulation resistance measurement shall be carried out at 5kV for HV and 1kV for LV. Value of IR should not be less than 1000 Mohms. Polarization Index (PI = IR10min/IR1min) should not be less than 1.5 (If one minute IR value is above 5000 Mohms and it is not be possible to obtain an accurate 10 minutes reading, in such cases polarization index can be disregarded as a measure of winding condition.)
16.6.3	Final Inspection of package substation after complete assembly	As per IEC 62271-202 and relevant IS/ IEC of equipment. a. Visual check b. Dimensional and sheet thickness check c. Verification of Wiring & BOM d. Paint thickness inside and outside of PSS enclosure. e. Functional test i. Operation of switchgear and control gear. ii. Mechanical operation and alignments of PSS doors. iii. Fixing of insulating barriers. iv. Voltage indication check v. Checking of temperature and liquid level of the transformer. vi. Fitting of earthing devices. vii. Cable testing viii. Replacement of LTCT ix. Operation of transformer tap changer x. Operation of illumination system xi. Trip function of HV switchgear. f. IR test g. HV test on power circuit

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		h. HV test on auxiliary circuits i. Operational and interlocks check
16.6.4	Acceptance Test of RMU	a. Physical inspection , BOM & wiring checks b. Insulation Resistance test c. HV Test for one minute d. Operation & Interlock check e. Measurement of resistance of main circuit f. Voltage indication check of VPI g. Functional testing of FPI for alarm h. Primary current injection test for circuit breaker feeder on both ration's of all CT's with relay i. Breaker closing and opening time measurement
16.6.5	Acceptance Test of LT Panel / APFC Panel	a. Visual, dimension, wiring & BOM check. b. Operational check. c. IR Test. d. HV Test
16.7	Special acceptance tests	
16.7.1	Transformer	Temperature rise test shall be carried out on 01 no transformer of each rating randomly selected from the offered lot.
16.7.2	PSS	Temperature rise test of PSS along with transformer as per IEC 62271-202.
16.8	Right to waive off tests	Reserved by Purchaser

17 Shipping, Handling and Site support

17.1	Packing Protection	Against corrosion, dampness, heavy rains, breakage and vibration
17.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label
17.3	Packing Identification Label	On each packing case, following details are

Technical Specification of 11 kV Oil Type Smart Packaged Substation

	(Anodized Aluminum Plate)	required:
		a) Individual serial number
		b) Purchaser's name
		c) PO number (along with SAP item code, if any) & date
		d) Equipment Tag no. (if any)
		e) Destination
		f) Manufacturer / Supplier's name
		g) Address of Manufacturer / Supplier / it's agent
		h) Description of PSS.
		i) Country of origin
		j) Month & year of Manufacturing
		k) Case measurements
		l) Gross and net weights in kilograms
		m) All necessary slinging and stacking instructions
17.4	Shipping	The seller shall be responsible for all transit damage due to improper packing.
17.5	Handling and Storage	a) Manufacturer instruction shall be followed. b) Detail handling & storage instruction sheet / manual to be furnished before commencement of supply.

18 Deviations

18.1	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.
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19 Drawings Submission

Drawing submission shall be as per the matrix given below.

- a. All documents/ drawing shall be provided in soft copy only in returnable Pen drives

Technical Specification of 11 kV Oil Type Smart Packaged Substation

- b. Language of the documents shall be English only.
- c. Incomplete submission shall be liable for rejection.
- d. Document check sheet compliance shall be the first sheet for each submission stage
i.e. Technical bid, Drawing Approval, Pre Dispatch
- e. No submission is acceptable without check list compliance.
- f. Order of documents shall be strictly as per the check list.
- g. Any drawing not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope.

S No.	Description	Bid	For Approval	Pre Dispatch
19.1	Copy of specification along with company seal & signature on each page.	Required		
19.2	Duly filled GTP as per Annexure 'B'.	Required	Required	
19.3	GA drawing (Complete assembly, RMU, transformer, LT panel + other items)	Required	Required	
19.4	BOM of Packaged substation	Required	Required	
19.5	Valid type test reports	Required		Required
19.6	Transformer BIS license	Required	Required	Required
19.9	Calculation for sizing of Transformer	Required	Required	
19.10	Sizing Calculation of busbar in support of its Guaranteed S.C. rating / Capability	Required	Required	
19.11	Deviation Sheet (if any)	Required	Required	
19.12	Catalogues & manuals for Package substation + RMU + Transformer + LT switchgear items + APFC			Required
19.13	User manual for Hermetically Sealed Transformers. The manual must be provided with,			Required

Technical Specification of 11 kV Oil Type Smart Packaged Substation

S No.	Description	Bid	For Approval	Pre Dispatch
	but not limited to, maintenance schedule, frequency & method of oil- sampling, procedures for oil-filling & oil-filtration, etc.			
19.14	Quality plan for Packaged substation	Required	Required	
19.15	Installation, commissioning manual for all items in Packaged substation. (for information)		Required	Required
19.16	Operation & maintenance manual for all items in Packaged substation. (for information)			Required
19.17	Transport / Shipping dimensions with weights, wheel base details, un tanking height		Required	
19.18	Recommended spare parts list as per annexure G.	Required	Required	
19.19	Inspection and test reports carried out in manufacturers works			Required
19.20	Test certificates of all bought out items.			Required

Technical Specification of 11 kV Oil Type Smart Packaged Substation**Annexure A - Service Conditions**

The package substation shall be designed & tested to operate satisfactorily under following conditions

Sr No	Description	Data by purchaser
1.	Location	Delhi
2.	Reference design ambient temperature	40°C for Delhi
3.	Maximum ambient temperature	50°C for Delhi
4.	Relative humidity	85% for Delhi
5.	Seismic zone	Zone IV for Delhi

Annexure B - Guaranteed Technical Particulars (Data by Supplier)

- Bidder shall furnish the GTP format with all details against each clause.
- Bidder shall not change the format of GTP or clause description.
- Bidder to submit duly filled GTP in hard copy format with company seal.

Sr. No.	Description	Data to be filled by Supplier
1	Manufacturer Name	
2	Manufacturer Address	
2.1	Telephone no	
3	Manufacturer contact person	
4	Manufacturer brand name (Give catalogue reference)	
4.1	Conformance to specification	Yes/No
4.2	If NO for above, Submission of clause wise deviation sheet	Yes/No
5	RMU	
5.1	Equipment make	
5.2	Equipment type / brand name	
5.3	Panel overall dimensions in mm	
5.3.1	Width (measured from front)	
5.3.2	Depth	
5.3.3	Height	
5.4	Panel weight in kg	
5.5	Panel enclosure protection offered	
5.6	Panel tested for internal arc	Yes / No

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
5.7	Insulation level for complete panel	
5.7.1	Impulse withstand	(KV peak)
5.7.2	Power frequency withstand	(KV rms)
5.8	Bus bar	
5.8.1	Material & grade	
5.8.2	Bus bar cross section area in sq mm	
5.8.3	Bus bar rated current in amp	
5.8.4	Max temperature rise above reference ambient	
5.8.5	Short time current withstand capacity for 3 seconds (in KA)	
5.8.6	Bus bar clearances in mm P-P / P-E	
5.8.7	Bus bar with insulation sleeve / barriers	
5.8.8	Bus bar support insulator type	
5.8.9	Bus bar support insulator voltage class	
5.8.10	Bus bar support insulator minimum creepage distance / mm	
5.9	Earth bus bar	
5.9.1	Earth bus bar material & grade	
5.9.2	Earth bus bar cross section area in sq mm	
5.9.3	Bus bar rated current in amp i) at designed 40 deg.C ambient ii) at 50 deg.C ambient	
5.9.4	Max temperature rise above reference ambient of 40 deg C	
5.9.5	Short time current withstand capacity for 3 seconds (in KA)	
5.9.6	Bus bar clearances in mm P-P / P-E	
5.9.7	Bus bar with insulation sleeve / barriers	
5.9.8	Bus bar support insulator type	
5.9.9	Bus bar support insulator voltage class	
5.9.10	Bus bar support insulator minimum	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
	creepage distance / mm	
5.9.11	Earth bus bar material	
5.9.12	Earth bus bar size	
5.9.13	Cable compartment	
5.9.13.1	C-C distance between bushings	
5.9.13.2	Phase to Phase Clearance (Min)	
5.9.13.3	Phase to Earth (Min) Clearance	
5.9.13.4	Impulse Withstand Voltage of design tested	
5.9.13.4	IAC level – Cable compartment / RMU Tank	
5.10	Circuit breaker type –VCB	
5.10.1	Rated voltage & frequency	
5.10.2	Rated current in amp	
5.10.3	Rated breaking current – KA rms symmetrical	
5.10.4	Short time withstand capacity in KA for 3 sec	
5.10.5	Rated making current - KA peak	
5.10.6	Breaker total opening time at rated breaking capacity (in milliseconds)	
5.10.7	Number of breaks per pole	
5.10.8	Total length of contact travel in mm	
5.10.9	No of circuit breaker operation cycles (close & open) guaranteed at rated current, Electrical endurance class	
5.10.9.1	25% rated current -	
5.10.9.2	50% rated current -	
5.10.9.3	75% rated current -	
5.10.9.4	100% rated current -	
5.10.10	No of breaker opening operations guaranteed at rated fault current, Electrical Endurance class	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
5.10.11	No of breaker mechanical operation cycles (close & open) guaranteed at zero current, Mechanical endurance	
5.10.12	Contact material	
5.10.13	Operating mechanism – trip free	
5.10.14	Motorized/Manual Sprig charge type	
5.10.15	Spring charging motor rating - Watt	
5.10.16	Spring charging motor rated DC voltage	
5.10.17	Closing coil wattage & rated DC voltage	
5.10.18	Trip coil wattage & rated DC voltage	
5.11	Minimum permissible SF6 gas pressure (For SF6 type RMU only)	
5.12	Capacitor type cable voltage indication provided?	Yes / No
5.13	Operation counter provided – Yes/ No	
5.14.1	Disconnect switch continuous rating (Amp)	
5.14.2	Disconnect switch Short time withstand rating -20kA for 3 sec minimum	Yes / No
5.15	Earth Switch	
5.15.1	Minimum number of operations at no load- Mechanical Endurance class	
5.15.2	Making capacity endurance of earth switch – Electrical endurance class	
5.16	Self Powered Relay (Transformer VCB module)– Make / Model	
5.16.1	CT Input	
5.16.2	IDMT Setting Range 4 element – Over Current & Earth fault & steps	Overcurrent- Earth Fault- Instantaneous O/C Instantaneous E/F-
5.16.3	Operating Time	Over Current – Curves Instantaneous

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
5.16.4	Pick up Current	
5.16.5	Resetting Current	
5.16.6	Relay Burden	
5.16.7	Time Accuracy	
5.16.8	Tripping Coil O/P – type & duration	
5.16.9	Fault Current Display	
5.16.10	No of Fault Current Latching with time stamping	
5.16.11	Display Facility / Type	
5.16.12	Operational Indicators	
5.16.13	Potential Free Output Contacts	
5.16.14	Thermal Withstand Capacity of Relay	
5.17	Fault Passage Indicator (for Cable feeder module 1 & 2)	
5.17.1	CBCT	
5.17.1.1	Type	
5.17.1.2	Mounting Arrangement	
5.17.1.3	CT to indicator connection	
5.17.1.4	ID of sensor	
5.17.2	Earth Fault Indicator	Make / Model
5.17.2.1	Sensing Current	
5.17.2.2	Sensing Time	
5.17.2.3	Indication	
5.17.2.3	Reset Time	
5.17.2.4	Resetting Facility	
5.17.2.5	Output Contact	
5.17.2.6	Contact Rating	
5.17.2.7	Aux Power Supply	
5.17.2.8	Degree of Protection	
5.17.2.9	Mounting Arrangement	
5.17.2.10	Ambient Temperature	
5.18	DC charger rating in amps – min 10 Amp	Yes/No

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
	Dual	
5.18.1	MCB rating at 230V AC input of charger	Amp
5.18.2	MCB rating at 24V DC output of charger	Amp
5.18.3	Charger heat sink temperature rise (max 55 deg C above ambient 40 deg C)	
5.18.4	Voltage variation in 24v Dc output for FRTU	(Max +/-1 V)
5.18.5	Charger with natural cooling (no cooling fans)	Yes/No
5.18.6	Charger tested for input supply voltage regulation test (input variation 150v-250v, output DC voltage variation +/- 1 volt max)	Yes/No
5.18.7	Charger temperature rise test certificate submitted	Yes/No
5.19	DC battery rating in Ah – 26Ah (mini) OR as approved battery sizing during detail engineering ,whichever is higher.	
5.20	DC charger changeover – Diode rating 10A min	Yes/No
5.21	HT Cable termination - 3cX300sqmm AYFY cable– Height of power terminal from gland plate	mm
5.22	Mimic diagram, labels & finish as per specification	Yes / No
5.23.1	Cable termination – Height of power terminal from gland plate	Mm
5.23.2	Torque required for tightening terminal lug	
5.24	Submission of RMU / component catalogue	Yes/No
5.25	Unit price for Conversion kit offered separately for converting the RMU from single cable termination design to double cable	Yes/No

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
	termination design	
5.26	FRTU Panel	
5.26.1	FRTU	
5.26.1.1	Make & Model No	
5.26.1.2	No of DI Modules	
5.26.1.3	No of DO Modules	
5.26.1.4	No of AI Modules	
5.26.1.5	Make of Protocol converter	
5.26.2	Modem	Ethernet Type
5.26.2.1	Make	
5.26.2.2	Serial port Isolator provided	Yes / No
5.26.2.3	Type – 4G Back compatible to 3G & 2G Refer FRTU Specifications	Yes / No
5.26.3	Interposing relay with freewheeling diode	
5.26.3.1	Make	
5.26.3.2	Capacity	
5.26.3.3	Model	
5.26.4	AC & DC MCB	
5.26.5	Terminal Blocks	
5.26.6	Disconnecting type fuses	
5.26.7	Enclosure	
5.26.7.1	Sheet steel thickness	
5.26.7.2	Painting process	
5.26.7.3	Construction of steel according to IEC 529 , index of protection	
5.26.7.4	Shade	
5.26.7.5	Louvers with filters	
5.26.8	Dimensions & Weight of FRTU	
5.28	Submission of RMU / component catalogue	Yes/No
6.0.0	11kv cable	from RMU to transformer
6.1.0	Cable size 3CX150 sqmm AYFY	Yes/No

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier	
6.2.0	Cable rated voltage - 11000v	Yes/No	
6.3.0	Cable short circuit current capacity for 1 sec	kA	
6.4.0	Type of insulation - XLPE	Yes/No	
6.5.0	Outer insulation sheath – PVC with armor	Yes/No	
6.6.0	Cable termination type & make		
7.0.0	Oil Type Transformer		
7.1.0	Make		
7.2.0	Type- Synthetic Ester Oil Transformer	Yes	
7.3.0	Transformer continuous rating when placed in package substation enclosure	HV winding	LV winding
		KVA	KVA
7.4.0	Rated voltage (kV)	HV winding	LV winding
		11 KV	0.433 KV
7.5.0	Rated current	HV winding	LV winding
		Amps	Amps
7.6.0	Transformer vector group – Dyn11	Yes / No	
7.7.0	Impedance at principal tap rated current and frequency, ohm @75 °C	As per the specification	
7.7.1	Impedance at lowest tap	Ω	
7.7.2	Impedance at highest tap	Ω	
7.7.3	X/R Ratio		
7.8.0	Resistance of the winding at 75°C in ohm	HV winding	LV winding
		Ω	Ω
7.10.0	Zero sequence impedance in ohm	HV winding	LV winding
		Ω	Ω
7.10.0	Guaranteed maximum losses at principal tap at 75°C without any positive tolerance, kW	50 % Load (kW)	100 % Load (kW)
7.10.1	No load losses (max.)		
7.10.2	Load losses (max.)		
7.10.2	Total losses (max.),		
7.10.4	No load loss at maximum permissible voltage and frequency (approx.),		
7.11.0	Temperature rise over reference ambient		

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
7.11.1	Winding by resistance: Outside the PSS enclosure / inside the PSS enclosure 0 C	
7.11.2	Top Oil by thermometer: Outside the PSS enclosure / inside the PSS enclosure 0 C	
7.11.3	Maximum hot spot temperature, Deg. C	°C
7.12.0	Efficiency	at 75°C and unity power factor
7.12.1	at 110% load	%
7.12.2	at 100% load	%
7.12.2	at 80% load	%
7.12.3	at 60% load	%
7.12.4	at 40% load	%
7.12.5	at 20% load	
7.13.0	Maximum hot spot temperature, Deg. C	at 75°C and 0.8 power factor lag
7.13.1	Efficiency	%
7.13.2	at 110% load	%
7.13.3	at 100% load	%
7.13.4	at 80% load	%
7.13.5	at 60% load	%
7.13.6	at 40% load	%
7.14.0	Maximum efficiency at 75°C	%
7.14.1	% Load and power factor at which it occurs	
7.15.0	Regulation at full load at 75°C	
7.15.1	at unity power factor	
7.15.2	at 0.8 power factor lagging	
7.16.0	Regulation at 110% load at 75° C	
7.16.1	at unity power factor	
7.16.2	at 0.8 power factor lagging	
7.17.0	Core	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
7.17.1	Core material grade	Premium grade minimum M3 or better
7.17.2	Thickness of lamination mm	mm
7.17.3	Insulation of lamination	
7.17.4	Design Flux Density at rated condition at principal tap, Tesla- 1.7 Tesla (Max)	
7.17.5	Maximum flux density at 12.5 % over excitation /overfluxing, Tesla -1.9 Tesla (Max)	
7.17.6	Equivalent cross section area	
7.18.0	Guaranteed No Load current At 100% rated voltage , Amps	
7.18.1	HV	
7.18.2	LV	
7.110.0	Guaranteed No Load current At 110% rated voltage, Amps	
7.110.1	HV	
7.110.2	LV	
7.20.0	Type of Winding	
7.20.1	HV	
7.20.2	LV	
7.20.3	Conductor material	
7.20.4	Current density Amps/sqmm	
	HV winding	
	LV winding	
7.20.5	Gauge/area of cross section of conductor, sqmm	
	HV	
	LV	
7.21.0	Tapping - Off Ckt	Yes / No
7.21.1	Capacity	Full Capacity
7.21.2	Range- steps X % variation	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier	
7.21.3	Taps provided on HV winding	Yes / No	
7.21.4	Tap link Current rating , A		
7.22.0	Insulating material and thickness	Material	Thickness
7.22.1	HV Turn		mm
7.22.2	LV Turn		mm
7.22.3	LV to Core		mm
7.22.4	HV to LV		mm
7.23.0	Minimum design clearance, mm		
7.23.1	HV to earth in Air	mm	
7.23.2	LV to earth in Air	mm	
7.23.3	Between HV & LV in Air	mm	
7.23.4	Top winding and yoke	mm	
7.23.5	Bottom winding and yoke	mm	
7.24.0	Bushing / Support Insulator		
7.24.1	Make		
7.24.2	Type		
7.24.3	Reference Standard		
7.24.4	Voltage class, kV		
7.24.5	HV side Bushing / Support insulator		
7.24.6	LV side line and neutral bushing / Support insulator		
7.24.7	Creepage factor for all bushing	mm / KV	
7.24.8	Weight	KG	
7.24.9	HV bushing / Support insulator		
7.24.10	LV line and neutral bushing / Support insulator		
7.24.11	Free space required for bushing / Support insulator removal, mm		
7.24.12	HV bushing / Support insulator		
7.24.13	LV line and neutral bushing / Support insulator		
7.25.0	Insulating Oil		

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
7.25.1	Quantity of Oil Ltrs	
7.25.2	10% excess oil furnished	
7.25.3	Type of Oil	
7.25.0	HV Termination arrangement	Suitable for 3CX150 mm ² AYFY 11KV
7.25.1	Phase to phase clearance	mm
7.25.2	Phase to earth clearance	mm
7.25.3	HV side bus bar size	
7.25.4	HV Termination height	mm
7.26.0	L.V termination arrangement	Suitable to 100x12 mm for phase & neutral
7.26.1	Phase to phase clearance,	25 mm minimum
7.26.2	Phase to earth clearance ,	25 mm minimum
7.26.3	LV side bus bar size	
7.26.4	LV Termination Height	mm
7.27.0	Current Transformer on LV phases	
7.27.1	Type	
7.27.2	Make	
7.27.3	Reference Standard	
7.27.4	CT Ratio	
7.27.5	Burden, VA	
7.27.6	Class of Accuracy	
7.28.0	WT scanner terminal box size	
7.210.0	Alarm and Trip contact ratings of protective devices	
7.210.1	Rated / making/ breaking currents , Amp @ Voltage for	
7.210.2	Winding temperature scanner	
7.30.0	Fittings and Accessories as per Cl. 8.9 provided	(YES / NO)
7.31.0	Over all transformer dimensions	
7.31.1	Length	mm

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
7.31.2	Width	mm
7.31.3	Height	mm
7.32.0	Weight data	
7.32.1	Core	KG
7.32.2	Frame parts, kG	KG
7.32.3	Core and frame, kG	KG
7.32.4	Total Winding, kG	KG
7.32.5	Core , Frame, Winding, kG	KG
7.32.6	Enclosure, kG	KG
7.32.7	Total Transport weight of the transformer, kG	KG
7.32.8	Total weight of the transformer with all accessories	KG
7.33.0	Shipping Data	
7.33.0	Weight of heaviest package, kG	KG
7.33.0	Dimensions of the largest package (L x B x H)	mm
7.34.0	Surge Arrestor requirement	
7.34.1	Type	
7.34.2	System Voltage , kV rms	
7.34.3	Rated Voltage of Arrestor, kV rms	
7.34.4	Continuous operating voltage , kV rms	
7.34.5	Maximum Continuous operating voltage, kV rms	
7.34.6	Nominal Discharge Current, kA peak	
7.34.7	Energy Absorption Capability, kJ/kV	
7.34.8	Creepage factor	
7.34.9	Reference std	
7.35.0	OTI/ WTI Scanner Details	
7.35.1	Make	
7.35.2	Model no.	
7.35.3	No of Channel / Input	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
7.35.4	Manual submitted	
8.0.0	Low voltage bus bar system	To connect transformer LV side to ACB & to MCCB
8.1.0	Bus bar material tinned copper	Yes / No
8.2.0	Bus bar size	sqmm
8.3.0	Bus bar continuous current rating	Amp
8.4.0	Bus bar insulator voltage class	kV
8.5.0	Bus bar droppers size from ACB to MCCB (50X10 tinned copper)	
8.6.0	Maximum bus bar temperature rise	
9.0.0	ACB, MCCB	As per IS 13947
9.1.0	ACB make	
9.1.1	ACB rated voltage 415v +/- 10%	
9.1.2	ACB type 4 pole with isolable neutral link	Yes / No
9.1.3	ACB continuous current capacity at 415v 50Hz, at 50 deg C	amp
9.1.4	ACB short circuit breaking capacity $I_{cs} = I_{cu} = 50kA$ minimum	kA
9.1.5	ACB SC making current capacity 100kAp	kA peak
9.1.6	ACB short time current withstand capacity for 1 sec ($I_{cw} = 50kA$)	kA
9.1.7	ACB rated impulse withstand voltage for main & aux circuit in kv	
9.1.8	ACB closing time in ms	
9.1.9	ACB opening time in ms	
9.1.10	Guaranteed number of close & open operations at no load	
9.1.11	Guaranteed number of close & open operations at rated load	
9.1.12	ACB dimensions	
9.1.13	ACB operating mechanism -Trip free, anti pumping type, manual as well as motor	Yes / No

