



**NOTICE INVITING TENDER (NIT)
FOR
SURVEY, DESIGN, ENGINEERING, SUPPLY, ERECTION,
TESTING, & COMMISSIONING OF NEW 11kV
SWITCHGEAR PANELS INCLUDING MINOR CIVIL WORKS
AND DISMANTLING OF EXISTING EQUIPMENTS ON
TURNKEY BASIS AT VARIOUS GRIDS IN BYPL, DELHI.**

NIT NO: CMC/BY/23-24/RS/SkS/MD/2

Due Date for Submission: 01.05.2023, 15:00 HRS

**BSES YAMUNA POWER LIMITED (BYPL)
CONTRACTS & MATERIALS DEPT.,
SHAKTI KIRAN BUILDING, KARKARDOOMA,
DELHI-110032
CIN: U40109DL2001PLC111525
WEBSITE: www.bsedelhi.com**

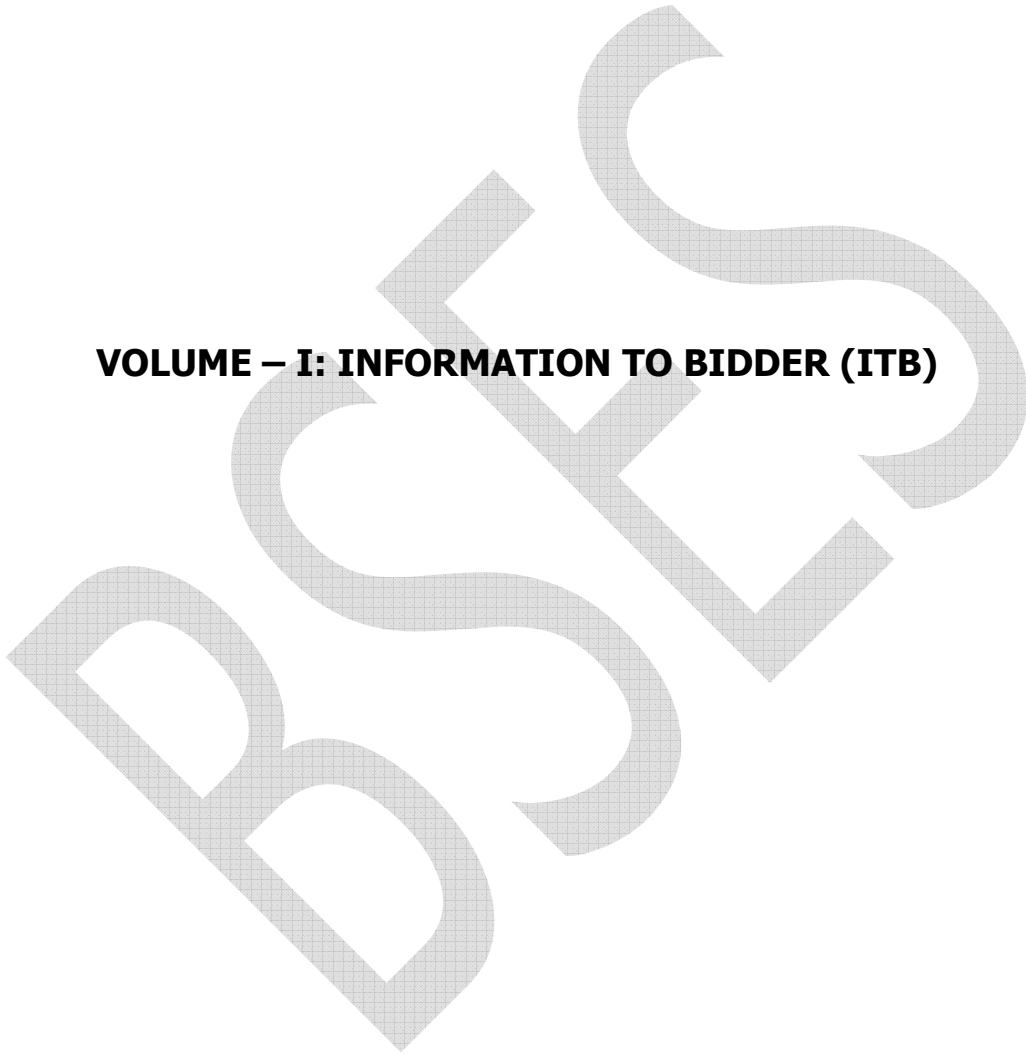
This document is a property of BYPL. This is not transferable and shall not be used for any purpose other than, for which it is stipulated.

INDEX

S NO	DOCUMENT DESCRIPTION	PAGE NO
VOLUME – I		
1	INFORMATION TO BIDDER (ITB)	
1.1	SECTION – I: REQUEST FOR QUOTATION	1 To 17
1.2	SECTION – II: INSTRUCTION TO BIDDERS	
2	APPENDIX I	
2.1	FORMAT FOR EMD BANK GUARANTEE	1 To 9
2.2	BID FORM	
2.3	ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT	
2.4	SCHEDULE OF CLARIFICATIONS/DEVIATIONS	
2.5	TECHNICAL BID SUBMISSION CHECK LIST	
2.6	VENDOR CODE OF CONDUCT	
3	GENERAL CONDITION OF CONTRACT- SUPPLY	1 To 17
4	GENERAL CONDITION OF CONTRACT- ETC	1 To 14
5	APPENDIX II	
5.1	FORMAT FOR PERFORMANCE BANK GUARANTEE	1 To 8
5.2	BENEFICIARY'S BANK DETAIL WITH IFSC CODE	
5.3	FORMAT OF WARRANTY/GUARANTEE CERTIFICATE	
5.4	FORMAT FOR NO DEMAND CERTIFICATE AND LETTER OF INDEMNITY	
5.5	SUMMARY OF COMMERCIAL TERMS AND CONDITIONS	
VOLUME – II - PRICE BID FORMAT		1 To 15
VOLUME – III – SCOPE OF TURNKEY EXECUTION & TECHNICAL SPECIFICATIONS		1 To 238



VOLUME – I: INFORMATION TO BIDDER (ITB)



INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 1 of 17	Bidders seal & signature
---	----------------------------	--------------------------



SECTION – I: REQUEST FOR QUOTATION

1.00 EVENT INFORMATION

- 1.01 BSES Yamuna Power Ltd (hereinafter referred to as "BYPL") invites sealed tenders in 2 envelopes for following scope of works:

S N	Items	Estimate Value In INR	Cost Value In INR	EMD Value In INR
1	SURVEY, DESIGN, ENGINEERING, SUPPLY, ERECTION, TESTING, & COMMISSIONING OF NEW 11KV SWITCHGEAR PANELS INCLUDING MINOR CIVIL WORKS AND DISMANTLING OF EXISTING EQUIPMENTS ON TURNKEY BASIS AT VARIOUS GRIDS IN BYPL, DELHI	10.00 Crore		10.00 Lakh

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

All envelopes shall be duly super scribed "BID FOR SURVEY, DESIGN, ENGINEERING, SUPPLY, ERECTION, TESTING, & COMMISSIONING OF NEW 11KV SWITCHGEAR PANELS INCLUDING MINOR CIVIL WORKS AND DISMANTLING OF EXISTING EQUIPMENTS ON TURNKEY BASIS AT VARIOUS GRIDS IN BYPL, DELHI., NIT NO: CMC/BY/23-24/RS/SKS/MD/2, DUE ON 01.05.2023, 15:00 Hrs."

Bid shall be submitted in two (02) parts. Details of part are as follow:

Part A – Techno-Commercial Bid

Part B – Price Bid

- 1.1. The schedule of specifications with detail terms & conditions can be obtained from address given below against submission of non-refundable demand draft of **Rs 1,180/-** drawn in favour of BSES Yamuna Power Ltd, payable at Delhi or Online transfer of requisite amount through NEFT/ RTGS. The tender documents & detail terms and conditions can also be downloaded from the website www.bsesselhi.com --> **BSES YAMUNA POWER LTD --> Tender --> Open Tenders**

In case tender papers are downloaded from the above website, then the bidder has to enclose a demand draft covering the cost of bid documents.

- 1.2. Bids will be received up to **01.05.2023, 15:00 Hrs.** at the address given below. Part A of the Bid shall be opened on **02.05.2023, 16:00 Hrs.**

Part B of the Bid will be opened in case of Techno-Commercially Qualified Bidders and the date of opening of same shall be intimated in due course. It is the sole responsibility of the bidder to ensure that the bid documents reach this office on or before the last date.

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

- 1.3 BSES Yamuna Power Ltd reserves the right to accept/reject any or all tenders without assigning any reason thereof. Bids are liable for rejection in the following events:



- a) Tender fee of requisite value is not deposited.
- b) Earnest Money Deposit (EMD) of requisite value & validity is not deposited in the form of Bank Guarantee drawn in favor of BSES Yamuna Power Ltd, payable at Delhi or through Online transfer through NEFT/RTGS.
- c) The offer does not contain prices indicating break-up towards all taxes & duties in prescribed format.
- d) Complete Technical details are not enclosed as per the Technical Bid Submission Checklist
- e) Tender is received after due date and time.
- f) Technical offer contains any prices.
- g) Prices are not FIRM and subject to Price Variation.

2.00 QUALIFICATION CRITERIA

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

2.01 Technical Criteria:

SN	Qualification Criteria	Documents to be submitted by bidder
1	The bidder should have own manufacturing facility in India for 11KV Switchgear Panels for last 3 years.	Factory incorporation certificate / Self-Undertaking. Details of manufacturing units, locations and works from where supply against this tender shall be proposed to be furnished.
2	The bidder should have servicing , repairing, testing & refurbishment facility in INDIA with necessary spares and testing equipment for providing prompt after sales service for switchgear panels.	Relevant Details/certificates/Self-Undertaking (Details of the set-up available shall be brought out in the offer. The bidder shall also submit self-undertaking along with the bid confirming the infrastructure details submitted)
3	The bidder should have successfully designed, supplied, installed/erected & commissioned a minimum of two projects of 11KV AIS Switchboards during the last 5 years from the date of bid submission.	a. Purchase order/Work Order copies b. Work completion certificates copy /Invoice copies
4	Performance certificate for minimum 2 years satisfactory performance of projects of 11 kV switchgears, executed during the last 7 years from the date of bid submission from at least two utilities/ SEB/ PSUs / Govt. organization. In case of bidder has previous association with BYPL/BRPL for similar product and service, the performance feedback from BYPL/BRPL shall only be considered irrespective of performance certificates issued by any third party organization.	Performance certificate
5	The Bidder must possess valid ISO 9001:2015 certification	Valid copy of certificate



2.02 Commercial Criteria:

SN	Qualification Criteria	Documents to be submitted by bidder
1	Bidder should have Average Annual Sales Turnover of Rs 200 Crores or more during last three (3) Financial Years (i.e., FY 2019-20, 2020-21 & 2021-22).	Balance Sheet/Duly certified CA certificate with UDIN no to be submitted
2	The Bidder shall submit an undertaking that "No Litigation" is pending with BYPL or its Group/Associates Companies as on the date of bid submission.	Self-Undertaking
3	An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution/Electricity utilities as on the date of bid submission.	Self-Undertaking
4	The bidder must have valid PAN No., GST Registration Number, in addition to other statutory compliances. The bidder must submit the copies of registrations and submit an undertaking that the bidder shall comply all the statutory compliances as per the laws/rules etc. before the start of the supply/work.	Relevant Statutory Documents Copy/Self-Undertaking
5	The bidder should possess valid Electrical Contractor License issued by competent statutory agency to undertake work in NCT Delhi. In case bidder is not having this license, suitable sub-contractor having the valid license shall be engaged for works at site wherein copy of valid license shall be submitted to BYPL before the start of the work OR Bidder to give undertaking that it will be obtained by them before the start of the work at site.	a. Electrical Contractor License Copy b. Self-undertaking if Electrical Contractor License is not available

The subsidiaries of global/Indian companies are also eligible to bid if the qualification requirements stated above are met independently or in combination with parent/sister concern/group Company. However, the bidder should have an establishment of permanent nature in India.

Notwithstanding anything stated above, BYPL reserves the right to assess 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. BYPL shall response to the queries raised by various bidders and the clarification will be distributed to all participating bidders through website/e-mail.

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 the



"ANNEXURE SCHEDULE OF DEVIATIONS" and submit the same as a part of the Technical Bid. Unless **specifically** mentioned in the schedule of deviation, the bid shall be deemed to confirm the BYPL's specifications.

3.01 BID SUBMISSION

Please mention our NIT Number: -"CMC/BY/23-24/RS/SKS/MD/2, DUE ON 01.05.2023, 15:00 Hrs". on the Tender and drop the same in our Tender Box placed at:

BSES Yamuna Power Ltd, Reception, Ground Floor, Shaktikiran Building, Karkardooma, Delhi 110032

The bids and the outer envelope shall be addressed to:

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

Kindly Note:

- Bidder will inform BYPL through mail within 02 hours from the submission or before the due date & time of submission to TPC & Buyer:
 1. Mr Rakesh Sharma, E-mail: Rakesh.Ku.Sharma@relianceada.com
 2. Mr Mahesh Dariyal, E-mail: Mahesh.Dariyal@relianceada.com
- Tender documents shall be submitted at main gate in tender box.
- Authorized person of TPC will collect the documents from tender box at scheduled time of tender submission and verify the bid documents with mails received. A confirmation of receipt shall be sent to bidder through mail by TPC on the same day.
- Bidder has to ensure that tender copy is dropped in correct box designated for tender submission only.
- BYPL shall not be responsible for any wrong placement of tender document by bidder.



PART A :: TECHNICAL **BID** comprising of following (1 Original copy + 1 soft copy in pen drive):

S. N	Descriptions	Type of Documents
Commercial :		
1	Tender Fee - Demand Draft (Rs.1180/-) (Incl GST)	Non-refundable demand draft for Rs 1180/- in case the forms are downloaded from website
2	EMD	In prescribed stamp paper & format
3	Power-of-Attorney	In prescribed stamp paper & format
4	PQR Compliances	Documentary evidence in support of qualifying criteria like: 1. Details of constitution of the company (Proprietary/Limited/etc along with the details), Memorandum of Association of the company 2. Bidders shall submit the certified annual Balance sheets for the last completed three (3) financial years 3. Supportive document on Positive Net worth. Credit rating/solvency certificate from competent authority. 4. Copies of Orders, Execution /Performance Certificate & Other Documents to support qualification Criteria
5	Signed Tender document	Original Tender documents duly stamped & signed on each page as token of acceptance
6	Black listing undertaking	Bidder should submit a Self-undertaking signed by its Authorized Signatories that the Bidder or any of their sub-contractor has not been blacklisted/barred by any Govt. Organization or Regulatory Agencies in India or abroad.
7	Commercial Terms and Conditions	Acceptance on Commercial Terms and Conditions viz Delivery schedule/period, Payment terms, PBG etc.
8	Acceptance on Reverse Auction	Duly signed Acceptance Form For Participation In Reverse Auction Event as per attached format
9	Bid Form (Unpriced) Duly Signed	Duly Signed Bid Form as per attached format
10	Un price Bid Duly Signed	Duly Signed Un price Bid as per attached format
Technical:		
11	Technical Details/ Filled in GTP/Drawings	Bidder shall submit duly filled GTP with all Technical documents and Drawings.
12	Type Test Reports	Bidders shall submit the copy of type test reports in their technical bids in support of technical specifications
13	Testing Facilities	Bidder shall submit the details of testing facilities available at their works/factory.
14	Organization Chart & Manpower Details.	Bidder shall submit the details of Organization & Manpower with qualification and experience.
15	Pen drive	Bidder shall submit above all document (technical bid) in Pen drive also.



PART B :: FINANCIAL BID comprising of (01 original only)

- Price strictly in the Format enclosed indicating Break up of basic price, taxes & duties, transportation etc

3.02 TIME SCHEDULE

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

S.No.	Steps	Due date
1	Last Date of Sale of Bid Documents	29.04.2023, 17:00HRS
2	Pre-Bid meeting:- Pre-Bid Meeting will be done via Zoom Meeting - https://zoom.us/j/8672899211 Meeting ID: 867 289 9211 For Passcode, bidder may submit their request via email to Mr. Mahesh Dariyal, E-mail: mahesh.dariyal@relianceada.com	20.04.2023, 11:30HRS
3	Last Date of receipt of pre-bid queries, if any (Queries to be submitted via e-mail)	24.04.2023, 17:00HRS
4	Last Date of replies to all the pre-bid queries as received	27.04.2023, 18:00HRS
4	Last date and time of receipt of Complete Bids (Tender Fees, EMD, Part A & Part B)	01.05.2023, 15:00HRS
5	Date & Time of Opening of PART A - Technical and Commercial Bid	02.05.2023, 16:30HRS

This is a two part bid process. Bidders are to submit the bids in 2(Two) parts Both these parts should be furnished in separate sealed covers super scribing NIT no. DUE DATE OF SUBMISSION, with particulars as **PART-A TECHNICAL BID & COMMERCIAL TERMS & CONDITIONS** and **Part-B FINANCIAL BID** and these sealed envelopes should again be placed in another sealed cover which shall be submitted before the due date & time specified.

Part – A: Technical Bid should not contain any cost information whatsoever and shall be submitted within the due date. Bids shall be liable to reject if any price part is attached in Part-A technical bid.

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

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

REVERSE AUCTION CLAUSE: Purchaser reserves the right to use the online reverse Auction as optional tool through SAP – SRM as an integral part of the entire tendering Process. All the bidders who are techno-commercially qualified on the basis of tender Requirements shall participate in reverse auction.



Notwithstanding anything stated above, the Purchaser reserves the right to assess bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final. Bidder to submit their acceptance as per format attached ANNEXURE-C

BIDS RECEIVED AFTER DUE DATE AND TIME MAY BE LIABLE TO REJECTION

4.00 AWARD DECISION

- 4.01 The purchaser reserves all the rights to award the contract to one or more bidders so as to meet the delivery requirement or nullify the award decision without any reason.
- 4.02 Purchaser intends to award the business on a lowest bid basis, so suppliers are encouraged to submit the bid competitively. The decision to place purchase order/LOI solely depends on purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.
- 4.03 In the event of your bid being selected by purchaser (and / or its affiliates) and you subsequently DEFAULT on your bid; you will be required to pay purchaser (and / or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in NIT/RFQ.
- 4.04 In case any bidder is found unsatisfactory during the Project execution, the award will be cancelled and BYPL reserves the right to award other bidders who are found fit.

5.00 MARKET INTEGRITY

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

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

6.00 SUPPLIER CONFIDENTIALITY

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.

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

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

7.00 CONTACT INFORMATION

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 8 of 17	Bidders seal & signature
---	----------------------------	--------------------------



Technical clarification, if any, as regards this RFQ shall be sought in writing and sent by e-mail/post/courier to following addresses. The same shall not be communicated through phone

Address	Name/ Designation	E-mail Address
Technical		
CES Dept. 3 rd Floor, B-Block, BSES Yamuna Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Gaurav Sharma Addl. VP (HOD-CES)	gaurav.a.sharma@relianceada.com
	Srinivas Gopu GM (CES)	srinivas.gopu@relianceada.com
	Abhishek Harsh DGM (CES)	abhishek.harsh@relianceada.com
Commercial		
C&M Dept. 3 rd Floor, A-Block, BSES Yamuna Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Robin Sebastian VP (HOD-C&M)	robin.sebastian@relianceada.com
	Santosh Singh Addl. VP (Head-Procurement)	Santosh.kum.singh@relianceada.com
	Mahesh Dariyal Asst. Manager (C&M)	mahesh.dariyal@relianceada.com

SECTION – II: INSTRUCTION TO BIDDERS

A. GENERAL

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

2.00 SCOPE OF WORK

The scope of work under this contract shall include the turnkey execution on End to End Basis, including Survey, Designing, manufacturing, inspection & testing, dispatches, loading, unloading, storage at site, dismantling of existing equipment, installation, testing of the installation, commissioning, handing over to the purchaser.

3.0 DISCLAIMER

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

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



or its employees, or otherwise a rising in any way from the selection process for the Supply.

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

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

4 COST OF BIDDING

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

B. BIDDING DOCUMENTS

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

- (a) Request for Quotation (RFQ)
- (b) Instructions to Bidders
- (c) General Terms & Conditions of Contract (T&C)
- (d) Delivery schedule
- (e) Price Formats & Summary T&C
- (f) Bid Form
- (g) Acceptance Format – RA
- (h) EMD BG Format
- (i) Vendor code of conduct
- (j) Appendix
- (k) Technical Specifications (TS)

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

6.0 AMENDMENT OF BIDDING DOCUMENTS

6.01 At any time prior to the deadline for submission of Bids, the Purchaser may for any reasons, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by Amendment.

6.02 The Amendment shall be part of the Bidding Documents, pursuant to Clause 5.01, and it will be notified in web site www.bsedelhi.com and the same will be binding on them.

6.03 In order to afford prospective Bidders reasonable time in which to take the Amendment into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids. The same shall be published as a corrigendum in website www.bsedelhi.com



- 6.04 Purchaser shall reserve the rights to following:
- extend due date of submission,
 - modify tender document in part/whole,
 - cancel the entire tender

6.05 **Bidders are requested to visit website regularly for any modification/clarification/corrigendum/addendum of the bid documents.**

C. PREPARATION OF BIDS

7.0 LANGUAGE OF BID

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

8.0 DOCUMENTS COMPRISING THE BID

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

- Bid Form, Price & other Schedules (STRICTLY AS PER FORMAT) and Technical Data Sheets completed in accordance with Technical Specification.
- All the Bids must be accompanied with the required EMD as mentioned in the Section-I against each tender.
- Tender documents duly stamped and signed on each page by authorized signatory.

9.0 BID FORM

9.01 The Bidder shall submit one "Original" and one "Copy" of the Bid Form and the appropriate Price Schedules and Technical Data Sheets duly filled in as per attached specification enclosed with the Bidding Documents.

9.02 EMD

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

The EMD shall be denominated in the following form:

- Bank Guarantee drawn in favour of BSES Yamuna Power Ltd, payable at Delhi.
- EMD shall be valid for **One Hundred Twenty (120)** days after due date of submission drawn in favour of BSES Yamuna Power Ltd

The EMD may be forfeited in case:

- the Bidder withdraws its bid during the period of specified bid validity
Or
- in the case of a successful Bidder, if the Bidder does not



- (i) Accept the Purchase Order,
or
- (ii) Furnish the required performance security BG.

10.0 **BID PRICES**

- 10.01 Bidders shall quote for the entire Scope of work with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance with the requirement of Bidding Documents the Bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total Price.
- 10.02 The prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during execution of the supply work, breakup of price constituents, should be there.
- 10.03 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.**
- 10.04 The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications/ Scope of Work/ SLA mentioned in the tender, shall be deemed to be included in prices quoted.

11.0 **BID CURRENCIES**

- 11.01 Prices shall be quoted in Indian Rupees Only.

12.0 **PERIOD OF VALIDITY OF BIDS**

- 12.01 Bids shall remain valid for 120 days from the due date of submission of the Bid.
- 12.02 Notwithstanding Clause 12.01 above, the Purchaser may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing and sent by post/courier

13.0 **ALTERNATIVE BIDS**

- 13.01 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.

14.0 **FORMAT AND SIGNING OF BID**

- 14.01 The original Bid Form and accompanying documents (as specified in Clause 5.0), clearly marked "Original Bid" plus one copy must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copies, the original shall govern.

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 12 of 17	Bidders seal & signature
---	-----------------------------	--------------------------



14.02 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid. The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid. A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

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

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

D. SUBMISSION OF BIDS

15.0 SEALING AND MARKING OF BIDS

15.01 Bid submission: One original (hard copy) & one pen drive (soft copy without price bid) of all the Bid Documents shall be sealed and submitted to the Purchaser before the closing time for submission of the bid.

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

15.03 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.

16.0 DEADLINE FOR SUBMISSION OF BIDS

16.01 The original Bid, together with the required copies, must be received by the Purchaser at the address on or before the due date & time of submission.

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause 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

17.0 ONE BID PER BIDDER

17.01 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.



18.0 LATE BIDS

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

19.0 MODIFICATIONS AND WITHDRAWAL OF BIDS

19.01 The Bidder is not allowed to modify or withdraw its Bid after the Bid's submission except due to any corrigendum/addendum/modifications in the tender documents uploaded in website.

E. EVALUATION OF BID

20.0 PROCESS TO BE CONFIDENTIAL

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

21.0 CLARIFICATION OF BIDS

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

22.0 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

22.01 Purchaser will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order. Purchaser may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

22.02 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.

22.03 Prior to the detailed evaluation, Purchaser will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

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

23.0 EVALUATION AND COMPARISON OF BIDS

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 14 of 17	Bidders seal & signature
---	-----------------------------	--------------------------



23.01 The evaluation of Bids shall be done based on the delivered cost competitiveness basis.

23.02 The evaluation of the Bids shall be a stage-wise procedure. The following stages are identified for evaluation purposes: In the first stage, the Bids would be subjected to a responsiveness check. The Technical & qualifying Proposals and the Conditional ties of the Bidders would be evaluated.