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
9.1.14	Spring charging motor supply	volt
9.1.15	Close & trip coil supply	volt
9.1.16	ACB utilization category -B as per IS	
9.1.17	ACB indications - ON, OFF & TRIP	
9.1.18	ACB operation - manual - ON, OFF by push buttons	
9.1.19	ACB operation – electrical - ON, OFF by TNC switch	
9.1.20	L/R switch for remote operation	Yes / No
9.1.21	ACB overload, short circuit & earth fault protection - By static or micro processor based releases	
9.1.22	Inbuilt CT burden, ration & class	
9.1.23	Overload release setting range	
9.1.24	Short circuit release setting range	
9.1.25	Earth fault release setting range	
9.2.0	MCCB make	
9.2.1	MCCB type -4 pole, double break / pole	Yes / No
9.2.2	MCCB - On & OFF by Manual handle and electrical	Yes / No
9.2.3	L/R switch for remote operation	
9.2.4	MCCB Neutral connection - Fully isolable link sized for rated current	
9.2.5	MCCB rated voltage 415v +/- 10% at 50Hz	
9.2.6	MCCB rated continuous current (630/800/1250 A) As per the type of PSS enquiry)	
9.2.7	MCCB 3 ph short circuit breaking capacity Ics = Icu =35kA	
9.2.8	MCCB 3 ph short circuit withstand capacity, Icw =8kA for 1 sec	
9.2.9	MCCB SC making current capacity	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
9.2.10	MCCB rated insulation level	
9.2.11	MCCB mechanical & electrical endurance as per IS 13947 / IEC	
9.2.12	MCCB category of duty - B as per IS / IEC 947	Yes / No
9.2.13	MCCB indications -ON, OFF ,TR & L/R switch	
9.2.14	MCCB protection - Microprocessor release + earth fault	
9.3.0	Connection to ACB main bus by Cu bar with double PVC insulation	Yes / No
9.3.1	MCCB	
9.4.0	Connection to outgoing cables by bus bar terminals suitable for 2x4CX400sqmm AYFY 1100 volt grade cable	
9.4.1	No.of LT Outgoings as per the PSS type	
9.4.2	Only for Type 5 & 6- Provisions in LT panel to increase LT outgoing by 02 no's by adding MCCB's in future.	(YES/ NO)
10.0.0	APFC system	
10.1.0	Rating of APFC system	KVAR
10.2.0	Rated voltage & frequency	Volts at 50Hz
10.3.0	Rated line current of APFC system	Amp
10.4.0	Rated capacitance	micro Farad
10.5.0	Capacitor steps – Type I: 12x25KVAR? Type II: 8 X 25 KVAR?	Yes / No
10.6.0	Rated current of each 25KVAR unit	Yes / No
10.7.0	Rated capacitance – 25KVAR unit	micro Farad
10.8.0	Three phase connection – star / delta	
10.9.0	Capacitor dielectric type –	APP / MPP
10.10.0	No of series group / capacitor unit	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
10.11.0	No. of parallel elements / series group	
10.12.0	Thickness of PP film in micron	
10.13.0	Thickness of Al foil in micron	
10.14.0	No. of PP film layers	
10.15.0	Maximum voltage stress per each PP film layer	
10.16.0	Discharge device material	
10.17.0	Capacitor tank steel thickness	mm
10.18.0	Capacitor unit dimension (L x D x H)	
10.19.0	APFC dimensions in mm (L x D x H)	
10.20.0	APFC system weight in kg	
10.21.0	Heat generated by APFC in Kw with all capacitor steps ON	
10.22.0	Operation with over voltage 115% of rated voltage for 12 hours in a day	
10.23.0	Operation with harmonic distortion THD 5% voltage & current	
10.24.0	Maximum permissible over current of	
10.25.0	1.3 times rated current continuous	
10.26.0	Dielectric loss less than 0.2w / KVAR	
10.27.0	Guaranteed minimum capacitor switching operations (ON/OFF) per year	
10.28.0	Maximum temperature rise above ambient of 45 Deg C	Deg C
10.29.0	Residual voltage after de-energization & at 60 seconds	
10.30.0	Design life of capacitor unit	
10.31.0	APFC panel insulation level	
10.32.0	1 minute power frequency withstand	KV
10.33.0	Impulse withstand voltage	KVp
10.34.0	Main bus bar material / size (sqmm)	
10.35.0	Main bus bar rated current	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
10.36.0	Main bus bar short time withstand	
10.37.0	CT make & accuracy class	
10.38.0	CT ratio & burden (VA)	
10.39.0	APFC relay make / type	
10.40.0	APFC relay catalogue enclosed?	Yes / No
10.41.0	Data logger make / type	
10.42.0	Data logger catalogue enclosed?	Yes / No
10.43.0	AC contactor make	
10.44.0	AC contactor rating	Amp
10.45.0	AC contactor utilization category as per IS	
10.46.0	100amp MCCB make	
10.47.0	100amp MCCB current breaking capacity Ics=Icu=35kA	
10.48.0	Copper wire size from MCCB to contactor & capacitor – 35sqmm Cu	
11.0.0	Energy meter box as per specification provided?	Yes / No
12.0	Enclosure for package substation	
12.1	Service conditions for outdoor use	Yes / No
12.2	Material for enclosure – Galvanised Sheet steel 2.5mm thick CRCA for all side doors, covers with painting	Yes / No
12.3	Enclosure construction -Frame supported construction with all doors, covers welded with steel channel ribs at every 1000mm minimum	Yes / No
12.4	Lifting lugs for site handling / lifting by crane - qty	
12.5	Doors for RMU compartment, Transformer compartment & LV compartment with anti theft hinge minimum 3 nos., with lockable handle & with padlocking facility	Yes / No

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
12.6	Top & other side walls of enclosure welded sheet metal	
12.7	Removable canopy above top cover -2.5mm thick sheet metal with 10° slope	Yes / No
12.8	Enclosure integral steel base frame 'I' section size	
12.9	Base frame bottom support pads for fixing by bolt to foundation - minimum six numbers to rest on foundation	Yes / No
12.10	Enclosure compartments -separate compartments for RMU, transformer & LV switchgear/APFC	Yes / No
12.11	Separation between RMU & transformer compartment by sheet steel 2.5mm thick	Yes / No
12.12	Separation between transformer compartment & LV compartment by sheet steel 2.5mm thick	Yes / No
12.13	Degree of ingress protection against solids & water as per IS12063	
12.13.1	IP53 for RMU compartment	
12.13.2	IP23 for transformer compartment	
12.13.3	IP33 for LV compartment	
12.14	Louvers on side covers of transformer compartment & side walls of LV compartment with steel wire mesh welded from inside so as to meet IP requirement as above	Yes / No
12.15	Louver area on cover / side wall -1500mm height x 1500mm minimum	
12.16	Exhaust fans mounted for APFC system to discharge air in transformer compartment - Controlled by SPMCB & thermostat to	

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
	operate above 35 deg C, 2x150CFM, 1 ph 230v 50Hz	
12.17	Gland plate for RMU compartment - 2.5mm thick MS plate suitable for 3x3c300sqmm AYFY 11kv cable	
12.18	Gland plate for LV compartment -2.5mm thick MS plate suitable for 10x4c400sqmm cable + 10x7c2.5sqmm cable	
12.19	Class of enclosure as per IEC 62271-202 = 10K	Yes / No
12.20	Overall dimensions of package substation (LxWxH)	In mm
12.21	Overall weight of package substation	Kg
13.0	Enclosure earthing & illumination	
13.1	Two earth bus connection brought out of package substation enclosure to earth pad for connection to earth pit -Two earth pads for RMU, transformer & LV compartment each -One earth pads for transformer neutral	
13.2	Earth bus size 50X 6 mm GI flat	
13.3	Earth bus fault current capacity 26.3kA for 1 sec	
13.4	Earth connection of all covers, doors & structural parts to GI bus by metallic jumper connection	Yes / No
13.5	Earth connection of RMU, ACB & transformer body parts to GI bus by two numbers of 50x6mm GI flat per equipment	
13.6	Earth bus identification shown by letter 'E'	Yes / No
13.7	RMU, transformer & LV Compartment illumination by 36w CFL fixture controlled	



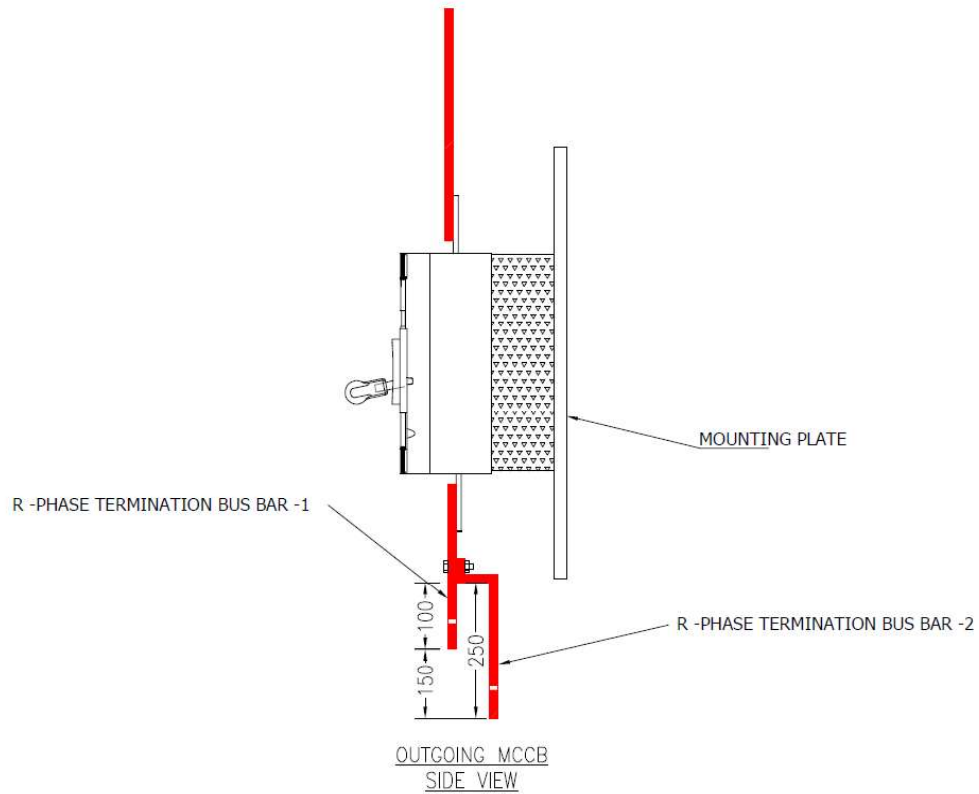
SP-PSSE-216-R0

Technical Specification of 11 kV Oil Type Smart Packaged Substation

Sr. No.	Description	Data to be filled by Supplier
	through SPMCB & door limit switch	
13.8	RMU, transformer & LV compartment power socket - 5/15amp 3 pin socket controlled through 15 amp SPMCB	
13.9	Paint shade external for enclosure	
13.10	Paint shade internal for enclosure	
13.11	Paint material & thickness	
13.12	Name plate & labels as per specification provided?	Yes / No
13.13	Smoke Detector	Yes / No
13.13.1	Make	
13.13.2	No Of Aux Contacts	
13.14	Hooter	Yes / No
14.0	Type test report submitted with GTP for RMU, transformer, ACB, MCCB, APFC system?	Yes / No
14.1	GA drawing of package substation submitted with GTP?	Yes / No
14.2	Bill of material submitted with GTP?	Yes / No
14.3	Clause wise deviation to technical specification submitted?	Yes / No

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of bidder	
Name of contact person	
Telephone no & email id	

Annexure C - MCCB Double Termination Details

Technical Specification of 11 kV Oil Type Smart Packaged Substation**Annexure D - Technical Specification for transformer oil**

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

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

Technical Specification of 11 kV Oil Type Smart Packaged Substation**Annexure E - Specification of 4G Ethernet Modem for FRTU**

SL	Parameter	Details
1.0	Operating Frequency Band	a. 4G Dual SIM with automatic fall back on 3G and 2G (GPRS): b. FDD LTE: B1 (1920-1980/2110-2170)/B3 (1710-1785/1805-1880) / B8 (880-915/925-960) / B20 (800) MHz c. TDD LTE: B38 (2570-2620) / B39 (1880-1920) / B40 (2300-2400) / B41 (2496-2690) d. HSPA / UMTS: B1 (2100) / B8 (900)/800/850/1900 MHz e. GSM: 900/1800/ MHz Class 10
2.0	WAN Protocol	PPP/PCP over Asynchronous HDLC with PAP/CHAP Authentication.
3.0	Compatibility	with IPv4 & IPv6 scheme.
4.0	Console Interface	RS232 on RJ45 connector
5.0	LAN Interface	10/100 Base-T complying to IEEE 802.3 / ANSI 8802-3 on RJ45 connector.
6.0	Network Protocols	PPP, IPCP, PAP, CHAP, ARP, IP, ICMP, TCP, UDP, IPSEC, SNTP, TFTP.
7.0	Management	Serial, HTTP, HTTPS, Telnet & via SMS, Port Mapping, Event Log & Upload. Firmware Upgrade
8.0	Status Monitoring	ICMP to 4 destinations for Keep Alive & Self Heal. Signal Strength & LEDs.
9.0	Features	a. Support for SCADA Protocols in transparent pass through mode b. Support for NAT and Port forwarding c. Modem shall have self healing capability to recover from dead lock situation
10.0	SIM Interface	External with locking provision
11.0	AT Commands Interface	Supporting AT commands for dialing from FRTU through RS-232 serial port to modem
12.0	Communication Interface	Remote management features like telnet & remote download facility

Technical Specification of 11 kV Oil Type Smart Packaged Substation

SL	Parameter	Details
13.0	LED Indications	Power ON, Network–Signal strength, SIM availability, Ethernet link
14.0	Connectors	a. RJ45 Ethernet Port, b. SIM Card Holder, c. DC power connector, SMA Antenna connector
15.0	Power Supply	a. 24V DC (with reverse current protection) with 2 numbers Terminal Block without adapter. b. Modem functionality shall not affect during DC voltage supply range of 18 to 30V DC.
16.0	Enclosure	Metallic Extrusion
17.0	Mounting	DIN Rail Mounting
18.0	Temperature	Operating (-10 to 70 Degree Centigrade), 95% Humidity
19.0	Antenna	a. 2 Nos to be provided b. 12dB High Gain omnidirectional Antenna with SMA connector and 15m wire length. c. 7dB High Gain Antenna with SMA connector and 5m wire length. d. It shall be ensured that the male pin SMA Connector of Antenna is of copper at the Antenna base and also at the point of modem connection.
20.0	Accessories	a. 1 Meter cable for connecting to external DC power source (24 V) b. 1 Meter Standard Ethernet (Straight) data cable with metallic connector (SS/MS). This cable shall be metallic shielded. c. Standard Console cable for diagnostic port of Modem d. 1 Meter serial cable for dialing modem from FRTU
21.0	Certification	
21.1	Conducted Immunity: IEC61000-4-6	a. Measure emission of the device (referenced to earth) on power mains and to compare them with specified limits to ascertain that the device will not disturb other equipment b. Frequency: 0.15MHz to 80MHz

Technical Specification of 11 kV Oil Type Smart Packaged Substation

SL	Parameter	Details
		c. Modulation: 80% AM at 1 KHz d. Test Voltage: 3V
21.2	Electrostatic Discharge (ESD): IEC61000-4-2	a. Check immunity against discharge of static electricity that may occur when a charged operator touches the device b. Contact Discharge: 4KV c. Air Discharge: 8KV d. No. of Discharge: 10 at pre-selected spots e. Positive & Negative Polarity
21.3	EN55022 CLASS B	a. Immunity characteristics of the device when subjected to continuous conducted noise b. Conducted Emission: Frequency - 150 KHz - 30 MHz c. Radiation Emission: Frequency – 30 MHz - 1000 MHz
21.4	MTCTE	a. Modem should comply to the requirement of Mandatory Testing and Certification of Telecom Equipment (MTCTE) vide MoP order No. 14/02/2021-UR&SI-II-Part(1) (E-258136). b. Certification should be enclosed along with the bid for offered modem.

Annexure F - Specification for Feeder Remote Terminal Unit for RMU**1.0 FRTU Technical requirement**

1.1	FRTU Functionalities	a. FRTU system should be modular and expandable. b. It should be capable of handling minimum 500 DP (data point). c. FRTU shall have serial port, configurable RS485/RS232 for MODBUS RTU. d. FRTU shall have TCP/IP port for Modbus TCP/IP. e. Ethernet ports for interfacing with IEC 60870-5-104 protocol to communicate with MCC and BCC. f. Ethernet port should be configured for IEC 60870-5-104 protocol as a slave. g. Built in optical couplers to isolate the field signals and field communication channels.
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Technical Specification of 11 kV Oil Type Smart Packaged Substation

		h. FRTU shall support event storage capacity as measured events (500), system events (50), alarms (50) and normal events (250). Events should be stored on the basis of FIFO. i. Local viewing of all events shall be possible. j. FRTU DI/ DO communication channel capacity should be such that it can fulfill automation of complete substation system. k. FRTU shall support web based monitoring from remote as well as local. l. All DI/ DO communication channels should have individual LED indications. m. FRTU shall support feature of remote configuration as well as diagnosis over secure and authenticated web interface. FRTU Configuration should also be downloadable from same interface. n. FRTU system shall support communication with 4 Nos. master stations simultaneously. o. All DI/DO communication card installed in FRTU shall support HOT swap feature. p. As the SCADA/ DMS system will use public domain such as RF/ Cellular etc., therefore it is mandatory to guard the data/ equipment from intrusion/ damage/ breach of security & shall have SSL VPN based security. q. FRTU shall support SNMP (Simple Network Management Protocol). r. It should have capability of time synchronization with GPS receiver and SCADA MCC/ BCC. s. FRTU should be capable to store the configuration program in detachable flash memory card. t. FRTU shall have console port with console cable.
1.2	Communication Ports	u. Each RS 485 port should be capable of handling minimum 10 Nos. devices on the network with same communication settings.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		v. Media settings of Ethernet and serial ports (Both RS 485 and RS 232) should be programmable. w. System should have the capability to increase TCP/ IP Ethernet and serial ports for communication by addition of communication modules. x. Refer Table 2 of of this annexure for details.
1.3	MCC/ BCC Communication Protocol	a. FRTU system shall be configured to communicate with MCC/ BCC simultaneously on IEC 60870-5-104 protocol with configurable TLS 1.2. b. In addition to IEC 104 protocol, FRTU shall also able to communicate all data over secure MQTT with latest version. c. FRTU shall support periodic reporting of analog data that shall be configurable upto 1-hour polling delay. d. Digital status data shall have higher priorities as compared to the analog data. e. Dead band for reporting analog values shall be programmable for the full scale value.
1.4	Communication between FRTU, MFMs and Protection Relays	a. FRTU can acquire analog values from MFMs/FPIs and protection relay through RS485 serial communication port using MODBUS RTU. b. Communication of ACB/ MCCBs on Modbus RTU protocol. Bidder can also offer Modbus TCP over Modbus RTU. c. MFM/ FPI and protection relay will act as slaves to the FRTU. The FRTU shall transmit these analog values to master station by using IEC 60870-5-104 protocol. d. To protect the serial communication port(s), optical isolation is required which is mandatory to avoid damage to FRTU channels
1.5	Digital Input Module	a. FRTU shall be capable of accepting isolated potential free contact status inputs. b. FRTU shall provide necessary sensing voltage, current, optical isolation for each status input. c. FRTU shall be capable to configure re-bounce filtering for

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		each input. d. The sensing voltage of input module should be 24V DC. e. The FRTU shall accept two types of status input: Single point and double point. f. Single point status input represented by 1 Bit in the protocol message whereas double point status input represented by 2 Bits in the protocol message. g. FRTU configuration software shall have the capability to invert the DI signal value required in the configuration. h. There shall be channel wise visual indication on all DI module installed in the FRTU panel for troubleshooting problems. i. Digital Input module should have hot swap compliance
1.6	Digital Output Module	a. FRTU shall provide the capability for master station to select and change the state of Digital output points. b. These control outputs shall be used to control power system devices such as circuit breakers, isolators and other two state devices which shall be supported by FRTU. c. FRTU should also support single command output to reset FPI operation. d. The output contact shall be rated to operate RMU motor, ACB, LT MCCB, APFC and other signals used in substation. e. In case control output module of FRTU does not provide potential free control output of required rating then separate control output relays shall be provided. f. There shall be channel wise visual indication of DOs available in FRTU panel and command issued for any digital channel for troubleshooting the problem. g. DO modules should have the capability to configure for a single as well as double command output. h. Digital Output module should have hot swap compliance
1.7	Troubleshooting	a. FRTU should be configurable using web based configuration and maintenance tool.

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		b. FRTU shall have proper diagnosis tool for troubleshooting the failures related to the following from remotely as well as locally. Supplier shall consider all required configuration and diagnosis cable and software with each supplied FRTU with license if any. c. Communication of FRTU with master d. Communication of MFM with FRTU e. Communication of DI/ DO f. Communication with Protection Relay
1.8	Programmable Logic Control (PLC)	a. FRTU shall be provided with the PLC license. b. FRTU should have the functionality of logic development and perform the task using its own CPU. c. FRTU should have the capability to run more than one PLC tasks at a time.
1.9	Cyber Security	a. The FRTU shall comply to IEC62351- 3 for cyber security in communication between FRTU and master station and IEC62443-4-2 for cyber security for product including testing requirement as per MoP order no 12/34/2020-T&R dtd 08.06.21 & CEA /PLG/R&D/MII/2021 dtd 11.6.21 and any amendment from time to time. b. All the eligible equipment should complied to requirement of Mandatory Testing and Certification of Telecom Equipment (MTCTE) vide MoP order No. 14/02/2021-UR&SI-II-Part(1) (E-258136). c. FRTU should have following features: • User level configuration • User wise authentication like system admin, configuration admin, control, operator. • Disabling the DNS • Disabling, enabling & configuration of TCP/ IP and UDP ports. • Door lock alarm integration with FRTU.
1.10	FRTU Power Supply	a. Power supply for FRTU shall be on 24V DC system which

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		would be made wired from Battery Charger/batteries housed in FRTU cabinet. b. The main DC circuits shall be protected by incoming circuit breakers. c. Each circuit shall be tapped through single pole MCB so as to provide an individual DC feed to each of the I/O modules, modems and protocol converters. d. Bidder shall provide maximum power consumption data of each of the type of FRTU. e. Power supply system should have redundant battery charger to provide the supply to FRTU system as well as to charge the battery.
1.11	Software / Firmware	a. The term software is used in this Technical Specification to mean software or software implemented through firmware. b. All software shall be implemented according to the Bidder's latest established design and coding standards. c. Complete and comprehensive documentation shall be provided for all software. d. Bidder should provide windows based software as it is preferred for its user friendliness.
1.12	General	a. A real-time non-proprietary operating system that is capable of managing the FRTU applications shall be provided. b. This software shall provide automatic restart of the FRTU upon power restoration, memory parity errors, hardware failures, and manual request. The software shall initialize the FRTU and begin execution of the FRTU functions without intervention by the SCADA/DMS master station. All restarts shall be reported to the SCADA/DMS. c. The software shall be prepared in a high level language and shall be documented in detail. No separate licensing charges or agreements shall attach to the FRTU software or its underlying operating system. d. In order to easily support the system under continuously

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		changing site conditions all protocol, configuration, and application data must be contained in easily programmable non-volatile memory such as Flash EPROM. e. The FRTU design shall be independent of any communication protocol that would impose restrictions on the flexibility or functionality of the FRTU. Protocol changes shall be accomplished by software/firmware changes only.
1.13	Diagnostic Software	a. Software shall be provided to continuously monitor operation of the FRTU and report FRTU hardware errors to the SCADA/DMS. b. The software shall check for memory, processor, and input/output errors and failures. c. It is desirable that internal diagnostics be sufficiently detailed to detect malfunctions to the level of the smallest replaceable component. d. The FRTU shall facilitate isolation and correction of all failures and shall include features that promote rapid fault isolation and component replacement. e. All functional module nodes shall be designed with integrated on-line diagnostic functions. f. The results of these diagnostics shall be reported to the central processing module. g. The central module shall store this information and report it to the SCADA/DMS as permitted by the protocol. h. FRTU shall be able to access from remote (BCC/MCC) for downloading configuration.

2.0 Communication Ports details

S. No.	Communication With	Communication Protocol	Physical Layer		Connecting Cable	Required Physical Port Qty.
			Interface	Port		
2.1	Master station(s)	IEC 60870-5-104	Ethernet	RJ45	CAT VI	1

Technical Specification of 11 kV Oil Type Smart Packaged Substation

S. No.	Communication With	Communication Protocol	Physical Layer		Connecting Cable	Required Physical Port Qty.
			Interface	Port		
2.2	Local Configuration	—	RS232	USB/DB9	Console Cable	1
2.3	Protection relays/FPI/VPI	MODBUS	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
2.4	MFM/ LV panel/Transformer	MODBUS	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
	Total					4

3.0 FRTU DI/DO/AI list

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

3.1	FRTU configuration	DI-64 no's DO-16 no's
3.2	Digital Inputs	
3.2.1	Cable feeder VCB module 1 & 2	CB ON
		CB OFF
		Dis-connector ON position
		Dis-connector OFF position
		Earth position ON position
		Earth position OFF position
		Fault Passage Indicator ON Status
		Fault Passage Indicator OFF Status
		L/R switch in local(Common all VCBs modules)
		L/R switch in remote (Common all VCBs modules)
		Control circuit Healthy
3.2.2	Transformer VCB 3 & 4	CB ON

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		CB OFF
		Dis-connector ON position
		Dis-connector OFF position
		Earth position ON position
		Earth position OFF position
		Auto Trip
		Control circuit Healthy
3.2.3	Common Signals	SF6 Low
		Battery Charger 1 Fail
		Battery Charger 2 Fail
		Battery low(BHMu & Charger)
		Battery Unhealthy/fail
		Battery Test in progress
		Command Acknowledgement
		Door Open/Close (Both Transformer and FRTU)
3.2.4	Transformer signals	Transformer Oil level low
		OTI Alarm from field
		WTI Alarm from field
		WTI trip
		Transformer pressure relay operated
3.2.5	LT ACB	LT ACB ON
		LT ACB OFF
		LTACB Trip
		L/R switch in remote
		Control supply healthy
3.2.5	Outgoing MCCB	LT Outgoing MCCB ON
		LT Outgoing MCCB OFF
		L/R switch in remote
		Control supply healthy
3.3	Digital Outputs (Commands)	
3.3.1	Cable feeder VCB module 1 & 2	CB ON
		CB OFF

Technical Specification of 11 kV Oil Type Smart Packaged Substation

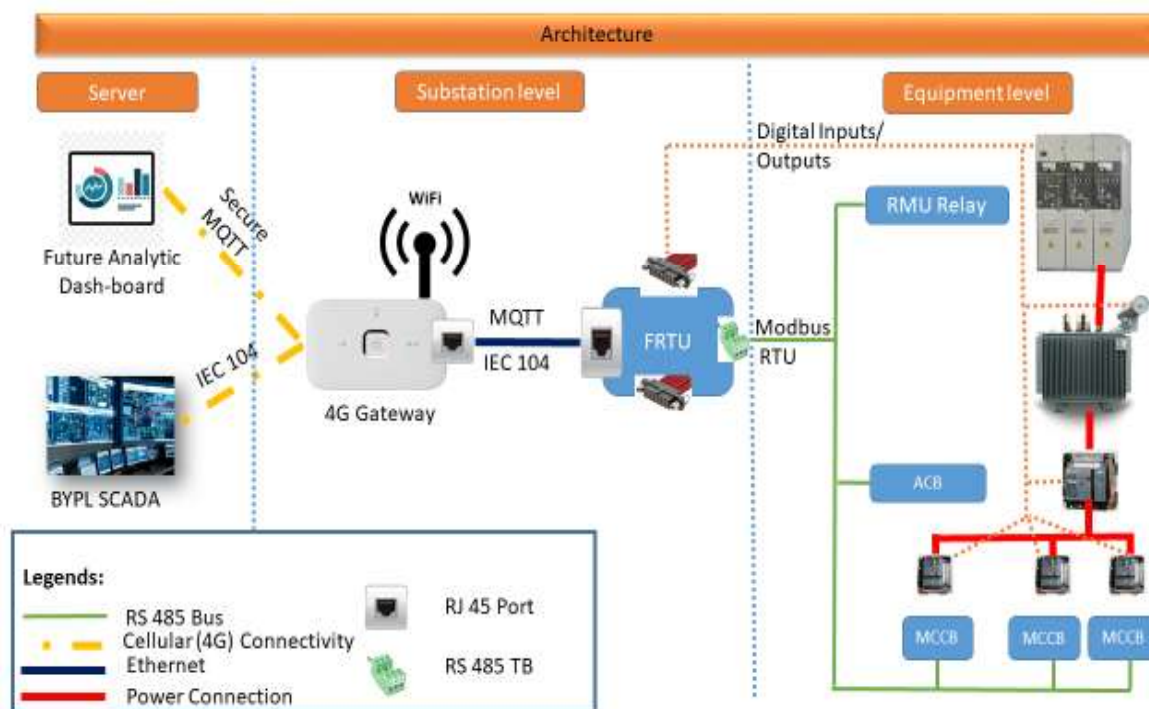
		FPI Reset
3.3.2	Transformer VCB module 3 & 4	CB ON
		CB OFF
3.3.3	LT ACB	LT ACB ON
		LT ACB OFF
3.4	Measuring inputs	
3.4.1	Energy Meter (energy meter in purchaser scope)	IR
		IY
		IB
		VAR
		W
		VA
		PF
		VRN
		VYN
		VBN
		VBN
		IN
3.4.2	ACB release	IR
		IY
		IB
		VR
		VY
		VB
		W
		VA
		VAR
		PF
3.4.3	MCCB release	IR
		IY
		IB
		VR

Technical Specification of 11 kV Oil Type Smart Packaged Substation

		VY
		VB
		W
		VA
		VAR
		PF
3.4.4	WTI Scanner	Oil temperature
		Winding temperature
3.4.5	Protection relay	IR
		IY
		IB
		R phase Fault current
		Y phase Fault current
		B phase Fault current
		Earth Fault current
3.4.6	Battery monitoring	Battery Voltage
		Battery current

Technical Specification of 11 kV Oil Type Smart Packaged Substation

4.0 Communication Architecture



Annexure G - Recommended spares (Data by supplier)

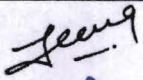
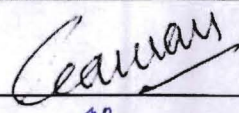
List of recommended spares as following:

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

BSES

Specification of 11 kV Dry type Smart Package Substation

Specification no – BSES-TS-122-SPSS-R0

Rev	0	
Date:	23/06/2022	
Pages	77	
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	Rohit Patil	
Reviewed by	Srinivas Gopu	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	

Index

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Record of Revision	3#
1.0# Scope	4#
2.0# Codes & standards	4#
3.0# Electrical Distribution System Data.....	5#
4.0# PSS Configuration	6#
5.0# PSS Enclosure	7#
6.0# 11KV Ring Main Unit.....	8#
7.0# 11KV XLPE Cable & termination kit.....	18#
8.0# Dry Type Transformer	19#
9.0# LV Switchgear Panel.....	27#
10.0# Automatic Power Factor Correction system	32#
11.0# Energy Meter Box	34#
12.0# Other Provisions: illumination, Hooter & Fire extinguisher	35#
13.0# PSS Enclosure Earthing	36#
14.0# Labels & painting.....	36#
15.0# Approved makes	37#
16.0# Quality assurance Inspection & testing.....	38#
17.0# Shipping, Handling and Site support	41#
18.0# Deviations	42#
19.0# Drawings Submission	42#
Annexure A Service Conditions.....	43#
Annexure B Guaranteed Technical Particulars (Data by Supplier).....	44#
Annexure D Recommended spares (Data by supplier).....	59#
Annexure E Specification of 4G Ethernet Modem for FRTU.....	60#
Annexure F Specification for FRTU.....	62#

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

Record of Revision

Revision No	Item / clause no.	Nature of Change	Approved By

Technical Specification of 11 KV Dry type Smart Packaged Substation**1.0 Scope**

- 1.1 Design, manufacture, testing at manufacturer works before dispatch, packing, and delivery of Packaged Substation (PSS) as per this specification and supply of commissioning spares.
- 1.2 Supply of all installation/commissioning accessories for PSS.
- 1.3 Submission of documentation of PSS with operating manuals of each equipment.
- 1.4 Installation testing & commissioning of PSS at site along with interconnection of all components DI/DO/AI signals, status monitoring signals and wireless sensors signals to FRTU. Integration of FRTU with SCADA.
- 1.5 FRTU Licensed software for programming, configuration, troubleshooting and diagnosis of FRTU shall be provided.
- 1.6 Supplier scope includes training of BSES team – 4 batches (each batch with 4-5 engineers) for minimum 3 days at factory for erection, commissioning, maintenance trouble shooting of complete PSS including Transformer, RMU, FRTU, Modem, LT Panel, APFC.
- 1.7 If any item not specifically mentioned in scope but necessary for successful operation of substation shall be deemed to be included in bidder's scope.

2.0 Codes & standards

Materials, equipment and methods used in the manufacture of 11kV Packaged Substation shall conform to the latest edition of following –

S.no	Standard	Title
2.1	Indian Electricity Rules	With latest amendments
2.2	Indian electricity act	IE act 2003
2.3		CBIP manual on transformers
2.4	IEC 60076	Power transformers
2.5	IEC:60616	Terminal and Tapping Markings for Power Transformers
2.6	IEC: 60529	Degrees of Protection Provided by Enclosures (IP Code).
2.7	IEC 60694	Specification for high voltage switchgear
2.8	IEC 60439-1	Low voltage switchgear & control gear assemblies
2.9	IEC 60529	Degree of enclosures provided by enclosures
2.10	IEC 60664-1	Insulation coordination for low voltage systems
2.11	IEC 62262	Degree of protection provided by enclosure against mechanical shocks
2.12	IEC 62271-202	High voltage switchgear & control gear - prefabricated substation
2.13	IEC 60044	Instrument transformers - Current & voltage transformers
2.14	IEC 60225	Electrical relays
2.15	IEC 60625	High voltage switches
2.16	IEC 60502	Power cables

Technical Specification of 11 KV Dry type Smart Packaged Substation

2.17	IEC 60947-2	Low-voltage switchgear and control gear :Circuit breakers
2.18	IS 2026 part 11	Power transformers-Dry type Transformer
2.19	IS 11171	Dry type transformers
2.20	IS 2026	Loading of power transformers
2.21	IS 13947	Low voltage switchgear & control gear
2.22	IS 2099	Bushings for voltages above 1000V
2.23	IS 3156	Voltage transformers
2.24	IS 2705	Current transformers
2.25	IS 1554	PVC cables
2.26	IS 7098	XLPE cables
2.27	IS 2629	Recommended Practice for Hot-Dip Galvanizing of Iron and Steel
2.28	IS 4759	Hot-dip zinc coatings on structural steel and other allied products
2.29	IS 13585	Shunt capacitors
2.30	IS 13340	Shunt capacitors
2.31	IS 3043	Code of practice for Earthing
2.32	IS 8130	Conductors for insulated cables
2.33	IS 5	Ready mixed paints

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

- i. Guaranteed Technical Particulars (GTP)
- ii. Specification including applicable codes & standards
- iii. Approved Vendor Drawings
- iv. Other documents

3.0 Electrical Distribution System Data

3.1.1	HT supply System	3 phase AC, 3 wire
3.1.2	Voltage	11000 volt $\pm 10\%$
3.1.3	Frequency	50 Hz $\pm 5\%$
3.1.4	Fault level	350MVA – 18.5kA
3.1.5	System neutral	Earthed at upstream 11kV source
3.2.1	LT supply system	3 phase AC, 4 wire
3.2.2	Rated voltage	415V $\pm 10\%$
3.2.3	Rated frequency	50 Hz $\pm 5\%$
3.2.4	Fault level	35MVA – 50kA

Technical Specification of 11 KV Dry type Smart Packaged Substation**4.0 PSS Configuration****4.1 Types of PSS- General**

S.no	PSS type	DT rating, kVA	RMU	LT Panel						APFC rating, kVAr @400V
				Incomer, ACB		Buscoupler, ACB		Outgoing, MCCB		
				Rating, Amps	Qty, no's	Rating, Amps	Qty, no's	Rating, Amps	Qty, no's	
4.1.1	Type 1	2000	3Way	3200	1	NA	NA	630	12	600
4.1.2	Type 2	2000	4Way	3200	1	NA	NA	630	12	600
4.1.3	Type 3	2000	3Way	3200	1	3200	1	630	10	600
4.1.4	Type 4	2000	4Way	3200	1	3200	1	630	10	600
4.1.5	Type 5	1600	3Way	3200	1	NA	NA	630	10	500
4.1.6	Type 6	1600	4Way	3200	1	NA	NA	630	10	500
4.1.7	Type 7	1600	3Way	3200	1	3200	1	630	8	500
4.1.8	Type 8	1600	4Way	3200	1	3200	1	630	8	500
4.1.9	Type 9	1000	3Way	2000	1	NA	NA	630	7	300
4.1.10	Type 10	1000	4Way	2000	1	NA	NA	630	7	300
4.1.11	Type 11	1000	3Way	2000	1	2000	1	630	5	300
4.1.12	Type 12	1000	4Way	2000	1	2000	1	630	5	300
4.1.13	Type 13	630	3Way	1250	1	NA	NA	630	5	200
4.1.14	Type 14	630	4Way	1250	1	NA	NA	630	5	200
4.1.15	Type 15	630	3Way	1250	1	1250	1	630	5	200
4.1.16	Type 16	630	4Way	1250	1	1250	1	630	5	200
4.1.17	Type 17	400	3Way	800	1	NA	NA	630	3	200
4.1.18	Type 18	400	4Way	800	1	NA	NA	630	3	200
4.1.19	Type 19	400	3Way	800	1	800	1	630	3	200
4.1.20	Type 20	400	4Way	800	1	800	1	630	3	200

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

4.2 Type of PSS- Multistoried building

S.no	PSS type	DT rating, kVA	RMU	LT Panel								APFC rating, kVAr @400V
				Incomer, ACB		Buscoupler, ACB		Outgoing				
								ACB		MCCB		
				Rating, Amps	Qty, no's	Rating, Amps	Qty , no's	Rating, Amps	Qty, no's	Rating, Amps	Qty, no's	
4.2.1	Type 21	2000	3Way	3200	1	NA	NA	2000	2	630	2	600
4.2.2	Type 22	2000	4Way	3200	1	NA	NA	2000	2	630	2	600
4.2.3	Type 23	1600	3Way	3200	1	3200	1	2000	2	630	2	500
4.2.4	Type 24	1600	4Way	3200	1	3200	1	2000	2	630	2	500

5.0 PSS Enclosure

5.1	Service conditions	For outdoor use
5.2	Material for enclosure	Galvanised Sheet steel 2mm thick with painting
5.3	Enclosure construction	Frame supported construction with all doors, covers welded with steel channel ribs at every 1000mm minimum
5.4	Lifting lugs for site handling / lifting by crane	Four numbers on top to enable lifting of total package unit without any problem
5.5	PSS enclosure door	a) Doors to be provided for all LT, HT and Transformer compartment. b) The door arrangement should be folded type design, the width of each folding section door is limited to 600mm. c) The doors should be internal anti theft hinge with minimum opening angle of 120°, minimum 3 nos. with lockable handle & with padlocking facility d) The door limits switch to be provided for status of door.
5.6	Top & other side walls of package substation enclosure	Welded sheet metal to main frame
5.7	Removable canopy above top cover	2mm thick sheet metal with 10° slope
5.8	Enclosure integral steel base frame	'I' section of suitable size to support total static and dynamic load

Technical Specification of 11 KV Dry type Smart Packaged Substation

5.9	Base frame bottom support pads for fixing by bolt to foundation	Minimum six numbers to rest on foundation
5.10	Enclosure compartments	Separate compartments for RMU, transformer & LV switchgear/APFC
5.11	Separation between RMU & transformer compartment	By sheet steel 2mm thick
5.12	Separation between transformer compartment & LV compartment	By sheet steel 2mm thick
5.13	Degree of ingress protection against solids & water as per IS12063	IP53 for RMU compartment IP23 for transformer compartment IP33 for LV compartment
5.14	Louvers on side covers of transformer compartment & side walls of LV compartment	To be provided with steel wire mesh welded from inside so as to meet IP requirement
5.15	Louver area on cover / side wall	1500mm height x 1500mm desirable
5.16	Exhaust Fans	Mounted in LV compartment to discharge air in transformer compartment & Controlled by SPMCB & thermostat to operate above 35 deg C, 2x150CFM, 220V DC. Rectifier to be provided for exhaust fan supply.
5.17	Gland plate for RMU compartment	3 mm thick MS plate suitable for 3x3c300sqmm AYFY 11kv cable
5.18	Gland plate for LV compartment	3 mm thick MS plate suitable for rated LT outgoing as per the PSS type. Each LT outgoing is suitable for 2X4CX300 sq mm cable.
5.19	Class of enclosure as per IEC 62271-202	10K
5.20	Internal Arc classification	IAC AB 20 KA, 1s
5.21	Limiting dimensions of package enclosure	
5.21.1	Type 1 to Type 8 and Type 21 to 24 configuration	4200(L) x 3000(W) x 3200(H)
5.21.2	Type 9 to Type 20 configuration	3400(L) x 2600(W) x 2600(H)

6.0 11KV Ring Main Unit

6.1.1	RMU Configuration	As per the PSS type
6.1.1.1	3 Way RMU, all are VCB modules.	
6.1.1.1.1	Cable feeder 1	Motorized VCB with manual operation facility. FPI and CBCT to be provided.
6.1.1.1.2	Cable feeder 2	Motorized VCB with manual operation facility. FPI and CBCT to be provided.

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.1.1.1.3	Transformer feeder	Motorized VCB with manual operation facility. Self power relay with protection CTs to be provided.
6.1.1.2	4 Way RMU, all are VCB modules.	
6.1.1.2.1	Cable feeder 1	Motorized VCB with manual operation facility. FPI and CBCT to be provided.
6.1.1.2.2	Cable feeder 2	Motorized VCB with manual operation facility. FPI and CBCT to be provided.
6.1.1.2.3	Transformer feeder 1	Motorized VCB with manual operation facility. Self power relay with protection CTs to be provided.
6.1.1.2.4	Transformer feeder 2	Motorized VCB with manual operation facility. Self power relay with protection CTs to be provided.
6.1.2	Extensibility	Non extensible type
6.1.3	Insulation Medium	
6.1.3.1	For panel	SF6 gas in sealed metallic tank
6.1.3.2	Breakers	Vacuum type (with disconnecter & earth switch)
6.1.4	Arc interruption chamber for breaker	Arc interruption chamber of breakers shall be separate from the main insulated tank.
6.1.5	Maximum dimensions of RMU	1250 mm(W) X 800 mm (D) X 2000 mm (H)
6.2.0	RMU Panel Construction	
6.2.1	Panel type	Metal enclosed, framed, Compartmentalized panel construction
6.2.2	Service Location	Indoor, non air conditioned environment
6.2.3	Mounting	Free Standing
6.2.4	Overall Enclosure Protection	IP4X minimum, vermin proof
6.2.5	Doors	Front access with internal anti theft hinge arrangement with minimum opening angle of 120°, minimum three hinges (desirable)
6.2.6	Covers	Bolted for rear access, with handles. Support for handle shall be provided at suitable place on RMU body. All the accessible bolts / screws shall be vandal proof. One set of required Special tools per RMU (if any) shall be in the scope of supply.
6.2.7	Construction	Sheet metal 2.5mm thick CRCA
6.2.8	Base frame	a) Made of CRCA steel b) Base frame height should be 300 mm
6.2.9	Power Cable Clamping Arrangement	Shall be provided for each power cable alongwith HDPE cable clamps (to suit the cable size from 150 to 400 sq mm PILC / XLPE cable. Exact size shall be provided during drawing approval stage.)
6.2.10	Lifting lugs	Four numbers

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.2.11	Cable Entry	Bottom
6.2.12	Gland plate	Separate for control cable & power cable 3mm metallic, removable type & split type in two parts, with 1 no ,90mm diameter knockout punch/ hole in the centre.
6.2.13	Cable termination	
6.2.13.1	Cable type & size	3C X 150 / 240 / 300 /400 sq mm Aluminium conductor XLPE/ PILC with armour & PVC outer sheath
6.2.13.2	Terminals for 11kV cable termination	.
6.2.13.2.1	Terminals	M16 size Set of required size of stud suitable for M 16 size Ring type lug & bimetallic washers.
6.2.13.2.2	Bimetallic washers	Required
6.2.13.2.3	Right angled boots	Minimum 20mm spacing between boots preferred. Type test reports, maintenance replacement plan shall be submitted.
6.2.13.2.4	Cable Test Plug	Preferred with cable test plug facility, without opening of cable compartment
6.2.13.3	Termination type	Suitable for heat shrinkable type
6.2.13.4	Termination height	700mm minimum, from gland plate
6.2.14	Bus bar	Tinned copper with sleeve (Sizing Calculation to be submitted in support of its Guaranteed S.C. rating / Capability)
6.2.14.1	Bus bar continuous rated current	630amp
6.2.14.2	Bus bar short time withstand capacity	20 KA for 3 sec
6.2.14.3	Bus bar support insulator material	SMC / DMC resin
6.2.14.4	Maximum temperature rise above reference ambient	In line with Table 3 of IEC60694
6.2.15	Earth bus bar	Aluminum / Copper sized for rated fault duty for 1 sec
6.2.15.1	Earth bus internal connection to all noncurrent carrying metal parts	By 2.5 sq mm copper flexible wire, Earth connection point maximum 1 meter away from cable test facility
6.2.15.2	Earth bus external connection to owners earth	Studs on both sides with holes for M10 bolt + hardware to readily receive purchaser earth connection
6.2.16	Cooling arrangement	By natural air without fan
6.2.17	Panel internal wiring	a) Multi strand flexible color coded PVC insulated Cu wire 1 sq mm (SCADA) b) 1.1KV , PVC insulated 2.5 sq mm cu cable for CT connection. c) Colour of wire (R phase - Red, Y phase –

Technical Specification of 11 KV Dry type Smart Packaged Substation

		Yellow, B phase – Blue, AC- black, DC – grey, Earth – green) with ferrules at both ends. All the internal control / auxiliary wiring shall be routed through proper conduit.
6.2.18	Hardware (Nut, bolts & handle)	Stainless steel (Except termination nut-bolts which are Brass / Tinned Copper)
6.2.19	Gasket	Neoprene rubber
6.2.20	Marshalling terminal blocks	Terminal block size should be suitable for 2.5 Sq mm, Nylon 66 material, screw type + 20% spare in each row of TB.
6.2.21	Panel cover fixing bolts	Allen head 6mm with hexagonal slot
6.2.22	Padlock facility	Required for all earth switches & all handles
6.2.23	Internal Arc classification	
6.2.23.1	Explosion vents	To ensure operator's safety, design should ensure that gases / flames generated during flash over / blast in any of the compartment, must not come out from the front of RMU as well shall not go to adjacent cable compartment. Internal arc test report (for Cable compartment & other compartments) must be submitted to support above, along with RMU GA drawing indicating these vents. There shall not be any type of holes, gaps etc on the walls of cable termination compartment.
6.2.23.2	Internal Arc rating	20 kA for 1s
6.2.23.3	Internal arc classification	Shall comply to the requirements of IEC 62271-200, Accessibility type AFLR. Operators of equipment shall be protected against the effects of an arcing fault in any of the MV compartment at all times , including while carrying out the maintenance works on other compartments
6.2.23.3	SF6 Gas Annual Loss	< 0.1% of total mass. Pressure of SF6 gas shall be above the operating limit throughout the life of the equipment.
6.3.0	Circuit breaker	
6.3.1	Type	Three pole, operated simultaneously by a common shaft
6.3.2	Arc interruption medium	Vacuum Bottle
6.3.3	Operating mechanism	Motorized spring charged stored energy type with facility for manual charging
6.3.4	Motor rated voltage	24V DC
6.3.5	Emergency trip / open push button	On panel front with Protective flap to prevent any accidental tripping of breaker.