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

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

- (a) 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 Bidding Documents shall be evaluated. **The Purchaser will make its own assessment of the cost of any deviation for the purpose of ensuring fair comparison of Bids.**

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

F. AWARD OF CONTRACT

24.0 CONTACTING THE PURCHASER

24.01 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.

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

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

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 award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Purchaser's action.

26.0 AWARD OF CONTRACT

The Purchaser will award the Contract to the successful Bidder whose Bid has been Determined to be the lowest-evaluated responsive Bid, provided further that the Bidder has been determined to be qualified to satisfactorily perform the Contract. Purchaser reserves the right to award order to



other bidders in the tender, provided it is required for timely execution of 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.

27.0 THE PURCHASER'S RIGHT TO VARY QUANTITIES

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

28.0 LETTER OF INTENT/ NOTIFICATION OF AWARD

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

29.0 CONTRACT PERFORMANCE BANK GAURANTEE

Within 15 days of the receipt of Notification of Award/ Letter of Intent/PO from the Purchaser, the successful Bidder shall furnish the Performance Bank Guarantee towards faithful performance of Contract for an amount of 10% (Ten percent) of the Contract Price. The Performance Bond shall be valid up to completion period/handing over, whichever is earlier plus 3 months claim period. Upon submission of the performance security, the EMD shall be released. 2 (two) nos. separate CPBG's shall be submitted against Supply, ETC.

Bidder shall submit separate performance bank guarantee for the project/grid. Value of the performance bank guarantee shall be 10% of the order value of each project/grid.

30.0 WORKMANSHIP/EQUIPMENT PERFORMANCE BANK GUARANTEE

Contractor shall submit the workmanship / equipment performance bank guarantee equivalent to the 10% of the contract value at the time of claiming the last payment as per TERMS OF PAYMENT (Supply and Erection, Testing & Commissioning), with the validity of the bank guarantee till Defect Liability Period i.e. 60 months from the date of Handing over of entire package plus 3 months towards claim period.

Bidder shall submit separate performance bank guarantee for the project/grid. Value of the performance bank guarantee shall be 10% of the order value of each project/grid.

31.0 CORRUPT OR FRADULENT 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 the purposes of this provision, the terms set forth below as follows:
- (i) "Corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and
 - (ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Purchaser, and includes



collusive practice among Bidders (prior to or after Bid submission) designed to establish Bid prices at artificial non -competitive levels and to deprive the Purchaser of the benefits of free and open competition.

- (b) Will reject a proposal 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 of time, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a contract.

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

32.00 COMPLETION PERIOD

06 Months from the date of LOA/PO for each project/grid.

05 months: Engineering - Drawing submission & approval, Electrical equipment Manufacturing, inspection & delivery at BYPL site. Detailed L2 schedule shall be finalized after award of contract.

01 month: Erection, Testing and Commissioning of electrical equipment and related accessories and handing over.

Detailed L2 schedule for both project/Grid shall be submitted separately by bidder.



APPENDIX I

(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*] (herein after called the "Bidder") has submitted its bid dated [*date of submission of bid*] for the supply of [*name and/or description of the goods*] (here after called the "Bid").

KNOW ALL PEOPLE by these presents that WE [*name of bank*] at [*Branch Name and address*], having our registered office at [*address of the registered office of the bank*] (herein after called the "Bank"), are bound unto BSES Yamuna Power Ltd., with its Corporate Office at Shaktikiran Building, Karkardooma, Delhi -110032, (herein after 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 the 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/23-24/RS/SKS/MD/2	Page 1 of 9	Bidders seal & signature
--	-------------	--------------------------



BID FORM

To

Head of Department
Contracts & Material Deptt.
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 Price 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 under take to deliver the entire goods as) as per delivery schedule mentioned elsewhere in the bid document, from the date of award of purchase order/letter of intent.

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

5 We agree to abide by this Bid for a period of 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 supply 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, in accordance with 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)

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 2 of 9	Bidders seal & signature
--	-------------	--------------------------



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 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, and 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 glitch, 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 to submit the bids to ensure fair & transparent competitive bidding. In case of an auction event is restarted, the best bid as 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 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 out rightly 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 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 of the bidders shall be reduced on pro-rata basis against each line item based on the final all-inclusive prices offered during conclusion of the auction event for arriving at contract amount.

Signature & seal of the Bidder

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 3 of 9	Bidders seal & signature
--	---------------------------	--------------------------

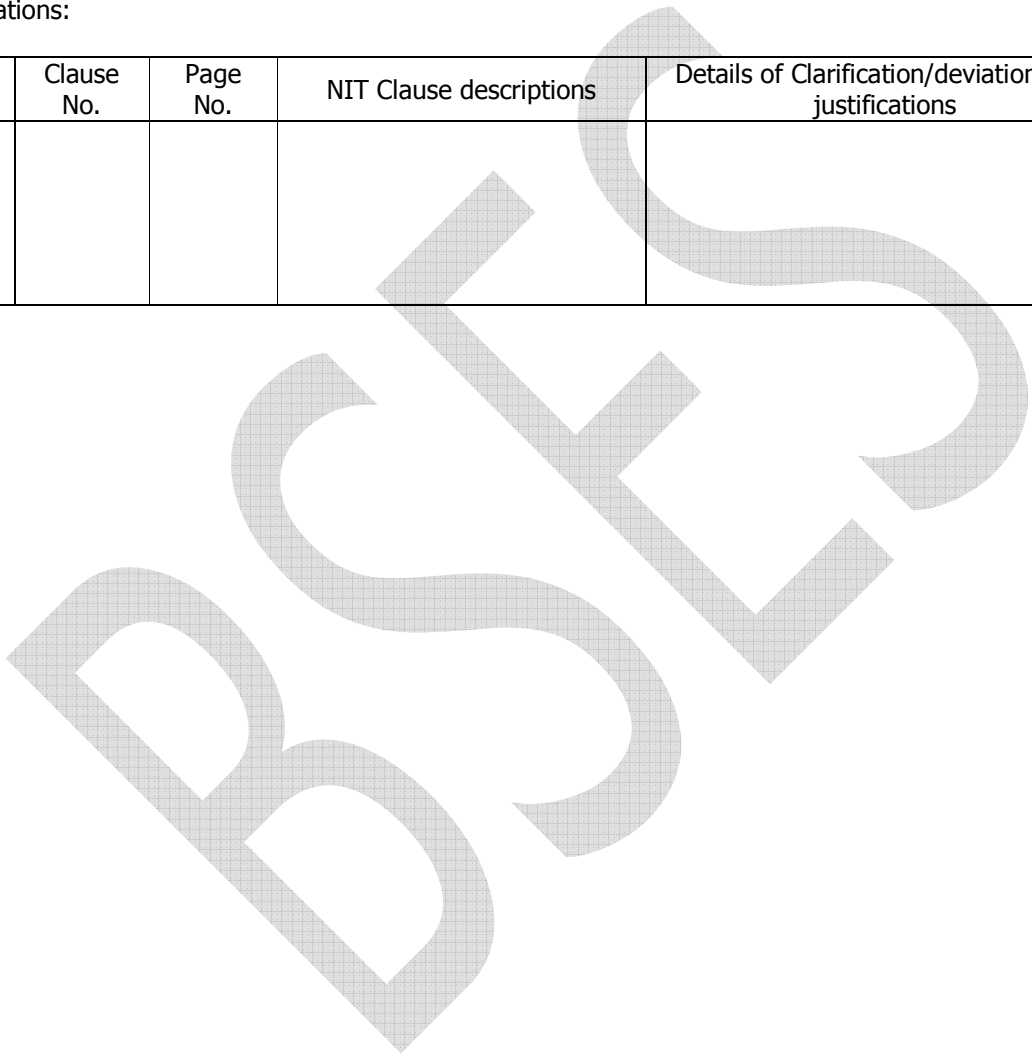


ANNEXURE - SCHEDULE OF DEVIATIONS

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:

SL NO	Clause No.	Page No.	NIT Clause descriptions	Details of Clarification/deviation with justifications





Technical Bid Submission Check List

S. No.	Description	BYPL Requirement	Bidder's Compliance
1	Tender No.	Required	
2	Technical Specification reference number	Required	
3	Communication Details		
3.1	Name of the Bidder	Required	
3.2	Name of Authorized contact person	Required	
3.3	Contact No. of Authorized contact person	Required	
3.4	E-mail id of Authorized contact person	Required	
4	Document Submission Format		
4.1	Documents shall be strictly submitted in Box file/spiral binding. Any other format is not acceptable. Bid submitted in loose paper shall be rejected without any clarification to bidder.	Required	
4.2	Index of documents with page numbers for each document	Required	
4.3	Separator with document description shall be provided before each document	Required	
5	Qualifying Requirement Compliance		
5.1	Summary of compliance of qualifying criteria in tabular form along with summary of documentary proof provided	Required	
5.2	Detailed Documents supporting compliance of qualifying criteria	Required	
6	Drawings/ Documents as per Technical Specification.		
6.1	Signed copy of technical specification	Required	
6.2	Type Test reports of offered model/ type/ rating	Required	
6.3	Guaranteed Technical particulars (GTP)	Required	
6.4	Deviation Sheet	Required	
6.5	Detailed Drawings	Required	
6.6	Manufacturer's quality assurance plan	Required	
6.7	Other drawing/ documents mentioned in technical specification	Required	
7	Soft copy of complete technical bid in pen drive	Required	
8	Samples as per technical specification.	N/A	

Note: Submission of Technical bid check list along with all items mentioned in the check list is mandatory. Order of documents shall be strictly as per the technical bid check list. Bids with incomplete/ wrong information are liable for rejection.

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 5 of 9	Bidders seal & signature
--	---------------------------	--------------------------



VENDOR CODE OF CONDUCT

Purchaser is committed to conducting its business in an ethical, legal and socially responsible manner. To encourage compliance with all legal requirements and ethical business practices, Purchaser has established this Vendor Code of Conduct (the "Code") for Purchaser's Vendors. For the purposes of this document, "Vendor" means any company, corporation or other entity that sells, or seeks to sell goods or services, to Purchaser, including the Vendor's employees, agents and other representatives.

Fundamental to adopting the Code is the understanding that a business, in all of its activities, must operate in full compliance with the laws, rules and regulations of the countries in which it operates. This Code encourages Vendors to go beyond legal compliance, drawing upon internationally recognized standards, in order to advance social and environmental responsibility.

I. Labour and Human Rights

Vendors must uphold the human rights of workers, and treat them with dignity and respect as understood by the international community.

- . Fair Treatment - Vendors must be committed to a workplace free of harassment. Vendors shall not threaten workers with or subject them to harsh or inhumane treatment, including sexual harassment, sexual abuse, corporal punishment, mental coercion, physical coercion, verbal abuse or unreasonable restrictions on entering or exiting company provided facilities.

- . Antidiscrimination - Vendors shall not discriminate against any worker based on race, colour, age, gender, sexual orientation, ethnicity, disability, religion, political affiliation, union membership, national origin, or marital status in hiring and employment practices such as applications for employment, promotions, rewards, access to training, job assignments, wages, benefits, discipline, and termination. Vendors shall not require a pregnancy test or discriminate against pregnant workers except where required by applicable laws or regulations or prudent for workplace safety. In addition, Vendors shall not require workers or potential workers to undergo medical tests that could be used in a discriminatory way except where required by applicable law or regulation or prudent for workplace safety.

- . Freely Chosen Employment - Forced, bonded or indentured labour or involuntary prison labour is not to be used. All work will be voluntary, and workers should be free to leave upon reasonable notice. Workers shall not be required to hand over government-issued identification, passports or work permits as a condition of employment.

- . Prevention of Under Age Labor - Child labor is strictly prohibited. Vendors shall not employ children. The minimum age for employment or work shall be 15 years of age, the minimum age for employment in that country, or the age for completing compulsory education in that country, whichever is higher. This Code does not prohibit participation in legitimate workplace apprenticeship programs that are consistent with Article 6 of ILO Minimum Age Convention No. 138 or light work consistent with Article 7 of ILO Minimum Age Convention No. 138.

- . Juvenile Labor - Vendors may employ juveniles who are older than the applicable legal minimum age for employment but are younger than 18 years of age, provided they do not perform work likely to jeopardize their health, safety, or morals, consistent with ILO Minimum Age Convention No. 138.

- . Minimum Wages - Compensation paid to workers shall comply with all applicable wage laws, including those relating to minimum wages, overtime hours and legally mandated benefits. Any Disciplinary wage deductions are to conform to local law. The basis on which workers are being paid is to be clearly conveyed to them in a timely manner.

- . Working Hours - Studies of good manufacturing practices clearly link worker strain to reduced productivity, increased turnover and increased injury and illness. Work weeks are not to exceed

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 6 of 9	Bidders seal & signature
--	-------------	--------------------------



maximum set by local law. Further, a work week should not be more than 60 hours per week, including overtime, except in emergency or unusual situations. Workers should be allowed at least one day off per seven-day week.

- . Freedom of Association - Open communication and direct engagement between workers and management are the most effective ways to resolve workplace and compensation issues. Vendors are to respect the rights of workers to associate freely and to communicate openly with management regarding working conditions without fear of reprisal, intimidation or harassment. Workers' rights to join labour unions seek representation and or join worker's councils in accordance with local laws should be acknowledged.

II. Health and Safety

Vendors must recognize that in addition to minimizing the incidence of work-related injury and illness, a safe and healthy work environment enhances the quality of products and services, consistency of production and worker retention and morale. Vendors must also recognize that ongoing worker input and education is essential to identifying and solving health and safety issues in the workplace.

The health and safety standards are:

- . Occupational Injury and Illness - Procedures and systems are to be in place to prevent, manage, track and report occupational injury and illness, including provisions to: a) encourage worker reporting; b) classify and record injury and illness cases; c) provide necessary medical treatment; d) investigate cases and implement corrective actions to eliminate their causes; and e) facilitate return of workers to work.

- . Emergency Preparedness - Emergency situations and events are to be identified and assessed, and their impact minimized by implementing emergency plans and response procedures, including: emergency reporting, employee notification and evacuation procedures, worker training and drills, appropriate fire detection and suppression equipment, adequate exit facilities and recovery plans.

- . Occupational Safety - Worker exposure to potential safety hazards (e.g., electrical and other energy sources, fire, vehicles, and fall hazards) are to be controlled through proper design engineering and administrative controls, preventative maintenance and safe work procedures (including lockout/tagout), and ongoing safety training. Where hazards cannot be adequately controlled by these means, workers are to be provided with appropriate, well-maintained, personal protective equipment. Workers shall not be disciplined for raising safety concerns.

- . Machine Safeguarding - Production and other machinery is to be evaluated for safety hazards. Physical guards, interlocks and barriers are to be provided and properly maintained where machinery presents an injury hazard to workers.

- . Industrial Hygiene - Worker exposure to chemical, biological and physical agents is to be identified, evaluated, and controlled. Engineering or administrative controls must be used to control overexposures. When hazards cannot be adequately controlled by such means, worker health is to be protected by appropriate personal protective equipment programs.

- . Sanitation, Food, and Housing - Workers are to be provided with ready access to clean toilet, facilities potable water and sanitary food preparation, storage, and eating facilities. Worker dormitories provided by the Participant or a labour agent are to be maintained clean and safe, and provided by the Participant or a labour agent, hot water for bathing and showering, and adequate heat and ventilation and reasonable personal space along with reasonable entry and exit privileges.

- . Physically Demanding Work - Worker exposure to the hazards of physically demanding tasks, including manual material handling and heavy or repetitive lifting, prolonged standing and highly repetitive or forceful assembly tasks is to be identified, evaluated and controlled.

III. Environmental

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 7 of 9	Bidders seal & signature
--	-------------	--------------------------



Vendors should recognize that environmental responsibility is integral to producing world class products. In manufacturing operations, adverse effects on the environment and natural resources are to be minimized while safeguarding the health and safety of the public.

The environmental standards are:

- . Product Content Restrictions - Vendors are to adhere to applicable laws and regulations regarding prohibition or restriction of specific substances including labeling laws and regulations for recycling and disposal. In addition, Vendors are to adhere to all environmental requirements specified by Purchaser.
- . Chemical and Hazardous Materials - Chemical and other materials posing a hazard if released to the environment are to be identified and managed to ensure their safe handling, movement storage, recycling or reuse and disposal.
- . Air Emissions - Air emissions of volatile organic chemicals, aerosols, corrosives, particulates, ozone depleting chemicals and combustion by-products generated from operations are to be characterized, monitored, controlled and treated as required prior to discharge.
- . Pollution Prevention and Resource Reduction - Waste of all types, including water and energy, are to be reduced or eliminated at the source or by practices such as modifying production, maintenance and facility processes, materials substitution, conservation, recycling and re-using materials.
- . Wastewater and Solid Waste - Wastewater and solid waste generated from operations industrial processes and sanitation facilities are to be monitored, controlled and treated as required prior to discharge or disposal.
- . Environmental Permits and Reporting - All required environmental permits (e.g. discharge monitoring) and registrations are to be obtained, maintained and kept current and their operational and reporting requirements are to be followed.

IV. Ethics

Vendors must be committed to the highest standards of ethical conduct when dealing with workers, Vendors, and customers.

- . Corruption, Extortion, or Embezzlement - Corruption, extortion, and embezzlement, in any form, are strictly prohibited. Vendors shall not engage in corruption, extortion or embezzlement in any form and violations of this prohibition may result in immediate termination as an Vendor and in legal action.
- . Disclosure of Information - Vendors must disclose information regarding its business activities, structure financial situation, and performance in accordance with applicable laws and regulations and prevailing industry practices.
- . No Improper Advantage - Vendors shall not offer or accept bribes or other means of obtaining undue or improper advantage.
- . Fair Business, Advertising, and Competition - Vendors must uphold fair business standards in advertising, sales, and competition.
- . Business Integrity - The highest standards of integrity are to be expected in all business interactions. Participants shall prohibit any and all forms of corruption, extortion and embezzlement. Monitoring and enforcement procedures shall be implemented to ensure conformance.
- . Community Engagement - Vendors are encouraged to engage the community to help foster social and economic development and to contribute to the sustainability of the communities in which they operate.
- . Protection of Intellectual Property - Vendors must respect intellectual property rights; safeguard customer information; and transfer of technology and know-how must be done in a manner that protects intellectual property rights.

V. Management System

Vendors shall adopt or establish a management system whose scope is related to the content of this Code. The management system shall be designed to ensure (a) compliance with applicable laws,

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 8 of 9	Bidders seal & signature
--	-------------	--------------------------



regulations and customer requirements related to the Vendors' operations and products; (b) conformance with this Code; and (c) identification and mitigation of operational risks related to this Code. It should also facilitate continual improvement.

The management system should contain the following elements:

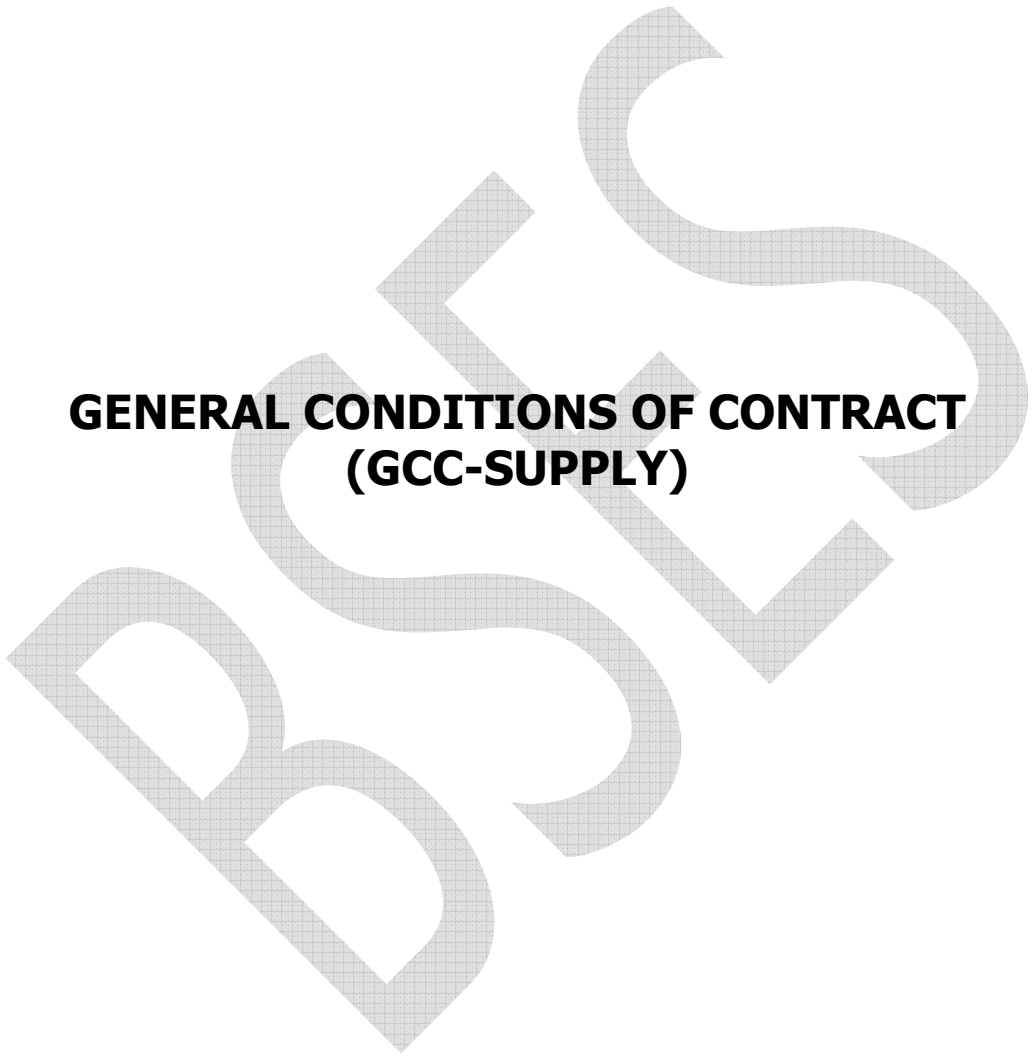
- . Company Commitment - Corporate social and environmental responsibility statements affirming Vendor's commitment to compliance and continual improvement.
- . Management Accountability and Responsibility - Clearly identified company representative[s] responsible for ensuring implementation and periodic review of the status of the management systems.
- . Legal and Customer Requirements - Identification, monitoring and understanding of applicable laws, regulations and customer requirements.
- . Risk Assessment and Risk Management - Process to identify the environmental, health and safety and labour practice risks associated with Vendor's operations. Determination of the relative significance for each risk and implementation of appropriate procedural and physical controls to ensure regulatory compliance to control the identified risks.
- . Performance Objectives with Implementation Plan and Measures - Areas to be included in a risk assessment for health and safety are warehouse and storage facilities, plant/facilities support equipment, laboratories and test areas, sanitation facilities (bathrooms), kitchen/cafeteria and worker housing /dormitories. Written standards, performance objectives, and targets an implementation plans including a periodic assessment of Vendor's performance against those objectives.
- . Training - Programs for training managers and workers to implement Vendor's policies, procedures and improvement objectives.
- . Communication - Process for communicating clear and accurate information about Vendor's performance, practices and expectations to workers, Vendors and customers.
- . Worker Feedback and Participation - Ongoing processes to assess employees' understanding of and obtain feedback on practices and conditions covered by this Code and to foster continuous improvement.
- . Audits and Assessments - Periodic self-evaluations to ensure conformity to legal and regulatory requirements, the content of the Code and customer contractual requirements related to social and environmental responsibility.
- . Corrective Action Process - Process for timely correction of deficiencies identified by internal or external assessments, inspections, investigations and reviews.
- . Documentation and Records - Creation of documents and records to ensure regulatory compliance and conformity to company requirements along with appropriate confidentiality to protect privacy.

The Code is modeled on and contains language from the Recognized standards such as International Labour Organization Standards (ILO), Universal Declaration of Human Rights (UDHR), United Nations Convention against Corruption, and the Ethical Trading Initiative (ETI) were used as references in preparing this Code and may be useful sources of additional information

APPENDIX I NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 9 of 9	Bidders seal & signature
--	---------------------------	--------------------------



**GENERAL CONDITIONS OF CONTRACT
(GCC-SUPPLY)**



GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 1 of 17	Bidders seal & signature
--	----------------------------	--------------------------



GENERAL CONDITIONS OF CONTRACT (GCC)-SUPPLY

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

1.0 General Instructions

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

2.0 Definition of Terms

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

<p style="text-align: center;">GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p style="text-align: center;">Page 2 of 17</p>	<p style="text-align: center;">Bidders seal & signature</p>
---	---	---



- 2.07** "Codes and Standards" shall mean all the applicable codes and standards as indicated in the Specification.
- 2.08** "Offer Sheet" shall mean Bidder's firm offer submitted to BYPL in accordance with the specification.
- 2.09** "Contract" shall mean the "Letter of Acceptance/Purchase Order" issued by the Purchaser.
- 2.10** "Contract Price" shall mean the price referred to in the "Letter of Acceptance/Purchase Order".
- 2.11** "Contract Period" shall mean the period during which the "Contract" shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.
- 2.12** "Acceptance" shall mean and deemed to include one or more of the following as will be stipulated in the specification:
- a) The written acceptance of material by the inspector at suppliers works to ship the materials.
 - b) Acceptance of material at Purchaser site stores after its receipt and due inspection/ testing and release of material acceptance voucher.
 - c) Where the scope of the contract includes supply, acceptance shall mean issue of necessary equipment / material takeover receipt after installation & commissioning and final acceptance.
- 3.0 Contract Documents & Priority**
- 3.01** Contract Documents: The terms and conditions of the contract shall consist solely of these RFQ conditions and the offer sheet.
- 4.0 Scope of Supply -General**
- 4.01** The "Scope of Supply" shall be on the basis of Bidder's responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.
- 4.02** Bidder shall have to quote for the Bill of quantities as listed in Volume-II of this RFQ.
- 4.03** Quantity variation and additional requirement if any shall be communicated to successful bidder during project execution.
- 4.04** All relevant drawings, data and instruction manuals.
- 5.0 Quality Assurance and Inspection**
- 5.01** Immediately on award of contract, the bidder shall prepare detailed quality assurance plan / test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of Purchaser before proceeding with manufacturing. However, Purchaser shall have right to review the inspection reports, quality checks and results of suppliers in house inspection department which are not Customer hold points and the supplier shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc.

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 3 of 17</p>	<p>Bidders seal & signature</p>
---	-----------------------------------	-------------------------------------



- 5.02** Witness and Hold points are critical steps in manufacturing, inspection and testing where the supplier is obliged to notify the Purchaser in advance so that it may be witnessed by the Purchaser. Final inspection is a mandatory hold point. The supplier to proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from BYPL.
- 5.03** The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the supplier of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.
- 5.04** On completion of manufacturing the items can only be dispatched after receipt of dispatch Instructions issued by the Purchaser.
- 5.05** All in-house testing and inspection shall be done without any extra cost. The in-house inspection shall be carried out in presence of BSES/BSES authorized third party inspection agency. Cost of Futile/abortive visit(s) shall be debited from the invoices.
- 5.06** Purchaser reserves the right to send any material being supplied to any recognized laboratory for testing, wherever necessary and the cost of testing shall be borne by the Bidder. In case the material is found not in order with the technical requirement / specification, the charges along with any other penalty which may be levied is to be borne by the bidder. To avoid any complaint, the supplier is advised to send his representative to the stores to see that the material sent for testing is being sealed in the presence of bidder's representative.
- 6.0 INSPECTION & TEST CHARGES:**
- 6.01 GOODS shall be inspected by BUYER and/or third party inspection agency nominated by BUYER. Inspection shall carry out stage wise/final inspection as per agreed QA /QC procedure. In addition, inspection of GOODS shall be carried out at our Site/stores. SELLER shall, however, repair/replace the damaged/rejected GOODS to the satisfaction of BUYER at no extra cost.
- 6.02 Inspection charges are included in total order value, however BUYER will bear third party inspection charges. In case of futile/abortive visit of BUYER's inspector at SELLER'S works, the cost towards the same shall be debited from the SELLER's invoices.
- 6.03 GOODS covered by this PURCHASE ORDER shall not be dispatched in whole or in part until SELLER has received a written Release for Shipment Notice from BUYER or their designated representative.
- 6.04 Inspection call shall be raised minimum 15(fifteen) days in advance from delivery schedule mentioned in PO and duly filled Format issued by BYPL
- 7.0 HANDLING AND STORAGE:**
- 7.01 Material Safety Data Sheet (MSDS), detail handling & storage instruction sheet/manual, wherever applicable, to be furnished before commencement of supply and one copy is to be submitted in store/site with First Lot.
- 8.0 Packing, Packing List & Marking**
- 8.01 **Packing:** Supplier shall pack or shall cause to be packed all Commodities in crates/boxes/drums/containers/cartons and otherwise in such a manner as shall be reasonably

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 4 of 17	Bidders seal & signature
--	--------------	--------------------------



suitable for shipment by road or rail to BYPL, Delhi/New Delhi stores/site without undue risk of damage in transit. All the packaging materials as prescribed shall be supplied preferably bio-degradable material.

- 8.02 **Packing List:** The contents of each package shall be itemized on a detailed list showing the exact weight, extreme outside dimensions (length, width & weight) of each container/box/drum/carton, Item SAP Code, PO No & date. One copy of the packing list shall be enclosed in each package delivered.

9.0 Prices/Rates/Taxes

9.01 Price basis for supply of materials

- a) Bidder to quote their prices on Landed Cost Basis and separate price for each item for supply to BYPL Delhi/New Delhi stores inclusive of packing, forwarding, loading at manufacturer's premises, payment of GST, Freight, any other local charges. **Octroi is presently not applicable in Delhi and however if applicable shall be reimbursed at actuals.**
- b) The above supply prices shall also include unloading at BYPL Delhi/New Delhi stores/site.
- c) Transit insurance will be arranged by bidder.

10.0 TAXES & DUTIES:

- 10.01 Prices for Goods are on Ex- Works basis. For the Goods covered under the GST laws, all taxes that are applicable under CGST, SGST, UGST, IGST and GST Compensation Cess shall be payable extra.
- 10.02 For the Goods not covered in the GST laws, the applicable ED, VAT / CST shall be payable extra at applicable rates.
- 10.03 GSTIN of BSES YAMUNA POWER LTD - 07AABCC8569N1Z0
CST No of BSES YAMUNA POWER LTD -07740254593
TIN NO of BSES YAMUNA POWER LTD - 07740254593
PAN NO of BSES YAMUNA POWER LTD - AABCC8569N
- 10.04 At the end of each month, the SELLER must submit their detail of invoices and amount thereof to the concerned officer in charge, within 07 days after the close of the respective month of which supply relates. Non submission of the said request would be treated as good as that the SELLER has no requirement of reconciliation.

11.0 INVOICING INSTRUCTIONS:

- 11.01 Invoices in triplicate [1) Original for recipient, 2) Duplicate for Transporter, 3) Triplicate for supplier] shall be made out and delivered to the following address: BSES YAMUNA POWER LIMITED, SHAKTI KIRAN BUILDING, KARKARDOOMA, DELHI-110032.
Material despatch clearance certificate (MDCC) will be released separately for Capex & Opex. Invoice will be submitted by supplier as per the MDCC.
- 11.02 Vendor shall obtain GST registration in the State from where the supply will be carried out. Vendors supplying Goods to the Purchaser shall have a valid GST registration number and shall submit GST Tax Invoice and other documents as per SGST Act, CGST Act, IGST Act, UTGST Act, GST Compensation Cess Act and Rules made there under. Failure to submit GST Tax Invoice shall be liable for withholding SGST, CGST, IGST, UTGST, GST Compensation Cess amount charged by the vendor while releasing the payment.

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 5 of 17	Bidders seal & signature
--	--------------	--------------------------



- 11.03 Invoice in the name of BSES YAMUNA Power Limited & address of the store/site mentioned in the MDCC. Invoice should contain all information as required under GST Invoice, Debit Note and Credit Rules. The government has notified rules of invoicing under GST along with a template of invoice(GST INV-01) covering the elements such as supplier's details, GSTIN No, HSN Codes, item details, GST tax rates, etc that need to be presented by the supplier.
- 11.04 Vendor to carefully examine and charge relevant CGST / SGST, UGST, IGST and GST compensation cess as applicable to the transactions.
- 11.05 Timely provision of invoices / Debit Notes / Credit Notes:
- 11.05.1 Vendor to timely provide invoice / Debit note / Credit note to enable Purchaser to claim tax benefit on or before stipulated time period. All necessary adjustment entries (Credit Note, Purchase Returns, Debit Notes) shall be made within the time lines prescribed under the GST Laws.
- 11.05.2 In case of receipt of advance, the Vendor undertakes to raise the tax invoice. Purchaser, upon payment of advance, shall issue payment voucher as per applicable GST laws and rules. Four copies of the invoices need to be provided by suppliers and wherever the law requires, an Electronic Reference Number for each invoice.
Documents and devices to be carried by a person-in-charge of a conveyance under.

12.0 Terms of payment and billing

- 12.01 For Supply of Equipment:
- A.** 90% of basic value with 100% taxes and duties shall be payable against R/A bills for supply of equipment and materials within 45 days against receipt & acceptance of material at site and submission of following documents duly certified by BYPL Project-in-charge:-
- Signed copy of accepted Purchase Order (for first payment)
 - LR / RR / BL as applicable
 - Challan as applicable
 - Two (02) copies of Supplier's detailed Recipient Invoice showing Commodity description, quantity, unit price, total price and basis of delivery, and being 100% of the value of the consignment claimed.
 - Two (02) copies of Supplier's transporter invoice duly certified by BYPL Stores/site & Original certificate issued by BYPL confirming receipt of the subject material at Stores/Site and acceptance of the same as per the provisions of the contract.
 - Two (02) copies Packing List / Detailed Packing List
 - Approved Test certificates / Quality certificates, if applicable
 - Certificate of Origin, if applicable
 - Material Dispatch Clearance Certificate (MDCC)
 - Insurance Policy / Certificate, if applicable
 - Warranty / Guarantee Certificate, if applicable
 - Check list for bill submission.
- B.** Balance 10% of supply value shall be paid within 45 days on completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by BYPL Engineer-in-Charge, on submission of Performance Bank Guarantee equivalent to 10% of contract value in the specified format and valid up to defect liability period plus three months towards claim period, submission of Electrical Inspector Clearance Certificate as applicable, Compliance of final punch point, No Demand Certificate, Letter of Indemnity by the supplier (The format of No Demand Certificate and Letter of Indemnity are attached as Annexure) and after

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 6 of 17</p>	<p>Bidders seal & signature</p>
---	-----------------------------------	-------------------------------------



reconciliation & adjustments of payments if any towards quantities of materials issued from purchaser's stock and consumed by the contractor for expeditious completion of the job.

In case of receipt of material at store & not erected, tested & commissioned within six (06) month from the date of receipt of material at store, Balance 10% of basic value retained shall be released.

- 12.02 Purchaser has the right to recover tax loss, interest and penalty suffered due to any non-compliance of tax laws by the Vendor. In the event, Purchaser is not able to avail any tax credit due to any short coming on the part of the Vendor (which otherwise should have been available to Purchaser in the normal course), then the Vendor at his own cost and effort will get the short coming rectified. If for any reason the same is not possible, then the Vendor will make 'good' the loss suffered by Purchaser due to the tax credit it lost. In such event, any amount paid to the Vendors shall be first attributable to the tax (GST) charged in the invoice and the balance shall be considered towards the 'value' of supply of goods/ services.
- 12.03 Purchaser shall deduct "Tax Deducted at Source" wherever applicable and at the rate prescribed under the GST Laws or any other Indian law and remit the same to the Government. Necessary TDS certificates as per law shall be issued by the purchase to the vendor.
- 12.04 Any liability arising out of dispute on the tax rate, classification under HSN, calculation and payment of tax to the Government will be to the Vendor's account.
- 12.05 Where the supply of Goods are liable to GST under reverse charge mechanism, then the supplier should clearly mention the category under which it has been registered and also that "the liability of payment of GST is on the Recipient of Supply".

13.0 TAX INDEMNITY CLAUSE:

- 13.01 Vendor (along with its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement) agrees that it will be solely responsible for performing all compliances and making payments of all taxes (direct tax or indirect tax including but not limited to income-tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess custom duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties or any other tax/ duty/ amount/ charge/ liability arising either out of laws/ regulations applicable in India and overseas or because of a demand/ recovery initiated by any revenue authority under laws/ regulations applicable in India or overseas.
- 13.02 In case any tax liability (including but not limited to income-tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess custom duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties or any other tax/ duty/ amount/ charge/ liability becomes payable by Purchaser due to failure of the Vendor, or any of its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement, to comply with the relevant laws/ regulations applicable in India or overseas, Vendor undertakes to indemnify Purchaser for an amount equal to amount payable by Purchaser.
- 13.03 Further, Vendor undertakes to keep Purchaser indemnified at all times against and from all other actions, proceedings, claims, loss, damage, costs and expenses which may be brought against Purchaser or suffered or incurred by Purchaser and which shall have arisen either directly or indirectly out of or in connection with failure of The Vendor, or any of its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 7 of 17</p>	<p>Bidders seal & signature</p>
---	-----------------------------------	-------------------------------------



- affiliates for the purpose of this agreement, to comply with relevant obligations/ compliance under any law/ regulations applicable in India and overseas.
- 13.04 The parties agree to follow the following process in case any communication of demand, arising out non-compliance by Vendor (along with its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement), is received by Purchaser :
- 13.04.1 On Purchaser receiving any communication from a competent authority demanding tax liability (including but not limited to income-tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess custom duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties or any other tax/ duty/ amount/ charge/ liability, Purchaser shall, within 5 common working days from the date of receipt of such communication (save where the period to respond to the relevant authority is less than five days, in which case, as soon as reasonably possible) inform Vendor in writing of such communication.
- 13.04.2 Pursuant to receiving communication from Purchaser, Vendor shall suggest to accept the communication and pay the demand amount to the competent authority. In such an event, Vendor shall reimburse such amount paid to Purchaser within 5 working days from the date of payment by Purchaser to the competent authority.
- 13.04.3 If Vendor advises in writing and Purchaser agrees to dispute the demand, then Purchaser shall dispute the matter with competent authority as per due process prescribed under the regulations and Purchaser shall not pay the Tax Demand. In such scenario, cost of litigation including but not limited to Counsel cost, filing fees, other related charges, should be reimbursed by Vendor to Purchaser. Additionally, If any coercive steps of recovery are initiated by the department, then Purchaser would pay such amount (including by way of adjustment of refunds due to it) and the same would be reimbursed by Vendor within 5 working days from date of such recovery from Purchaser. Purchaser will take all necessary steps to avoid such recovery measures.
- 13.04.4 On determination of the demand through an Order issued by a Tribunal or any other similar Authority, by whatever name called, under any law applicable in India or overseas, if the demand or any part thereof becomes payable and is paid by Purchaser, then Vendor undertakes to reimburse such amount to Purchaser within 10 days from the date of payment. Alternatively, if on determination of the demand through an Order, no amount is payable by Purchaser then any refund arising to Purchaser due to such an Order shall be passed on to Vendor within 10 days from the date of receipt of refund.

14.0 The Micro, Small and Medium Enterprises (MSME):

- 14.01 If the SELLERS establishment is covered under the purview of The Micro, Small and Medium Enterprises Development Act, 2006, he shall declare so within the bid of its status failing which it will be presumed that it is a non-MSME unit. Also submit a copy of Udyog Aadhaar (UA) if available.

15.0 Price Validity

- 15.01 All bids submitted shall remain valid, firm and subject to unconditional acceptance by BRPL Delhi for 120 days from the due date of submission & subsequent corrigendum/amendment/extension of due date of submission. For awarded suppliers/contractors, the prices shall remain valid and firm till contract completion.

16.0 Performance Guarantee

- 16.01 Bank guarantee shall be drawn in favour of "BSES YAMUNA Power Ltd" as applicable. The performance Bank guarantee shall be in the format as specified by BYPL.

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 8 of 17</p>	<p>Bidders seal & signature</p>
---	-----------------------------------	-------------------------------------



16.02 Contract performance bank guarantee of total 10% of the contract price shall be submitted within 15 days of award of contract with the validity till completion of the contract period.

Bidder shall submit separate performance bank guarantee for the project/grid. Value of the performance bank guarantee shall be 10% of the order value of each project/grid.

16.03 Contractor shall submit the workmanship / equipment performance bank guarantee equivalent to the 10% of the contract value at the time of claiming the last payment as per TERMS OF PAYMENT (Supply and Erection, Testing & Commissioning), with the validity of the bank guarantee till Defect Liability Period i.e. 60 months from the date of Handing over of entire package plus 3 months towards claim period.

Bidder shall submit separate performance bank guarantee for the project/grid. Value of the performance bank guarantee shall be 10% of the order value of each project/grid.

17.0 Forfeiture

17.01 Each Performance Bond established under the contract shall contain a statement that it shall be automatically and unconditionally forfeited without recourse and payable against the presentation by BYPL of this Performance Bond, to the relevant bank referred to above, together with a simple statement that supplier has failed to comply with any term or condition set forth in the Contract. Each Performance BG established under will be automatically and unconditionally forfeited without recourse if BYPL in its sole discretion determines that supplier has failed to comply with any term or condition set forth in the contract.

18.0 Release

18.01 All Performance Bonds will be released without interest within seven (7) days from the last date up to which the Performance Bond has to be kept valid (as defined in Clause 16.0) except for the case set forth in Clause 24.0.

19.0 Defects Liability Period/Guarantee/Warranty

19.01 The bidder to Guarantee the materials / items supplied against any defect of failure, which arise due to faulty materials, workmanship or design for the entire defects liability period. The Defect liability period shall be 60 months from the date of commissioning or 66 months from the date of delivery whichever is earlier.

19.02 If during the Defects Liability Period any GOODS are found to be defective, they shall be promptly replaced or rectified by BIDDER at its own cost (including the cost of dismantling and (reinstallation) on the instructions of BUYER and if removed from SITE for such purpose, shall be removed and re-delivered to SITE by BIDDER at its own cost.

20.0 Return, Replacement or Substitution.

20.01 BYPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BYPL may in its discretion elect to return defective Commodities to Supplier for replacement, free of charge to BYPL, or may reject such Commodities and purchase the same or similar Commodities from any third party. In the latter case BYPL shall furnish proof to Supplier of the cost of such substitute purchase. In either case, all costs of any replacement, substitution, shipping, labour and other related expenses incurred in connection with the return and

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 9 of 17	Bidders seal & signature
--	----------------------------	--------------------------



replacement or for the substitute purchase of a Commodity hereunder should be for the account of Supplier. BYPL may set off such costs against any amounts payable by BYPL to Supplier. Supplier shall reimburse BYPL for the amount, if any, by which the price of a substitute Commodity exceeds the price for such Commodity as quoted in the Bid. BUYER at its sole discretion shall have the opinion to dispose the material or GOODS so rejected and not taken back within forty-five days from the date of intimation of rejection.

21.0 Effective Date of Commencement of Contract:

21.01 The date of the issuance of the Letter of Acceptance/Purchase Order shall be treated as the effective date of the commencement of Contract.

22.0 Time – The Essence Of Contract

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

23.0 The Laws and Jurisdiction of Contract:

23.01 The laws applicable to this Contract shall be the Laws in force in India.

23.02 All disputes arising in connection with the present Contract shall be settled amicably by mutual consultation failing which shall be finally settled as per the rules of Arbitration and Conciliation Act, 1996 at the discretion of Purchaser. The venue of arbitration shall be at Delhi in India

24.0 Events of Default

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

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

25.0 Consequences of Default.

- (a) If an Event of Default shall occur and be continuing, BYPL may forthwith terminate the Contract by written notice.

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 10 of 17	Bidders seal & signature
--	-----------------------------	--------------------------



(b) In the event of an Event of Default, BYPL may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;

(i) present for payment to the relevant bank the Performance Bond;

(ii) purchase the same or similar Commodities from any third party; and/or

(iii) recover any losses and/or additional expenses BYPL may incur as a result of Supplier's default.

26.0 Penalty for Delay

26.01 If supply of items/equipments is delayed beyond the delivery schedule as stipulated in purchase order then the Supplier shall be liable to pay to the Purchaser as penalty for delay, a sum of 1% (one percent) of the Total price for every week delay of undelivered units or part thereof for individual mile stone deliveries.

26.02 The total amount of penalty for delay under the contract will be subject to a maximum of ten percent (10%) of the Total price of total undelivered units.

26.03 The Purchaser may, without prejudice to any method of recovery, deduct the amount for such damages from any amount due or which may become due to the Supplier or from the Performance Bond or file a claim against the supplier.

22.4 If Penalty is levied as per the Order terms & conditions; BYPL will raise Invoice of the penalty amount along with applicable GST rates. Accordingly, after set off of the penalty Invoice amount, net payment shall be made.

27.0 VARIATION IN TAXES, DUTIES & LEVIES

27.1 The total order value shall be adjusted on account of any variations in Statutory Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period only. In case of reduction in taxes, duties and levies, the benefits of the same shall be passed on to BUYER.

27.2 No other Taxes, Duties & Levies other than those specified above will be payable by BUYER except in case of new Levies, Taxes & Duties imposed by the Competent Authorities by way of fresh notification(s) subsequent to the issue of PURCHASE ORDER but within the stipulated delivery period.

27.3 Notwithstanding what is stated above, changes in Taxes, Duties & Levies shall applied only to that portion of PURCHASE ORDER not executed on the date of notification by Competent Authority. Further, changes in Taxes, Duties & Levies after due date of Delivery shall not affect PURCHASE ORDER Terms and Value.

27.4 PURCHASE ORDER value shall not be subject to any variation on account of variation in Exchange rate(s).

28.0 TAXES & DUTIES ON RAW MATERIALS & BOUGHT OUT COMPONENTS:

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

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 11 of 17</p>	<p>Bidders seal & signature</p>
---	------------------------------------	-------------------------------------



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

29.0 Force Majeure

29.01 General

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

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

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

- (i) The following events and circumstances:
 - a) Effect of any natural element or other acts of God, including but not limited to storm, flood, earthquake, lightning, cyclone, landslides or other natural disasters.
 - b) Explosions or fires
- (ii) War declared by the Government of India, provided that the ports at Mumbai are declared as a war zone.
- (iii) Dangers of navigation, perils of the sea.

29.03 Notice of Events of Force Majeure If a force majeure event prevents a party from performing any obligations under the Contract in part or in full, that party shall:

- i) 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
- ii) 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.
- iii) Use all reasonable efforts to resume full performance of the obligation as soon as practicable
- iv) Keep the other party informed of all such efforts to resume full performance of the obligation on a regular basis.
- v) Provide prompt notice of the resumption of full performance or obligation to the other party.

29.04 Mitigation of Events of Force Majeure Each Party shall:

- (i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure including recourse to alternate methods of satisfying its obligations under the Contract;
- (ii) Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 12 of 17	Bidders seal & signature
--	-----------------------------	--------------------------



(iii) Keep the other Party informed at regular intervals of the circumstances concerning the event of Force Majeure, with best estimates as to its likely continuation and what measures or contingency planning it is taking to mitigate and or terminate the Event of Force Majeure.

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

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

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

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

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

30.0 **Transfer And Sub-Letting**

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

31.0 **Recoveries**

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

32.0 **Waiver**

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

33.0 **Indemnification**

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 13 of 17</p>	<p>Bidders seal & signature</p>
---	------------------------------------	-------------------------------------



- 33.01 Notwithstanding contrary to anything contained in this RFQ, Supplier shall at his costs and risks make good any loss or damage to the property of the Purchaser and/or the other Supplier engaged by the Purchaser and/or the employees of the Purchaser and/or employees of the other Supplier engaged by the Purchaser whatsoever arising out of the negligence of the Supplier while performing the obligations under this contract.
- 34.0 **Problem Troubleshooting & Restoration In Warranty Period For A Particular Equipment:**
- 34.01 a) Service Engineer Availability to Attend, Identify & Restore Defects (Minor) Of Equipments under Guarantee Period within 48 Working Hours (Exclusion of Material Support Cases)
 b) Spare Material Delivery For Restoration Of Grid Equipment (Major Defect) Under Guarantee Period Within Two Weeks. Seller must keep Requisite Inventory of Critical Switchgear Spares & Other Equipment's Covered in Guarantee Period to Restore Equipment within Two Weeks.
 c) In Case Of Complete Replacement of Equipment, Complete Equipment to Be Replaced Within a Period Of 4 Weeks.
- 35.00 **DOCUMENTATION**
- 35.01 The Bidder shall procure all equipment from BYPL approved sources as per attached specifications. The Bidder's shall submit 5 copies of Material/Type Test Certificates, O&M Manuals, and Approved & As-built drawings, related to various equipment. The Bidder's shall ensure for the strict compliance to the specifications and Field Quality Procedures issued by BYPL Engineer in-charge.
- 36.0 **Limitation of Liability**
- 36.01 Except as provided otherwise in the Contract and except for willful misconduct or gross negligence, neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or any other indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract. The total liability of the Contractor to the Purchaser under the Contract shall not exceed the Contract Value except that this Clause shall not limit the liability of the Contractor:
- (a) In cases of fraud, willful misconduct or illegal or unlawful acts, or
 (b) In cases of acts or omissions of the Contractor which are contrary to the most elementary rules of diligence which a conscientious Contractor would have followed in similar circumstances.
- 37.0 **Liability of Contractors**
- 37.01 Subject to the due discharge of its obligations under the Contract and except in case of gross negligence or willful misconduct on the part of the Contractor or on the part of any person acting on behalf of the Contractor, with respect to any loss or damage caused by the Contractor to the Purchaser's property or the Site, the Contractor shall not be liable to the Purchaser for the following:
- (a) For any indirect or consequential loss or damage; and
 (b) For any direct loss or damage that exceeds:
 (i) The total payments made and expected to be made to the Contractor under the Contract including reimbursements, if any; or
 (ii) The insurance claim proceeds which the Contractor may be entitled to receive from any insurance purchased by the Contractor to cover such a liability, whichever is higher.
- 37.02 This limitation of liability shall not affect the Contractor's liability, if any, for damage to any third

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 14 of 17	Bidders seal & signature
--	-----------------------------	--------------------------



party, caused by the Contractor or any Person or firm acting on behalf of the Contractor in executing the Works.