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.3.6	Continuous rating	630amp
6.3.7	Short time withstand capacity	20 KA for 3 sec
6.3.8	Minimum number of operations at rated current (as per IEC 62271-100)	Mechanical Endurance – Class M1(2000 operations) Electrical Endurance – Class E2
6.3.9	Fault making capacity	50 KA peak
6.3.10	Fault breaking capacity	20 KA Minimum
6.3.11	Maximum number of operations at rated Fault current (as per IEC 62271-100)	Electrical Endurance – Class E2. To be guaranteed by manufacturer with authorized lab test reports
6.3.12	Breaker status auxiliary contact	2NO + 2NC wired to terminal block
6.4	Earth switch	
6.4.1	Type	Three Pole, operated simultaneously by a common shaft for each Circuit breaker.
6.4.2	Dielectric medium	SF6 gas
6.4.3	Operating mechanism for close & open	Manual
6.4.4	Fault making capacity	50 kA (Desirable)
6.4.5	Auxiliary contacts	1NO+1NC wired to terminal block
6.4.6	Disconnect switch (if provided in series with vacuum bottle)	Desirable to be located on purchaser cable connection side of vacuum bottle
6.4.7	Minimum number of operations at no load (as per IEC 62271-102)	Mechanical Endurance – Class M0(1000 operations)
6.4.8	Making capacity endurance of earth switch (as per IEC 62271-102)	Class E2 (Min 10 operations)
6.5	For Cable Feeder circuit breaker module (Module 1& Module 2)	
6.5.1	Self powered relay	Not required
6.5.2		
6.5.3	Fault passage indicator (FPI)	To be provided cable feeders
6.5.4	Fault passage indicator (FPI) (Earth fault and over current protection type)	a) To be provided on each and every cable feeder for RMU. FPI shall be earth fault and over current protection type and shall be suitable for remote load monitoring at SCADA for cable feeders. b) CBCT – Split open type suitable for mounting without disconnection of cable for EF.

Technical Specification of 11 KV Dry type Smart Packaged Substation

		c) Phase sensor – 3 Nos. split open type for short ckt. purpose with mounting arrangement
6.5.5	Connection of CBCT with FPI	Cable connection of FPI with CBCT shall be of pre moulded type on the CBCT side. Cable shall be 2.5 sq.mm cu cable or fiber cable.
6.5.6	Fault Passage Indicator	a) Digital type and shall operate as the current exceeds the set value. Flash indication for identifying faults with red LED with one flash for every one sec. Test & reset button 1 NO + 1 NC potential free contact for remote indication FPI power supply unit shall use lithium battery with minimum life of 1000 blinking hours , so that FPI shall continue to function even after main feeder has tripped. FPI shall be powered with 24V DC in all motorized RMU. b) FPI shall be suitable for remote load monitoring at SCADA for Cable feeder. FPI shall be provided with Remote communication capability with SCADA on Modbus Protocol. The Load current as measured by FPI shall be communicated to SCADA.
6.5.6.1	Earth Fault Indicator	
6.5.6.1.1	Sensing Current	50 to 400A
6.5.6.1.2	Sensing Time	30 to 100 ms in steps of 10ms.
6.5.6.1.3	Reset Time	0.5 -1-2-3-4 hr
6.5.6.1.4	Resetting Facility	a) Self rest after reset time b) Self rest after restoration of voltage c) Manual d) Remote resetting
6.5.6.1.5	Contact Rating	1A at 230 V
6.5.6.1.6	Degree of Protection	IP 54
6.5.6.1.7	Mounting Arrangement	Surface or Flush Mounting
6.5.6.1.8	Ambient Temperature	-20 to 55 Deg C
6.5.6.2	Short Ckt indicator	
6.5.6.2.1	Sensing Current	200 to 1200 A
6.5.6.2.2	Sensing Time	30 to 100 ms in steps of 10 ms
6.5.6.2.3	Reset time	0.5-1-2-3-4 hr
6.5.7	Data by Purchaser	
6.5.7.1	System Fault Level	2kA – 8.75kA

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.5.7.2	Type of Grounding	Solidly Grounded
6.5.7.3	Fault clearing time	100ms
6.5.7.4	Cable Type	XLPE , 70 sq.mm to 400 sq.mm
6.6	For Transformer circuit breaker module (Module 3)	
6.6.1	Current transformer	a) 75-150-400 / 1 amp b) Resin Cast Ring type c) Considering three core cable terminations, mounting flexibility shall be provided for CT's (in horizontal & vertical direction both). Additionally, CAUTION marking (by sticker/ paint) shall be provided to avoid CT's installation above the screen of cable. (i.e. earth potential point.) d) Disconnecting type terminal block shall be provided for CT Circuit. e) Change in CT ratio shall be possible from the disconnecting type TB. Any change in CT ratio from CT secondary will not be acceptable.
6.6.2	CT accuracy class	5P10 minimum
6.6.3	CT burden	CT burden should be 20% higher than the connected relay burden.
6.6.4	Protection relay	a) Self powered, Microprocessor based Numerical relay (with backlit LCD display), IDMT over current / earth fault protection with high set element, manual reset type, flush mounted on panel front b) Relay Setting 10 % to 250% In insteps of 1% c) The relay should record atleast 10 fault events on FIFO basis d) Relay should have event recorder e) Relay auxiliary supply shall be 24V DC for all motorized RMU. For non Motorized RMU relay shall be with 240V AC auxiliary for remote tripping f) RS-485 Port to be provided on the Relay for remote communication of the parameters to the SCADA through FRTU over IEC103 Protocol. Necessary internal wiring also shall be done between Relay and FRTU. g) Licensed software shall be provided for Relay communication with Laptop along with necessary cables for interconnection between Laptop and Relay (Based on requirement). h) Appropriate wiring to be done to connect all the relays to the FRTU.
6.6.5	Relay auxiliary contacts for remote indication	Potential free contact 1NO + 1NC wired to terminal block

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.6.6	Shunt trip 24V DC (for WTI trip & door limit switch & for remote trip from SCADA.)	To be wired to terminal blocks
6.7	FRTU and Associated equipment battery, BHMU and battery charger	
6.7.1	Battery	
6.7.1.1	Battery type	SMF lead acid battery
6.7.1.2	Rating	24V DC, 26AH (min). It shall be rated for 10 close & 10 open operations of RMU CBs motor as well as 3 hrs back up for all equipment install inside FRTU cabinet (mini FRTU load shall be consider 50 W). However the actual battery and battery charger sizing shall be finalize by owner during detail engineering and bidder has to supply the finalized size of battery and battery charger without any price implication.
6.7.1.3	Location	Battery shall be kept in shielded compartment in FRTU panel and fixed with rivet and nut bolt. Individual battery terminal shall be wired upto terminal blocks mounted in FRTU cabinet.
6.7.2	Battery Health Monitoring Unit (BHMU)	1. BHMU will have Auto / Manual test facility. In Auto Mode it ensures battery automatic discharge at preset set period with 100W discharge resistor along with suitable algorithm to check the healthiness based on rate of discharge. 2. In manual Mode PB provided for battery testing. 3. Provision for Bypass mode of BHMU shall also be provided. 4. Output contacts :230V/24V DC -5A a. Battery Fail: 1 CO b. Test In process 5. Indications: a. BHMU healthy. b. Battery Fail c. Battery Low d. Test On.
6.7.3	Battery charger	2 no's chargers with auto change over using 10A diodes.
6.7.3.1	MCBs at charger input & output supply	Required 2nos DP MCB for AC Incoming supply All the MCBs shall be easily accessible for operation, with proper labeling. All AC MCB shall be 2 poles. MCB location shall be preferably away from Battery charger location.
6.7.3.2	Charger temperature rise at heat sink at full load for 2 hours	Maximum 55 deg C above ambient of 40 deg C

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.7.3.3	Battery charger cooling method	Natural without any fans
6.7.3.4	Individual CBs DC control	Required with MCB
6.7.4	FRTU	FRTU shall be provided and integrated with RMU and LV compartment with completely wired along with Modem suitable for communicating over GSM network and also have facility to communicate with fibre network. Bidder shall demonstrate the data communication of FRTU modem with MCC/BCC for the proposed modem for approval of owner in the Pre Order technical evaluation stage. For detailed specification of FRTU, I/O requirements , refer standard specification of Annexure F
6.7.5	Modem	Modem should be dual sim 4G and shall also have compatibility of 3G/2G network. For detailed technical specification of modem, please refer Annexure E
6.7.6	Transducer	DC voltage transducer (4-20mA) for monitoring of DC battery bus voltage.
6.8	Requirements of sealed housing live parts (RMU SF6 gas chamber)	
6.8.1	Enclosure	Stainless steel enclosure suitable for IP67
6.8.2	SF6 gas pressure low alarm	To be given
6.8.3	Provision for SF6 gas filling	To be given (For 'sealed for life' design of RMU, this is not applicable)
6.8.4	Provision for SF6 gas pressure indication	Manometer with non return valve
6.8.5	Arc interruption method for SF6 breaker / Load break switch	Puffer type / rotating arc type
6.8.6	Potential free contacts for SF6 gas pressure low	1NO +1NC (Desirable)
6.9	RMU operation interlocks	
6.9.1	Circuit breaker & respective earth switch	Only one in 'close' condition at a time
6.9.2	Prevent the removal of respective cable covers if circuit breaker is 'ON'	Electrical / Mechanical
6.9.3	Prevent the closure circuit breaker if respective cable cover is open	Electrical / Mechanical
6.9.4	Cable test plug for CB accessible only if Earth switch connected to earth	Mechanical
6.9.5	Prevent motorized operation of CB during manual operation	Electrical / Mechanical Electrical signal shall cut-off completely during manual operation. If CB fail to operate, the supply to motor shall be disconnected after certain time period

Technical Specification of 11 KV Dry type Smart Packaged Substation

		to prevent burning of motor due to continuous supply.
6.9.6	Prevent motorized operation of more than one CB at a time	Necessary feature (Electrical)
6.10.1	Indication & signals	Local
6.10.1.1	Operation counter on front / Inside the RMU LT chamber	To be provided for each Circuit breaker, with minimum four digits & non resettable type
6.10.1.2	Cable charge status indication for all CB	Capacitor type voltage indicators with LED on all the phases (Shall be clearly visible in day light)
6.10.1.3	Spring charge status indication	On front for breaker
6.10.1.4	Circuit breaker On/OFF indication	Green for OFF / Red for ON
6.10.1.5	Earth switch closed indication (For Each CB)	On front
6.10.1.6	Circuit breaker protection relay operated on fault	Flag
6.10.1.7	Fault passage indication on CB	Flag
6.10.2	Status signals to SCADA-to be wired to marshalling terminal block	2NO + 2NC
6.10.2.1	CB close / open	potential free contacts
6.10.2.2	CB Earth Switch close /open	potential free contacts
6.10.2.3	Battery charger Fail	potential free contacts
6.10.2.4	CB close / open	potential free contacts
6.10.2.5	Protection relay operated	potential free contacts
6.10.2.6	FPI operated	potential free contacts
6.10.2.7	SF6 gas pressure low	potential free contacts
6.10.2.8	Ready to close signal to control centre to indicate all interlocks are OK	Potential free contacts. Signal to indicate Ready for remote operation from Scada required for entire closing and entire tripping ckt. with all interlocks accounted for (Make : Gogate with P Card / Eqvt after approvals)
6.10.2.9	Local / Remote Switch	a) A manual Local / Remote selector switch shall be provided for each FRTU to disable all control outputs by breaking the power supply connection to the control outputs. b) When in the "Local" position, the Local/ remote switch shall allow testing of all the control outputs of FRTU without activating the control outputs to field devices. A status input indication shall be

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

		provided for the Local/ Remote switch to allow the SCADA system to monitor the position of the switch. c) The status of Local/ Remote switch should be wired and configured in FRTU.
6.10.2.7	Commands from SCADA- to be wired to marshalling terminal block	Cable feeder close / open
		Cable feeder close / open
		FPI Reset
		Transformer feeder Trip
6.11.0	Mimic diagram, labels & finish	a) Mimic diagram (Shall not be accepted with Stickers) b) On panel front with description of function & direction of operation of handles/buttons
6.11.1	Operating Instructions	Operating instruction chart and Do's & Don'ts in Hindi / local language to be displayed on left / front side of panel enclosure on anodized Al Sheet 16SWG, duly affixed on panel.
6.11.2	Name plate on panel front	Fixing by rivet only
6.11.2.1	Material	Anodized aluminum 16SWG / SS
6.11.2.2	Background	SATIN SILVER
6.11.2.3	Letters, diagram & border	Black
6.11.2.4	Process	Etching
6.11.2.5	Name plate details	Month & year of manufacture, equipment type, input & output rating, purchaser name & order number, guarantee period
6.11.3	Labels for meters & indications	Anodized aluminum with white character on black background OR 3 ply lamicoid
6.11.4	Danger plate on front & rear side	Anodized aluminum 16 SWG with white letters on red background
6.11.5	Painting surface preparation	Shot blasting or chemical 7 tank process
6.11.6	Painting external finish	Powder coated epoxy polyester base grade A, shade -RAL 7032, uniform thickness 60 micron minimum
6.11.7	Painting internal finish	Powder coated epoxy polyester base grade A, shade -white, uniform thickness 60 micron minimum

7.0 11KV XLPE Cable & termination kit

The 11kV XLPE cable connection from RMU to distribution transformer shall be conforming to IS 7098 and shall have all the following features –

Technical Specification of 11 KV Dry type Smart Packaged Substation

7.1	Cable type & size	XLPE insulated armoured / un armoured cable 3C x 150 sqmm Aluminium conductor
7.2	Cable voltage grade	11KV
7.3	XLPE insulation thickness	3.14 mm minimum
7.4	Aluminium conductor no of strands	As per Table 2 of IS 8130
7.5	Insulation screen	With semi conducting extrusion, copper tape & water swellable tape
7.6	Type of armour	GI flat as per table 4 of 7098 part 2
7.7	11KV end termination at RMU	By 11kv grade end termination kit, heat shrink type
7.8	11KV end termination at Distribution transformer	By 11kv grade end termination kit, heat shrink type
7.9	Cable support from RMU to transformer HT side cable box	GI cable tray 300mm wide

8.0 Dry Type Transformer

8.1.0	Major Design criteria	
8.1.1	Voltage variation on supply side	+ / - 10 %
8.1.2	Frequency variation on supply side	+/- 5 %
8.1.3	Transient condition	- 20 % or + 10 % combined variation of voltage and frequency
8.1.4	Service Condition	Refer Annexure B, the transformer enclosure in PSS is to be designed for outdoor location with service condition as specified, but its full rating shall be available if located indoor in poorly ventilated atmosphere
8.1.5	Insulation Level	
8.1.5.1	One minute power frequency withstand voltage	28KV for 11KV system & 3KV for 415 V system
8.1.5.2	Lightning impulse withstand voltage	75KV peak for 11KV system
8.1.6	Short Circuit withstand Capacity of the transformer	
8.1.6.1	Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side	For 3 secs.

Technical Specification of 11 KV Dry type Smart Packaged Substation

8.1.6.2	Single phase short circuit at secondary terminal with rated voltage maintained on other side voltage maintained on other side	For 3 secs.				
8.1.7	Overload capability	As per IEC 60905				
8.1.8	Noise level	Shall not exceed limits as per NEMA TR-1 with all accessories running measured as per IEC 551 / NEMA standard				
8.1.9	Radio Influence Voltage	Maximum 250 Microvolt				
8.1.10	Harmonic currents	Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances.				
8.1.11	Partial Discharges	Transformer to be free from partial discharge upto 120 % of rated voltage as the voltage is reduced from 150 % of rated voltage i.e. there shall be no significant rise above background level				
8.1.12	Parallel operation	Shall be designed to operate in parallel with existing transformer. Details of existing transformers shall be forwarded to the bidder on request				
8.1.13	Fire Protection class	Class F1 shall be required				
8.1.14	Climate class	Class C2 shall be required				
8.1.15	Environment class	Class E2 shall be required				
8.2.0	Major Parameters					
8.2.1	Rating	2000kVA/1600kVA/1000KVA/ 630KVA/ 400KVA				
8.2.2	Voltage Ratio	11kV / 433 volts				
8.2.3	Vector Group	Dyn11				
8.2.4	Impedance	a) 5% for 400kVA/630kVA &1000kVA, tolerance as per IS b) 6% for 400kVA/630kVA &1000kVA, tolerance as per IS				
8.2.5	Losses at 130 deg C					
8.2.5.1	No load Loss –Max in KW	2000 KVA	1600 KVA	1000 KVA	630 KVA	400 KVA
		3.56	3.2	1.78	1.2	0.9
8.2.5.2	Load losses at principal tap- Max in KW	2000 KVA	1600 KVA	1000 KVA	630 KVA	400 KVA
		15.25	12	7.5	5.4	3.4
8.2.6	Temperature rise winding	Outside PSS without enclosure			Inside PSS max.	
		80°C			90°C	

Technical Specification of 11 KV Dry type Smart Packaged Substation

8.2.7	Flux density	Maximum flux density at 10 % over excitation /overfluxing-1.9 Tesla maximum	
8.2.8	Tapping on HV winding	Off Circuit taps on HV winding , + / - 10 % in steps of 2.5 % , change of taps by link	
8.2.9	Design Clearances	Phase – phase	Phase - earth
8.2.9.1	11KV system	180mm	120mm
8.2.9.2	415V system	25mm	25mm
8.2.9.3	415V system	25mm	25mm
8.3	Construction & Design		
8.3.1	Core		
8.3.1.1	Material	High grade , non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel lamination	
8.3.1.2	Grade	Premium grade minimum M3 or better	
8.3.1.3	Lamination thickness	0.23mm (Max)	
8.3.1.4	Design Flux Density at rated conditions at principal tap	1.7 Tesla	
8.3.1.5	Maximum Flux Density at 10 % over excitation / over fluxing	1.9 Tesla maximum allowed	
8.3.1.6	Core Design Features	a. All steel sections used for supporting the core shall be thoroughly sand blasted after cutting , drilling, welding. b. Provision of lifting lugs for core coil assembly	
8.3.2	Winding		
8.3.2.1	Material	Electrolytic Aluminum	
8.3.2.2	Maximum Current Density allowed	Maximum allowed 1.5 A per sqmm	
8.3.2.3	Winding Insulating material	Class F minimum, free from compounds liable to ooze out, shrink or collapse. Uniform insulation shall be applied to the windings and overall winding shall be epoxy cast resin	
8.3.2.4	Tapping	Off Circuit taps on HV winding , + / - 5 % in steps of 2.5 % , change of taps by link	
8.3.2.5	Essential provision for tap links	Shall be shrouded with cover made from insulating material. To prevent deposit of dust.	
8.3.2.6	Design features	a) Stacks of winding to receive adequate shrinkage treatment b) Connections braced to withstand shock during transport, switching, short circuit, or other transients. c) Minimum out of balance force in the transformer winding at all voltage ratios. d) Conductor width on edge exceeding six times its thickness	

Technical Specification of 11 KV Dry type Smart Packaged Substation

		e) The termination bus-bar coming out from winding shall be tinned Copper f) Transposed at sufficient intervals. g) Threaded connection with locking facility. h) Winding leads rigidly supported, using guide tubes if practicable i) Provision of taps as indicated in the technical particulars
8.3.2.7	Essential provision of HV and LV winding leads	Phase marking required near termination on both HV and LV side. Phase colour coding required on insulating sleeves on both HV and LV side. Phase sequence 1U, 1V, 1W from left to right looking inside from the HV side door. Phase sequence 2n, 2u, 2v, 2w from right to left looking inside from LV side door Adequate HV termination clearance. Provision of check nut in all HV and LV winding lead connection.
8.3.3	Vibration Isolator	Vibration isolation pads shall be installed between core and coil assembly and enclosure base assembly to prevent the transmission of structure borne vibrations.
8.3.4	Bushings/Support Insulator/ terminations	
8.3.4.1	Type of HV and LV Bushings, support insulators	Epoxy Resin Cast
8.3.4.2	Minimum Creepage of bushings and support Insulators	31 mm / kV
8.3.4.3	Arcing horns	Not required
8.3.4.4	Termination on HV side	By cable within main enclosure by separable connector
8.3.4.5	HV side cable size	11 kV (E) grade , A2XCEWY 3C x 150 sqmm
8.3.4.6	Cable lugs	Long barrel medium duty Aluminium lug with knurling on inside surface. and suitable for cable size for 11 kV (E) grade , A2XCEWY 3C x 150 sqmm
8.3.4.7	HV side bushing	Indoor, Epoxy resin cast, 12kV voltage class and creepage 31mm/KV
8.3.4.7	Termination on LV side	Suitable bus bar as per PSS spec
8.3.5	Current Transformers	
8.3.5.1	Mounting	On LV side terminal busbars on all three phases and neutral with the help of fibre glass mounting plate
8.3.5.2	Maintenance requirements	Replacement should be possible without dismantling LV side support insulators
8.3.5.3	Accuracy Class	0.5s
8.3.5.4	Burden	5VA
8.3.5.5	Type	Resin Cast Ring type suitable for outdoor use
8.3.5.6	CT ratio	a) 400/630kVA -1000/5 Amps b) 1000kVA -1500/5 amp

Technical Specification of 11 KV Dry type Smart Packaged Substation

		c) 1500kVA- 2500/5 amp d) 2000kVA-3000/5 amp
8.3.6	Hardware	
8.3.6.1	External	Stainless Steel up 10mm size and Hot dip galvanized for 12mm and above size bolts.
8.3.6.2	Internal	Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design
8.4	Gasket	Neoprene rubber based gasket across all doors & covers
8.5	Control cable specification (to be used by the vendor)	PVC insulated, extruded PVC inner sheathed, FRLS , armoured, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sqmm for signals and 4 sqmm for CT with multistrand copper conductor
8.6	Terminal Blocks to be used by the vendor	Nylon 66 material, minimum 4 sq mm, screw type for control wiring and potential circuit.
8.6.1	Essential provision for CT terminals	Sliding link type disconnecting terminal block screwdriver operated stud type with facility for CT terminal shorting material of housing melamine/ Nylon66
8.7	Painting of WTI box	
8.7.1	Surface preparation	By 7 tank pre-treatment process CRCA sheet or Powder coating for GI sheet.
8.7.2	Finish on internal / external surfaces	Polyurethane based painting, min. Dry film thickness 80 microns
8.7.3	Insulating support material for base plate for mounting components	Bakelite shall not be used as a base plate for mounting any components, insulating material non hygroscopic insulating material like FRP shall be used.
8.8	Minimum Protective devices on Transformer	
8.8.1	Surge Arrestor	Required, Connected on Transformer Primary side on all three phases
8.8.1.1	Type	Metal oxide
8.8.1.2	Housing	Polymeric preferable
8.8.1.3	Rating	9 KV
8.8.1.4	Continuous operating voltage , kV rms	6.35
8.8.1.5	Maximum Continuous operating voltage, kV rms	7.65
8.8.1.6	Nominal Discharge Current, kA peak	5
8.8.1.7	Energy Absorption Capability, kJ/kV	Greater than 2.5
8.8.1.8	Creepage factor	31 mm /kV
8.8.1.9	Reference std	IS 3070 part 3 and IEC 99-4