- 37.03 Notwithstanding anything contained in the Contract, the Contractor 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 Contractor and/or, its directors, officers, agents or representatives or its affiliates, or Subcontractor, or the vendor or any third party engaged by it.
- 37.04 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 Contractor from any of its liabilities or responsibilities arising in relation to or under the Contract.

38.0 **Intellectual Property Rights and Royalties**

- 38.01 The Contractor shall indemnify the Purchaser and the Purchaser's Representative from and against all claims and proceedings on account of infringement (or alleged infringement) of any patent rights, registered designs, copyright, design, trademark, trade name, know-how or other intellectual property rights (hereinafter collectively referred to as "Intellectual Property Rights") in respect of the Works, Contractor's Equipment, machines, Works method, Plant, Materials, or anything whatsoever required for the execution of the Works and from and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. In the event of infringement of any Intellectual Property Rights of any third party as a result of the execution of the Works (or any part thereof) by the Contractor, the Contractor shall rectify, modify or replace, at its own cost, the Works, Plant or Materials or anything whatsoever required for the Works so that infringement ceases to exist or, in the alternative, the Contractor shall procure necessary rights/ licenses from the affected third party so that there is no infringement of Intellectual Property Rights.
- 38.02 The Contractor shall be promptly notified of any claim made against the Purchaser. The Contractor shall, at its cost, conduct negotiations for the settlement of such claim, and any litigation or arbitration that may arise from it. The Purchaser or the Purchaser's Representative shall not make any admission which might be prejudicial to the Contractor, unless the Contractor has failed to take over the conduct of the negotiations, litigation or arbitration within a reasonable time after having been so requested. In the event of Contractor failing to act at the Purchaser's Representative's notice, the Purchaser shall be at full liberty to deduct any such amount of pending claim from any amount due to the Contractor under the Contract or any other contract and the balance portion of claim shall be treated as debt due from the Contractor.
- 38.03 All Intellectual Property Rights in respect of any Plant, Materials, Drawings and Designs, plans, documents, specifications, data, materials, know how, charts, information, etc., provided to the Contractor by the Purchaser pursuant to this Contract for the execution of the Works, belongs to and shall continue to belong to the Purchaser and the Contractor shall not have any rights in the same other than the limited right for its use for the purpose of execution of the Works.
- 38.04 Intellectual Property Rights in respect of any Plant, Materials, Drawings and Designs, plans, calculations, drawings, documents, know-how and information relating to the Works which are proprietary to the Contractor and/ or its third party licensors ("Contractor's IPR") shall continue to vest with the Contractor and/ or its third party licensors and the Contractor shall grant and/ or procure from its third party licensors, at its own cost, a worldwide, perpetual, royalty free, non-exclusive license (along with the right to sub-license) to use and reproduce such Contractor's IPR for the use, operation, maintenance and repair of the Works.
- 38.05 If any patent, trademark, trade name, registered design or software is developed by the Contractor or its Subcontractor specifically for the execution of the Works, then all Intellectual Property Rights

<p>GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 15 of 17</p>	<p>Bidders seal & signature</p>
---	------------------------------------	-------------------------------------



- in respect of such design, trademark, trade name or software shall be the absolute property of the Purchaser and shall not be utilized or retained by the Contractor (or its Subcontractors) for any purpose other than with the prior written consent of the Purchaser.
- 38.06 If the Contractor uses proprietary software (whether customized or off the shelf) for the purpose of storing or utilizing records in relation to the Works, the Contractor shall obtain at its own expense, the grant of a worldwide, royalty-free, perpetual licence or sublicense (including the right to sublicense) to use such software, in favour of the Purchaser provided that the use of such software under the licence or the sublicense may be restricted to use any such software only for the design, construction, reconstruction, manufacture, installation, completion, reinstatement, extension, repair and operation of the Works or any part thereof.
- 38.07 If any software is used by the Contractor for the execution of the Works over which the Contractor or a third party holds pre-existing title or other rights, the Contractor shall obtain for the Purchaser, a worldwide, royalty free, perpetual license for the right to use and apply that software (together with any modifications, improvements and developments thereof).
- 39.00 **Commissioning Spares**
- 39.01 Commissioning Spares shall be deemed to be included in the quoted prices.
- 40.0 **Transit Insurance:**
- 40.01 Transit Insurance shall be arranged by the Bidder.
- 40.02 **DAMAGE / LOSS OF CARGO IN TRANSIT:** Vendor shall be solely responsible for coordinating with the concerned insurance company for procuring insurance for material and/or Goods, processing claim lodgment and settlement. Notwithstanding the insurance cover, in case of loss / damage to material and/or Goods, in any manner and for any cause whatsoever, Vendor shall cause the damaged cargo to be replaced and delivered to the Purchaser with new material and/or Goods within 30 days of such loss / damage. The Vendor shall be solely responsible for all expenses in relation to the replacement and delivery in such circumstances.
- 41.0 **Acceptance:**
- 41.01 Vendor confirms to have gone through the Policy of BYPL on legal and ethical code required to be followed by vendors encapsulated in the "Vendor Code of Conduct" displayed on the official website of BYPL (www.bsesdelhi.com) also, which shall be treated as a part of the contract/PO/WO.
Vendor undertakes that he shall adhere to the Vendor code of Conduct and also agrees that any violation of the Vendor Code of Conduct shall be treated as breach of the contract/PO/WO.
In event of any such breach, irrespective of whether it causes any loss/damage, Purchaser (BYPL) shall have the right to recover loss/damage from Vendor.
The Contractor/Vendor hereby indemnifies and agrees to keep indemnified the Purchaser (BYPL) against any claim/litigation arising out of any violation of Vendor Code of Conduct by the Contractor/Vendor or its officers, agents & representatives etc.
- 41.02 Acceptance of the CONTRACT implies and includes acceptance of all terms and conditions enumerated in the CONTRACT in the technical specification and drawings made available to Contractor consisting of general conditions, detailed scope of work, detailed technical specification, detailed equipment drawing and complete scope of work.

GENERAL CONDITIONS OF CONTRACT (GCC-SUPPLY) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 16 of 17	Bidders seal & signature
--	-----------------------------	--------------------------



- 41.03 Contractor and Company contractual obligation are strictly limited to the terms set out in the CONTRACT. No amendments to the concluded CONTRACT shall be binding unless agreed to in writing for such amendment by both the parties
- 41.04 We expect your services and supplies are aligned to our Vision, Mission and Values. Please refer to the following link to know about our Vision, Mission and Values; <https://www.bsesdelhi.com/web/bypl/about-bses>.

BSES



GENERAL CONDITIONS OF CONTRACT (GCC-ETC)

GENERAL CONDITIONS OF CONTRACT
(GCC-ETC)
NIT NO: CMC/BY/23-24/RS/SKS/MD/2

Page 1 of 14

Bidders seal & signature



GENERAL TERMS & CONDITIONS - ERRECTION, TESTING, & COMISSIONING

1. DEFINITIONS and INTERPRETATION:

The following terms shall have the following meanings:

- 1.1 "Company": means BSES Yamuna Power Ltd, a company incorporated under the Companies Act 1956 and having its office at BSES Yamuna Power Limited having its office at Shaktikiran Building, Karkardooma, Delhi -110032, which expression shall include its authorized representatives, agents, successors and assigns.
- 1.2 "Contractor": shall mean the successful Tenderer / vendor to whom the contract has been awarded
- 1.3 "Rate": The unit rates for the work to be carried out at site shall be as per finalized unit rates through tender. The finalized rates shall be firm for the entire duration of work to be carried out by the Contractor under the work order and are not subject to escalation for any reason whatsoever.
- 1.4 CONTRACT SPECIFICATION: The terms "CONTRACT Specification" shall mean the Technical specification of the work as agreed by you and description of work as detailed in Annexure-I enclosed herewith and all such particulars mentioned directly/referred to or implied as such in the contract.
- 1.5 SITE: The terms "Site" shall mean the working location in BYPL area. Under this tender, working location shall be as mentioned elsewhere.
- 1.6 ENGINEER IN CHARGE: "Engineer In-charge" means the Company's authorized representative for the purpose of carrying out the work.

2. EXAMINATION OF SITE AND LOCAL CONDITIONS:

- 2.1 The contractor is deemed to have visited the site of the work and ascertained therefore all site conditions and information pertaining to his work. The company shall not accept any claim whatsoever arising out of the difficult site/terrain/local conditions, if any.

3. LANGUAGE AND MEASUREMENT:

- 3.1 The CONTRACT issued to the contractor by the company and all correspondence and documents relating to the CONTRACT placed on the Contractor shall be written in English language.
- 3.2 Metric System shall be followed for all dimension, units etc.

4. SCOPE OF WORK:

- 4.1 The scope of work under this contract shall include the turnkey execution on End to End Basis , including Survey, Designing, manufacturing, inspection & testing, dispatches, loading , unloading, storage at site, erection & installation, testing of the installation, commissioning ,handing over to the purchaser.

<p>GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 2 of 14</p>	<p>Bidders seal & signature</p>
--	---------------------	-------------------------------------



- 4.2 A Separate order will be placed for supply & ETC which inter-alia includes the Scope of Work as mentioned/required for satisfactory operation of the Scheme shall be in Bidder's scope. Bidder(s) must provide goods and services that conform to these specifications for the entire term of the agreement.
- 4.3 All the labour, cranes, tool and tackles, and technical supervision etc. are including in your scope of work. Adequate number of engineers, supervisors and labours shall be posted at site and the list of the same along with certificate of Qualification of technical staff should be submitted by the Contractor to the Engineer In Charge for checking the adequacy immediately (with in seven days) after award of contract.
- 4.4 All loading/unloading, of materials at work-site shall be your responsibility. Involvement of Crane/Hydra/Tractor/Trailer for this type of work shall be in your scope.
- 4.5 The scope shall also include installation, transportation, loading & unloading of free-issued materials if any and transportation of scrap (generated at Site), balance free-issued material, dismantled material from site to BYPL store including loading & unloading and no additional charges shall be paid against these activities.
- 4.6 After completion of E/T/C work , contractor has to obtain Electrical Inspector/BYPL's clearance certificate of the electrical installation.

5. RATES:

- 5.1 The rates finalized for this order shall be firm for the entire duration of work carried out by the Contractor under the order and are not subject to any variation and escalation for any reason whatsoever.
- 5.2 The cost of insurance during loading/unloading of materials/ equipments during its storage and handling/erection at site for installation is included in the contractor's scope and value is included in the unit rates finalized.

6. TAXES AND DUTIES:

- 6.1 Prices are inclusive of all taxes and duties including labour cess and GST as applicable. However, IT as per applicable rate will be deducted from your bills as Tax Deduction at Source (TDS). The total order value shall remain **FIRM** and shall only be adjusted on account of any variations in Statutory Taxes, duties and Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period.

7. BILL SUBMISSION PROCEDURE:

- 7.1 All bills shall be submitted to the Engineer In charge 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.

8. TERMS OF PAYMENT:

- 8.1 Payment shall be made as under:

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 3 of 14	Bidders seal & signature
---	--------------	--------------------------



- A. 90% pro-rata payment of total installation value corresponding to actual executed value shall be made progressively on submission of your running invoices on Monthly basis duly certified by our Engineer In charge & shall be paid within 45 days on receipt of such bills at our office.
- B. Balance 10% on account of total installation value of the actual executed value shall be paid within 45 days after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by BYPL Engineer-in-Charge, submission of performance Bank Guarantee equivalent to 10% of contract value in the specified format and valid up to defect liability period plus three months towards claim period, submission of Electrical Inspector Clearance Certificate as applicable, Compliance of final punch point, No Demand Certificate, Letter of Indemnity by the supplier (The format of No Demand Certificate and Letter of Indemnity are attached as Annexure) and after reconciliation & adjustments of payments if any towards quantities of materials issued from purchaser's stock and consumed by the contractor for expeditious completion of the job.

8.2 Company shall make payments of the bills by electronic transfer directly to Contractor's designated bank account.

9. COMPLETION PERIOD:

9.1 For completion period, refer "Information to bidder" Clause 32.00 - Completion period.

10. PERFORMANCE GUARANTEE

10.01 Bank guarantee shall be drawn in favour of "BSES YAMUNA Power Ltd" as applicable. The performance Bank guarantee shall be in the format as specified by BYPL.

10.02 Contract performance bank guarantee of total 10% of the contract price shall be submitted within 15 days of award of contract with the validity till completion of the contract period.

Bidder shall submit separate performance bank guarantee for the project/grid. Value of the performance bank guarantee shall be 10% of the order value of each project/grid.

10.03 Contractor shall submit the workmanship / equipment performance bank guarantee equivalent to the 10% of the contract value at the time of claiming the last payment as per TERMS OF PAYMENT (Supply and Erection, Testing & Commissioning), with the validity of the bank guarantee till Defect Liability Period i.e. 60 months from the date of Handing over of entire package plus 3 months towards claim period.

Bidder shall submit separate performance bank guarantee for the project/grid. Value of the performance bank guarantee shall be 10% of the order value of each project/grid.

11. CLEANLINESS & PRECAUTIONS INSTRUCTIONS:

Bidder has to take precaution while doing work at site to ensure cleanliness and prevent dust pollution:

11.1 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, Bidder shall be fully responsible for keeping the work site clean at all times. In case of non-compliance, Purchaser shall get the same done at Bidder's risk and costs.

11.2 While carrying out any civil work including road/ pit digging, plinth/ fence making, road restoration etc. Bidder shall adhere to below mentioned guidelines.

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 4 of 14	Bidders seal & signature
---	--------------	--------------------------



- i. No construction material/ debris shall be stored on metalled road.
 - ii. Wind breakers of appropriate height on all sides of ear marked area using CGI sheets shall be raised to ensure that no construction material dust fly outside ear marked area.
 - iii. 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.
 - iv. Bidder 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.
 - v. Over loading of vehicles shall be strictly prohibited
 - vi. The construction material at site shall be stored under wet and covered condition.
 - vii. The dumping sites for temporarily storing the excavated earth shall be properly leveled, watered and rehabilitated by plantation to avoid flying of dust.
 - viii. The worker at the site shall be sensitized to adopt / observe the dust controlled measures in true spirit.
 - ix. 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.
 - x. Wet jet in grinding and stone cutting is being permitted at site.
 - xi. The necessary record for dust control is being maintained by the department on day to day basis and being monitored regularly.
 - xii. Bidder shall ensure that no tree shall be harmed and no tree roots shall be destroyed/cut while performing the task under contract.
 - xiii. Bidder shall comply the provisions of The Delhi Preservation of Trees Act 1994.
- 11.3 Bidder 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. Bidder shall be liable for the penalties / other action by the authorities, Bidder shall indemnify BYPL/its employees/officers/directors from all liabilities on this account.
- 11.4 Guidelines regarding inspection & maintenance of PITS/DUGS while doing work at site in BYPL Area. The contractor shall ensure strict compliance of the following directions:
- i. The sites of all manholes, pits, holes, tanks or any other opening in the ground of any kinds shall be regularly inspected and maintained.
 - ii. Schedule and protocols of inspections and maintenance shall be drawn up and notified to BYPL.
 - iii. These sites shall be cordoned off to render them inaccessible to the public.
 - iv. The existence of these sites shall be clearly & visibly marked by the display of signboards/ signages.
 - v. If they are required to be covered, it shall be ensured that the covers are in place.
 - vi. If required, as per law, prior permission from authorities shall be secured before the commencement of work.
 - vii. Bidder shall follow all law 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.
- 12. COMMISSIONING & ACCEPTANCE TEST:**
- 12.1 After completion of the work, the Contractor shall conduct trial run/ operation in the presence of Engineer In charge. During such trial run the system shall be operated under the supervision of the Contractor. If any rectification/modification required during this period the Contractor shall do all necessary measures.
- 12.2 On satisfactory completion of above, the system shall be deemed to have energized and placed in commercial operation. The Engineer In Charge will issue an acceptance certificate.

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 5 of 14	Bidders seal & signature
---	--------------	--------------------------



13. WORK COMPLETION CERTIFICATION, HANDING OVER:

13.1 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.

14. PENALTY AND LIQUIDATED DAMAGES:

14.1 Penalty: A penalty of 2.5% of bill amount shall be levied in each case of non-compliance of safety practices and site cleanliness.

14.2 Liquidated Damages: In the event of any delay in completion of the work beyond the stipulated time given by in order due to reasons solely attributable to the Contractor, the Contractor shall pay to the Company liquidated damages.

14.3 If the Contractor failed perform the services within the time period specified in the order, the Company shall, without prejudice to its other remedies under the contract, deduct liquidated damages a sum equivalent to 1% of the Total order value for each week or part there of delay until the actual date of completion up to a maximum deduction of 10% of Total order value. Once the maximum is reached to Company may consider termination of contract without any liabilities to Company.

14.4 Engineer In charge should specifically mention the amount of LD levied on the bill of contractor.

15. SAFETY CODE:

15.1 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.

15.2 The contractor shall observe the safety requirements as laid down in the 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.

15.3 The contractor employing two hundred employees or more, including contract workers, shall have a safety co-ordinator in order 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.

15.4 The contractor shall be responsible for non-compliance of the safety measures, implications, injuries, fatalities and compensation arising out of such situations or incidents.

15.5 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, extent of properly damage and remedial action 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.

16. STATUTORY OBLIGATIONS:

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 6 of 14	Bidders seal & signature
---	--------------	--------------------------



16.1 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.
- i) Delhi Building and other Construction Worker (Regulation of Employment and Conditions of Services) Rules, 2002(B.O.C.W.)

(Bidder responsible for execution of the job should obtain a copy of Labour License before start of the work by the contractor.)

16.2 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.
- g) Workman Compensation Policy. {If applicable}.
- h) Labour license before start of work. {If applicable}.

16.3 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.

17. WORKMAN COMPENSATION:

17.1 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.

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 7 of 14	Bidders seal & signature
---	--------------	--------------------------



- 17.2 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.
- 17.3 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.

18. STAFF AND WORKMAN:

(I) It shall be responsibility of contractor:

- (a) To obtain Contract Labour License from the concerned authorities and maintain proper liaison with them. Necessary Forms for obtaining Labour License would be issued by the company. However you will bear all expenses for obtaining Labour license and registration in PF Department for your scope of work. You will deposit PF of your staff/laborer each month and all related documents should be furnished to us.
- (b) To obtain workman insurance cover against deployment of workers etc.

(II) To maintain, proper records relating to workmen employed, in the form of various Registers, namely.

- (a) Register of workmen.
 (b) Register of muster roll.
 (c) Register of overtime.
 (d) Register of wages.
 (e) Any other register as per latest amendment Labour Act.

(III) To disburse monthly wages to your workers/ supervisors in time and in the presence of Company representatives or as directed by the Labour authorities.

(IV) To maintain proper liaison with the Project authorities, local police and all other government and local bodies.

(V) To pay your workmen at least not less than the minimum prescribed wages as per state/Central Labour laws as may be, applicable. The contractor shall, be responsible for compliance of all the provisions of minimum Wages Act, PF, ESIC Act workmen Compensation Act and Contract Labour Regulation & Abolition Act the rules made there under. In case of non- Compliance of the statutory requirements. The company would take necessary action at the risk and cost of the Contractor.

(VI) To employ required number of skilled/semi-skilled and unskilled workmen as per site requirement to complete the entire project as per schedule. To provide safety shoes, safety helmets, safety belts, gloves etc. to your worker/staff as per requirement during erection work.

(VII) To employ necessary engineering and supervisory staff for completion of the Project in time. While day-to-day management of the site and supervision of the works shall be the responsibility of your Engineer - In charge, he will report to the our Engineer in charge to assist him to discharge the overall responsibility of the execution of the project.

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 8 of 14	Bidders seal & signature
---	--------------	--------------------------



19. THIRD PARTY INSURANCE:

- 19.1 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.

20 ENVIRONMENTAL, HEALTH & SAFETY PLAN:

- 20.1 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 prior to 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.

21. TEST CERTIFICATE & QUALITY ASSURANCE:

- 21.1 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 to the specifications and Field Quality Procedures issued by company / Engineer in-charge.

22. SUB-CONTRACTING / SUBLETTING:

- 22.1 CONTRACTOR shall not assign or transfer the whole or any part of this Work Order or any other benefits accruing there from nor shall it subcontract / sublet the whole or any part of the Works without the prior written consent of COMPANY.

<p>GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2</p>	<p>Page 9 of 14</p>	<p>Bidders seal & signature</p>
--	---------------------	-------------------------------------



22.2 In the event the contractor assigns this work order, contractor's assignees shall be bound by the terms and conditions of this work order and shall, if deemed necessary by COMPANY at the time of such assignment, undertake in writing to be so bound by this Work Order.

22.2 Notwithstanding the subletting / subcontracting of any portion of the works, contractor shall remain wholly responsible for the carrying out, completion and satisfactory execution of Works in all respects in accordance with this Work Order, specification, approved drawings and data sheets.

23. INDEMNITY:

23.1 Contractor shall indemnify and save harmless COMPANY against and from any and all liabilities, claims, damages, losses or expenses arising due to or resulting from:

- a) Any breach non-observance or non-performance by contractor or its employees or agents of any of the provisions of this Work Order.
- b) Any act or omission of contractor or its employees or agents.
- c) Any negligence or breach of duty on the part of contractor, its employees or agents including any wrongful use by it or them of any property or goods belonging to or by COMPANY.

23.2 Contractor shall at all times indemnify COMPANY against all liabilities to other persons, including the employees or agents of COMPANY or contractor for bodily injury, damage to property or other loss which may arise out of or in consequence of the execution or completion of Works and against all costs charges and expenses that may be occasioned to COMPANY by the claims of such person.

24. EVENTS OF DEFAULTS:

24.1 COMPANY may, without prejudice to any of its other rights or remedies under the Work Order or in law, terminate the whole or any part of this Work Order by giving written notice to the Contractor, if in the opinion of COMPANY, contractor has neglected to proceed with the works with due diligence or commits a breach of any of the provisions of this work order including but not limited to any of the following cases.

- a) Failing to complete execution of work within the terms specified in this work order.
- b) Failing to complete works in accordance with the approved schedule of works.
- c) Failing to meet requirements of specifications, drawings, and designs as approved by COMPANY.
- d) Failing to comply with any reasonable instructions or orders issued by COMPANY in connection with the works.
- e) Failing to comply with any of the terms or conditions of this work order.

24.2 In the event COMPANY terminates this work order, in whole or in part, on the occurrence of any event of default, COMPANY reserves the right to engage any other subcontractor or agency to complete the work or any part thereof, and in addition to any other right COMPANY may have under this work order or in law including without limitation the right to penalize for delay under clause 15.0 of this work order, the contractor shall be liable to COMPANY for any additional costs that may be incurred by COMPANY for the execution of the Work.

25. RISK & COST:

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 10 of 14	Bidders seal & signature
---	---------------	--------------------------



25.1 If the Contractor fails to execute the work as per specification / as per the direction of Engineer's In-charge within the scheduled period and even after the extended period, the contract shall get cancel and company reserves the right to get the work executed from any other source at the Risk & Cost of the Contractor. The Extra Expenditure so incurred shall be debited to the Contractor.

26. ARBITRATION:

26.1 To the best of their ability, the parties hereto shall endeavor to resolve amicably between themselves all disputes arising in connection with this LOA. If the same remain unresolved within thirty (30) days of the matter being raised by either party, either party may refer the dispute for settlement by arbitration. The arbitration to be undertaken by two arbitrators, one each to be appointed by either party. The arbitrators appointed by both the parties shall mutually nominate a person to act as presiding arbitrator before entering upon the reference in the event of a difference between the two arbitrators and the award of the said presiding arbitrator in such a contingency shall be conducted in accordance with this provisions of the Indian Arbitration & Conciliation Act, 1996 and the venue of such arbitration shall be in the city of New Delhi only.