Technical Specification of 11 KV Dry type Smart Packaged Substation

8.8.2	Winding Temperature scanner	Required
8.8.2.1	No of RTD inputs	Five (Three for windings, one for enclosure & one shall be spare) RTD for enclosure temperature monitoring shall be fixed at enclosure Top from inside to give max enclosure temp reading & shall be wired up to temp. scanner to indicate the reading
8.8.2.1.1	Location of winding RTD	At location of winding where maximum temperature is expected.
8.8.2.2	No of potential free trip contacts	Two
8.8.2.3	No of potential free Alarm contacts	Two
8.8.2.4	Auxiliary supply	240 V AC, 1 phase, 50 Hz. Tapped from LV side busbar through a MCB located inside box
8.8.2.5	Communication	RS 485 Port for communication on Modbus protocol for remote SCADA indication
8.8.2.6	Winding Temperature Scanner terminal Box	Required
8.8.2.6.1	Size	As per Manufacturer's Standard
8.8.2.6.2	Fixing of instrument within box	On base plate
8.8.2.6.3	Fixing of terminals within the box	On C channel available with the terminals
8.9	Fitting and accessories	
8.9.1	Rating & Diagram plate	Required
8.9.1.1	Material	Anodized aluminum 16SWG
8.9.1.2	Background	SATIN SILVER
8.9.1.3	Letters, diagram & border	Black
8.9.1.4	Process	Etching
8.9.1.5	Name plate details	Following details shall be provided on rating and diagram plate as a minimum a) Type of transformer i.e cast resin or VPI etc. With winding material b) IS / IEC standard to which it is manufactured c) Manufacturer's name; d) Transformer serial number; e) Month and year of manufacture f) Rated frequency in HZ g) Rated voltages in KV h) Number of phases i) Rated power in KVA j) Type of cooling k) Rated currents in a l) Vector group symbol m) 1.2/50 μ s wave impulse voltage withstand level in

Technical Specification of 11 KV Dry type Smart Packaged Substation

		KV n) Power frequency withstand voltage in KV o) Impedance voltage at rated current and frequency in percentage at principal, minimum and maximum tap at highest temperature p) Load loss at rated current at highest temperature q) No-load loss at rated voltage and frequency r) Auxiliary loss s) Continuous ambient temperature at which ratings apply in c t) Winding connection diagram with taps and table of tapping voltage, current and power u) Transport weight of transformer v) Weight of core and windings w) Weight of enclosure and fittings x) Total weight y) Tapping details z) Phase ct details aa) Class of insulation bb) IP protection rating of the enclosure cc) Name of the purchaser dd) Po no and date ee) Guarantee period
8.9.2	Detachable Bi-directional flat Roller Assembly	Required
8.9.2.1	Roller center to center distance	Minimum 900 mm on the side of HV and LV termination Maximum 800 mm on the other side (perpendicular to HV, LV termination). and LV termination Maximum 800 mm on the other side (perpendicular to HV, LV termination).
8.9.2.2	Essential provision	Roller dia. 150 mm min., roller to be fixed in such a way so that the lowermost part of the skid is above ground by at least 100 mm when the transformer is installed on roller.
8.9.3	Earthing pad on enclosure for transformer earthing complete with Stainless Steel nut, bolt, washers, spring washers etc.	Required with identification plate on outside of enclosure.
8.9.4	Core, Frame to tank Earthing	Required
8.9.5	Off Circuit tapping link	Required
8.9.6	Tap link position plate	Required inside HV side door
8.9.7	Danger plate made of Anodized aluminium with white letters on red background on HV and LV side	Required
8.9.8	Skid with Haulage lugs	Required

Technical Specification of 11 KV Dry type Smart Packaged Substation

8.9.9	Lifting lugs for complete transformer as well as enclosure	Required
8.9.9.1	Essential provision for lifting lugs	Lifting lugs for core coil assembly shall be provided in such a way that the weight shall not come on canopy while lifting. Lifting lugs for canopy/ enclosure shall be provided in such a way that the weight shall not come on canopy while lifting, it shall be borne by supporting members.
8.9.10	Caution Plate for tap links	Required
8.9.11	Ventilation louvers with stainless steel wire mesh and rain water guard	Required as per Manufacturer's design, but it is to be provided minimum required preventing ingress of excessive dust.
8.9.12	Surge Arrestor & its Grounding bushing	Required
8.9.12.1	Essential provision	Surge arrestor shall be erected vertically in such a way that the surge arrestor can be removed at site without removing HV cable lug. Surge arrestor shall not be used for any kind of support. Surge arrestor grounding strip to be routed to the surge arrestor grounding bushing near bottom of enclosure with proper support. Surge arrestor grounding bushing shall be identified by identification plate on outside of enclosure. Surge arrestor grounding bushing shall be supplied with all hardware to readily connect purchaser's ground lead.
8.9.13	LV additional neutral earthing bushing	Required
8.9.13.1	Essential provision	Busbar connecting the neutral to additional neutral bushing shall be properly supported and additional neutral bushing shall be identified by identification plate on outside of enclosure. Additional neutral bushing shall be supplied with all hardware to readily connect purchaser's ground lead.
8.9.14	Winding temperature scanner with inbuilt RS 485 port for SCADA communication	Required
8.9.15	RTD in Winding and near top of enclosure.	Required
8.9.16	Space heater inside enclosure	Thermostatically controlled space heater inside enclosure required, supply of space heater from feeder pillar through MCB fixed properly inside enclosure.
8.9.1	Mounting of space heater	By suitable spacers so that heater does not come in contact with panel wall directly.
8.9.17	Copper earthing link	Across all gasketed joints in the enclosure body.

Technical Specification of 11 KV Dry type Smart Packaged Substation**9.0 LV Switchgear Panel**

9.1	LV busbar system	
9.1.1	Type of connection on transformer	By flexible copper link rated size as per the transformer size.
9.1.2	Busbar material	High conductivity electrolytic grade aluminium
9.1.3	Main Bus bar	a. Suitable for carrying rated continuous current depending upon the incomer ACB rating. Current density should be less than 1A per sqmm. Busbars shall be continuous throughout the panel. b. Size of neutral busbar should be same as phase busbar.
9.1.4	Vertical/Dropper Busbar	a. Bus bars rating should be same as the rating of respective ACB/MCCB. Current density should be less than 1A per sqmm. b. Size of neutral busbar should be same as phase busbar. c. Bus bars shall be colour coded with heat resistant colour tapes.
9.1.5	Busbar Joints	a. Shall be silver plated. Adequate contact pressure shall be ensured b. Bimetallic connectors shall be provided, as necessary c. Length of overlap shall be more than the width of Busbar
9.1.6	Temperature Rise	20 degrees over ambient (maximum)
9.1.7	Insulation	a. Bus bar shall be provided with colour coded PVC insulating heat shrinkable sleeves rated for maximum operating voltage b. Insulating shroud should be provided on all joints
9.1.8	Bus insulator	Non-hygroscopic, Flame retardant, Track resistant type with high creepage surface (31mm/kV), epoxy resin insulators
9.1.9	Phase barrier	All cable termination shall be provided with phase barriers.
9.1.10	Neutral link	Bolted disconnecting links shall be provided for all incoming and outgoing feeders for isolation of neutral, if necessary
9.2.0	Air Circuit Breaker	
9.2.1	General Features	
9.2.1.1	Rated Current at 40 deg C	Rating of ACB as per the configuration table. De-rating @50 deg C shall be mentioned separately.
9.2.1.2	Number of Poles	4 Pole ACB
9.2.1.3	ACB mounting	Fixed type
9.2.1.4	Line-Load Reversibility	Required
9.2.1.5	Terminals	Suitable for connection with aluminium busbars with phase barriers & shrouds

Technical Specification of 11 KV Dry type Smart Packaged Substation

9.2.1.6	Operating mechanism	Electrical and manual spring charging, stored energy type
9.2.1.7	Operation counter	4 digit minimum, non reversible
9.2.1.8	Operating handle	Required
9.2.1.9	ACB indications	Separate ON / OFF / TRIP, L/R in remote & spring charge status
9.2.1.10	Closing coil	Closing coil shall operate correctly at all values of voltage between 85% & 110% of the rated voltage.
9.2.1.11	Tripping coil	Shunt trip shall operate correctly at all values of supply voltage between 70% & 110% of rated voltage.
9.2.1.12	ACB auxiliary contacts	6 NO + 6 NC minimum
9.2.1.13	ACB operating knob sealing	Possible in OFF condition
9.2.1.14	CT Requirement	All phase and neutral
9.2.1.15	Access to releases, coils & add on type replaceable parts to ACB	From front only
9.2.1.16	ACB indications	a. Separate ON / OFF / TRIP b. Spring charge status
9.2.1.17	ACB ingress protection (without enclosure)	IP2X minimum
9.2.1.18	Pollution degree as per IS	2 – non conductive pollution
9.2.1.19	ACB temperature rise limits	As per table 2 & 3 of IS 60947-1
9.2.2	Operation Features	
9.2.2.1	Number of phases	Three phase & neutral
9.2.2.2	Rated Operational Voltage(V)	415V
9.2.2.3	Rated Insulation Voltage (V)	1000V
9.2.2.4	Rated Impulse Voltage	8 kV for main circuit
9.2.2.5	Category of utilization	B
9.2.2.6	Rated Ultimate breaking capacity at rated voltage	a. Icu = 50kA minimum (up to 2000A rating ACB) b. Icu = 65kA minimum (above 2000A rating ACB)
9.2.2.7	Rated Service breaking capacity at rated voltage Ics	Ics =100% Icu
9.2.2.8	Rated short term withstand current for 1 sec at rated voltage - Icw	Icw = 100% Icu
9.2.2.9	Rated making current capacity -Icm	Icm = 220% Icu
9.2.2.10	Number of operating cycles at rated current (open + close) without changing arcing contact	5000
9.2.2.11	Number of mechanical operating cycles (open +	20000

Technical Specification of 11 KV Dry type Smart Packaged Substation

	close)	
9.2.2.12	Product Information marking on ACB	As per clause 5 of IS 60947 Part-I. In addition name of purchaser shall be marked on front of device
9.2.3	Measurement and Protection Requirement	
9.2.3.1	Microprocessor release	a. Microprocessor based release with true RMS based sensing. b. Self powered, tapped from incoming side of supply, setting panel with locking arrangement
9.2.3.2	Protections Required	Overload, short-circuit & earth fault
9.2.3.3	Tripping characteristic	Inverse definite minimum time characteristics for Short circuit and earth fault protection
9.2.3.4	Overload setting	40% -100% I_n , steps of 10%.
9.2.3.5	Overload setting time delay	2.5 s to 40 s minimum three settings
9.2.3.6	Short Circuit Setting	100% - 800% of I_n , steps of 10%.
9.2.3.7	Short Circuit Setting time delay	50 ms - 400 ms in steps of 50ms
9.2.3.8	Instantaneous setting	200% - 1500% of I_n & OFF
9.2.3.9	Earth fault setting	10- 100 % of I_n , steps of 10%
9.2.3.10	Earth fault setting time delay	50ms - 400 ms in steps of 50ms
9.2.3.11	Neutral unbalance	Earth fault function should not operate during neutral unbalance. Same will be verified during inspection.
9.2.3.12	Measurements required in release	a. Phase wise current b. Phase wise voltage c. Power factor d. Maximum current with date and time e. Instantaneous Power: Active, Reactive and apparent power f. Power Demand g. Energy
9.2.3.13	Metering measurement accuracy	a. 1% for current and voltage b. 2% for Power and energy
9.2.3.14	Other release requirements	a. Release should have backlit display. b. Release should be plug-in type and easily replaceable in field. c. Separate fault indication shall be provided for each protection stage i.e overload, short circuit and earthfault d. Release should store 10 fault records on FIFO basis with date and time stamp. e. Release should have 2 Digital Inputs. CB On and Off status shall be wired to DIs through auxiliary switch. f. Release should have RS485 port for SCADA communication on open Modbus protocol. It should be able to transmit all measured,

Technical Specification of 11 KV Dry type Smart Packaged Substation

		monitored and recorded data to SCADA including status of DIs. g. Remote time synchronization through SCADA should be possible
9.3.0	MCCB	
9.3.1	General Features	
9.3.1.1	Standard current rating at 40 deg C	As per the PSS configuration (De-rating @50 deg C shall be mentioned separately)
9.3.1.2	Construction	The MCCBs shall comprise of Four poles in a single construction. All the parts shall be enclosed in a moulded insulating material housing.
9.3.1.3	Type	The MCCBs shall be trip free type with quick make and break design.
9.3.1.4	Terminals	Suitable for connection with aluminium busbars with phase barriers & shrouds
9.3.1.5	CT Requirement	All phase and neutral
9.3.1.6	Access to releases, coils & add on type replaceable parts to MCCB	From front only
9.3.1.7	Indications	MCCBs shall be provided with mechanical position indicator with shrouded terminals. MCCB's shall have ON/OFF/trip positions.
9.3.1.8	MCCB ingress protection (without enclosure)	IP2X minimum
9.3.1.9	Pollution degree as per IS	2 – non conductive pollution
9.3.1.10	ACB temperature rise limits	As per table 2 & 3 of IS 60947-1
9.3.2.0	Operation Features	
9.3.2.1	Number of phases	Three phase & neutral
9.3.2.2	Rated Operational Voltage(V)	415V
9.3.2.3	Rated Insulation Voltage (V)	1000V
9.3.2.4	Rated Impulse Voltage	8 kV for main circuit
9.3.2.5	Category of utilization	A
9.3.2.6	Rated Ultimate breaking capacity at rated voltage	Icu = 50kA minimum
9.3.2.7	Rated Service breaking capacity at rated voltage Ics	Ics =100% Icu
9.3.2.8	Rated short term withstand current for 1 sec at rated voltage - Icw	Icw = 100% Icu
9.3.2.9	Rated making current capacity -Icm	Icm = 220% Icu
9.3.2.10	Number of operating cycles at rated current	5000

Technical Specification of 11 KV Dry type Smart Packaged Substation

	(open + close) without changing arcing contact	
9.3.2.11	Number of mechanical operating cycles (open + close)	20000
9.3.2.12	Product Information marking on MCCB	As per clause 5 of IS: 13947 Part-I. In addition name of purchaser shall be marked on front of device
9.3.3	Measurement and Protection Requirement	
9.3.3.1	Microprocessor release	a. Microprocessor based release with true RMS based sensing. b. Self powered, tapped from incoming side of supply, setting panel with locking arrangement
9.3.3.2	Protection	Overload, short-circuit & earth fault
9.3.3.3	Tripping characteristic	Inverse definite minimum time characteristics for Short circuit and earth fault protection
9.3.3.4	Overload setting	40% -100% I_n , steps of 10%.
9.3.3.5	Overload setting time delay	2.5 s to 40 s minimum three settings
9.3.3.6	Short Circuit Setting	100% - 800% of I_n , steps of 10%.
9.3.3.7	Short Circuit Setting time delay	50 ms - 400 ms in steps of 50ms
9.3.3.8	Instantaneous setting	200% - 1500% of I_n & OFF
9.3.3.9	Earth fault setting	10- 100 % of I_n , steps of 10%
9.3.3.10	Earth fault setting time delay	50ms - 400 ms in steps of 50ms
9.3.3.11	Neutral unbalance	Earth fault function should not operate during neutral unbalance. Same will be verified during inspection.
9.3.3.12	Measurements required in release	a. Phase wise current b. Phase wise voltage c. Power factor d. Maximum current with date and time e. Instantaneous Power: Active, Reactive and apparent power f. Power Demand g. Energy
9.3.3.13	Metering measurement accuracy	a. 1% for current and voltage b. 2% for Power and energy
9.3.3.14	Other release requirements	a. Release should have backlit display. b. Release should be plug-in type and easily replaceable in field. c. Separate fault indication shall be provided for each protection stage i.e overload, short circuit and earthfault d. Release should store 10 fault records on FIFO basis with date and time stamp. e. Release should have 2DIs for MCCB On and Off status shall be wired to DIs through auxiliary switch.

Technical Specification of 11 KV Dry type Smart Packaged Substation

		f. Release should have RS485 port for SCADA communication on open Modbus protocol. It should be able to transmit all measured, monitored and recorded data to SCADA including status of DIs. g. Remote time synchronization through SCADA should be possible
9.3.10	Common RS 485 port	a. Communication ports of all MCCBs and ACBs shall be looped and connected to a common RS485 port provided in the panel for interfacing with SCADA on open modbus protocol. b. If any additional communication device is required for looping/combining of ACB and MCCB data is to be provided.
9.3.11	Serial Port surge protection device	To be provided

10.0 Automatic Power Factor Correction system

The APFC equipment shall be located in LV compartment of package enclosure either as a separate panel or integrated along with LV Switchgear and shall have all the following features

10.1	APFC Output	As per the PSS configuration clause 4.0 APFC should be rated at 440V. Manufacturer need to specify the rated output at 440V.
10.2	APFC mounting	All components mounted in shelf type arrangement on package substation enclosure LV compartment wall or RMU compartment wall or Part of LT Panel
10.3	APFC relay & data logger	Mounted on base plate supported on compartment wall by three hinges
10.4	APFC system bus bar power connection to transformer LT side	a) By 4CX300sqmm AYFY 1100V grade cable to or Bus Bars for 200kVAR/300kVAR APFC rating b) By 2X4CX300sqmm AYFY 1100V grade cable to or Bus Bars for 600kVAR/800kVAR APFC rating
10.5	APFC system bus bar size	a) 50x10mm tinned copper mounted on SMC insulators 1100V grade for 200kVAR/300kVAR APFC rating b) 100x10mm tinned copper mounted on SMC insulators 1100V grade for 200kVAR/300kVAR APFC rating
10.6	APFC system CT input signal	From CT on transformer LV side by 7CX2.5sqmm YY 1100V grade cable
10.7	APFC capacitor modules	As per the requirement
10.8	Capacitor duty contactor for each capacitor module	Utilization category 6b as per IS

Technical Specification of 11 KV Dry type Smart Packaged Substation

10.9	MCCB for each capacitor module	100amp, Three Pole, Ics=Icu=35kA
10.10	Connection to each MCCB from APFC system bus	By 35sqmm copper wire double insulated with tinned copper lugs
10.11	APFC control supply	Through 415/240v transformer, 2amp / 6amp SP MCB
10.12	APFC relay	Microprocessor based relay for automatic control of minimum 12 capacitors in sequential or cyclic switching fashion with settable time delay 0 -180 sec.
10.13	APFC relay LCD display with self monitoring feature	To show no. of capacitors energized, actual PF & target PF, voltage & current
10.14	Target power factor setting range	0.8 lag to 0.9 lead in steps of 0.1
10.15	APFC relay sensing	3 phase CT input 5 amp to sense max load current
10.16	No volt protection in relay	To switch OFF all capacitors
10.17	Capacitor unit 25KVAR type	Double layer All Poly Propylene (APP) or Mixed Poly Propylene (MPP)
10.18	Capacitor unit construction	1.5mm thick sheet metal welded tank or Al cylindrical construction
10.19	Capacitor unit impregnant	Dry type filler or non PCB liquid
10.20	Capacitor unit conducting layer	Al foil or metalized film
10.21	Capacitor sealing	Hermetic sealing after vacuum process
10.22	Capacitor unit safety	Pressure sensitive dis-connector or internal fuse for each element
10.23	Discharge resistor	Between all three phases of capacitor unit, to reduce the voltage across the capacitor to 50V or less in one minute
10.24	Terminal bushings	For rated voltage class 1 KV Suitable wires / terminals brought out from capacitor unit is also acceptable.
10.25	Earth connection for individual capacitor container	To be done & connected to main earth bus bar of the panel
10.26	APFC Operational features	
10.26.1	Automatic power factor correction	To achieve target lagging power factor without hunting
10.26.2	Operation for rated output	At continuous rated voltage (440 V) & frequency (50 Hz)
10.26.3	Operation with over voltage	115% of rated voltage for 12 hours in a day
10.26.4	Operation with harmonic distortion	THD voltage – 5% & THD current 3%
10.26.5	Maximum permissible over current	1.3 times rated current, continuous
10.26.6	Dielectric loss	0.2 watt per KVAR maximum

Technical Specification of 11 KV Dry type Smart Packaged Substation

10.26.7	Temperature Category & Maximum temperature rise	- 5 / 60 deg C Not exceeding 10 deg C over 60 deg C.
10.26.8	Residual voltage after disconnection from mains	50 volts maximum after 60 seconds
10.26.9	Design life of capacitor unit	Minimum 10 years
10.27.0	Data Logger	
10.27.1	General	Accuracy class 0.5, microprocessor based with LCD display, with 3 CTs for measurement of cumulative KWH, power factor, voltage & current of transformer secondary, THD of voltage.
10.27.2	Data logging and Software	Data logging of KWH value at every 30 minutes to give cumulative reading of KWH for 45 days minimum, data downloadable in ASCII-II or MS Excel format. Software for downloading the data from data logger to be provided by data logger vendor.
10.27.3	Display communication and	Display of DATE, TIME, station ID -Display & log power parameters phase wise & total (load current, kVA, kW & PF). -Display & log kVAr phase wise & total. -Display TDH V or current. -The logger shall be with built in communication facility of RS485 to down load all parameters on demand. Integration of APFC relay with FRTU for SCADA monitoring and control.

11.0 Energy Meter Box

111.1	Energy meter	In the scope of purchaser
11.2	Location	To be provided mounted on enclosure wall in LV compartment.
11.3	Energy meter box Size	650 mm height x 450 mm width x 275 mm depth.
11.4	Box door design	With antitheft hinge, padlock facility, door fixed by stainless steel Allen screw M6 size.
11.5	Fixing of energy meter within box	On slotted horizontal channel 40 x 12 mm size, channel shall be movable on vertical slotted angle 40 x 40 mm size at two ends.
11.6	Meter reading window	Front door shall be with acrylic sheet for viewing the energy meter.
11.7	Sealing arrangement	02 no's sealing arrangement shall be provided on meter box's door.
11.8	Data downloading port	Slot shall be provided on door of meter box for fixing 9 pin DB connector.
11.9	Test Terminal Block	No Test terminal block shall be provided.

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

11.10	Cables and wires	PVC insulated, extruded PVC inner sheathed, armored, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sq mm for PT and 4 sq mm for CT with multi strand copper conductor.
11.11	Cable Glands	Nickel plated brass double compression weatherproof cable gland.
11.12	Wiring diagram	To be fixed on the back of door along with CT spec. etched on Anodised Aluminium plate fixed by rivet.
11.13	CT Secondary/VT wires	All CT secondary wire and VT wires shall be routed through metallic conduit. All secondary wires shall be bunched and kept for termination without any terminal/ TTB in between.

12.0 Other Provisions: illumination, Hooter & Fire extinguisher

12.1.1	RMU, transformer & LV compartment illumination	By 36w CFL fixture controlled through SPMCB & door limit switch
12.1.2	RMU, transformer & LV compartment power socket	5/15amp 3 pin socket through 32 amp SPMCB
12.2	Smoke Detector in each compartment	Minimum 02 no's Smoke Detectors in each LV, HV and Transformer compartment , wiring to be provided for RMU tripping and SCADA indication.
12.3	Energy meter box	To be provided on transformer LT side along with wiring.
12.4	Portable Modular Fire Extinguisher for HV, LV and Transformer compartment	a) The Portable modular FE, ABC (Stored Pressure) shall conform IS 13849. b) The powder in the extinguisher must be MAP 90%. c) The Dry powder used in FE shall conform IS 4308. d) The internal and external surface of the body shall be epoxy powder coated of minimum 0.050mm thickness. e) The wall thickness shall be as per IS 13849 f) All Internal and external surface of the body shall be completely coated with lead-tin alloy (tin not less than 10%) by means of hot dipping or by electrolytic process to a thickness not less than 0.012 mm. The thickness of the coating shall be measured as given in IS 3203:1982. Epoxy powder coating can also be used for anti-corrosive treatment with 0.050 mm thickness. g) The extinguisher body and valve assembly shall be capable of withstanding the Internal

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

		hydraulic pressure of 3 0 MN/m ² (30 kgf/cm ²) without rupture, leakage or visible distortion for a period of 2 minute". Make Cease fire/ Mini Max
12.5	Other requirements	Substation internal cabling, lighting & earthing system along with required hardware, gaskets, gland plates etc.