27. FORCE MAJEURE:

27.1 General:

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

(i) Such event or circumstance, despite the exercise of reasonable diligence, could not have been prevented, avoided or reasonably foreseen by such Party;

(ii) Such event or circumstance materially and adversely affects the ability of the affected Party to perform its obligations under this Contract, and the affected Party has taken all reasonable precautions, due care and reasonable alternative measures in order to prevent or avoid the effect of such event on the affected parties ability to perform its obligations under this Contract and to mitigate the consequences thereof. For the avoidance of doubt, if such event or circumstance would not have materially and adversely affected the performance of the affected party had such affected party followed good industry practice, such event or circumstance shall not constitute force majeure.

(iii) Such event is not the direct or indirect result of the failure of such Party to perform any of its obligations under this Contract; and

(iv) Such Party has given the other Party prompt notice describing such events, the effect thereof and the actions being taken in order to comply with above clause

27.2 Specific Events of Force Majeure:

Subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements: The following events and circumstances:

(i) Effect of any natural element or other acts of God, including but not limited to storm, flood, earthquake, lightning, cyclone, landslides or other natural disasters, and

(ii) Explosions or fires

(iii) Declaration of the Site as war zone

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 11 of 14	Bidders seal & signature
---	---------------	--------------------------



Any order, regulation, directive, requirement from any Governmental, legislative, executive or judicial authority.

27.3 Notice of Events of Force Majeure:

If a force majeure event prevents a party from performing any obligations under the Contract in part or in full, that party shall:

- (i) Immediately notify the other party in writing of the force majeure events within 2 working days of the occurrence of the force majeure event
- (ii) 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
- (iii) Use all reasonable efforts to resume full performance of the obligation as soon as practicable
- (iv) Keep the other party informed of all such efforts to resume full performance of the obligation on a regular basis.
- (v) Provide prompt notice of the resumption of full performance or obligation to the other party.

27.4 Mitigation of events of force majeure:

The Contractor shall:

- (i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure, including applying other ways in which to perform the Contract;
- (ii) Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and
- (iii) Keep the Company 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.

27.5 Burden of proof:

In the event that the Parties are unable in good faith to agree that a Force Majeure event has occurred to an affected party, the parties shall resolve their dispute in accordance with the provisions of this Contract. 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.

27.6 Terminations for certain events of force majeure:

27.7 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 1 (one) month during the Term of the Contract the Contract shall be terminated at the discretion of the Company and neither Party shall be liable to the other for any consequences arising on account of such termination.

28. SECURITY CLAUSE:

28.1 The technical information, drawing and other related documents forming part of work order and the information obtained during the course of investigation under this work order shall be the

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 12 of 14	Bidders seal & signature
---	---------------	--------------------------



Company's executive property and shall not be used for any other purpose except for the execution of the work order. The technical information drawing, records and other document shall not be copied, transferred, or divulged and/ or disclosed to third party in full/part, not misused in any form whatsoever except to the extent for the execution of this work order. This technical information, drawing and other related documents shall be returned to the Company with all approved copies and duplicates including drawing/plans as are prepared by the Bidder during the executions of this work order, if any, immediately after they have been used for agreed purpose.

28.2 In the event of any breach of this provision, the Bidder shall indemnify the Company against any loss, cost or damage or claim by any party in respect of such breach.

29. TERMINATION:

29.1 During the course of the execution, if at any time BSES observe and form an opinion that the work under the order is not being performed in accordance with the terms of this Agreement, BSES reserves its right to cancel this Agreement giving 15 days notice mentioning the reason for the termination of the agreement and BSES will recover all damages including losses occurred due to loss of time from Contractor.

30. QUALITY:

30.1 Contractor shall ensure that strict quality is maintained and execution of works under this Work Order and Works are executed in conformity with the Specification.

30.1 All tools, tackles, instruments and other equipments used in the execution of the Works shall be duly calibrated as required and Contractor shall maintain proper records of such tools, tackles, instruments and / or equipment.

31. INSURANCE POLICY FOR LIFE COVER:

31.1 Before commencing the execution of the work the CONTRACTOR shall take Life insurance policy for the staff engaged by him for this work to insure against any loss of life which may occur during the contract for the work of the COMPANY.

31.2 The policy shall have coverage of Rs 10 Lacs (Table C- Death + Permanent Total Disability + Partial permanent Disability due to external accidents). The premium amount for such life cover policy shall be in contractor scope. The policy document shall be submitted before commencement of the work by the contractor.

32. ACCEPTANCE:

32.1 Acceptance of this work order implies and includes acceptance of all terms and conditions enumerated in this work order in the technical specification and drawings made available to you consisting of general conditions, detailed scope of work, detailed technical specification & detailed equipment, drawing. Complete scope of work and the Bidder's and Company's contractual obligation are strictly limited to the terms set out in the work order. No amendments to the concluded work order shall be binding unless agreed to in writing for such amendment by both the parties.

32.2 However, during the course of the execution of the work order, if at any time the Company's representative observe and form an opinion that the work under the work order is not being performed in accordance with the terms of this work order, the company reserves its right to cancel this work order forthwith without assigning any reason and the Company will recover all damages including losses occurred due to loss of time from the Bidder.

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 13 of 14	Bidders seal & signature
---	---------------	--------------------------



32.3 We request you to please sign the duplicate copy of this work order as a token of your acceptance and return to us.

BSES

GENERAL CONDITIONS OF CONTRACT (GCC-ETC) NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 14 of 14	Bidders seal & signature
---	---------------	--------------------------



APPENDIX II

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, 1956 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.

APPENDIX II NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 1 of 8	Bidders seal & signature
---	--------------------	--------------------------



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, reorganisation, 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.

APPENDIX II NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 2 of 8	Bidders seal & signature
---	-------------	--------------------------



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. Owner may assign this Guarantee to any Person or body whether natural, incorporated or otherwise under intimation to the Bank. The Bank shall be discharged of its obligations hereunder by performance in accordance with the terms hereof to such assignee without verifying the validity / legality / enforceability of the assignment.
16. 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.....

APPENDIX II NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 3 of 8	Bidders seal & signature
---	-------------	--------------------------

**BYPL BANK DETAIL WITH IFSC CODE:**

1. Name of the Bank: State Bank of India
2. Branch Name & Full Address: Industrial Finance branch New Delhi, 14-15 Floor,
Jawahar vyapar bhawan1, Tolstoy Marg, New Delhi 110001
3. Branch Code: 09601
4. Bank Account No: 10277791808
5. IFSC Code: SBIN0009601

BSES



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 found any manufacturing defect during.....months from the date of dispatch of material or.....months from the data of commissioning whichever is earlier.

Vendors Name & Signature

UNDERTAKING GST

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

"The tax component as mentioned in the invoice shall be deposited with 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 Vendor, 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 Vendor"

APPENDIX II NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 5 of 8	Bidders seal & signature
---	-------------	--------------------------



FORMAT OF NO DEMAND CERTIFICATE

NO DEMAND CERTIFICATE BY CONTRACTOR (To be issued on letterhead of Contractor)

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

Name of the Project:

Contract No.:

Date of Contract:

Name of the Contractor:

We, M/s _____ (Contractor) do

hereby acknowledge and confirm that we have claimed Rs. _____ (Rs. _____) towards

full and final settlement of our claims from BSES Yamuna Power Limited, in respect of the aforesaid WO/PO/Contract No.: #####. Dated. ####. including all amendments, if any, to the said Contract, to our entire satisfaction and we further confirm that we have no claim whatsoever pending with BSES Yamuna Power Limited under or in respect of the said Contract.

Notwithstanding any protest, note or objection recorded or raised by us in any correspondence, documents, measurement books and / or final bills etc.

(a) we confirm that BSES Yamuna Power Limited stands fully discharged of all its obligations,

(b) we shall make no claim of any nature on BSES Yamuna Power Limited or any of its affiliates or personnel, and

(c) we waive all our rights to lodge any claim or protest in future, in respect of the said Contract.

We have paid in full all applicable duties, levies, taxes and statutory and other amounts payable by us in connection with the above-mentioned Contract and amounts payable to or in relation to third parties engaged by us including our contractors, suppliers, employees and labour. No payment in this regard is pending or unpaid and we have no (and shall have no) claim against BSES Yamuna Power Limited in this regard.

No refund has been received/ is envisaged to be received or reasonably believed to be receivable on account of taxes, duties or any other payment made by us in respect of the Contract. In case any refund corresponding to any amount paid or reimbursed by BSES Yamuna Power Limited is received in the future, the same will be passed on to BSES Yamuna Power Limited promptly and without any demand from them in this regard.

We are issuing this "NO DEMAND CERTIFICATE" in favor of BSES Yamuna Power Limited with full knowledge of its contents and with our free consent without any influence, misrepresentation, coercion etc.

Date:

Place:

Signature:

Name:

Designation:
(Company Seal)

APPENDIX II NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 6 of 8	Bidders seal & signature
---	-------------	--------------------------



FORMAT FOR LETTER OF INDEMNITY

Format for Letter of Indemnity

(Notes: Preferably shall be obtained on Stamp paper of appropriate value as applicable at the place of execution, if not, then at least on the letterhead of the Contractor)

Place: _____

Date: _____

To,

BSES Yamuna Power Limited, Shaktikiran Building, Karkardooma, Delhi -110032.

Dear Sirs,

WO/PO/Contract No. _____ Dated ___/___/___

For _____

Settlement of Dues

In consideration of your awarding the subject Work Order/Purchase Order/Contract to us and in further consideration of your having agreed to pay our final bill towards settlement of the dues in respect of the subject Work Order/Purchase Order/Contract, inter alia, on our assurances and representations that :

(a) We have paid in full all amounts payable by us including but not limited to duties, levies, taxes, cess, octroi, royalties, statutory payments, amounts payable to or in relation to third parties engaged by us including our contractors, suppliers, employees and labour, and

(b) we have fully complied with all requirements under applicable laws in connection with the subject Purchase Order/Work Order/Contract,

We _____,

unconditionally and irrevocably agree and undertake, to pay and/or settle entirely at our own cost and indemnify, defend and hold harmless you, your affiliates and your/your affiliates' personnel, directors and representatives, (hereinafter collectively referred to as "Indemnified Parties") from and against any and all liabilities, judgments, damages, losses, claims, costs and expenses, claimed, suffered or incurred or, likely to be claimed, suffered or incurred at any time by or against the Indemnified Parties or any of them as a result of, or arising out of, or in any way related to any failure or delay in payment of any of the amounts or compliances by us as aforesaid for any reason whatsoever.

Any notice(s) or communication(s) by you shall be sufficient proof that the Indemnified Parties have suffered or incurred loss, damages, liabilities etc. as aforesaid and we shall upon receipt of such notice(s) or communication(s) immediately, without any delay or demur or contest, make payment to you of the entire amount demanded under the said notice(s) or communication(s).

This letter of indemnity shall be in addition to and not in derogation of any other indemnity/ guarantee and/or security which we may have executed in your favor or your rights and entitlements under the contract.

This letter shall be governed by and construed and interpreted to accordance with the laws of India, and shall be subject to the exclusive jurisdiction of the courts of law at Mumbai.

Yours faithfully,

For M/s _____
Authorized Signatory

APPENDIX II NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 7 of 8	Bidders seal & signature
---	-------------	--------------------------



COMMERCIAL TERMS AND CONDITIONS SUMMARY

SI N	Item Description	AS PER BYPL	BIDDER'S CONFIRMATION
1	Validity	120 days from the date of submission of bid	
2	Price basis	a) "Firm" , FOR Delhi store basis. Prices shall be inclusive of all taxes & duties, freight upto Delhi stores. b) Unloading at stores shall be in vendor's scope c) Transit insurance in Bidders scope	
3	Payment terms	For supply:- As per NIT (Clause 12.01 of GCC-SUPPLY) For ETC:- As per NIT (Clause 8 of GCC-ETC)	
4	Completion period	As per NIT (Clause 32.00 of INFORMATION TO BIDDER)	
5	Defect Liability period	60 months after commissioning or 66 months from the last date of dispatch, whichever is earlier	
6	Penalty for delay	Supply:- 1% per week of delay of the Total price of undelivered units or part thereof subject to maximum of 10% of total price of undelivered units ETC:- 1% of the Total order value for each week or part there of delay until the actual date of completion up to a maximum deduction of 10% of Total order value.	
7	Contract Performance/security Bank Guarantee	10% (Ten Percent) of contract Price valid up to completion period/ handing over of entire project	
8	Performance Bank Guarantee	10% (Ten Percent) each of PO(supply) & WO(Erection, testing & commissioning) value valid for 60 months after commissioning or 66 months from the last date of dispatch, whichever is earlier plus 3 months towards claim period	

VOLUME – II**PRICE BID FORMAT**

PRICE BID FORMAT
NIT NO: CMC/BY/23-24/RS/SKS/MD/2

Page 1 of 15

Bidders seal & signature



GRAND SUMMARY

ALL PRICES IN INR (Rs)

Item Name/Work -	SURVEY, DESIGN, ENGINEERING, SUPPLY, ERECTION, TESTING, & COMMISSIONING OF NEW 11KV SWITCHGEAR PANELS ALONG WITH ALLIED EQUIPMENTS, ACCESSORIES, DISMANTLING OF EXISTING EQUIPMENTS AND WORKS ON TURNKEY BASIS.				
Grid Name	Quantity (Q)	Supply Price Landed (A)	ETC price Landed (B)	Total Cost (C=A+B)	Total Cost (D=C*Q)
Seelampur	1 Lot				
IG Stadium	1 Lot				
GB Pant	1 Lot				
Kanti Nagar	1 Lot				
GRAND TOTAL					

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

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

Date:

Bidders Name:

Place:

Bidders Address:

Signature:

Designation:

Printed Name:

Common Seal:



PRICE FORMAT – SUPPLY - SEELAMPUR GRID (A) (Kindly refer detail SCOPE OF SUPPLY attached as Volume III for Indicative Description of Goods/BOM, BOQ)

ALL PRICES IN INR (Rs)

GRID NAME - SEELAMPUR GRID							
S No.	DESCRIPTION OF GOODS	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Adaptor for Incomer Panel	Nos	2				
1.3	Bus Coupler Panel	Nos	2				
1.4	Bus Riser Panel with Bus PT	Nos	2				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	15				
1.7	Station Transformer Panel	Nos	1				
1.8	Adaptor Panel for Bus Coupling through Cable	Nos	4				
1.9	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.10	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
1.11	Ethernet Switches at 11 kV Switchgear	LOT	1				
2	ACDB	Nos	1				
3	Optical Fiber Cable	LOT	1				
4	SCADA Works	LOT	1				
5	End Termination Kit						
5.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	72				
5.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8				
5.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2				
5.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4				
6	Cable and Associated Items						
6.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1				
6.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1				
6.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1				
7	Earthing	LOT	1				
8	Conduits	LOT	1				

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 3 of 15	Bidders seal & signature
--	--------------	--------------------------



9	Illumination and Ventilation	LOT	1				
10	Fire Retardant Coating	LOT	1				
11	Insulated Floor Coating	LOT	1				
12	Tools and Accessories	LOT	1				
13	Emergency Exit Floor Marking	LOT	1				
14	Recommended and Mandatory Spares	LOT	1				
GRAND TOTAL LANDED COST							
In words							
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement							

PRICE FORMAT – E/T/C – SEELAMPUR GRID (B) (Kindly refer detail SCOPE OF WORK attached as Volume III for Indicative Description of Services/BOM, BOQ)
ALL PRICES IN INR (Rs)

GRID NAME - SEELAMPUR GRID							
S No.	DESCRIPTION OF SERVICE (ETC)	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Adaptor for Incomer Panel	Nos	2				
1.3	Bus Coupler Panel	Nos	2				
1.4	Bus Riser Panel with Bus PT	Nos	2				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	15				
1.7	Station Transformer Panel	Nos	1				
1.8	Adaptor Panel for Bus Coupling through Cable	Nos	4				
1.9	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.10	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
1.11	Ethernet Switches at 11 kV Switchgear	LOT	1				
2	ACDB	Nos	1				
3	Optical Fiber Cable	LOT	1				
4	SCADA Works	LOT	1				
5	End Termination Kit						
5.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	72				
5.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8				
5.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2				
5.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4				

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 4 of 15	Bidders seal & signature
--	--------------	--------------------------

BSES

BSES Yamuna Power Limited

6	Cable and Associated Items							
6.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1					
6.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1					
6.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1					
7	Earthing	LOT	1					
8	Conduits	LOT	1					
9	Illumination and Ventilation	LOT	1					
10	Fire Retardant Coating	LOT	1					
11	Insulated Floor Coating	LOT	1					
12	Emergency Exit Floor Marking	LOT	1					
13	Dismantling of 11 KV Switchgear with its Associated items Including Cables	LOT	1					
14	Dismantling of ACDB with its associated items	Nos	1					
15	Dismantling of Power Cables	LOT	1					
16	Disconnection of Power Cables	LOT	1					
17	Reconnection of Power Cables	LOT	1					
18	Training on application, programming, testing and commissioning of Numerical Relays	Day	2					
19	Training on IEC 61850	Day	1					
20	Painting of Feeder names (SCADA code, Asset Code, etc)	LOT	1					
21	Civil Work							
21.1	New Trench/Complete modification and repair of existing power cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1					
21.2	New Trench/Complete modification and repair of existing control cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1					
21.3	Power Cable Trench other than 11 KV Switchgear room	MTR	1					
21.4	Trench For road crossing	MTR	1					
21.5	Cable Clamping Arrangement	LOT	1					
21.6	Angle Channel Arrangement	LOT	1					
21.7	Flooring and skirting of 11 KV Switchgear Room	LOT	1					
21.8	Painting of 11 KV Switchgear Room	LOT	1					
GRAND TOTAL LANDED COST								
In words								
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement								

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 5 of 15	Bidders seal & signature
--	--------------	--------------------------



PRICE FORMAT – SUPPLY – IG STADIUM GRID (A) (Kindly refer detail SCOPE OF SUPPLY attached as Volume III for Indicative Description of Goods/BOM, BOQ)

ALL PRICES IN INR (Rs)

GRID NAME - IG STADIUM							
S No.	DESCRIPTION OF GOODS	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Bus Coupler Panel	Nos	1				
1.3	Bus PT Panel	Nos	1				
1.4	Bus Riser Panel with Bus PT	Nos	1				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	12				
1.7	Station Transformer Panel	Nos	2				
1.8	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.9	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
2	Ethernet Switches at 11 kV Switchgear	LOT	1				
3	DCDB	Nos	1				
4	ACDB	Nos	1				
5	Optical Fiber Cable	LOT	1				
6	SCADA Works	LOT	1				
7	End Termination Kit						
7.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	36				
7.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8				
7.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	4				
7.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	8				
8	Cable and Associated Items						
8.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1				
8.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1				
8.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1				
9	Earthing	LOT	1				
10	Conduits	LOT	1				

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 6 of 15	Bidders seal & signature
--	--------------	--------------------------



11	Illumination and Ventilation	LOT	1				
12	Fire Retardant Coating	LOT	1				
13	Insulated Floor Coating	LOT	1				
14	Tools and Accessories	LOT	1				
15	Emergency Exit Floor Marking	LOT	1				
16	Recommended and Mandatory Spares	LOT	1				
GRAND TOTAL LANDED COST							
In words							
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement							

PRICE FORMAT – E/T/C – IG STADIUM GRID (B) (Kindly refer detail SCOPE OF WORK attached as Volume III for Indicative Description of Services/BOM, BOQ)

ALL PRICES IN INR (Rs)

GRID NAME - IG STADIUM							
S No.	DESCRIPTION OF SERVICE (ETC)	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Bus Coupler Panel	Nos	1				
1.3	Bus PT Panel	Nos	1				
1.4	Bus Riser Panel with Bus PT	Nos	1				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	12				
1.7	Station Transformer Panel	Nos	2				
1.8	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.9	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
2	Ethernet Switches at 11 kV Switchgear	LOT	1				
3	DCDB	Nos	1				
4	ACDB	Nos	1				
5	Optical Fiber Cable	LOT	1				
6	SCADA Works	LOT	1				
7	End Termination Kit						
7.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	36				
7.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8				
7.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	4				
7.4	End Termination kit for 0.415 kV 4C X	Set	8				

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 7 of 15	Bidders seal & signature
--	--------------	--------------------------



	300 sqmm cable							
8	Cable and Associated Items							
8.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1					
8.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1					
8.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1					
9	Earthing	LOT	1					
10	Conduits	LOT	1					
11	Illumination and Ventilation	LOT	1					
12	Fire Retardant Coating	LOT	1					
13	Insulated Floor Coating	LOT	1					
14	Emergency Exit Floor Marking	LOT	1					
15	Dismantling of 11 KV Switchgear with its Associated items Including Cables	LOT	1					
16	Dismantling of DCDB with its associated items	Nos	1					
17	Dismantling of ACDB with its associated items	Nos	1					
18	Dismantling of Power Cables	LOT	1					
19	Disconnection of Power Cables	LOT	1					
20	Reconnection of Power Cables	LOT	1					
21	Painting of Feeder names (SCADA code, Asset Code, etc)	LOT	1					
22	Civil Work							
22.1	New Trench/Complete modification and repair of existing power cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1					
22.2	New Trench/Complete modification and repair of existing control cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1					
22.3	Power Cable Trench other than 11 KV Switchgear room	MTR	1					
22.4	Trench For road crossing	MTR	1					
22.5	Cable Clamping Arrangement	LOT	1					
22.6	Angle Channel Arrangement	LOT	1					
22.7	Flooring and skirting of 11 KV Switchgear Room	LOT	1					
22.8	Painting of 11 KV Switchgear Room	LOT	1					
GRAND TOTAL LANDED COST								
In words								
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement								

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 8 of 15	Bidders seal & signature
--	--------------	--------------------------



PRICE FORMAT – SUPPLY – GB PANT GRID (A) (Kindly refer detail SCOPE OF SUPPLY attached as Volume III for Indicative Description of Goods/BOM, BOQ)

ALL PRICES IN INR (Rs)

GRID NAME - GB PANT GRID							
S No.	DESCRIPTION OF GOODS	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Bus Coupler Panel	Nos	1				
1.3	Bus PT Panel	Nos	1				
1.4	Bus Riser Panel with Bus PT	Nos	1				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	15				
1.7	Station Transformer Panel	Nos	1				
1.8	Adaptor Panel for Bus Coupling through Cable	Nos	1				
1.9	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.10	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
2	Ethernet Switches at 11 kV Switchgear	LOT	1				
3	DCDB	Nos	1				
4	Auto Switched Capacitor Bank	Nos	1				
5	Numerical Relay for Auto Switched Capacitor Bank	Nos	1				
6	Optical Fiber Cable	LOT	1				
7	SCADA Works	LOT	1				
8	End Termination Kit						
8.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	54				
8.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	12				
8.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2				
8.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4				
9	Cable and Associated Items						
9.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1				

PRICE BID FORMAT
NIT NO: CMC/BY/23-24/RS/SKS/MD/2

Page 9 of 15

Bidders seal & signature



9.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1					
9.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1					
10	Earthing	LOT	1					
11	Conduits	LOT	1					
12	Illumination and Ventilation	LOT	1					
13	Fire Retardant Coating	LOT	1					
14	Insulated Floor Coating	LOT	1					
15	Tools and Accessories	LOT	1					
16	Emergency Exit Floor Marking	LOT	1					
17	Recommended and Mandatory Spares	LOT	1					
GRAND TOTAL LANDED COST								
In words								
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement								

PRICE FORMAT – E/T/C – GB PANT GRID (B) (Kindly refer detail SCOPE OF WORK attached as Volume III for Indicative Description of Services/BOM, BOQ)

ALL PRICES IN INR (Rs)

GRID NAME - GB PANT GRID							
S No.	DESCRIPTION OF SERVICE (ETC)	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Bus Coupler Panel	Nos	1				
1.3	Bus PT Panel	Nos	1				
1.4	Bus Riser Panel with Bus PT	Nos	1				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	15				
1.7	Station Transformer Panel	Nos	1				
1.8	Adaptor Panel for Bus Coupling through Cable	Nos	1				
1.9	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.10	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
2	Ethernet Switches at 11 kV Switchgear	LOT	1				
3	DCDB	Nos	1				
4	Auto Switched Capacitor Bank	Nos	1				
5	Numerical Relay for Auto Switched Capacitor Bank	Nos	1				

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 10 of 15	Bidders seal & signature
--	---------------	--------------------------