13.0 PSS Enclosure Earthing

13.1	Earth bus connection brought out of package substation enclosure to earth pad for connection to earth pit	a) Two earth pads for RMU, transformer & LV compartment each. b) Two earth pads for transformer neutral
13.2	Earth bus size	a) 50x6 GI flat up to 1000kVA rating of PSS b) 2X50x6 GI flat for 1600kVA and 2000kVA rating of PSS
13.3	Earth bus fault current capacity	a) 26.3kA for 1 sec up to 1000kVA rating b) 43KA for 1 sec up to 1600kVA rating and 2000kVA rating of PSS
13.4	Earth connection of all covers, doors & structural parts to GI bus	By metallic jumper connection
13.5	Earth connection of RMU, ACB & transformer body parts to GI bus	By two numbers of 50x6mm GI flat per equipment
13.6	Earth bus identification	Shown by letter 'E'

14.0 Labels & painting

14.1	Name plate on package enclosure	Fixing by rivet only
14.1.1	Material	Anodized aluminum 16SWG / Stainless Steel (SS)
14.1.2	Background	SATIN SILVER
14.1.3	Letters, diagram & border	Black
15.1.4	Process	Etching

Technical Specification of 11 KV Dry type Smart Packaged Substation

14.2	Name plate details	a) Month & year of manufacture b) transformer rating c) Purchaser name & order number d) Guarantee period e) Ref. IS / IES No. Shall be provided inside enclosure as well as outside enclosure.
14.3	Labels for meters & indications	Anodized aluminium with white character on black background OR 3 ply Lamicaid
14.4	Danger plate on doors of RMU compartment & LV compartment	Etched on 16 swg anodised aluminium / SS plate with white letters on red background
14.5	BSES Insignia	a) 02 no's b) HV and LV side of PSS enclosure. c) Shall be etched on anodized aluminium 16SWG / SS plate. d) Details shall be finalized during drawing approval.
14.6	Enclosure painting surface preparation	Shot blasting or 7 tank chemical process
14.7	Enclosure painting external finish Powder coated epoxy polyester base	Hot dip galvanizing – 80 micron thick grade A, shade - RAL 7032, uniform thickness 60 micron minimum .
14.8	Enclosure painting internal finish	Powder coated epoxy polyester base grade A, shade -white, uniform thickness 80 micron minimum

15.0 Approved makes

15.1	RMU	ABB/Schneider/Siemens/C&S
15.2	Transformer	ABB/Raychem/TMC/Voltamp
15.3	FRTU	ABB/Schneider/Siemens/Phoenix
15.4	FPI	EASI/ EMG/Siemens/C&S
15.5	Protection Relay	Ashida ADR241S -761/ C&S-CSPR-V2-500
15.6	Battery charger and BHMU	Allan/Gagate
15.7	Oil type transformer	ABB/ Schneider/Danish/kotson/Toshiba
15.8	Bushings make	Baroda bushing / CJI / Jaipur
15.9	Winding Temperature Indicator	Precimeasure/ Pecon
15.10	ACB	L&T / Schneider-MG /Siemens / ABB
15.11	MCCB	GE / ABB/Schneider/Siemens
15.12	APFC	ABB/Schneider/Epcos
15.13	Switch	ABB / Siemens / L&T (Salzer)
15.14	HRC Fuse Links	Alstom / Siemens / L&T / GE
15.15	Load manager	L&T / Enercon / AE / DUCATI / Phasetrac M-40 / TAS POWERTECH

Technical Specification of 11 KV Dry type Smart Packaged Substation

15.16	APFC relay	Beluk / ABB / Fraco / Ducati/ TAS / POWERTECH
15.17	AC Contactors	ABB / Schneider
15.18	Push buttons / Actuator	L&T / Teknic / Siemens
15.19	MCCB	ABB / L&T / Siemens/Schneider –MG
15.20	Capacitors	FRACO / DUCATI/ABB/shrim
15.21	Fans	EBM Nadi
15.22	Terminals	Connectwell / Elmex
15.23	Transformer Bushings (HV side)	Baroda/CJI/ any other make approved by BSES
15.24	Termination kits for RMU	3m/ Raychem/ Denson
15.25	Termination kits for Transformer	3M/ Raychem/ Denson / any other make approved by BSES
15.26	Cold applied cable boots	3M/ Raychem/KD joshi
15.27	Interposing relay	ABB / Tyco/OEN
15.28	Modem	Niseva/Lantronix/Pheonix
15.29	CT and Aux PT	Narayan Power Tech (NPT)/Gilbert Maxwell, Pragati, Nortex
15.30	CBCT (Both for Earth fault and Over current protection)	EMG/Schneider/SIEMENS/C&S
15.31	Battery	HBL/Exide
15.32	Protocol converter	ABB/Tyco/OEN
15.33	DC power connector	Wago/Havells/Connectwell
15.34	Surge protector	Phoenix
15.35	Vacuum Interrupter	CG/ABB/Schneider/BEL

Note – Any other make of component offered by the bidder maybe reviewed & approved by BSES

16.0 Quality assurance Inspection & testing

16.1	Vendor quality plan	To be submitted for purchaser approval for all components listed in clause 4.0 For transformer, RMU & APFC panel sub vendor quality plan to be submitted.
16.2	Inspection points in quality plan	To be mutually identified & agreed
16.3	Quality – Process Audits	BSES shall carryout vendor process audits.
16.4	Type test as per IS / IEC	a) Only type tested quality equipment(s) shall be offered. b) Type test certificates mentioned in this clause shall be submitted along with offer for scrutiny c) The test report should not be more than 5years old. d) If identical rating type test reports for transformers are not available vendor to carryout Short circuit withstand test, Lightning impulse test & temperature rise test without any additional cost.
16.4.1	Package substation assembly	As per IEC 62271-202

Technical Specification of 11 KV Dry type Smart Packaged Substation

16.4.2	11kv RMU, transformer, ACB, MCCB, APFC system and capacitor units	As per relevant IS/ IEC
16.5	Routing tests	
16.5.1	Routine tests of PSS	As per IEC 62271-202
16.5.2	Routine tests of transformer, RMU, LT panel & APFC	As per relevant IS/ IEC
16.6	Inspection and acceptance testing	a) Purchaser reserves the right to inspect /witness all tests on the meters at manufacture's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b) Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests during inspection. All the testing equipment should be calibrated. c) Stage and / or final inspection call intimation shall be given at least 15 days in advance to the purchaser.
16.6.1	Stage inspection of transformer	Purchaser shall inspect transformers at the core and coil assembly stage at the manufacturer's premises.
16.6.2	Final inspection of transformers	The sequence of testing shall be as follows a) Visual and dimension check for completely assembled transformer. b) Measurements of voltage ratio. c) Measurements of winding resistance at principal tap and two extreme taps. d) Vector Group and polarity test. e) *Measurements of insulation resistance and polarization index. f) Separate sources voltage withstand test. g) Measurement of iron losses and exciting current at rated frequency and 90%, 100% and 110% rated voltage. h) Induced voltage withstand test. i) Load losses measurement. j) Impedance measurement of principal tap (HV and LV) of the transformer. k) Measurement of Iron loss (to be repeated if type test are conducted). l) Measurement of capacitance and Tan Delta for HV and LV bushings and Tan Delta for transformer oil (for all transformers). m) Oil leakage test on assembled transformer n) Magnetic balance test. o) Power frequency voltage withstand test on all auxiliary circuits p) Measure of zero seq. impedance (Cl. 16.10 IS 2026 Part I). q) Measurement of acoustic noise level (Cl. 16.12 of

Technical Specification of 11 KV Dry type Smart Packaged Substation

		IS 2026 Part I). r) Measurement of harmonic level on no load current. s) Partial discharge test *Insulation resistance measurement shall be carried out at 5kV for HV and 1kV for LV. Value of IR should not be less than 1000 Mohms. Polarization Index (PI = IR10min/IR1min) should not be less than 1.5 (If one minute IR value is above 5000 Mohms and it is not possible to obtain an accurate 10 minutes reading, in such cases polarization index can be disregarded as a measure of winding condition.)
16.6.3	Final Inspection of package substation after complete assembly	As per IEC 62271-202 and relevant IS/ IEC of equipment. a) Visual check b) Dimensional and sheet thickness check c) Verification of Wiring & BOM d) Paint thickness inside and outside of PSS enclosure. e) Functional test i. Operation of switchgear and control gear. ii. Mechanical operation and alignments of PSS doors. iii. Fixing of insulating barriers. iv. Voltage indication check v. Checking of temperature and liquid level of the transformer. vi. Fitting of earthing devices. vii. Cable testing viii. Replacement of LTCT ix. Operation of transformer tap changer x. Operation of illumination system xi. Trip function of HV switchgear. f) IR test g) HV test on power circuit h) HV test on auxiliary circuits i) Operational and interlocks check
16.6.4	Acceptance Test of RMU	a) Physical inspection , BOM & wiring checks b) Insulation Resistance test c) HV Test for one minute d) Operation & Interlock check e) Measurement of resistance of main circuit f) Voltage indication check of VPI g) Functional testing of FPI for alarm h) Primary current injection test for circuit breaker feeder on both ration's of all CT's with relay i) Breaker closing and opening time measurement

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

16.6.5	Acceptance Test of LT Panel / APFC Panel	a) Visual, dimension, wiring & BOM check. b) Operational check. c) IR Test. d) HV Test
16.7	Special acceptance tests	
16.7.1	Transformer	Temperature rise test shall be carried out on 01 no transformer of each rating randomly selected from the offered lot.
16.7.2	PSS	Temperature rise test of PSS along with transformer as per IEC 62271-202.
16.8	Right to waive off tests	Reserved by Purchaser

17.0 Shipping, Handling and Site support

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

Technical Specification of 11 KV Dry type Smart Packaged Substation**18.0 Deviations**

18.1	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.
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19.0 Drawings Submission

Drawing submission shall be as per the matrix given below.

- a) All documents/ drawing shall be provided in soft copy only in returnable Pen drives
- b) Language of the documents shall be English only.
- c) Incomplete submission shall be liable for rejection.
- d) Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch
- e) No submission is acceptable without check list compliance.
- f) Order of documents shall be strictly as per the check list.
- g) Any drawing not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope.

S No.	Description	Bid	For Approval	Pre Dispatch
19.1	Copy of specification along with company seal & signature on each page.	Required		
19.2	Duly filled GTP as per BSES specification	Required	Required	
19.3	GA drawing (Complete assembly, RMU, transformer, LT panel + other items)	Required	Required	
19.4	BOM of Packaged substation	Required	Required	
19.5	Valid type test reports	Required		Required
19.6	Transformer BIS license	Required	Required	Required
19.7	Reference list of clients/suppliers list for last 3 years	Required		
19.8	Performance certificates executed in last 5 years	Required		
19.9	Calculation for sizing of Transformer	Required	Required	
19.10	Sizing Calculation of busbar in support of its Guaranteed S.C. rating / Capability	Required	Required	
19.11	Deviation Sheet (if any)	Required	Required	
19.12	Catalogues & manuals for Package substation + RMU + Transformer + LT switchgear items + APFC			Required

Technical Specification of 11 KV Dry type Smart Packaged Substation

S No.	Description	Bid	For Approval	Pre Dispatch
19.13	User manual for Hermetically Sealed Transformers. The manual must be provided with, but not limited to, maintenance schedule, frequency & method of oil- sampling, procedures for oil-filling & oil-filtration, etc.			Required
19.14	Quality plan for Packaged substation	Required	Required	
19.15	Installation, commissioning manual for all items in Packaged substation. (for information)		Required	Required
19.16	Operation & maintenance manual for all items in Packaged substation. (for information)			Required
19.17	Transport / Shipping dimensions with weights, wheel base details, un tanking height		Required	
19.18	Recommended spare parts and consumable items for five years of operation and spare parts catalogue with price list	Required	Required	
19.19	Inspection and test reports carried out in manufacturers works			Required
19.20	Test certificates of all bought out items.			Required

Annexure A Service Conditions

The package substation shall be designed & tested to operate satisfactorily under following conditions -

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

Sr No	Description	Data by purchaser
1.	Location	Delhi
2.	Reference design ambient temperature	40°C for Delhi
3.	Maximum ambient temperature	50°C for Delhi
4.	Relative humidity	85% for Delhi
5.	Seismic zone	Zone IV for Delhi

Annexure B Guaranteed Technical Particulars (Data by Supplier)

- i. Bidder shall furnish the GTP format with all details against each clause.
- ii. Bidder shall not change the format of GTP or clause description.

Technical Specification of 11 KV Dry type Smart Packaged Substation

iii. Bidder to submit duly filled GTP in hard copy format with company seal.

Sr. No.	Description	Data to be filled by Manufacturer
1	Manufacturer Name	
2	Manufacturer Address	
2.1	Telephone no	
3	Manufacturer contact person	
4	Manufacturer brand name (Give catalogue reference)	
4.1	Conformance to specification	Yes/No
4.2	If NO for above, Submission of clause wise deviation sheet	Yes/No
5	RMU	
5.1	Equipment make	
5.2	Equipment type / brand name	
5.3	Panel overall dimensions in mm	
5.3.1	Width (measured from front)	
5.3.2	Depth	
5.3.3	Height	
5.4	Panel weight in kg	
5.5	Panel enclosure protection offered	
5.6	Panel tested for internal arc	Yes / No
5.7	Insulation level for complete panel	
5.7.1	Impulse withstand	(KV peak)
5.7.2	Power frequency withstand	(KV rms)
5.8	Bus bar	
5.8.1	Material & grade	
5.8.2	Bus bar cross section area in sq mm	
5.8.3	Bus bar rated current in amp	
5.8.4	Max temperature rise above reference ambient	
5.8.5	Short time current withstand capacity for 3 seconds (in KA)	
5.8.6	Bus bar clearances in mm P-P / P-E	
5.8.7	Bus bar with insulation sleeve / barriers	
5.8.8	Bus bar support insulator type	
5.8.9	Bus bar support insulator voltage class	
5.8.10	Bus bar support insulator minimum creepage distance / mm	
5.9	Earth bus bar	
5.9.1	Earth bus bar material & grade	
5.9.2	Earth bus bar cross section area in sq mm	
5.9.3	Bus bar rated current in amp	

Technical Specification of 11 KV Dry type Smart Packaged Substation

	i) at designed 40 deg.C ambient ii) at 50 deg.C ambient	
5.9.4	Max temperature rise above reference ambient of 40 deg C	
5.9.5	Short time current withstand capacity for 3 seconds (in KA)	
5.9.6	Bus bar clearances in mm P-P / P-E	
5.9.7	Bus bar with insulation sleeve / barriers	
5.9.8	Bus bar support insulator type	
5.9.9	Bus bar support insulator voltage class	
5.9.10	Bus bar support insulator minimum creepage distance / mm	
5.9.11	Earth bus bar material	
5.9.12	Earth bus bar size	
5.9.13	Cable compartment	
5.9.13.1	C-C distance between bushings	
5.9.13.2	Phase to Phase Clearance (Min)	
5.9.13.3	Phase to Earth (Min) Clearance	
5.9.13.4	Impulse Withstand Voltage of design tested	
5.9.13.4	IAC level – Cable compartment / RMU Tank	
5.10	Circuit breaker type –VCB	
5.10.1	Rated voltage & frequency	
5.10.2	Rated current in amp	
5.10.3	Rated breaking current – KA rms symmetrical	
5.10.4	Short time withstand capacity in KA for 3 sec	
5.10.5	Rated making current - KA peak	
5.10.6	Breaker total opening time at rated breaking capacity (in milliseconds)	
5.10.7	Number of breaks per pole	
5.10.8	Total length of contact travel in mm	
5.10.9	No of circuit breaker operation cycles (close & open) guaranteed at rated current, Electrical endurance class	
5.10.9.1	25% rated current -	
5.10.9.2	50% rated current -	
5.10.9.3	75% rated current -	
5.10.9.4	100% rated current -	
5.10.10	No of breaker opening operations guaranteed at rated fault current, Electrical Endurance class	
5.10.11	No of breaker mechanical operation cycles (close & open) guaranteed at zero current,	

Technical Specification of 11 KV Dry type Smart Packaged Substation

	Mechanical endurance	
5.10.12	Contact material	
5.10.13	Operating mechanism – trip free	
5.10.14	Motorized/Manual Sprig charge type	
5.10.15	Spring charging motor rating - Watt	
5.10.16	Spring charging motor rated DC voltage	
5.10.17	Closing coil wattage & rated DC voltage	
5.10.18	Trip coil wattage & rated DC voltage	
5.11	Minimum permissible SF6 gas pressure (For SF6 type RMU only)	
5.12	Capacitor type cable voltage indication provided?	Yes / No
5.13	Operation counter provided – Yes/ No	
5.14.1	Disconnect switch continuous rating (Amp)	
5.14.2	Disconnect switch Short time withstand rating -20kA for 3 sec minimum	Yes / No
5.15	Earth Switch	
5.15.1	Minimum number of operations at no load- Mechanical Endurance class	
5.15.2	Making capacity endurance of earth switch – Electrical endurance class	
5.16	Self Powered Relay (Transformer VCB module)– Make / Model	
5.16.1	CT Input	
5.16.2	IDMT Setting Range 4 element – Over Current & Earth fault & steps	Overcurrent- Earth Fault- Instantaneous O/C Instantaneous E/F-
5.16.3	Operating Time	Over Current – Curves Instantaneous
5.16.4	Pick up Current	
5.16.5	Resetting Current	
5.16.6	Relay Burden	
5.16.7	Time Accuracy	
5.16.8	Tripping Coil O/P – type & duration	
5.16.9	Fault Current Display	
5.16.10	No of Fault Current Latching with time stamping	
5.16.11	Display Facility / Type	
5.16.12	Operational Indicators	
5.16.13	Potential Free Output Contacts	
5.16.14	Thermal Withstand Capacity of Relay	

Technical Specification of 11 KV Dry type Smart Packaged Substation

5.17	Fault Passage Indicator (for Cable feeder module 1 & 2)	
5.17.1	CBCT	
5.17.1.1	Type	
5.17.1.2	Mounting Arrangement	
5.17.1.3	CT to indicator connection	
5.17.1.4	ID of sensor	
5.17.2	Earth Fault Indicator	Make / Model
5.17.2.1	Sensing Current	
5.17.2.2	Sensing Time	
5.17.2.3	Indication	
5.17.2.3	Reset Time	
5.17.2.4	Resetting Facility	
5.17.2.5	Output Contact	
5.17.2.6	Contact Rating	
5.17.2.7	Aux Power Supply	
5.17.2.8	Degree of Protection	
5.17.2.9	Mounting Arrangement	
5.17.2.10	Ambient Temperature	
5.18	DC charger rating in amps – min 10 Amp Dual	Yes/No
5.18.1	MCB rating at 230V AC input of charger	Amp
5.18.2	MCB rating at 24V DC output of charger	Amp
5.18.3	Charger heat sink temperature rise (max 55 deg C above ambient 40 deg C)	
5.18.4	Voltage variation in 24v Dc output for FRTU	(Max +/-1 V)
5.18.5	Charger with natural cooling (no cooling fans)	Yes/No
5.18.6	Charger tested for input supply voltage regulation test (input variation 150v-250v, output DC voltage variation +/- 1 volt max)	Yes/No
5.18.7	Charger temperature rise test certificate submitted	Yes/No
5.19	DC battery rating in Ah – 26Ah (mini) OR as approved battery sizing during detail engineering ,whichever is higher.	
5.20	DC charger changeover – Diode rating 10A min	Yes/No
5.21	HT Cable termination - 3cX300sqmm AYYF cable– Height of power terminal from gland plate	mm
5.22	Mimic diagram, labels & finish as per specification	Yes / No
5.23.1	Cable termination –	Mm

Technical Specification of 11 KV Dry type Smart Packaged Substation

	Height of power terminal from gland plate	
5.23.2	Torque required for tightening terminal lug	
5.24	Submission of RMU / component catalogue	Yes/No
5.25	Unit price for Conversion kit offered separately for converting the RMU from single cable termination design to double cable termination design	Yes/No
5.26	FRTU Panel	
5.26.1	FRTU	
5.26.1.1	Make & Model No	
5.26.1.2	No of DI Modules	
5.26.1.3	No of DO Modules	
5.26.1.4	No of AI Modules	
5.26.1.5	Make of Protocol converter	
5.26.2	Modem	Ethernet Type
5.26.2.1	Make	
5.26.2.2	Serial port Isolator provided	Yes / No
5.26.2.3	Type – 4G Back compatible to 3G & 2G Refer FRTU Specifications	Yes / No
5.26.3	Interposing relay with freewheeling diode	
5.26.3.1	Make	
5.26.3.2	Capacity	
5.26.3.3	Model	
5.26.4	AC & DC MCB	
5.26.5	Terminal Blocks	
5.26.6	Disconnecting type fuses	
5.26.7	Enclosure	
5.26.7.1	Sheet steel thickness	
5.26.7.2	Painting process	
5.26.7.3	Construction of steel according to IEC 529 , index of protection	
5.26.7.4	Shade	
5.26.7.5	Louvers with filters	
5.26.8	Dimensions & Weight of FRTU	
5.28	Submission of RMU / component catalogue	Yes/No
6.0.0	11kv cable	from RMU to transformer
6.1.0	Cable size 3CX150 sqmm AYFY	Yes/No
6.2.0	Cable rated voltage - 11000v	Yes/No
6.3.0	Cable short circuit current capacity for 1 sec	kA
6.4.0	Type of insulation - XLPE	Yes/No
6.5.0	Outer insulation sheath – PVC with armor	Yes/No

Technical Specification of 11 KV Dry type Smart Packaged Substation

6.6.0	Cable termination type & make		
7.0.0	400/630/1000KVA Cast Resin Transformer		
7.1.0	Make		
7.2.0	Type- Cast Resin Dry Type	Yes / No	
7.3.0	Transformer continuous rating when placed in package substation enclosure	HV winding	LV winding
		KVA	KVA
7.4.0	Rated voltage (kV)	HV winding	LV winding
		11 KV	0.433 KV
7.5.0	Rated current	HV winding	LV winding
		Amps	Amps
7.6.0	Transformer vector group – Dyn11	Yes / No	
7.7.0	Impedance at principal tap rated current and frequency, ohm @130 °C	As per the specification	
7.7.1	Impedance at lowest tap	Ω	
7.7.2	Impedance at highest tap	Ω	
7.8.0	Resistance of the winding at 130°C in ohm	HV winding	LV winding
		Ω	Ω
7.9.0	Zero sequence impedance in ohm	HV winding	LV winding
		Ω	Ω
7.10.0	Guaranteed maximum losses at principal tap full load and 130°C without any positive tolerance, kW		
7.10.1	No load losses (max.)	KW	
7.10.2	Load losses (max.)	KW	
7.10.2	Total losses (max.),	KW	
7.10.4	No load loss at maximum permissible voltage and frequency (approx.),	KW	
7.11.0	Temperature rise over reference ambient		
7.11.1	Winding by resistance: Outside the PSS enclosure / inside the PSS enclosure °C	80°C/ 90°C	
7.11.2	Maximum hot spot temperature, Deg. C	°C	
7.12.0	Efficiency	at 130°C and unity power factor	
7.12.1	at 110% load	%	
7.12.2	at 100% load	%	
7.12.2	at 80% load	%	
7.12.3	at 60% load	%	
7.12.4	at 40% load	%	
7.12.5	at 20% load		
7.13.0	Maximum hot spot temperature, Deg. C	at 130°C and 0.8 power factor lag	
7.13.1	Efficiency	%	

Technical Specification of 11 KV Dry type Smart Packaged Substation

7.13.2	at 110% load	%
7.13.3	at 100% load	%
7.13.4	at 80% load	%
7.13.5	at 60% load	%
7.13.6	at 40% load	%
7.14.0	Maximum efficiency at 130°C	%
7.14.1	% Load and power factor at which it occurs	
7.15.0	Regulation at full load at 130°C	
7.15.1	at unity power factor	
7.15.2	at 0.8 power factor lagging	
7.16.0	Regulation at 110% load at 130° C	
7.16.1	at unity power factor	
7.16.2	at 0.8 power factor lagging	
7.17.0	Core	
7.17.1	Core material grade	Premium grade minimum M3 or better
7.17.2	Thickness of lamination mm	mm
7.17.3	Insulation of lamination	
7.17.4	Design Flux Density at rated condition at principal tap, Tesla- 1.7 Tesla (Max)	
7.17.5	Maximum flux density at 10 % over excitation /overfluxing, Tesla -1.9 Tesla (Max)	
7.17.6	Equivalent cross section area	
7.18.0	Guaranteed No Load current At 100% rated voltage , Amps	
7.18.1	HV	
7.18.2	LV	
7.19.0	Guaranteed No Load current At 110% rated voltage, Amps	
7.19.1	HV	
7.19.2	LV	
7.20.0	Type of Winding	
7.20.1	HV	
7.20.2	LV	
7.20.3	Conductor material	
7.20.4	Current density Amps/sqmm	
	HV winding	
	LV winding	
7.20.5	Gauge/area of cross section of conductor, sqmm	
	HV	
	LV	