6	Optical Fiber Cable	LOT	1				
7	SCADA Works	LOT	1				
8	End Termination Kit						
8.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	54				
8.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	12				
8.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2				
8.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4				
9	Cable and Associated Items						
9.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1				
9.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1				
9.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1				
10	Earthing	LOT	1				
11	Conduits	LOT	1				
12	Illumination and Ventilation	LOT	1				
13	Fire Retardant Coating	LOT	1				
14	Insulated Floor Coating	LOT	1				
15	Emergency Exit Floor Marking	LOT	1				
16	Retrofitting of Numerical relay for Existing Capacitor Bank	Nos	1				
17	Dismantling of 11 KV Switchgear with its Associated items Including Cables	LOT	1				
18	Dismantling of DCDB with its associated items	Nos	1				
19	Dismantling of Power Cables	LOT	1				
20	Disconnection of Power Cables	LOT	1				
21	Reconnection of Power Cables	LOT	1				
22	Painting of Feeder names (SCADA code, Asset Code, etc)	LOT	1				
23	Civil Work						
23.1	New Trench/Complete modification and repair of existing power cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1				
23.2	New Trench/Complete modification and repair of existing control cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1				
23.3	Power Cable Trench other than 11 KV Switchgear room	MTR	1				

PRICE BID FORMAT
NIT NO: CMC/BY/23-24/RS/SKS/MD/2

Page 11 of 15

Bidders seal & signature



23.4	Trench For road crossing	MTR	1				
23.5	Cable Clamping Arrangement	LOT	1				
23.6	Angle Channel Arrangement	LOT	1				
23.7	Flooring and skirting of 11 KV Switchgear Room	LOT	1				
23.8	Painting of 11 KV Switchgear Room	LOT	1				
23.9	Providing and fixing of fire rated door	Nos	1				
23.10	Construction of RCC type foundation for capacitor bank	LOT	1				

GRAND TOTAL LANDED COST

In words

Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement

PRICE FORMAT – SUPPLY - KANTI NAGAR GRID (A) (Kindly refer detail SCOPE OF SUPPLY attached as Volume III for Indicative Description of Goods/BOM, BOQ)**ALL PRICES IN INR (Rs)**

GRID NAME - KANTI NAGAR GRID							
S No.	DESCRIPTION OF GOODS	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Bus Coupler Panel	Nos	1				
1.3	Bus PT Panel	Nos	1				
1.4	Bus Riser Panel with Bus PT	Nos	1				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	15				
1.7	Station Transformer Panel	Nos	1				
1.8	Adaptor Panel for Bus Coupling through Cable	Nos	1				
1.9	Earthing Truck for Bus bar Side Earthing	Nos	1				
1.10	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1				
2	Ethernet Switches at 11 kV Switchgear	LOT	1				
3	ACDB	Nos	1				
4	Optical Fiber Cable	LOT	1				
5	SCADA Works	LOT	1				
6	End Termination Kit						
6.1	End termination kit for 11kV, 1C x	Set	54				

PRICE BID FORMAT
NIT NO: CMC/BY/23-24/RS/SKS/MD/2

Page 12 of 15

Bidders seal & signature



	1000sqmm cable							
6.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8					
6.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2					
6.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4					
7	Cable and Associated Items							
7.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1					
7.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1					
7.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1					
8	Earthing	LOT	1					
9	Conduits	LOT	1					
10	Illumination and Ventilation	LOT	1					
11	Fire Retardant Coating	LOT	1					
12	Insulated Floor Coating	LOT	1					
13	Tools and Accessories	LOT	1					
14	Emergency Exit Floor Marking	LOT	1					
15	Recommended and Mandatory Spares	LOT	1					
GRAND TOTAL LANDED COST								
In words								
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement								

PRICE FORMAT – E/T/C – KANTI NAGAR GRID (B) (Kindly refer detail SCOPE OF WORK attached as Volume III for Indicative Description of Services/BOM, BOQ)

ALL PRICES IN INR (Rs)

GRID NAME - KANTI NAGAR GRID							
S No.	DESCRIPTION OF SERVICE (ETC)	UOM	QTY	UNIT BASIC PRICE INCL FREIGHT(Rs)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs)	UNIT LANDED COST(Rs)	TOTAL LANDED COST (Rs)
			(A)	(B)	(C)	(D = B+C)	(E = DXA)
1	11 kV Switchboard						
1.1	Incomer panel (with Line PT)	Nos	2				
1.2	Bus Coupler Panel	Nos	1				
1.3	Bus PT Panel	Nos	1				
1.4	Bus Riser Panel with Bus PT	Nos	1				
1.5	Capacitor Panel	Nos	2				
1.6	Outgoing Panel	Nos	15				

PRICE BID FORMAT NIT NO: CMC/BY/23-24/RS/SKS/MD/2	Page 13 of 15	Bidders seal & signature
--	---------------	--------------------------



1.7	Station Transformer Panel	Nos	1					
1.8	Adaptor Panel for Bus Coupling through Cable	Nos	1					
1.9	Earthing Truck for Bus bar Side Earthing	Nos	1					
1.10	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1					
2	Ethernet Switches at 11 kV Switchgear	LOT	1					
3	ACDB	Nos	1					
4	Optical Fiber Cable	LOT	1					
5	SCADA Works	LOT	1					
6	End Termination Kit							
6.1	End termination kit for 11kV, 1C x 100sqmm cable	Set	54					
6.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8					
6.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2					
6.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4					
7	Cable and Associated Items							
7.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1					
7.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1					
7.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1					
8	Earthing	LOT	1					
9	Conduits	LOT	1					
10	Illumination and Ventilation	LOT	1					
11	Fire Retardant Coating	LOT	1					
12	Insulated Floor Coating	LOT	1					
14	Emergency Exit Floor Marking	LOT	1					
15	Dismantling of 11 KV Switchgear with its Associated items Including Cables	LOT	1					
16	Dismantling of ACDB with its associated items	Nos	1					
17	Dismantling of Power Cables	LOT	1					
18	Disconnection of Power Cables	LOT	1					
19	Reconnection of Power Cables	LOT	1					
20	Painting of Feeder names (SCADA code, Asset Code, etc)	LOT	1					
21	Civil Work							

PRICE BID FORMAT
NIT NO: CMC/BY/23-24/RS/SKS/MD/2

Page 14 of 15

Bidders seal & signature



21.1	New Trench/Complete modification and repair of existing power cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1					
21.2	New Trench/Complete modification and repair of existing control cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1					
21.3	Power Cable Trench other than 11 KV Switchgear room	MTR	1					
21.4	Trench For road crossing	MTR	1					
21.5	Cable Clamping Arrangement	LOT	1					
21.6	Angle Channel Arrangement	LOT	1					
21.7	Flooring and skirting of 11 KV Switchgear Room	LOT	1					
21.8	Painting of 11 KV Switchgear Room	LOT	1					
GRAND TOTAL LANDED COST								
In words								
Note: All quantities mentioned above are estimated quantities. Actual quantities may vary as per actual site requirement								

VOLUME – III

**SCOPE OF TURNKEY EXECUTION &
TECHNICAL SPECIFICATIONS**

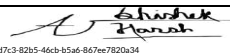


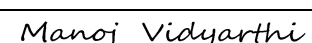

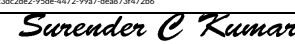
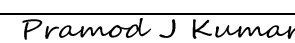
SUPPLY, INSTALLATION, TESTING & COMMISSIONING (SITC)


FOR

REPLACEMENT OF 11 KV AIS

AT

VARIOUS GRID SUBSTATIONS

Revision			0
Date			09.02.2023
Prepared by	Abhishek Harsh	CES	 326747c3-82b5-46cb-b5a6-867ec7820a34
Reviewed by	Srinivas Gopu	CES	 5d32525e-ed3a-4f41-b1c7-0ba5e77d1519
	Ashish Gupta	CIVIL	 94b6d815-d37c-4e5c-98b0-0e9970199bdc
	Manoj Vidhyarthi	P&E	 482e4648-110f-4d8f-9528-b52a523b0d85
Approved by	Gaurav Sharma	CES	 23dc2d82-95de-4472-99a7-dea873f472b6
	Surender Kumar	CIVIL	 b09b1829-cdec-434c-9f3f-55cc99e86708
	Pramod Kumar	P&E	 8bb6c4b3-a9d3-4f1e-a14e-527ef6e0034f

	BYPL-SOW-ROP-22-23-07-R0
SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S	

Contents

1	INTENT	3
2	SITE DETAILS.....	3
3	BIDDER’S SCOPE	3
4	APPROVED MAKE LIST	20

SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S
1 INTENT

- a. This document defines the scope for supply, installation, testing and commissioning of 11 KV AIS at various grid SS.
- b. This document shall be read in conjunction with all technical documents enclosed in tender. In event of any contradiction between tender documents, the most stringent one shall govern.

2 SITE DETAILS

S. No	Grid	Address	Latitude and Longitude
2.1	Seelampur	Seelampur Metro Mall, Seelampur, Shahdara, Delhi, 110053	28.671612989248594, 77.26786434847405
2.2	IG Stadium	Indraprastha Estate, Grand Trunk Rd, near Raj Ghat, IG Indoor Stadium, ITO, IP Estate, New Delhi, Delhi 110002	28.63100262288977, 77.24966747670729
2.3	GB Pant	GB Pant Grid Substation is situated near GB Pant Hospital Delhi 110002	28.63995276161045, 77.23288182802428
2.4	Kanti Nagar	286/5, Kanti Nagar East, Seelampur, Shahdara, Delhi, 110031	28.66805990256051, 77.27680558495113

3 BIDDER'S SCOPE


- a. Bidder's Scope includes design, engineering, manufacture, shop testing, inspection, packing, dispatch, supply, loading, unloading, storage at site, civil works, assembly, erection, complete pre-commissioning checks, testing & commissioning at site, obtaining statutory clearance & certification from Electrical Inspector and handing over of complete substation covered under scope of this document to BSES Yamuna Power Ltd.
- b. Any supply/work details not explicitly mentioned in this scope but mandatory for successful commercial operation of the substation shall be deemed to be included in bidder's scope.
- c. Bidder shall depute its representative at site to assess the condition of existing infrastructure in detail prior to submission of bid.

3.1 DESIGN & ENGINEERING

- a. Detailed design and engineering of complete project as per tender requirements shall be in bidder's scope.
- b. General guidelines for design are given below

3.1.1 CODES AND STANDARDS

- a. The bidder shall comply with latest Indian/International standard and CEA regulations.
- b. Refer respective equipment specification for applicable standards.

	BYPL-SOW-ROP-22-23-07-R0
SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S	

3.1.2 SERVICE CONDITIONS

3.1.2.1	Average grade atmosphere	Heavily polluted, Dry
3.1.2.2	Maximum altitude above sea level	1000M
3.1.2.3	Ambient air temperature	Highest 50Deg C, Average 40Deg C
3.1.2.4	Minimum ambient air temperature	0 Deg C
3.1.2.5	Relative Humidity	100%
3.1.2.6	Rainfall	750mm concentrated in four months
3.1.2.7	Seismic Condition	Zone IV
3.1.2.8	Max. Relative Humidity	100%

3.1.3 SYSTEM PARAMETERS

3.1.3.1	Nominal Voltage Kv	11
3.1.3.2	Rated voltage Kv	12
3.1.3.3	Power Frequency (kV rms) with stand voltage	28
3.1.3.4	Basic Insulation Level KVp	75
3.1.3.5	Rated Frequency Hz	50±5%
3.1.3.6	System Neutral Earthing	Solidly Grounded

3.2 SCOPE OF SUPPLY

S No.	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.2.1	11 kV Switchboard						For Seelampur & IG Stadium, panel depth shall not exceed 1800 mm
3.2.1.1	Incomer panel (with Line PT)	Nos	2	2	2	2	
3.2.1.2	Adaptor for Incomer Panel	Nos	2	0	0	0	For Connection of Incoming Cables
3.2.1.3	Bus Coupler Panel	Nos	2	1	1	1	
3.2.1.4	Bus PT Panel	Nos	0	1	1	1	
3.2.1.5	Bus Riser	Nos	2	1	1	1	

SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S


S No.	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
	Panel with Bus PT						
3.2.1.6	Capacitor Panel	Nos	2	2	2	2	
3.2.1.7	Outgoing Panel	Nos	15	12	15	15	
3.2.1.8	Station Transformer Panel	Nos	1	2	1	1	
3.2.1.9	Adaptor Panel for Bus Coupling through Cable	Nos	4	0	1	1	Provision for termination of 3RX1CX1000 sqmm 11 kV cable per phase
3.2.1.10	Earthing Truck for Bus bar Side Earthing	Nos	1	1	1	1	
3.2.1.11	Earthing Truck for Cable Side Earthing for Panel of Each Size	Nos	1	1	1	1	
3.2.2	Ethernet Switches at 11 kV Switchgear	LOT	1	1	1	1	a) Number of Ethernet Switches shall be as per System Architecture b) 20% of the ports shall be spare.
3.2.3	DCDB	Nos	0	1	1	0	Height of DCDB shall not exceed 2.3 meters
3.2.4	ACDB	Nos	1	1	0	1	Height of ACDB shall not exceed 2.3 meters
3.2.5	Auto Switched Capacitor Bank	Nos	0	0	1	0	
3.2.6	Numerical Relay for Auto Switched Capacitor Bank	Nos	0	0	1	0	At Existing 11 KV Switchgear
3.2.7	Optical Fiber Cable	LOT	1	1	1	1	For Communication between Relay and Ethernet Switch
3.2.8	SCADA Works	LOT	1	1	1	1	As per Specification
3.2.9	End Termination Kit						

SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S

S No.	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.2.9.1	End termination kit for 11kV, 1C x 1000sqmm cable	Set	72	36	54	54	a) For Terminating 11 kV Cables at 11 kv incomer end b) For Terminating 11 kV Cables at Transformer end c) For interconnection of 11 Kv Switchgears
3.2.9.2	End Termination kit for 11kV, 3C x 300 sqmm cable	Set	8	8	12	8	For Terminating 11 kV Cables at 11 kV Capacitor Bank end and 11 kV Capacitor Panel end
3.2.9.3	End termination kit for 11kV, 3C x 300 sqmm cable	Set	2	4	2	2	For Terminating 11 kV Cables at 11 kV Station Transformer Panel and Station Transformer
3.2.9.4	End Termination kit for 0.415 kV 4C X 300 sqmm cable	Set	4	8	4	4	For Terminating 0.415 kV Cables at ACDB and Station Transformer
3.2.10	Cable and Associated Items						For Items specified in "Scope of Supply"
3.2.10.1	Control Cables with proper ferruling and tagging along with glands and lugs	LOT	1	1	1	1	a) Control Cable size shall be 6CX2.5 sqmm abd 10CX2.5 sqmm only b) It shall also include control cables for LV REF, Capacitor bank and Station Transformer
3.2.10.2	Auxiliary Power Cable with proper ferruling and tagging along with glands and lugs	LOT	1	1	1	1	

SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S

S No.	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.2.10.3	Cable Tray including bends etc with 50% spare capacity in each	LOT	1	1	1	1	a) For items specified in "Scope of Supply" and "Free Issue Items" b) 50% spare capacity in each is tray is required
3.2.11	Earthing	LOT	1	1	1	1	a) Earthing for Items specified in "Scope of Supply" with 50x6 GI flat b) Two earthing per equipment shall be considered c) Connection of GI Flat with existing earth mesh shall be in bidder's scope
3.2.12	Conduits	LOT	1	1	1	1	
3.2.13	Illumination and Ventilation	LOT	1	1	1	1	
3.2.14	Fire Retardant Coating	LOT	1	1	1	1	On all cables specified in "Scope of Supply" and "Free Issue Items"
3.2.15	Insulated Floor Coating	LOT	1	1	1	1	a) For Switchgears b) Insulated Floor coating shall be 2m meter around supplied equipment
3.2.16	Tools and Accessories	LOT	1	1	1	1	For Items specified in "Scope of Supply"
3.2.17	Emergency Exit Floor Marking	LOT	1	1	1	1	
3.2.18	Recommended and Mandatory Spares	LOT	1	1	1	1	As per Specification of Supplied items
3.2.19	Civil	LOT	1	1	1	1	a) All Material Required for civil works b) Kindly refer "Scope of Work"

 BSES BSES Yamuna Power Limited	BYPL-SOW-ROP-22-23-07-R0
SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S	

3.3 SCOPE OF WORK

Broad scope of work is specified below. Refer respective equipment/work specifications for detailed scope of work.

S. No	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.3.1	Erection, Testing and Commissioning of all items specified in "Scope of Supply" and "Free Issue Items"	LOT	1	1	1	1	
3.3.2	Retrofitting of Numerical relay for Existing Capacitor Bank	Nos	0	0	1	0	
3.3.3	Dismantling of 11 KV Switchgear with its Associated items Including Cables	LOT	1	1	1	1	a) It includes dismantling of 11 kV CRP with Its Associated Items if any b) It includes bus duct if any
3.3.4	Dismantling of DCDB with its associated items	Nos	0	1	1	0	It also includes disconnection and reconnection of cables
3.3.5	Dismantling of ACDB with its associated items	Nos	1	1	0	1	It also includes disconnection and reconnection of cables
3.3.6	Dismantling of Power Cables	LOT	1	1	1	1	Dismantling of Power Cables associated to Incomer Panel, Capacitor Panel, Station Transformer Panel and interconnection if any
3.3.7	Disconnection of	LOT	1	1	1	1	For all 11 KV

SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S

S. No	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
	Power Cables						Switchgears
3.3.8	Reconnection of Power Cables	LOT	1	1	1	1	For Incomer, Station Transformer Panel and Capacitor Panel
3.3.9	Training on application, programming, testing and commissioning of Numerical Relays	Day	2	0	0	0	One-day classroom training at BYPL Training Centre and one-day onsite training. Training shall be provided by Domain experts only
3.3.10	Training on IEC 61850	Day	1	0	0	0	Classroom Training
3.3.11	Painting of Feeder names (SCADA code, Asset Code, etc)	LOT	1	1	1	1	It Includes Supply Part
3.3.12	Civil Work						
3.3.12.1	New Trench/Complete modification and repair of existing power cable trench in 11 KV Switchgear room for installation of offered Switchgears	LOT	1	1	1	1	It includes a) Angle Channel Arrangement b) RCC, Plastering works c) Anchor Fastener Works d) Resizing of trench e) Trench Covers, cable tray and cable support Structure
3.3.12.2	New Trench/Complete modification and repair of existing control cable trench in 11 KV	LOT	1	1	1	1	It includes a) Angle Channel Arrangement b) RCC, Plastering

SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S


S. No	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
	Switchgear room for installation of offered Switchgears						works c) Anchor Fastener Works d) Resizing of trench e) Trench Covers, cable tray and cable support Structure
3.3.12.3	Power Cable Trench other than 11 KV Switchgear room	meter	1	1	1	1	a) Unit rate shall be provided for 1.5 meter (Depth)X1.5 meter (Width) Trench b) Cable trench shall be of RCC type c) It Includes Trench Covers, cable tray and cable support Structure
3.3.12.4	Trench For road crossing	meter	1	1	1	1	a) Unit rate shall be provided for 1.5 meter (Depth)X1.5 meter (Width) Trench b) Cable trench shall be of RCC type c) It Includes Trench Covers, cable tray and cable support Structure d) Box Culvert (For 100 Ton Load) shall be provided

SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S

S. No	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.3.12.5	Cable Clamping Arrangement	LOT	1	1	1	1	For items specified in "Scope of Supply" and "Free Issue Items"
3.3.12.6	Angle Channel Arrangement	LOT	1	1	1	1	For items specified in "Scope of Supply" and "Free Issue Items"
3.3.12.7	Flooring and skirting of 11 KV Switchgear Room	LOT	1	1	1	1	Kota stone flooring
3.3.12.8	Painting of 11 KV Switchgear Room	LOT	1	1	1	1	
3.3.12.9	Providing and fixing of fire rated door	Nos	0	0	1	0	
3.3.12.10	Construction of RCC type foundation for capacitor bank	LOT	0	0	1	0	Considering soil bearing capacity of 7.5 T/m ² at 1.5m depth

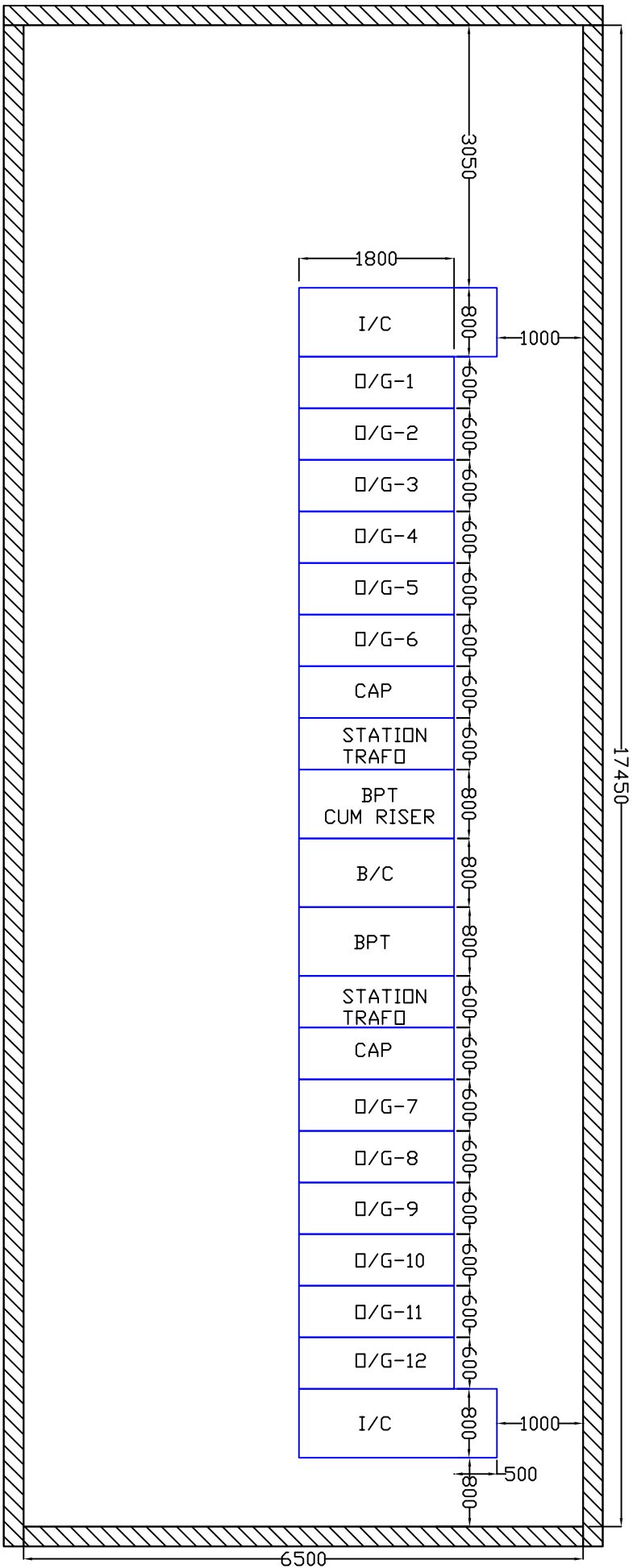
3.4 FREE ISSUE ITEMS

S No.	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.4.1	11 kV 1CX1000 sqmm XLPE insulated, stranded Aluminium conductor, PVC outer sheath cable	LOT	1	1	1	1	a) From 11 kV Incomer Panel to Power Transformer b) For interconnection of 11 kV Switchgears
3.4.2	11 kV 3CX300 sqmm XLPE insulated, stranded aluminum conductor, PVC outer sheath Power cable	LOT	1	1	1	1	From 11 kV Capacitor Panel to Capacitor Bank

	BYPL-SOW-ROP-22-23-07-R0
SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S	


S No.	Items	UOM	Quantity				Remarks
			Seelampur	IG Stadium	GB Pant	Kanti Nagar	
3.4.3	11 kV 3CX300 sqmm XLPE insulated, stranded aluminum conductor, PVC outer sheath Power cable	LOT	1	1	1	1	For Station transformer
3.4.4	0.415 kV 2R X 4C X 300 sqmm XLPE Insulated stranded conductor, PVC outer Sheath Power Cable	LOT	1	1	1	1	For Station Transformer