Technical Specification of 11 KV Dry type Smart Packaged Substation

7.21.0	Tapping - Off Ckt	Yes / No	
7.21.1	Capacity	Full Capacity	
7.21.2	Range- steps X % variation		
7.21.3	Taps provided on HV winding	Yes / No	
7.21.4	Tap link Current rating , A		
7.22.0	Insulating material and thickness	Material	Thickness
7.22.1	HV Turn		mm
7.22.2	LV Turn		mm
7.22.3	LV to Core		mm
7.22.4	HV to LV		mm
7.23.0	Minimum design clearance, mm		
7.23.1	HV to earth in Air	mm	
7.23.2	LV to earth in Air	mm	
7.23.3	Between HV & LV in Air	mm	
7.23.4	Top winding and yoke	mm	
7.23.5	Bottom winding and yoke	mm	
7.24.0	Bushing / Support Insulator		
7.24.1	Make		
7.24.2	Type		
7.24.3	Reference Standard		
7.24.4	Voltage class, kV		
7.24.5	HV side Bushing / Support insulator		
7.24.6	LV side line and neutral bushing / Support insulator		
7.24.7	Creepage factor for all bushing	mm / KV	
7.24.8	Weight	KG	
7.24.9	HV bushing / Support insulator		
7.24.10	LV line and neutral bushing / Support insulator		
7.24.11	Free space required for bushing / Support insulator removal, mm		
7.24.12	HV bushing / Support insulator		
7.24.13	LV line and neutral bushing / Support insulator		
7.25.0	HV Termination arrangement	Suitable for 3CX150 mm ² AYFY 11KV	
7.25.1	Phase to phase clearance	mm	
7.25.2	Phase to earth clearance	mm	
7.25.3	HV side bus bar size		
7.25.4	HV Termination height	mm	
7.26.0	L.V termination arrangement	Suitable to 100x12 mm for phase & neutral	
7.26.1	Phase to phase clearance,	25 mm minimum	

Technical Specification of 11 KV Dry type Smart Packaged Substation

7.26.2	Phase to earth clearance ,	25 mm minimum
7.26.3	LV side bus bar size	
7.26.4	LV Termination Height	mm
7.27.0	Current Transformer on LV phases	
7.27.1	Type	
7.27.2	Make	
7.27.3	Reference Standard	
7.27.4	CT Ratio	
7.27.5	Burden, VA	
7.27.6	Class of Accuracy	
7.28.0	WT scanner terminal box size	
7.29.0	Alarm and Trip contact ratings of protective devices	
7.29.1	Rated / making/ breaking currents , Amp @ Voltage for	
7.29.2	Winding temperature scanner	
7.30.0	Fittings and Accessories as per Cl. 8.9 provided	(YES / NO)
7.31.0	Over all transformer dimensions	
7.31.1	Length	mm
7.31.2	Width	mm
7.31.3	Height	mm
7.32.0	Weight data	
7.32.1	Core	KG
7.32.2	Frame parts, kG	KG
7.32.3	Core and frame, kG	KG
7.32.4	Total Winding, kG	KG
7.32.5	Core , Frame, Winding, kG	KG
7.32.6	Enclosure, kG	KG
7.32.7	Total Transport weight of the transformer, kG	KG
7.32.8	Total weight of the transformer with all accessories	KG
7.33.0	Shipping Data	
7.33.0	Weight of heaviest package, kG	KG
7.33.0	Dimensions of the largest package (L x B x H)	mm
7.34.0	Surge Arrestor requirement	
7.34.1	Type	
7.34.2	System Voltage , kV rms	
7.34.3	Rated Voltage of Arrestor, kV rms	
7.34.4	Continuous operating voltage , kV rms	
7.34.5	Maximum Continuous operating voltage, kV	

Technical Specification of 11 KV Dry type Smart Packaged Substation

	rms	
7.34.6	Nominal Discharge Current, kA peak	
7.34.7	Energy Absorption Capability, kJ/kV	
7.34.8	Creepage factor	
7.34.9	Reference std	
7.35.0	WTI Scanner Details	
7.35.1	Make	
7.35.2	Model no.	
7.35.3	No of Channel / Input	
7.35.4	Manual submitted	
8.0.0	Low voltage bus bar system	To connect transformer LV side to ACB & to MCCB
8.1.0	Bus bar material tinned copper	Yes / No
8.2.0	Bus bar size	sqmm
8.3.0	Bus bar continuous current rating	Amp
8.4.0	Bus bar insulator voltage class	kV
8.5.0	Bus bar droppers size from ACB to MCCB (50X10 tinned copper)	
8.6.0	Maximum bus bar temperature rise	
9.0.0	ACB, MCCB	As per IS 13947
9.1.0	ACB make	
9.1.1	ACB rated voltage 415v +/- 10%	
9.1.2	ACB type 4 pole with isolable neutral link	Yes / No
9.1.3	ACB continuous current capacity at 415v 50Hz, at 50 deg C	amp
9.1.4	ACB short circuit breaking capacity $I_{cs} = I_{cu} = 50kA$ minimum	kA
9.1.5	ACB SC making current capacity 100kAp	kA peak
9.1.6	ACB short time current withstand capacity for 1 sec ($I_{cw} = 50kA$)	kA
9.1.7	ACB rated impulse withstand voltage for main & aux circuit in kv	
9.1.8	ACB closing time in ms	
9.1.9	ACB opening time in ms	
9.1.10	Guaranteed number of close & open operations at no load	
9.1.11	Guaranteed number of close & open operations at rated load	
9.1.12	ACB dimensions	
9.1.13	ACB operating mechanism -Trip free, anti pumping type, manual as well as motor	Yes / No
9.1.14	Spring charging motor supply	volt

Technical Specification of 11 KV Dry type Smart Packaged Substation

9.1.15	Close & trip coil supply	volt
9.1.16	ACB utilization category -B as per IS	
9.1.17	ACB indications - ON, OFF & TRIP	
9.1.18	ACB operation - manual - ON, OFF by push buttons	
9.1.19	ACB operation – electrical - ON, OFF by TNC switch	
9.1.20	L/R switch for remote operation	Yes / No
9.1.21	ACB overload, short circuit & earth fault protection - By static or micro processor based releases	
9.1.22	Inbuilt CT burden, ration & class	
9.1.23	Overload release setting range	
9.1.24	Short circuit release setting range	
9.1.25	Earth fault release setting range	
9.2.0	MCCB make	
9.2.1	MCCB type -4 pole, double break / pole	Yes / No
9.2.2	MCCB - On & OFF by Manual handle and electrical	Yes / No
9.2.3	L/R switch for remote operation	
9.2.4	MCCB Neutral connection - Fully isolable link sized for rated current	
9.2.5	MCCB rated voltage 415v +/- 10% at 50Hz	
9.2.6	MCCB rated continuous current (630/1250 As per the type of PSS enquiry)	
9.2.7	MCCB 3 ph short circuit breaking capacity Ics = Icu =35kA	
9.2.8	MCCB 3 ph short circuit withstand capacity, Icw =8kA for 1 sec	
9.2.9	MCCB SC making current capacity	
9.2.10	MCCB rated insulation level	
9.2.11	MCCB mechanical & electrical endurance as per IS 13947 / IEC	
9.2.12	MCCB category of duty - B as per IS / IEC 947	Yes / No
9.2.13	MCCB indications -ON, OFF ,TR & L/R switch	
9.2.14	MCCB protection - Microprocessor release + earth fault	
9.3.0	Connection to ACB main bus by Cu bar with double PVC insulation	Yes / No
9.3.1	630 amp MCCB	
9.4.0	Connection to outgoing cables by bus bar terminals suitable for 2x4CX300sqmm AYFY	

Technical Specification of 11 KV Dry type Smart Packaged Substation

	1100 volt grade cable	
9.4.1	No.of LT Outgoings as per the PSS type	
9.4.2	Only for Type 5 & 6- Provisions in LT panel to increase LT outgoing by 02 no's by adding MCCB's in future.	(YES/ NO)
10.0.0	APFC system	
10.1.0	Rating of APFC system	KVAR
10.2.0	Rated voltage & frequency	Volts at 50Hz
10.3.0	Rated line current of APFC system	Amp
10.4.0	Rated capacitance	micro Farad
10.5.0	Capacitor steps – Type I: 12x25KVAR? Type II: 8 X 25 KVAR?	Yes / No
10.6.0	Rated current of each 25KVAR unit	Yes / No
10.7.0	Rated capacitance – 25KVAR unit	micro Farad
10.8.0	Three phase connection – star / delta	
10.9.0	Capacitor dielectric type –	APP / MPP
10.10.0	No of series group / capacitor unit	
10.11.0	No. of parallel elements / series group	
10.12.0	Thickness of PP film in micron	
10.13.0	Thickness of Al foil in micron	
10.14.0	No. of PP film layers	
10.15.0	Maximum voltage stress per each PP film layer	
10.16.0	Discharge device material	
10.17.0	Capacitor tank steel thickness	mm
10.18.0	Capacitor unit dimension (L x D x H)	
10.19.0	APFC dimensions in mm (L x D x H)	
10.20.0	APFC system weight in kg	
10.21.0	Heat generated by APFC in Kw with all capacitor steps ON	
10.22.0	Operation with over voltage 115% of rated voltage for 12 hours in a day	
10.23.0	Operation with harmonic distortion THD 5% voltage & current	
10.24.0	Maximum permissible over current of	
10.25.0	1.3 times rated current continuous	
10.26.0	Dielectric loss less than 0.2w / KVAR	
10.27.0	Guaranteed minimum capacitor switching operations (ON/OFF) per year	
10.28.0	Maximum temperature rise above ambient of 45 Deg C	Deg C

Technical Specification of 11 KV Dry type Smart Packaged Substation

10.29.0	Residual voltage after de-energization & at 60 seconds	
10.30.0	Design life of capacitor unit	
10.31.0	APFC panel insulation level	
10.32.0	1 minute power frequency withstand	KV
10.33.0	Impulse withstand voltage	KVp
10.34.0	Main bus bar material / size (sqmm)	
10.35.0	Main bus bar rated current	
10.36.0	Main bus bar short time withstand	
10.37.0	CT make & accuracy class	
10.38.0	CT ratio & burden (VA)	
10.39.0	APFC relay make / type	
10.40.0	APFC relay catalogue enclosed?	Yes / No
10.41.0	Data logger make / type	
10.42.0	Data logger catalogue enclosed?	Yes / No
10.43.0	AC contactor make	
10.44.0	AC contactor rating	Amp
10.45.0	AC contactor utilization category as per IS	
10.46.0	100amp MCCB make	
10.47.0	100amp MCCB current breaking capacity $I_{cs}=I_{cu}=35kA$	
10.48.0	Copper wire size from MCCB to contactor & capacitor – 35sqmm Cu	
11.0.0	Energy meter box as per specification provided?	Yes / No
12.0	Enclosure for package substation	
12.1	Service conditions for outdoor use	Yes / No
12.2	Material for enclosure – Galvanised Sheet steel 2.5mm thick CRCA for all side doors, covers with painting	Yes / No
12.3	Enclosure construction -Frame supported construction with all doors, covers welded with steel channel ribs at every 1000mm minimum	Yes / No
12.4	Lifting lugs for site handling / lifting by crane - qty	
12.5	Doors for RMU compartment, Transformer compartment & LV compartment with anti theft hinge minimum 3 nos., with lockable handle & with padlocking facility	Yes / No
12.6	Top & other side walls of enclosure welded sheet metal	
12.7	Removable canopy above top cover -2.5mm thick sheet metal with 10° slope	Yes / No
12.8	Enclosure integral steel base frame 'I'	

Technical Specification of 11 KV Dry type Smart Packaged Substation

	section size	
12.9	Base frame bottom support pads for fixing by bolt to foundation - minimum six numbers to rest on foundation	Yes / No
12.10	Enclosure compartments -separate compartments for RMU, transformer & LV switchgear/APFC	Yes / No
12.11	Separation between RMU & transformer compartment by sheet steel 2.5mm thick	Yes / No
12.12	Separation between transformer compartment & LV compartment by sheet steel 2.5mm thick	Yes / No
12.13	Degree of ingress protection against solids & water as per IS12063	
12.13.1	IP53 for RMU compartment	
12.13.2	IP23 for transformer compartment	
12.13.3	IP33 for LV compartment	
12.14	Louvers on side covers of transformer compartment & side walls of LV compartment with steel wire mesh welded from inside so as to meet IP requirement as above	Yes / No
12.15	Louver area on cover / side wall -1500mm height x 1500mm minimum	
12.16	Exhaust fans mounted for APFC system to discharge air in transformer compartment - Controlled by SPMCB & thermostat to operate above 35 deg C, 2x150CFM, 1 ph 230v 50Hz	
12.17	Gland plate for RMU compartment - 2.5mm thick MS plate suitable for 3x3c300sqmm AYFY 11kv cable	
12.18	Gland plate for LV compartment -2.5mm thick MS plate suitable for 10x4c400sqmm cable + 10x7c2.5sqmm cable	
12.19	Class of enclosure as per IEC 62271-202 = 10K	Yes / No
12.20	Overall dimensions of package substation (LxWxH)	In mm
12.21	Overall weight of package substation	Kg
13.0	Enclosure earthing & illumination	
13.1	Two earth bus connection brought out of package substation enclosure to earth pad for connection to earth pit -Two earth pads for RMU, transformer & LV compartment each -One earth pads for transformer neutral	
13.2	Earth bus size 50X 6 mm GI flat	

Technical Specification of 11 KV Dry type Smart Packaged Substation

13.3	Earth bus fault current capacity 26.3kA for 1 sec	
13.4	Earth connection of all covers, doors & structural parts to GI bus by metallic jumper connection	Yes / No
13.5	Earth connection of RMU, ACB & transformer body parts to GI bus by two numbers of 50x6mm GI flat per equipment	
13.6	Earth bus identification shown by letter 'E'	Yes / No
13.7	RMU, transformer & LV Compartment illumination by 36w CFL fixture controlled through SPMCB & door limit switch	
13.8	RMU, transformer & LV compartment power socket - 5/15amp 3 pin socket controlled through 15 amp SPMCB	
13.9	Paint shade external for enclosure	
13.10	Paint shade internal for enclosure	
13.11	Paint material & thickness	
13.12	Name plate & labels as per specification provided?	Yes / No
13.13	Smoke Detector	Yes / No
13.13.1	Make	
13.13.2	No Of Aux Contacts	
13.14	Hooter	Yes / No
14.0	Type test report submitted with GTP for RMU, transformer, ACB, MCCB, APFC system?	Yes / No
14.1	GA drawing of package substation submitted with GTP?	Yes / No
14.2	Bill of material submitted with GTP?	Yes / No
14.3	Clause wise deviation to technical specification submitted?	Yes / No

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of bidder	
Name of contact person	
Telephone no & email id	

Annexure D Recommended spares (Data by supplier)

List of recommended spares as following

Sr No	Description of spare part	Unit	Quantity
1	Battery Charger set for RMU – Dual RMU	Nos	limited to 10% of order

Technical Specification of 11 KV Dry type Smart Packaged Substation

			quantity of PSS
2	FPI	Nos	limited to 10% of order quantity of PSS
3	VPIS	Nos	limited to 10% of order quantity of PSS
4	Manometer with pressure indicator switch	Nos	limited to 10% of order quantity of PSS
5	Motor Kit for LBS	Nos	limited to 10% of order quantity of PSS
6	Self Powered Relay	Nos	limited to 10% of order quantity of PSS
7	Aux Relays	Nos	limited to 10% of order quantity of PSS
8	Aux Switches	Nos	limited to 10% of order quantity of PSS
9	Modem with antenna	Nos	limited to 10% of order quantity of PSS
10	CPU with Power Supply Card, I/O Adapter Board, rack, relay board etc	Nos	limited to 10% of order quantity of PSS
11	DO Card – 8 channel	Nos	limited to 10% of order quantity of PSS
12	DI Card -16 channel	Nos	limited to 10% of order quantity of PSS
13	AI Card- 6 channel	Nos	limited to 10% of order quantity of PSS
14	Voltage/current transducer	Nos	limited to 10% of order quantity of PSS
15	BHMu Module	Nos	limited to 10% of order quantity of PSS
16	Battery	Nos	limited to 10% of order quantity of PSS
17	Interlock card	Nos	limited to 10% of order quantity of PSS
18	ACB Release	Nos	limited to 10% of order quantity of PSS
19	MCCB Release	Nos	limited to 10% of order quantity of MCCB

Any additional spares, if required shall be separately listed by bidder. Unit price for each spare item to be provided.

Annexure E Specification of 4G Ethernet Modem for FRTU

1. **Module:** 4G with backward compatible 3G /GSM GPRS
 - a) FDD LTE: B1 (1920-1980/2110-2170) / B3 (1710-1785/1805-1880) / B8 (880-915/925-960) / B20 (800) MHz

Technical Specification of 11 KV Dry type Smart Packaged Substation

- b) TDD LTE: B38 (2570-2620) / B39 (1880-1920) / B40 (2300-2400) / B41 (2496-2690)
 - c) HSPA / UMTS: B1 (2100) / B8 (900) /800/850/1900 MHz
 - d) GSM: 900/1800/ MHz Class 10
2. WAN Protocol: PPP/IPCP over Asynchronous HDLC with PAP/CHAP Authentication.
 3. Modem shall be compatible with IPv4 & IPv6 scheme
 4. Console Interface: RS232 on RJ45 connector.
 5. LAN Interface: 10/100 Base-T complying to IEEE 802.3 / ANSI 8802-3 on RJ45 connector.
 6. Support for SCADA Protocols in transparent pass through mode.
 7. Network Protocols: PPP, IPCP, PAP, CHAP, ARP, IP, ICMP, TCP, UDP, IPSEC, SNTP, TFTP.
 8. Support for NAT and Port forwarding.
 9. Management: Serial, HTTP, Telnet & via SMS, Port Mapping, Event Log & Upload. Firmware Upgrade
 10. Modem shall have self healing capability to recover from dead lock situation.
 11. Status Monitoring: ICMP to 4 destinations for Keep Alive & Self Heal. Signal Strength & LEDs.
 12. SIM Interface: External with locking provision.
 13. AT Commands Interface: Supporting AT commands for dialing from FRTU through RS-232 serial port to modem.
 14. Communication Interface: Remote management features like telnet & remote download facility
 15. LED Indications: Power ON, Network–Signal strength, SIM availability, Ethernet link
 16. Connectors: RJ45 Ethernet Port, SIM Card Holder, DC power connector, SMA Antenna connector
 17. Power Supply: 24V DC (with reverse current protection) with 2 numbers Terminal Block without adapter.
 18. Enclosure: Metallic Extrusion
 19. Mounting: DIN Rail Mounting
 20. Temperature: Operating (-10 to 60 Degree Centigrade), 95% Humidity

Technical Specification of 11 KV Dry type Smart Packaged Substation

21. Antenna: High Gain Antenna with SMA connector.
22. Accessories:
 - a) 1 Meter cable for connecting to external DC power source (24 V)
 - b) 1 Meter Standard Ethernet (Straight) data cable
 - c) Standard Console cable for diagnostic port of Modem
 - d) 1 Meter serial cable for dialing modem from FRTU
23. Certification:
 - a) Conducted Immunity : IEC61000-4-6
Measure emission of the device (referenced to earth) on power mains and to compare them with specified limits to ascertain that the device will not disturb other equipments
Frequency : 0.15MHz to 80MHz
Modulation : 80% AM at 1 KHz
Test Voltage : 3V
 - b) Electrostatic Discharge (ESD):IEC61000-4-2
Check immunity against discharge of static electricity that may occur when a charged operator touches the device
Contact Discharge : 4KV
Air Discharge : 8KV
No of Discharge : 10 at pre-selected spots
Positive & Negative Polarity
 - c) EN55022 CLASS B
Immunity characteristics of the device when subjected to continuous conducted noise
Conducted Emission : Frequency - 150 KHz - 30 MHz
Radiation Emission : Frequency – 30 MHz - 1000 MHz
24. Warranty period: 5 years

Annexure F Specification for FRTU

1.0.0 Scope of Supply & Work

This document defines the scope of supply, including spares and scope of work of installation, testing & commissioning including interfacing/ integration with RMU, DT

Technical Specification of 11 KV Dry type Smart Packaged Substation

monitoring, ACB, LT panel, APFC, fire protection system and wireless sensors for acquisition of real time status and control functions associated with the same.

1.0.1 Scope of Supply

The specification covers design, engineering, manufacturing, factory testing, packaging and delivery of FRTU for complete PSS automation. The system should be completely wired up with all the required accessories to make the system capable of SCADA data acquisition and controlling of all components of PSS system. The scope of supply also covers the required spares that are to be supplied along with the system as per detail given under Spares, Accessories & Tools, clause 1.6.0.

1.0.2 Scope of Work

- a) The specification covers site survey, engineering, installation, testing and commissioning of FRTU system, to make the system capable of SCADA data acquisition and controlling of complete accessories of PSS system at site.
- b) The scope also covers the interfacing/ inter-connecting of FRTU with RMU, DT monitoring, ACB, LT panel, APFC and fire protection system used in PSS. The details are as per the clause 1.5.3 SAT is also included in the scope of work as defined in the document.
- c) Any firmware up-gradation meets the protocol requirement of MCC/ BCC communication protocol (IEC 60870-5-104) to be made available by the supplier engineer.
- d) End to end testing from MCC/ BCC to be carried out in presence of the supplier engineer. If any change is required for operation and monitoring of the RMU system to be made by the bidder without any price implication to owner.

1.1.0 Applicable Standards

FRTU shall comply with the requirements stated in the latest editions of the following recommendations, standard and specifications:

- a) International Electro technical Commission (IEC),
- b) Institute of Electrical and Electronics Engineering (IEEE),
- c) American National Standards Institute (ANSI),
- d) National Equipment Manufacturers Association (NEMA) standards

1.2.0 Technical Requirements**1.2.1 FRTU Functionalities:**

FRTU shall contain all the functions required for SCADA data acquisition and controlling of the complete accessories used in PSS.

- a) It should be capable of handling minimum 750 DP(data points) respectively.
- b) FRTU shall have serial port, configurable RS485/RS232 for MODBUS serial protocol and serial IEC 103.
- c) FRTU shall have TCP/IP port for Modbus TCP/IP and IEC 61850 communication.
- d) Ethernet and serial ports for interfacing with IEC 60870-5-104 protocol to communicate with MCC and BCC.

Technical Specification of 11 KV Dry type Smart Packaged Substation

- e) Ethernet port should be configured for IEC 60870-5-104 protocol as a slave.
- f) Built in optical couplers to isolate the field signals and field communication channels.
- g) Support for battery availability and battery health check feature.
- h) Suitable provision in FRTU to supervise and prevent accidental serious discharge of battery.
- i) FRTU shall support event storage capacity as measurand events (10,000), system events (1,000), alarms (1,000) and normal events (5,000). Events should be stored on the basis of FIFO.
- j) Local viewing of all events shall be possible.
- k) FRTU DI/ DO and AI communication channel capacity should be such that it can fulfill automation of complete PSS system.
- l) FRTU shall support web based monitoring from remote as well as local.
- m) All DI/ DO and AI communication channels should have individual LED indications.
- n) FRTU shall support feature of remote configuration as well as diagnosis.
- o) FRTU system shall support communication with 4 Nos. master stations simultaneously.
- p) FRTU shall support hot swap feature.
- q) As the SCADA/ DMS system will use public domain such as RF/ GPRS etc., therefore it is mandatory to guard the data/ equipment from intrusion/ damage/ breach of security & shall have SSL VPN based security.
- r) FRTU shall support SNMP (Simple Network Management Protocol).
- s) Capability of time synchronization with GPS receiver and SCADA MCC/ BCC.
- t) FRTU system should be modular and expandable.
- u) FRTU should be capable to store the configuration programme in detachable flash memory card.
- v) FRTU shall have console port with console cable.

1.2.2 CPU Module:

- a) 32 bit ARM core CPU, operating @ minimum 450 MHz.
- b) Internal memory minimum 128MB and RAM 64MB, suitable for handling the PSS data acquisition and controlling the RMU, DT monitoring, ACB, LT panel, APFC and used in PSS.
- c) RTC- Real Time Clock
- d) Display to show the error code and status of the processor.

1.2.3 Communication Ports:

- a) FRTU shall have the following port for communications

S. No	Communication With	Communication Protocol	Physical Layer		Connecting Cable	Required Qty
			Interface	Physical Port		
1	Master station(s)	IEC 60870-5-104	Ethernet	RJ45	CAT VI	1
2	LT panel/Transformer	IEC 61850	Ethernet	RJ45	CAT VI	1

	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

S. No	Communication With	Communication Protocol	Physical Layer		Connecting Cable	Required Qty
			Interface	Physical Port		
3	Local Configuration	—	RS232	USB/DB9	Console Cable	1
4	Protection relays	IEC 103	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
5	MFM	MODBUS	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
6	LT panel/Transformer	MODBUS	RS485	Terminal Block	Shielded RS485 Twisted Copper Cable	1
Total						6

- b) Each Serial port should be capable of handling minimum 10 Nos. devices on the network with same communication settings.
- c) The settings of Ethernet and serial ports should be programmable.
- d) System should have the capability to increase TCP/ IP Ethernet and serial ports for communication by addition of communication modules.

1.2.4 MCC/ BCC Communication Protocol:

- a) FRTU system shall be configured to communicate with MCC/ BCC simultaneously on IEC 60870-5-104 protocol.
- b) FRTU shall support periodic reporting of analog data that shall be configurable upto 1 hour polling delay.
- c) Digital status data shall have higher priorities as compared to the analog data.
- d) Dead band for reporting analog values shall be programmable for the full scale value.

1.2.5 Communication between FRTU, MFMs and Protection Relays:

- a) FRTU can acquire analog values from MFMs and protection relay through RS485 serial communication port using serial MODBUS and serial IEC 103 protocol respectively.
- b) Communication of ACB/MCCBs on Modbus TCP/IP / IEC 61850 protocol.
- c) MFM and protection relay will act as slaves to the FRTU. The FRTU shall transmit these analog values to master station by using IEC 60870-5-104 protocol.
- d) To protect the serial communication port(s), optical isolation is required which is mandatory to avoid damage to FRTU channels.

1.2.7 Digital Input Module:

Technical Specification of 11 KV Dry type Smart Packaged Substation

- a) FRTU shall be capable of accepting isolated potential free contact status inputs.
- b) FRTU shall provide necessary sensing voltage, current, optical isolation for each status input.
- c) FRTU shall be capable to configure re-bounce filtering for each input.
- d) The sensing voltage of input module should be 24VDC.
- e) The FRTU shall accept two types of status input: Single point and double point.
- f) Single point status input represented by 1 Bit in the protocol message whereas double point status input represented by 2 Bits in the protocol message.
- g) FRTU configuration software shall have the capability to invert the DI signal value required in the configuration.
- h) There shall be channel wise visual indication of all DIs modules installed in the FRTU panel for troubleshooting problems.
- i) Digital Input module should have hot swap compliance.

1.2.8 Digital Output Module:

- a) FRTU shall provide the capability for master station to select and change the state of Digital output points.
- b) These control outputs shall be used to control power system devices such as circuit breakers, isolators and other two state devices which shall be supported by FRTU.
- c) FRTU should also support single command output to reset FPI operation.
- d) The output contact shall be rated to operate RMU motor, ACB, LT MCCB, APFC and other signals used in PSS.
- e) In case control output module of FRTU does not provide potential free control output of required rating then separate control output relays shall be provided.
- f) There shall be channel wise visual indication of DOs available in FRTU panel and command issued for any digital channel for troubleshooting the problem.
- g) DO modules should have the capability to configure for a single as well as double command output.
- h) Digital Output module should have hot swap compliance.

1.2.9 Analog Module:

- a) FRTU analog module should be capable of connecting universal type of analog value ($\pm 20\text{mA}$, $\pm 10\text{V}$).
- b) FRTU should have the capability to configure the analog channel for any value of universal analog input through the FRTU configuration software.
- c) Analog module should be 16 Bit, bipolar.
- d) Analog module should have hot swap compliance.
- e) There shall be channel wise visual indication of AIs card available in FRTU panel.

1.2.10 Interfacing of FRTU system with all the components used in PSS

- a) RMU, DT monitoring, LT panel, APFC, wireless sensor signal connections should be terminated in bay wise and extension of the signals from the each equipment TB (Terminal Block) to FRTU TB through cable connectors, bay wise.
- b) Separate multi-core cable for Interconnection of FRTU with RMU, LT panel, DT monitoring, APFC, Sensors with suitable size and length.

Technical Specification of 11 KV Dry type Smart Packaged Substation

- c) Male and female connector with cable for interconnection should be provided in FRTU panel.
- d) Use 2.5/ 4 sqmm multi-strand copper wire/ cable of suitable length for connecting the battery bank and battery charger placed in the in FRTU cabinet.
- e) Supply and dressing of inter-connecting cables through suitable size PVC duct are in the supplier scope.
- f) Interconnections should have proper lugs, ferrules etc.

1.2.11 Communication Package:

- a) Communication media should support GSM/ GPRS.
- b) 1 no. of Ethernet, 4G/3G GPRS gateway with 1 ethernet 10/ 100 BaseT port.
- c) 3G GPRS Gateway, RF should support multi NAT configuration.
- d) Driver software
- e) Gateway shall be remotely manageable and configurable.
- f) Antenna with 5m coaxial pig tail (extension of antenna cable should be possible).
- g) Rated voltage: 9- 48 VDC.
- h) Cable to connect the communication module of FRTU.

1.2.12 Troubleshooting:

- a) FRTU should be configurable using web based configuration and maintenance tool.
- b) FRTU shall have proper diagnosis tool for troubleshooting the failures related to the following from remotely as well as locally. Supplier shall consider all required configuration and diagnosis cable and software with each supplied FRTU with license if any.
- c) Communication of FRTU with master
- d) Communication of MFM with FRTU
- e) Communication of DI/ DO/AI
- f) Communication with Protection Relay

1.2.13 Programmable Logic Control (PLC):

- a) FRTU shall be provided with the PLC license.
- b) FRTU should have the functionality of logic development and perform the task using its own CPU.
- c) FRTU should have the capability to run more than one PLC tasks at a time.

1.2.14 Cyber Security:

The FRTU shall support the advanced cyber security standard ISO 27002 2005 (previously known as ISO IEC 17799 2005), NERC CIP-009-1 and ISA-99.02.01[5]-[7].

FRTU should have following features:

- a) User level configuration
- b) User wise authentication like system admin, configuration admin, control, operator.
- c) Disabling the DNS

Technical Specification of 11 KV Dry type Smart Packaged Substation

- d) Disabling, enabling & configuration of TCP/ IP and UDP ports.
- e) Door lock alarm integration with FRTU.

1.3.0 General Construction of Enclosure:

- a) FRTU system housed in suitably sized panel, fabricate steel plate with mini 2mm thick frame and 2.0 mm thick CRCA sheet with seven tank process for indoor and for outdoor of protection mini IP 55 with safety lock of good quality. the cabinet shall have adequate space for installation of other hardware's like modem, battery charger and battery as well as shall have at least 30% spare space.
- b) It is suitable class of IP 55 protection as per indoor and outdoor applications.
- c) Enclosure fabricated with double door, swing frame type with proper pad lock arrangement to avert the theft of the equipment fitted inside.
- d) The component and accessories to be mounted on mounting plate of FRTU.
- e) Enclosure should have proper illumination, , universal type socket and laptop stand, Drawing pocket etc

1.4.0 FRTU Power Supply

- a) Power supply for FRTU shall be on 24V DC system which would be made wired from batteries housed in RMU to battery chargers in FRTU cabinet.
- b) The main DC circuits shall be protected by incoming circuit breakers. Each circuit shall be tapped through single pole MCBs so as to provide an individual DC feed to each of the I/O modules, modems and protocol converters. Contractor shall provide maximum power consumption data of each of the type of FRTU. To protect the batteries from the theft the battery in RMU compartment should have separate pad lock arrangement.
- c) Power supply system should have redundant battery charger to provide the supply to FRTU system as well as to charge the battery.
- d) Pluggable Surge Protection Device in accordance with IEC 61643 with KEMA & UL approval must be installed at the incoming power supply of FRTU.
- e) DIN Rail Mounted Suitable Surge Protection must be installed on all communication lines (Ethernet/RS 485)

1.5.0 FRTU Type and Routine Tests**1.5.1 Type Tests**

The FRTU's shall have passed type tests carried out by government accredited labs and in accordance with IEC 255-4, 255-5, 255-6, 801-2, and 801-3 to demonstrate that the FRTU's comply with the ratings stated in these standards. As a minimum, certificates for the following type tests shall be furnished:

- a) Dielectric test
- b) Impulse voltage withstand test
- c) High frequency disturbance test
- d) Thermal requirement test
- e) Mechanical requirement test

Technical Specification of 11 KV Dry type Smart Packaged Substation

- f) Limiting dynamic value test
- g) Contact performance test
- h) Electromagnetic radiation susceptibility test
- i) Electrostatic discharge susceptibility test

1.5.2 Routine Tests

The FRTU's shall pass the Manufacturer's standard routine tests in accordance with the referenced standards.

In addition to the tests described in the IEC standards, the routine tests and test report of the FRTU's shall include the following:

- a) Visual tests to confirm that construction and sizing requirements have been met.
- b) Rigorous testing of each input and output function of the FRTU's. This shall include the fault detection and the disturbance data storage functions as well as the operation and performance of the FRTU time and date facilities.
- c) Verification of the use of the FRTU test equipment for maintenance and testing.
- d) Verification of the ability to download parameters and configuration data from the SCADA/DMS master station.
- e) Verification that FRTU software and firmware support FRTU sizing and expansion requirements.
- f) Verification of successful communications (i.e. protocols) at all the required data rates.
- g) Testing for secure operation, including verification that: a) Communication errors are detected. b) SCBO procedures are properly performed for control outputs. c) No erroneous control operation occurs and no incorrect data is generated when power is turned on or off or when operating on low battery voltage.

1.5.3 SAT

This document exclusively covers the SAT for FRTU system.

After the successful commissioning and testing of the FRTU system and liquidation of all punch points, the system will be put on continuous running mode for a cycle of minimum thirty (30) days after clearance on punch-points. During this period, if the FRTUs performance due to configuration and/ or hardware does not meet the criteria as per Technical Requirements of this document, the cycle will be reset.

During the cycle, availability and operational efficacy in regard of the supplied FRTU system will be checked and after successful validation, SAT will be concluded.

SAT will include the validation of the following:

- a) Network
- b) FRTU availability and operational efficacy
- c) Validation of SOE
- d) Indication, Command and Measured data

BYPL reserves the right to financially penalize the supplier on failure of SAT as per the technical and tender document.

1.6.0 Spares, Accessories & Tools:

- a) Bidder should provide minimum 10% spare of each and every equipments and parts of the equipment that will be recommended by the bidder for 5 years for trouble free operations.
- b) The recommended spares of FRTU and accessories to be approved by the engineering in-charge of SCADA- DMS.
- c) The cost of spares is part of the tender and should not be considered separately.
- d) All software license shall be provided for programing, configuration, troubleshooting and diagnosis shall not be hardware/Machine specific. In case software's are machine or hardware specific mini two numbers of such software shall be supplied.
- e) The bidder shall provide all license software package (system/application/antivirus) required by the system for meeting the intent, functional, parametric and performance requirement of the specification. As a customer support, the bidder shall periodically inform and upgrade the provided software till completion of warranty period.

1.7.0 Software / Firmware

The term software is used in this Technical Specification to mean software or software implemented through firmware. All software shall be implemented according to the Contractor's latest established design and coding standards. Complete and comprehensive documentation shall be provided for all software. Contractor should provide windows based software as it is preferred for its user friendliness.

1.7.1 General

- a) A real-time non-proprietary operating system that is capable of managing the FRTU applications shall be provided.
- b) This software shall provide automatic restart of the FRTU upon power restoration, memory parity errors, hardware failures, and manual request. The software shall initialize the FRTU and begin execution of the FRTU functions without intervention by the SCADA/DMS master station. All restarts shall be reported to the SCADA/DMS.
- c) The software shall be prepared in a high level language and shall be documented in detail. No separate licensing charges or agreements shall attach to the FRTU software or its underlying operating system.
- d) In order to easily support the system under continuously changing site conditions all protocol, configuration, and application data must be contained in easily programmable non-volatile memory such as Flash EPROM.
- e) The FRTU design shall be independent of any communication protocol that would impose restrictions on the flexibility or functionality of the FRTU. Protocol changes shall be accomplished by software/firmware changes only.

1.7.2 Diagnostic Software

Technical Specification of 11 KV Dry type Smart Packaged Substation

Software shall be provided to continuously monitor operation of the FRTU and report FRTU hardware errors to the SCADA/DMS. The software shall check for memory, processor, and input/output errors and failures. It is desirable that internal diagnostics be sufficiently detailed to detect malfunctions to the level of the smallest replaceable component.

The FRTU shall facilitate isolation and correction of all failures and shall include features that promote rapid fault isolation and component replacement. All functional module nodes shall be designed with integrated on-line diagnostic functions. The results of these diagnostics shall be reported to the central processing module. The central module shall store this information and report it to the SCADA/DMS as permitted by the protocol. FRTU shall be able to access from remote (BCC/MCC) for down loading configuration.

1.8.0 Service Life and Warranty Support

Service Life:

BYPL prefers that the major equipments of FRTU system shall be capable of complying with this standard, including performing its intended purpose, for a minimum of 5 years from the date of supply.

The supplier shall provide a service support letter containing:

- a) The date at which the product was released for sale.
- b) The anticipated date at which the product will be withdrawn from sale, but support will continue to be supplied.
- c) The anticipated date of when the product support will be withdrawn i.e. spares will no longer be available and technical support will no longer be provided.

1.9.0 Trainings & Hands-on

The supplier personnel who are experienced instructors and who speak understandable English shall conduct training. The supplier shall arrange on its own cost all hardware training platform required for successful training and understanding at BYPLs works. The supplier shall provide all necessary training material. Each trainee shall receive individual copies of all technical manuals and all other documents used for training. These materials shall be sent to BYPL at least one (1) months before the scheduled commencement of the particular training course. Class materials, including the documents sent before the training courses as well as class handouts, shall become the property of BYPL. BYPL reserves the right to copy such materials, but for in-house training and use only. Hands-on training shall utilize equipment identical to that being supplied to BYPL. The schedule, location, and detailed contents of each course will be finalized during BYPL and supplier's discussions. If the supplier has utilized 3rd party equipment or outsourced work to a 3rd party then experienced instructors of the 3rd party are required to be part of the training sessions.

1.9.1 FRTU System Hardware Course

A computer system hardware course shall be offered, but at the system level. The training course shall be designed to give BYPL hardware personnel sufficient knowledge of the overall design and operation of the system, so that they can correct obvious problems, configure the hardware, perform preventive maintenance, run diagnostic programs, and communicate with contract maintenance personnel. The following shall be covered:

Technical Specification of 11 KV Dry type Smart Packaged Substation

- a) System hardware design architecture overview: Configuration of the system hardware.
- b) Equipment Maintenance: Basic theory of operation, maintenance techniques and diagnostic procedures for each element of the computer system, e.g., processors, auxiliary memories, Ethernet, routers and printers. Configuration of all the hardware equipment.
- c) System Expansion: Techniques and procedures to expand and add equipment such as loggers, monitors and communication channels.
- d) System Maintenance: Theory of operation, maintenance techniques and practices, diagnostic procedures and (where applicable) expansion techniques and procedures. Classes shall include hands-on training for the specific subsystems that are part of BYPLs equipment or part of similarly designed and configured subsystems. All interfaces to the computing equipment shall be taught in detail.
- e) Operational Training: Practical training on preventive and corrective maintenance of all equipment, including use of special tools and instruments. This training shall be provided on BYPLs equipment or on similarly configured systems.

1.9.2 FRTU System Software Course

The contractor shall provide a computer system software course that covers the following subjects:

- a) System Programming: Including all applicable programming languages and all stand-alone service and utility packages provided with the system. An introduction to software architecture, effect of tuning parameters (OS software, Network software, database software etc.) on the performance of the system.
- b) Operating System: Including the user aspects of the operating system, such as program loading and integrating procedures, scheduling, management, service and utility functions and system expansion techniques and procedures.
- c) System Initialization and Failover: Including design, theory of operation and practice
- d) Diagnostics: Including the execution of diagnostic procedure and the interpretation of diagnostic outputs.
- e) Software Documentation: Orientation in the organization and use of system software documentation.
- f) Hands-on Training: One week, with allocated computer time for trainee performance of unstructured exercises and with the course instructor available for assistance as necessary.

1.9.3 FRTU Application Software Course

The supplier shall provide comprehensive application software courses covering all applications including the database and display building course. The training shall include:

- a) Overview: Block diagrams of the application software and data flows. Programming standards and program Interface conventions.

Technical Specification of 11 KV Dry type Smart Packaged Substation

- b) Application Functions: Functional capabilities, design and major algorithm. Associated maintenance and expansion techniques.
- c) Software Development: Techniques and conventions to be used for the preparation and integration of new software functions.
- d) Software Generation: Generation of application software from source code and associated software configuration control procedures.
- e) Software Documentation: Orientation in the organization and use of functional and detailed design documentation and of programmer and user manuals.
- f) Hands-on Training: One week, with allocated computer time for trainee performance of unstructured exercises and with the course instructor available for assistance as necessary.

1.9.4 Requirement of Training

The supplier shall provide training for a batch (maximum of 10 people) for five (5) days in two slots (Time of which will be decided by BYPL and supplier) on the following courses.

Name of Course:

- a) System Hardware
- b) System Software
- c) Application Software

1.10.0 Drawings & Documents

The bidder shall submit all the standard and customised FRTU documents for review and approval which includes the following:

- a) FRTU function design document
- b) FRTU hardware description document & all the documents referred therein to meet all the clauses of the specification.
- c) FRTU Test equipment user documents
- d) FRTU user guide
- e) FRTU Operation & Maintenance document
- f) FRTU training documentation
- g) FRTU database document
- h) FRTU I/O list (as build) after the execution
- i) FRTU Test procedures
- j) Data Requirement Sheet (DRS) of all items
- k) Protocol documentation including implementation profile etc.

BSES	BSES-TS-122-SPSS-R0
Technical Specification of 11 KV Dry type Smart Packaged Substation	

- I) FRTU installation and layout, GA, BOQ, schematics and internal wiring drawings for each FRTU site

Following Technical documents shall be submitted in addition to Commercial Documentation based on Statutory Requirements and shall be submitted along with the bid:

S. No.	Description	For Approval	For Review	Final Submission
1	GTP	✓		✓
2	GA Drawing	✓		✓
3	Installation Instruction			✓
4	Manual/ Catalogues		✓	✓
5	Dimension drawing		✓	✓
6	QA & QC plan	✓	✓	✓
7	Test Certificates	✓	✓	✓

After the award of the contract, bidder shall submit 4 copies of Drawings describing the equipment in detail and forward for approval before final dispatch of the equipment. Soft copy of all the Drawings, GTP, Test certificates shall be submitted for final approval by BYPL. All the documents & drawings shall be in English language.

1.11.0 FRTU DI/DO/AI list

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

1.11.1.1	FRTU configuration	DI-64 no's DO-16 no's AI-6 no's
1.11.2	Digital Inputs	
1.11.2.1	Cable feeder VCB module 1 & 2	CB ON
		CB OFF
		Disconnecter ON position
		Disconnecter OFF position
		Earth position ON position
		Earth position OFF position
		Fault Indicator ON Status
		Fault Indicator OFF Status
		L/R switch in remote
		Control circuit Healthy
1.11.2.2	Transformer VCB	CB ON
		CB OFF
		Disconnecter ON position

Technical Specification of 11 KV Dry type Smart Packaged Substation

		Disconnecter OFF position Earth position ON position Earth position OFF position Auto Trip L/R switch in remote Control circuit Healthy
1.11.2.3	Common Signals	SF6 Low Battery Charger 1 Fail Battery Charger 2 Fail Battery low(BHMu & Charger) Battery Unhealthy/fail Battery Test in progress Command Acknowledgement Door Open/Close
1.11.2.4	Transformer signals	Transformer Oil level low OTI Alarm from field WTI Alarm from field WTI trip Transformer pressure relay operated
1.11.2.5	APFC	APFC Incomer MCCB ON APFC Incomer MCCB OFF APFC Incomer MCCB Trip L/R switch in remote Control supply healthy
1.11.2.6	LT ACB (through microprocessor release)	LT ACB ON LT ACB OFF LTACB Trip L/R switch in remote Control supply healthy
1.11.2.7	Outgoing MCCB (through microprocessor release)	LT Outgoing MCCB ON LT Outgoing MCCB OFF L/R switch in remote Control supply healthy
1.11.2.8	Fire Extinguisher & smoke detector	Fire Extinguisher Operated In service Fire Alarm
1.11.3	Digital Outputs (Commands)	
1.11.3.1	Cable feeder VCB module 1 & 2	CB ON CB OFF FPI Reset
1.11.3.2	Transformer VCB module 3	CB ON CB OFF
1.11.3.3	LT ACB (through microprocessor release)	LT ACB ON LT ACB OFF
1.11.4	Measuring inputs	
1.11.4.1	Energy Meter (energy meter in purchaser)	IR IY

Technical Specification of 11 KV Dry type Smart Packaged Substation

	scope)	IB
		VAR
		W
		VA
		PF
		VRV
		VYB
		VBR
		VRN
		VYN
		VBN
		IN
1.11.4.2	ACB release	IR
		IY
		IB
		W
		VA
		VAR
		PF
		Harmonic
1.11.4.3	MCCB release	IR
		IY
		IB
		W
		VA
		VAR
		PF
		Harmonic
1.11.4.3	WTI Scanner	Oil temperature
		LV Winding temperature
		HV Winding temperature
1.11.4.4	APFC relay	Switching Step
		IR
		IY
		IB
		PF
		VA
		VAR
		W

1.12.0 Guaranteed Technical Documents

(Vendors shall furnish the General Technical Particulars along with their offer)

Sr. No.	Description	Requirement	Vendors Data
1	Vendors Name		
2	Guarantee period	5 yrs	
3	Make of FRTU base module		
4	No. of DI modules	40	

Technical Specification of 11 KV Dry type Smart Packaged Substation

5	No. of DO modules	16	
6	No. of AI modules	6	
7	Dimensions & Weight of FRTU	Vendor shall provide	
8	Dimensions of FRTU panel	Vendor shall Provide	
9	Make of protocol converter	Vendor shall provide	
10	Interposing relay with freewheeling diode		
10.1	Make	ABB / SCHNEIDER/SIEMENS	
10.2	Capacity	>8 A	
10.3	Model	CR-P with 2C/O contacts	
11	Surge protection		
11.1	Incoming to FRTU supply		
11.2	Serial communication		
11.3	Ethernet port		
12	AC & DC MCB	Merlin & Gerin / Protec / Indokopp	
13	Terminal Blocks	Elmex / Connectwell / Phoenix	
14	Disconnecting type fuses	Elmex / Connectwell / Phoenix	
15	Enclosure		
15.1	Sheet steel thickness	Mini 2 mm	
15.2	Painting process	7 tank	
15.3	Construction of steel according to IEC 529 , index of protection	IP55	
15.4	Shade	As PSS	
15.5	Louvers with filters	2 Nos	