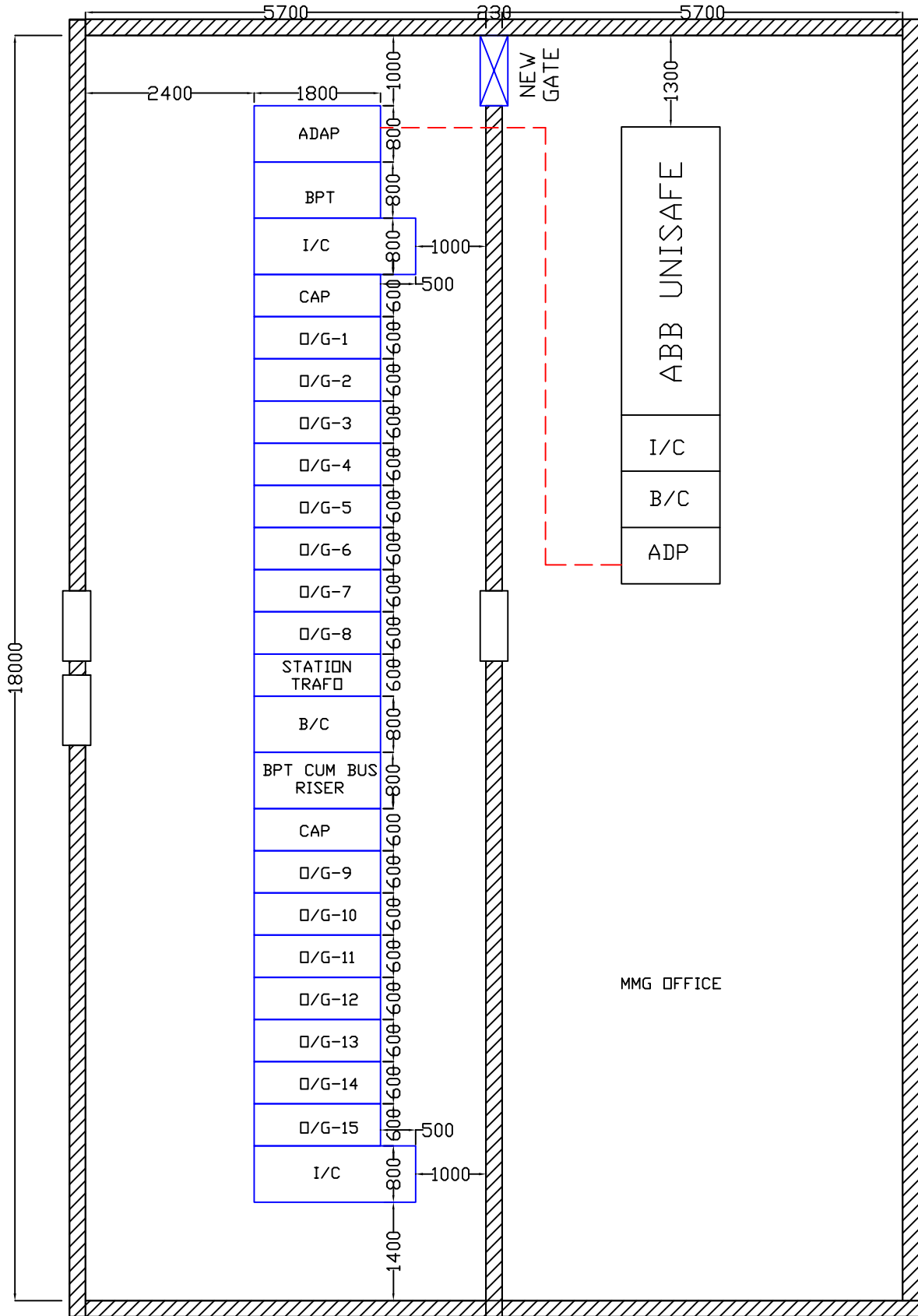
3.5 REFERENCE LAYOUT



NEW JOB

- NOTE:-
1. ALL DIMENSION ARE IN MM
 2. LAYOUT IS TENTATIVE AND FOR REFERENCE ONLY
 3. ROOM HEIGHT = 2800 mm

DRAWN	R.K.	
CHECKED	A.H./S.G.	
APPD.	G.S.	
DATE	18/01/23	
SCALE	NTS	
TITLE:-		BSES Yamuna Power Limited IG STADIUM PROPOSED SWITCHGEAR ROOM LAYOUT



NOTE:-

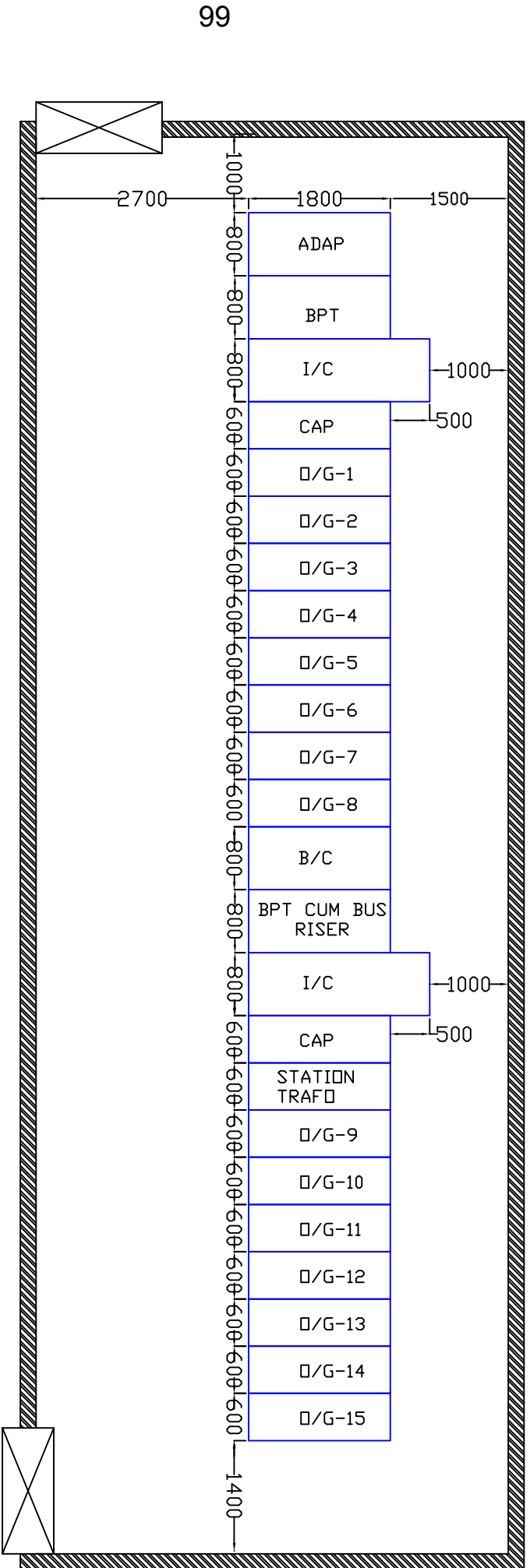
1. ALL DIMENSION ARE IN MM
2. LAYOUT IS TENTATIVE AND FOR REFERENCE ONLY

- NEW JOB
- - - CABLE COUPLING

DRAWN	R.K	TITLE:- PROPOSED LAYOUT FOR 11KV AIS AT G.B.PANT
CHECKED	A.H./S.G.	
APPD.	G.S	
DATE	18.01.23	



PROPOSED 11 KV PANEL ROOM LAYOUT KANTI NAGAR GRID



99

- NOTE:-
1. ALL DIMENSION ARE IN MM
 2. LAYOUT IS TENTATIVE AND FOR REFERENCE ONLY
 3. ROOM HEIGHT = 3500MM

NEW JOB

DRAWN	R.K
CHECKED	A.H./S.G.
APPD.	G.S
DATE	18.01.23
SCALE	NTS

TITLE:-
 PROPOSED 11 KV
 PANEL ROOM LAYOUT
 KANTI NAGAR GRID



SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S
3.6 SCOPE DEMARCATION

S. No	Head	BYPL	Bidder's Scope	Remarks
3.6.1	Permissions from Various External and Internal Agencies other than Tree Cutting permission	x	✓	Statutory fees will be borne by BYPL if applicable
3.6.2	Permit to work request to BYPL authority	x	✓	Permit Should be applied to Engineer Incharge prior to work through proper procedure
3.6.3	Permit to work issuance from BYPL authority	x	✓	
3.6.4	Testing Equipment	x	✓	
3.6.5	Lighting Arrangement	x	✓	
3.6.6	Construction Power and Construction Water	x	✓	For construction power, bidder may take temporary connection from BYPL on chargeable basis.
3.6.7	Safety and Security of Manpower(Labor, Engineers, Supervisors etc)	x	✓	
3.6.8	Various Tools and Tackles related to Job	x	✓	
3.6.9	Loading, Unloading and Transportation of Material	x	✓	a) It includes transportation of dismantled equipment to BYPL store in stacked manner. b) It also includes items specified in "Free Issue Items"
3.6.10	Cleanliness around work premises	x	✓	
3.6.11	Document/Drawing Submission	x	✓	
3.6.12	Document/Drawing Approval	✓	x	
3.6.13	Security and Safety of material until handover	x	✓	
3.6.14	Various Machines e.g. Crane, Hydra, JCB etc to complete the Job	x	✓	
3.6.15	Maintenance of Equipment Until Handover to Engineer Incharge and EHV O&M	x	✓	

SITC FOR REPLACEMENT OF 11 KV PANELS AT VARIOUS GRID S/S

S. No	Head	BYPL	Bidder's Scope	Remarks
3.6.16	Electrical Inspector Clearance	x	✓	Only statutory fees will be borne by BYPL if applicable
3.6.17	Permit issuing agency for Works inside BYPL Premises	✓	x	
3.6.18	Permit requesting Agency	x	✓	Permit Should be applied to Engineer In charge prior to start of work. Isolation & permit of only one Feeder at a time, shall be given at a time, during final hook up. All necessary preparation works to be made, in order to minimize the Shutdown Time.
3.6.19	Temporary office near work premises	x	✓	After handing over the equipment, contractor has to evacuate the premises within one week otherwise deemed fit action will be taken
3.6.20	Temporary store at work premises	x	✓	
3.6.21	Yard aesthetics at work place should be maintained at the time and after the completion of Work	x	✓	Disposal of Scrap/Debris etc from site and complete cleaning of working area till handover
3.6.22	Any damages done to the existing system, shall be repaired/ rectified/ replaced	x	✓	
3.6.23	Clearance certificate	x	✓	Clearance Certificate shall be taken from BYPL Departments (Quality, Safety, Protection, O&M, SCADA, EHV, Civil, etc) before Final Charging of the Systems. Any Site Observations/ Punch points, observed during execution, shall be attended.
3.6.24	External Agency Clearance	x	✓	Statutory fee shall be borne by BYPL
3.6.25	Various compliances pertaining to Job	x	✓	IE rules, CEA Regulation 2010
3.6.26	Any accident of employee & its liabilities after accident / death during work	x	✓	

SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S

3.7 DOCUMENTATION

Document/Drawing submission shall be as per the matrix given below:

- a. All documents/drawings shall be provided in soft copy only.
- 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, Pre closure
- e. No submission is acceptable without check list compliance.
- f. Deficient/ improper document/ drawing submission shall be liable for rejection.
- g. Order of documents shall be strictly as per the check list.
- h. 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	Technical Bid	Drawing Approval	Pre-Dispatch	Pre-Closure
3.7.1	Tender No.	Required			
3.7.2	Communication Details				
3.7.2.1	Name of the Bidder	Required			
3.7.2.2	Name of Authorized contact person	Required			
3.7.2.3	Contact No. of Authorized contact person	Required			
3.7.2.4	E-mail id of Authorized contact person	Required			
3.7.3	Document Submission Format				
3.7.3.1	Documents shall be submitted in Box file/spiral binding. Any other format is not acceptable	Required			
3.7.3.2	Index of documents with page numbers for each document	Required			
3.7.3.3	Separator with document description shall be provided before each document	Required			
3.7.4	Qualifying Requirement Compliance	Required			
3.7.4.1	Summary of compliance of qualifying criteria in tabular form along with summary of documentary proof provided	Required			
3.7.4.2	Detailed Documents supporting compliance of qualifying criteria	Required			
3.7.5	Drawings/ Documents as per Technical Specification.				
3.7.5.1	Signed copy of technical specification	Required			

SITC FOR REPLACEMENT OF 11 kV PANELS AT VARIOUS GRID S/S

S. No.	Description	Technical Bid	Drawing Approval	Pre-Dispatch	Pre-Closure
3.7.5.2	Type Test reports of offered model/ type/ rating	Required	Required		
3.7.5.3	Deviation Sheet	Required	Required		
3.7.5.4	Detailed Drawings	Required	Required		
3.7.5.5	Other drawing/ documents mentioned in technical specification	Required	Required		
3.7.5.6	Soft copy of complete technical bid in pen drive	Required			
3.7.5.7	Samples as per technical specification.	Required			
3.7.5.8	Design Calculation		Required		
3.7.5.9	Manufacturer's quality assurance plan		Required		
3.7.5.10	GTP		Required		
3.7.5.11	Inspection Reports			Required	
3.7.5.12	As manufacturing Drawings			Required	
3.7.5.13	Operation and Maintenance Manual			Required	
3.7.5.14	As built Drawings				Required
3.7.6	Soft Copy				
3.7.6.1	In Pen drive	Required			
3.7.6.2	Through Mail		Required	Required	Required

4 APPROVED MAKE LIST

Following table contains Approved Make List. Although, any make other than specified in table shall be subject to BSES Yamuna Power Limited Approval.

S. No	Equipment	MAKE
4.1.1	11 kV AIS	ABB/Siemens/Schneider
4.1.2	Auto Switched Capacitor Bank	ABB/Shreem/EPCOS
4.1.3	11 kV End Termination kit	Raychem/3M/Yamuna Cable Accessories
4.1.4	Control cable	Universal/KEI/GEMSCAB/Polycab/ Cords Cable
4.1.5	Numerical relays	Siemens Siprotec series/7SR5 Series, Schneider / GE Micom Series, Schneider P5 Series
4.1.6	Ethernet Switch	Ruggedcom, Hirschman
4.1.7	Fire retardant coating for cables	3M/Demech/Stanvac
4.1.8	Floor coating	3M/Demech/Stanvac






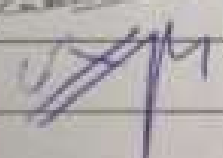
BSES

Technical Specification

Of

HT Indoor Switchgear (33 & 11 kV)

Specification no – BSES-TS-66-HTSWG-R0

Rev:	0	
Date:	22 Jun 2022	
Prepared by	Abhishek Harsh	
	Hemanshi Kaul	
Reviewed by	Srinivas Gopu	
	Abhinav Srivastava	
Approved by	Gaurav Sharma	
	Gopal Nariya	

INDEX

1	SCOPE OF SUPPLY.....	3
2	CODES & STANDARDS.....	3
3	SERVICE CONDITION.....	4
4	PANEL CONSTRUCTION.....	4
5	CIRCUIT BREAKER.....	6
6	FUNCTIONAL REQUIREMENTS.....	7
7	SURGE SUPPRESSOR.....	10
8	CURRENT TRANSFORMER.....	10
9	POTENTIAL TRANSFORMER.....	10
10	FEEDER AND BUS EARTHING.....	10
11	EQUIPMENT EARTHING.....	11
12	METERS.....	11
13	INDICATION, ALARMS & ANNUNCIATION.....	12
14	SELECTOR SWITCHES & PUSH BUTTONS.....	14
15	INTERNAL WIRING.....	14
16	TERMINAL BLOCKS.....	15
17	RELAYS.....	16
18	SYNCH CHECK PHILOSOPHY.....	28
19	ETHERNET SWITCHES & FIBRE OPTICS.....	29
20	SPACE HEATERS.....	30
21	SOCKETS, SWITCHES ,ILLUMINATION LAMPS & MCBs.....	30
22	NAMEPLATES AND MARKING.....	31
23	SURFACE TREATMENT & PAINTING.....	32
24	APPROVED MAKES OF COMPONENTS.....	32
25	INSPECTION , TESTING & QUALITY ASSURANCE.....	33
26	PACKING.....	34
27	SHIPPING.....	35
28	HANDLING AND STORAGE.....	35
29	DEVIATION.....	35
30	ACCESSORIES & TOOLS.....	36
31	DRAWINGS & DATA SUBMISSION MATRIX.....	36
	ANNEXURE – A - SCOPE OF SUPPLY.....	39
	ANNEXURE – B – TRANSFORMER MONITORING CUM AVR RELAY.....	40
	ANNEXURE – C - TECHNICAL PARTICULARS.....	43
	ANNEXURE – D - GUARANTEED TECHNICAL PARTICULARS (DATA BY BIDDER).....	47
	ANNEXURE – E – SPARES REQUIREMENT.....	48
	ANNEXURE – F – SLDs.....	48

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)
1 SCOPE OF SUPPLY

- a. This specification covers the design, manufacture, testing, supply, erection & commissioning of 33kV and 11kV, Air Insulated, metal-enclosed and factory assembled switchgear.
- b. This specification shall be used in conjunction with all specifications, switchgear data sheets, single line diagrams, and other drawings attached to the specification / purchase requisition.

2 CODES & STANDARDS

Materials, equipment and methods used in the manufacture of switchboards shall conform to the latest edition of following

2.1	Indian Electricity Rules 1956	Latest edition
2.2	Indian Electricity act 1910	Latest edition
2.3	Switchgear and control gear	IEC : 60694, IEC: 60298, IEC : 62271-200, IEC : 60529, IS: 3427, IS: 12729, IS: 12063, IS: 13947, IS: 9046
2.4	Circuit breaker	IEC 62271 - 100, IS 13118, IS 2516
2.5	Isolators & earthing switches	IEC 62271 - 102
2.6	Current transformers	IS:2705, IEC:60185
2.7	Voltage transformer	IS:3156, IEC:60186,
2.8	Indicating Instruments	IS:1248
2.9	Energy meters	IS 13010
2.10	Relays	IS:8686, IS:3231, IS:3842
2.11	Control switches and push buttons	IS 6875
2.12	HV fuses	IS 9385
2.13	Arrangement of Switchgear bus bars, main connections and auxiliary wiring	IS:375
2.14	Code of practice for phosphating iron & steel	IS 6005
2.15	Colours for ready mixed paints	IS 5
2.16	Code of practice for installation and maintenance of switchgear	IS 3072

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

3 SERVICE CONDITION

3.1	Max Ambient Temperature	50 deg C
3.2	Max Daily average ambient temp	40 deg C
3.3	Min Ambient Temp	0 deg C
3.4	Maximum Humidity	95%
3.5	Minimum Humidity	10%
3.6	Maximum annual rainfall	750 mm
3.7	Average no of rainy days per annum	60
3.8	Rainy months	June to Oct
3.9	Altitude above MSL	300 M
3.10	Seismic Zone	IV

4 PANEL CONSTRUCTION

4.1	Enclosure Type	Free standing, Indoor, Fully compartmentalised, Metal clad, Vermin proof
4.2	Enclosure degree of protection	IP 4X for high voltage compartment IP 5X for low voltage compartment
4.3	Enclosure material	Pre-Galvanized CRCA steel
4.3.1	Load bearing members	2.5 mm thick
4.3.2	Doors and covers	2.0 mm thick
4.3.3	Gland plate	3.0 mm MS for multicore and 5.0 mm Aluminium for single core cables. All gland plates should be detachable type with gasket
4.4	Dimension of Panel	Maximum 2700mm, Operating height maximum 1600mm. In case of Extension of Existing make panels, vendor shall match the dimension of existing panel.
4.5	Extensibility	On either side
4.6	Separate Compartments for	Bus bar, Circuit Breaker, HV incoming cable, HV outgoing cable, PT, LV instruments & relays
4.7	Transparent inspection window	For cable compartment at height of cable termination.
4.8	Bus end cable box	For direct cable feeder from bus
4.9	Rear Doors	Rear doors shall not be interlocked i.e. all door opening shall be independent to each other.

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

4.10	Breaker compartment door	Separate, with lockable handle (Design with breaker trolley as the front cover is not acceptable). Door of one panel should not cause hindrance for opening of adjacent panel.
4.11	Inter compartmental connections	
4.11.1	Breaker to bus bar compartment	Through seal-off bushings
4.11.2	Breaker to cable compartment	Through seal-off bushings
4.12	Nut Bolt	Shall be as less as possible for ease of opening of compartments
4.13	Pressure relief devices	To be provided for each HV compartment
4.14	Bus support insulator	Non-hygroscopic, track-resistant, high strength, Epoxy insulators (Calculation for validating dynamic force withstand capability to be submitted during detailed engineering)
4.15	Fixing arrangement	Doors - Concealed hinged, door greater than 500mm shall have minimum three sets of hinges Covers - SS bolts Gasket - Neoprene
4.16	Required HV cable termination height in the cable compartment	650 mm for 11 KV. 1000mm for 33 KV
4.17	Panel Base Frame	Steel Base frame as per manufacturer's standard.
4.18	Handle	Removable bolted covers with handle for cable chamber and busbar chamber. Panel no./identification to be provided on cable box cover also.

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

4.19	APFC	<p>a. Controlling of Capacitor Banks' switching shall be done by APFC. Although APFC shall not be in bidder's scope, Space for cut out shall be provided in the Capacitor panel. Space requirement-150X150 mm²</p> <p>b. Wiring of Bus PT , Incomer CT and Capacitor CT upto spare terminal for APFC shall also be provided in Capacitor Panel</p>
4.20	Technical particulars	As per Annexure –C

5 CIRCUIT BREAKER

5.1	Type	Truck or cassette type
5.2	Mounting	On withdrawable truck or carriage, with locking facility in service position.
5.3	Switching duty	<p>c. Transformer (oil filled and dry type)</p> <p>d. Motor (of small and large ratings – DOL starting with starting current 6 to 8 times the full load current & with a maximum of 3 starts per hour)</p> <p>e. Underground cable with length up to 10 km</p>
5.4	Interrupting medium	Vacuum
5.5	Contact	Tulip contact shall be provided without any gap between contacts
5.6	Breaker operation	Three separate identical single pole units operated through the common shaft
5.7	Operating Mechanism	Re-strike free, Trip free, with electrical anti-pumping feature
5.7.1	Type	Motor wound, spring charged, stored energy type with manual charging facility
5.7.2	Operation on supply failure	One O-C-O operation possible after failure of power supply to the spring charging motor
5.8	Breaker indications & push buttons	


TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

5.8.1	ON/ OFF / Emergency trip push button	<p>a. Manual / mechanical.</p> <p>b. Emergency Off push button should be provided with a protective flap.</p> <p>c. Mechanical ON shall have padlocking facility.</p>
5.8.2	Mechanical ON – OFF indication	On breaker trolley front
5.8.3	Operation counter	On breaker trolley front
5.8.4	Test-service position indicator	On breaker trolley front
5.8.5	Mechanism charge / discharge indicator	On breaker trolley front
5.9	Breaker positions	Service, Test and Isolated
5.10	Inter changeability	Possible, only with breaker of same rating
5.11	Breaker Control	On panel front only
5.12	Handle	Breaker shall be provided with handles for easy handling, rack in–out operation and manual spring charging as applicable.
5.13	Pin Sequence and Configuration of Pin of Adaptor Plug	<p>(a) Pin sequence and No of Pins of Adaptor plug shall be same in Outgoing and Capacitor Panel</p> <p>(b) Pin sequence and No of Pins of Adaptor plug shall be same in Incoming and Bus Coupler Panel</p>
5.14	Technical particulars	As per Annexure-C

6 FUNCTIONAL REQUIREMENTS

6.1	Interlocks	
6.1.1	Breaker compartment door opening	Opening of door and rack out to test/isolated position should be possible with breaker in OFF position only.
6.1.2	Breaker compartment door closing	Should be possible even when breaker is in isolated position
6.1.3	Racking mechanism safety interlock	Mechanical type
6.1.4	Racking in or out of breaker inhibited	When the breaker is closed

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

6.1.5	Racking in the circuit breaker inhibited	Unless the control plug is fully engaged
6.1.6	Disconnection of the control plug inhibited	As long as the breaker is in service position
6.1.7	Opening of cable compartment cover of Incomer Panels inhibited	As long as cable end is alive
6.2	Safety Devices	
6.2.1	Exposure to live parts	In case the breaker panel door is required to be opened during a contingency, the personnel should not be exposed to any live part. Suitable shrouds/barriers/insulating sleeves should be provided.
6.2.2	Breaker handling	In case the breaker is mounted on a carriage which does not naturally roll out on the floor, a trolley for handling the breaker is to be provided.
6.3	Operation of breaker	In either service or test position
6.3.1	Closing from local	Only when local/remote selector switch is in local position
6.3.2	Closing from remote	Only when local/remote selector switch is in remote position
6.3.3	Tripping from local	Only when local/remote selector switch is in local position
6.3.4	Tripping from remote	Only when local/remote selector switch is in remote position
6.3.5	Tripping from protective relays	Irrespective of position of local/remote switch
6.3.6	Testing of breaker	In test or isolated position keeping control plug connected
6.4	Safety shutters.	

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

6.4.1	Automatic safety shutter for female primary disconnects	To fully cover contacts when breaker is withdrawn to test. Independent operating mechanism for bus bar & cable side shutters, separately pad-lockable in closed position.
6.4.2	Label for identification	For Bus side and cable side shutters
6.4.3	Warning label on shutters of incoming and other connections	Clearly visible label "Isolate elsewhere before earthing" be provided
6.5	Breaker electrical operation features	
6.5.1	Trip circuit supervision	To be given for breaker close & open condition
6.5.2	Trip circuit supervision relay contact	For indication, alarm & to inhibit closing of breaker
6.5.3	Emergency trip push button contact	Wired directly to trip coil (wired to Master trip relay if second trip coil provided)
6.5.4	Emergency trip push button contact	Wired to inhibit closing of breaker
6.5.5	Master trip relay contact (if given)	Wired to inhibit closing of breaker
6.5.6	Tripping or opening of breaker through relay but not routed through Lockout (Example- SCADA Opening, Undervoltage, Overvoltage)	Wired to Contact multiplication Relay and then from CMR to tripping of breaker
6.5.7	Closing of breaker through relay	Wired to Contact multiplication Relay and then from CMR to closing of breaker
6.6	DC control supply bus in all panels	Fed by two DC incoming sources in Bus coupler panel with auto changeover facility
6.7	PT supply bus in all panels	Fed normally by bus PT with automatic changeover facility to incomer line PT
6.8	Flaps for Internal Arc Protection	Flaps shall not have any pores/ opening during normal operation

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

7 SURGE SUPPRESSOR

7.1	Provision	To be provided in all panels except bus coupler and BPT.
7.2	Type	Gapless, metal oxide type
7.3	Technical particulars	As per Annexure -C

8 CURRENT TRANSFORMER

8.1	Type	Shall be cast resin type with insulation class of E or better.
8.2	Rating and technical particulars	As per Annexure – C (Technical particulars) and Annexure – F (SLDs)
8.3	CBCT	If specified, bidder shall clearly mention his proposal for mounting the same.

9 POTENTIAL TRANSFORMER

9.1	Type	Shall be cast resin type with insulation class of E or better.
9.2	Rating and technical particulars	As per Annexure – C (Technical particulars) and Annexure – F (SLDs)
9.3	Mounting	It shall be mounted on a withdrawable carriage. Mounting of PT on the breaker truck is not acceptable. Mounting of PT on the panel top is also not acceptable. Primary PT fuse shall be easily accessible.
9.4	Neutral	The HV neutral connection to earth shall be easily accessible for disconnection during HV test.

10 FEEDER AND BUS EARTHING

10.1	Earthing arrangement	Through separate earthing truck for bus & feeder
10.2	Short time withstand capacity of earthing truck	Equal to rating of breaker. Refer technical parameters.
10.3	Operation from front	Mechanically operated by separate switch.

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

10.4	Interlocks and Alarm	To prevent inadvertent closing on live circuit, with padlocking arrangement to lock truck in close or open position.
------	----------------------	--

11 EQUIPMENT EARTHING

11.1	Material of earthing bus	Aluminium
11.2	Earthing Bus Position	It shall run through whole switchgear passing nearer to Power Cable Position
11.3	Earth bus joints	All bolted joints in the bus should be made by connection of two bolts.
11.4	Rating	Sized for rated short circuit current for 3 seconds
11.5	Enclosure & non -current carrying part of the switchboard / components	Effectively bonded to the earth bus.
11.6	Hinged doors	Earthed through flexible copper braid
11.7	Circuit breaker frame /carriage	Earthed before the main circuit breaker contacts/ control circuit contacts are plugged in the associated stationary contacts
11.8	Metallic cases of relays, instruments and other LT panel mounted equipment	Connected to the earth bus by independent copper wires of size not less than 2.5 sq. mm with green colour insulation. For this purpose LT compartment should have a clear designated earth bus to which earth connections from all components are to be connected.
11.9	CT and PT neutral	Earthed at one place at the terminal blocks through links.

12 METERS

12.1	Mounting	Flush mounted
12.2	Multifunction Meter	
12.2.1	SCADA Interfacing	RS485 rear port suitable for integration on Modbus Protocol
12.2.2	Size	96x96 mm ²

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

12.2.3	Panels where to be provided	All panels except Bus PT Panel
12.2.4	Accuracy Class	0.2
12.2.5	Signal List	R-Ph Current, Y-Ph Current, B-Ph Current, Neutral Current, R-Y Ph Voltage, Y-B Ph Voltage, B-R Ph Voltage, Active Power, Active Energy, Reactive Power, Power Factor, Max Demand, Phase angle 1, Phase angle 2, Phase angle 3, THD Mean Current, THD Mean Voltage
12.2.6	Data Type	MFI
12.2.7	Compatibility with RTU	ABB 560
12.2.8	Programmability	CT secondary shall be programmable i.e for both 1 A and 5 A
12.2.9	Auxiliary Supply	a. 48 – 240VDC and AC i.e universal type. b. Although in Scheme, MFM must be wired up with DC only
12.3	Voltmeter	Digital type with programmable ratio
12.3.1	Size	96x96 mm ²
12.3.2	Panels where to be provided	Incomer and bus PT panel
12.3.3	Voltmeter switch	Inbuilt in meter
12.3.4	Accuracy Class	1.0
12.4	Energy meter provision	Energy meter is not in supplier's scope. Only space and CT/PT wiring is to be provided in all panels except bus coupler and bus PT. Space for Energy meter shall be 200(w) X 350(h) mm ²

13 INDICATION, ALARMS & ANNUNCIATION

13.1	Indications	Flush mounted, High intensity, clustered LED type
13.1.1	Breaker ON	Red
13.1.2	Breaker Off	Green
13.1.3	Spring Charged	Blue
13.1.4	DC control supply fail	Amber
13.1.5	AC control supply fail	Amber
13.1.6	Auto trip	Amber
13.1.7	Test Position	White
13.1.8	Service Position	White

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

13.1.9	Heater circuit healthy	Yellow (Indication with integrated push button for checking)
13.1.10	Trip circuit healthy	White
13.1.11	PT supply as applicable	R,Y B
13.2	Annunciator (For 33kV Panels only)	
13.2.1	Type	Static type alongwith alarm. Annunciations shall be repetitive type and shall be capable of registering the fleeting signal. Fascia test facility should also be provided.
13.2.2	Note	LED type indications may not be provided for alarm signals provided on annunciator.
13.2.3	Mounting	Flush mounted
13.2.4	Fascia	12 window
13.2.5	Signals to provided on Fascia	Window 1 – Main Protection Operated (Distance /Differential) Window 2 – Backup O/C & E/F Protection Operated Window 3 – LBB operated Window 4 – CB Autotrip Window 5 – Trip Circuit Unhealthy Window 6 – DC Fail Window 7 – AC Fail Window 8 – VT Fuse Fail Window 9 – Protection Relay Faulty
13.2.6	Push Buttons	For test, accept and reset
13.2.7	Potential Free Contacts	To be provided for event logger
13.3	Alarm scheme with isolation switch	a. For DC fail, TC fail and CB auto trip in 11kV panels b. For all signals wired to annunciator in 33kV panels

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

Sequence of operation of the annunciator shall be as follows-

S No.	Alarm Condition	Fault Contact	Visual Annunciation	Audible Annunciation
a.	Normal	Open	Off	Off
b.	Abnormal	Close	Flashing	On
c.	Accept	Close	Steady on	Off
d.	Return to normal	Open	Steady On	Off
e.	Reset	Open	Off	Off
f.	Reset before return to normal	Close	Flashing	On

14 SELECTOR SWITCHES & PUSH BUTTONS

14.1	Selector switches	Flush mounted on LV compartment door, with shrouded terminals
14.1.1	TNC switch with pistol grip	Lockable, spring return to normal position
14.1.2	Local / SCADA selector switch	2 pole Lockable Switch
14.1.3	Rotary ON/OFF switches	For heater / illumination circuit
14.1.4	Rating	16 A
14.2	Push Button	Flush mounted on LV compartment door, with shrouded terminals
14.2.1	Emergency trip push button	Red color with stay put
14.2.2	Accept push buttons	Black color – Trip alarm / DC fail alarm
14.2.3	Reset push buttons	Yellow color – Trip alarm / DC fail alarm
14.2.4	Rating	10 A

15 INTERNAL WIRING

15.1	Internal wiring	1100 V grade, PVC insulated (FRLS) stranded flexible copper wire.
15.2	Size	2.5 sq mm for CT circuit, 1.5 sq mm for PT & control circuits
15.3	Colour code	
15.3.1	CT & PT	R Ph – Red Y Ph – Yellow B Ph – Blue Neutral – Black

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

15.3.2	Others	DC– grey, AC-black, Earth – green
15.4	Ferrules	At both ends of wire
15.5	Ferrule type	Interlocked type (one additional red colour ferrule for all wires in trip circuit)
15.6	Lugs	Tinned copper, pre-insulated, ring type, fork type and pin type as applicable. CT circuits should use ring type lugs only.
15.7	Spare contacts	Spare contacts of relays and contactors etc. should be wired upto the terminal block.
15.8	Wiring enclosure	Plastic channels, Inter panel wiring through PVC sleeves
15.9	Interpanel wiring	Wires with ferrule to be terminated in the adjacent shipping section should be supplied with one end terminated and the other end bunched and coiled.
15.10	Auxiliary supply	Auxiliary bus wiring for AC and DC supplies, voltage transformer circuits, annunciation circuits and other common services shall be provided on the same set of terminals in all the panels with proper segregation.

16 TERMINAL BLOCKS

16.1	Rating and Type	1100 V grade, moulded piece, stud type screw driver operated terminals complete with insulated barriers, washers, nuts and lock nuts.
16.2	Segregation	TBs shall be segregated.
16.3	Suitability	Terminal Block shall be Stud Type Screw Driver Operated suitable for 6sqmm control cable. Disconnecting facility shall be provided in CT and PT terminal. Shorting and Earthing facility shall be provided in CT
16.4	Marking and covers	White fibre markings strip with clear plastic, slip-on / clip-on terminal covers to be provided.
16.5	Disconnecting Facility	To be provided in CT and PT terminals

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

16.6	Shorting & Earthing Facility	To be provided in CT Terminals
16.7	Spare Terminals	20% in each TB row
16.8	Spare Terminal Block in Capacitor Bank Panel	Separate Terminal Block with 50 number terminals required (20 Numbers Disconnecting and 30 Number Non Disconnecting type)
16.9	TB shrouds & separators	Moulded non- inflammable plastic material
16.10	Clearance between 2 sets of TB	100 mm min
16.11	Clearance with cable gland plate	250 mm min
16.12	Clearance between AC / DC set of TB	100 mm min
16.13	Test terminal blocks	Screw driver operated stud type for metering circuit

17 RELAYS

17.1	Protection Relays – General Features	
17.1.1	Technology and Functionality	Numerical , microprocessor based with provision for multifunction protection, control, metering and monitoring
17.1.2	Mounting	Flush Mounting, IP5X
17.1.3	Architecture	Hardware and software architecture shall be modular and disconnectable to adapt the protection and control unit to the required level of complexity as per the application.
17.1.4	Programming and configuration	Relay shall utilize a user friendly setting and operating multi-lingual software in windows environment with menus and icons for fast access to the data required. Programming software and communication cord for offered relays should be included in scope of supply.
17.1.5	Conformal Coating	<ol style="list-style-type: none"> a. Required on all cards and Components to protect against moisture, dust, chemicals, temperature extremes etc b. Testing shall be as per IEC 60068-2-60

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

17.1.6	SCADA Interface port	LC type Dual fibre optic port for interfacing with SCADA on IEC 61850 & PRP compatible. Through this port relays shall be connected to Ethernet switches..
17.1.7	Processing Indications	SCADA functions for monitoring shall be executed on SPI (Single Point Input) and DPI (Double Point Input). DPI shall only be used in case of Isolator and Circuit breaker “close” and “open” indication.
17.1.8	Command Processing	Functionality of command processing offered for SCADA interface shall include the processing of single and double commands i.e SCO (Single Command Output) and DCO (Double object command Output). DCO shall only be used in case of Isolator and Circuit Breaker “close” and “open” command.
17.1.9	PC Interface port	Front port (preferably serial) for configuration/data downloads using PC. Cost of licensed software and communication cord, required for programming of offered protection relays shall be included in the cost of switchgear.
17.1.10	User Interface	An alphanumeric key pad and graphical LCD display with backlight indicating measurement values and operating messages. It should be possible to access and change all settings and parameters without the use of PC.
17.1.11	SCADA Interface	Relay shall communicate all measured & monitored parameters, analog signals, event record, fault record, DIs , DOs etc to SCADA
17.1.12	Relay Characteristics	Relay shall integrate all necessary protections for different applications in accordance with IS and IEC. Relay shall provide wide setting ranges and choice of all IEC, IEEE and other tripping curves through a

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

		minimum of two setting groups.
17.1.13	GOOSE Messaging	Relays shall communicate all status signals, commands and events on GOOSE messaging.
17.1.14	Event and Fault records	Relay shall have the facility of recording of various parameters during event/fault with option to set the duration of record through settable pre fault and post fault time. Relay shall store records for last 10 events and 10 faults (minimum). It should be possible to download records locally to PC and remotely to SCADA.
17.1.15	Self diagnosis	Relay shall be able to detect internal failures. A watchdog relay with changeover contact shall provide information about the failure.
17.1.16	Time synchronization	All relays shall be capable of being synchronized with the system clock using SCADA interface and PC.
17.1.17	Operation Indicators	LEDs with push button for resetting.
17.1.18	Test Facility	Inbuilt with necessary test plugs.
17.2	Protection Relays for 11kV Incomer panel	
17.2.1	Relay 1	3-phase Directional Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Undervoltage and overvoltage protection
		Trip Circuit Supervision
		Sync Check function
		PT supervision (fuse failure monitoring)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs ,

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

		DOs etc to SCADA
17.2.2	Relay 2	Auto Re-closer (If Specified in Tender document) High Impedance Restricted Earth fault protection.
17.2.3	User Configurable DIs and Dos	Relay-1 & 2 should have a total of 16 Dis and 10 Dos (minimum). Each relay should have atleast 2 Dis and 4 Dos
17.2.4	Note	Combining functions of Relay-1 and Relay-2 in single relay is not acceptable.
17.2.5	SLD	Refer annexure – F1
17.3	Protection Relays for 11kV Bus Section panel	
17.3.1	Relay 1	3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Sync Check function
		Trip Circuit Supervision
		PT supervision (fuse failure monitoring)
		User Configurable 16 Dis and 8 Dos (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.3.2	SLD	Refer annexure – F2
17.4	Protection Relays for 11kV Outgoing panel	
17.4.1	Relay 1	3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Trip Circuit Supervision
		User Configurable 12 Dis and 6 Dos (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

		power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.4.2	SLD	Refer annexure – F3
17.5	Protection Relays for 11kV Station Transformer panel	
17.5.1	Relay 1	3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Trip Circuit Supervision
		User Configurable 12 DIs and 6 DOs (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.5.2	SLD	Refer annexure – F4
17.6	Protection Relays for 11kV Capacitor panel	
17.6.1	Relay 1	3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Undervoltage and Overvoltage protection(From Bus PT)
		Trip Circuit Supervision
		Neutral Unbalance protection(From RVT associated to Cap Bank)
		Timer for on time delay (minimum 600 seconds)
		User Configurable 12 DIs and 6 DOs (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

		factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.6.2	SLD	Refer annexure – F5.
17.7	Protection Relays for 33kV Incomer	
17.7.1	Relay 1	Line differential protection (Dual channel, ST Port Compatible for Single Mode Fibre having wavelength 1310 nm)
		Distance Protection
		Software based CT ratio correction
		Dedicated port for communication with remote end relay through optical fibre. This port should be in addition to PC interface and SCADA interface ports.
17.7.2	Relay 2	Bay control unit having MIMIC with 3-phase Directional Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics.
		Trip Circuit Supervision
		Sync check function
		Under Frequency, Over Frequency, Rate of Change of Frequency
		Circuit Breaker failure protection
		Reverse blocking function
		PT supervision
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.7.3	User Configurable DIs and Dos	Relay-1 & 2 should have a total of 16 DIs and 12 DOs (minimum). Each relay should have atleast 2 DIs and 6 Dos

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

17.7.4	Note	Combining functions of Relay-1 and Relay-2 in single relay is not acceptable.
17.7.5	SLD	Refer annexure – F6
17.8	Protection Relays for 33kV Transformer Feeder Panel	
17.8.1	Relay 1	Biased differential protection
		REF protection
		Software based ratio and vector correction feature (without ICT)
		H2 and H5 harmonic restraint
17.8.2	Relay 2	Bay control unit having MIMIC with 3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Trip Circuit Supervision
		Under Frequency, Over Frequency, Rate of Change of Frequency
		Reverse Blocking function
		Circuit Breaker failure protection
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.8.3	User Configurable DIs and DOs	Relay-1 & 2 should have a total of 16 DIs and 12 DOs (minimum). Each relay should have atleast 2 DIs and 6 DOs.
17.8.4	Note	Combining functions of Relay-1 and Relay-2 in single relay is not acceptable.
17.8.5	SLD	Refer annexure – F7
17.9	Protection Relays for 33kV Buscoupler Panel	
17.9.1	Relay 1	Bay control unit having MIMIC with 3-phase Overcurrent and earthfault protection with IDMT,

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

		Definite time and instantaneous characteristics.
		Trip Circuit Supervision
		Sync check function
		Reverse Blocking Function
		Circuit Breaker failure protection
		PT supervision (fuse failure monitoring) for Bus PT-1
		User Configurable 16 DIs and 8 DOs (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
17.9.2	Relay 2	Under Frequency, Over Frequency, Rate of Change of Frequency
		PT supervision (fuse failure monitoring) for Bus PT-2
		Auto Re-closer (If Specified in Tender document)
17.9.3	SLD	Refer annexure – F8
17.10	Protection Relays for 33kV Outgoing Panel (For Installation at KCC Consumer Premises)	
17.10.1	Relay 1	Bay control unit having MIMIC with 3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Trip Circuit Supervision
		Reverse Blocking Function
		Under Frequency, Over Frequency, Rate of Change of Frequency
		Circuit Breaker failure protection
		User Configurable 12 DIs and 6 DOs (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

		factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.10.2	SLD	Refer annexure – F9
17.11	Protection Relays for 33kV Incomer from 66/33kV Autotransformer	
17.11.1	Relay 1	High Impedance Restricted Earth fault protection
17.11.2	Relay 2	Bay control unit having MIMIC with 3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics
		Trip Circuit Supervision
		Under Frequency, Over Frequency, Rate of Change of Frequency
		Reverse Blocking Function
		Sync check function
		Undervoltage and overvoltage protection
		Circuit Breaker failure protection
		PT supervision (fuse failure monitoring)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
Auto Re-closer (If Specified in Tender document)		
17.11.3	User Configurable DIs and DOs	Relay-1 & 2 should have a total of 16 DIs and 12 DOs (minimum). Each relay should have atleast 2 DIs and 6 Dos
17.11.4	Note	Combining functions of Relay-1 and Relay-2 in single relay is not acceptable
17.11.5	SLD	Refer annexure – F10
17.12	Protection Relays for 33kV Outgoing from 66/33kV Autotransformer	
17.12.1		Power swing blocking
	Relay 1	Line differential protection(Dual channel, ST Port

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

		Compatible for Single Mode Fibre having wavelength 1310 nm)
		Distance Protection
		Software based CT ratio correction
		Dedicated port for communication with remote end relay through optical fibre. This port should be in addition to PC interface and SCADA interface ports.
17.12.2	Relay 2	Bay control unit having MIMIC with 3-phase Overcurrent and Earthfault protection with IDMT, Definite time and instantaneous characteristics.
		PT Supervision
		Under Frequency, Over Frequency, Rate of Change of Frequency
		Trip Circuit Supervision
		Reverse Blocking Function
		Circuit Breaker failure protection
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
		Auto Re-closer (If Specified in Tender document)
17.12.3	User Configurable DIs and Dos	Relay-1 & 2 should have a total of 16 DIs and 12 DOs (minimum). Each relay should have atleast 2 DIs and 6 Dos
17.12.4	Note	Combining functions of Relay-1 and Relay-2 in single relay is not acceptable.
17.12.5	SLD	Refer annexure – F11
17.13	Protection Relays for 33kV Buscoupler for Switchboard of 66/33kV Autotransformer	
17.13.1	Relay 1	Bay control unit having MIMIC with 3-phase Overcurrent and earthfault protection with IDMT, Definite time and instantaneous characteristics.
		Trip Circuit Supervision

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

		Sync check function
		Circuit Breaker failure protection
		PT supervision (fuse failure monitoring) for Bus PT-1
		User Configurable 16 DIs and 8 DOs (minimum)
		Relay shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event record, fault record, DIs , DOs etc to SCADA
17.13.2	Relay 2	Under Frequency, Over Frequency, Rate of Change of Frequency
		PT supervision (fuse failure monitoring) for Bus PT-2
		Auto Re-closer (If Specified in Tender document)
17.13.3	SLD	Refer annexure – F12
17.14	Protection Relays – SCADA Interfacing	
17.14.1	Configuration and wiring of DIs in Protection Relays (All panels) for routing status signals to SCADA	DI-1 – TC-1 Healthy DI-2 – TC-2 Healthy DI-3 – CB Autotrip (contact from lockout relay) DI-4 – CB Open DI-5 – CB Close DI-6 – CB in service DI-7 – CB in test DI-8 – Spring Charged DI-9 – L/R switch Remote DI-10 – AC fail DI-11 – Adjacent Panel DC Fail/DC MCB Trip DI-12 – Adjacent Panel Protection Relay fail DI-13 – PT MCB trip (metering and protection, for incomer and capacitor panel only) Sequence of DIs should be strictly as mentioned above. Change in sequence of DIs will not be acceptable.
17.14.2	Configuration and wiring of	DO-1 – CB Open

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

	DOs in Protection relays (all panels) for execution of SCADA commands through SCADA interface port (refer clause 16.1.5).	DO-2 – CB close DO-3-Electrical Reset Sequence of DOs should be strictly as mentioned above. Change in sequence of DOs will not be acceptable.
17.14.3	Looping of numerical relays	All relays in the switchboard have to be looped to form a common bus for interfacing with SCADA.
17.14.4	Spare DIs and DOs	Should be wired upto terminal block for future use.
17.15	Transformer Monitoring cum AVR Relay	
17.15.1	Features	As per annexure –B
17.15.2	Requirement	To be provided in 33KV Transformer panel only
17.16	Auxiliary Relays – General Features	
17.16.1	Relays for auxiliary, supervision, trip and timer relays	Static or electromechanical type.
17.16.2	Reset mechanism for auxiliary relays	Self reset contacts except for lock-out relays.
17.16.3	Reset mechanism for lockout relays	Electrical reset type for 11kV outgoing panels only. Hand reset type for all other panels.
17.16.4	Operation indicators	With hand-reset operation indicators (flags) or LEDs with pushbuttons for resetting.
17.17	Auxiliary relays – Requirement	
17.17.1	Anti pumping (94), lockout (86),	a. For each breaker b. Lock Out Relay mounting shall be flush type on front side of Panel
17.17.2	PT selection relays	To be provided in bus coupler panel for selection between Bus PT and Line PT of respective sections.
17.17.3	Switchgear with two incomer & bus coupler	Lockout relay (86) contact of each incoming breakers to be wired in series in closing circuit of other incoming breakers & bus coupler.
17.17.4	Contact Multiplication Relay for Tripping and closing of Breaker	a. One for Tripping and one for closing with each breaker b. Current Rating shall be 30 percent more than closing and tripping coil current rating c. Shall be of closed type i.e. direct

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

		unauthorised access shall not be provided.
17.17.5	Auxiliary Relays, contact multiplication relays etc.	To effect interlocks and to exchange signals of status & control
17.17.6	Transformer trouble relays (For 33kV Transformer feeder panel only)	Auxiliary relays with indicating flags (contactors will not be accepted) should be provided for the following trip and alarm commands – <ul style="list-style-type: none"> a. Buchholz trip b. OSR trip c. PRV trip d. SPR trip e. WTI Trip f. OTI Trip g. Buchholz Alarm h. Low oil level alarm i. OTI Alarm j. WTI Alarm.
17.18	General Requirements for all relays/contactors	Auxiliary supply will be 50/220VDC based on requirement. All relays/contactors shall be suitable for continuous operation at 15% overvoltage.

18 SYNCH CHECK PHILOSOPHY

18.1	Dead Bus – Live Line	<ul style="list-style-type: none"> a. Application - Required for Charging of Bus from Line Supply b. Logic - Sync check relay installed on line panel will check the line and bus voltage and derive that the line is live and bus is in dead condition i.e bus has to be charged by the line breaker. Hence Sync check relay will allow the line breaker to close in this condition.
18.2	Dead Line – Live Bus	<ul style="list-style-type: none"> a. Application - Required for Charging of Line from Bus Supply b. Logic - Sync check relay installed on line panel will check line and bus voltage and derive that the line is dead and bus is in live condition i.e line has to be charged from bus. Hence Sync check relay will allow the line breaker to close in this condition.

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

18.3	Live Bus – Live Line	<ul style="list-style-type: none"> a. Application - Required for paralleling of bus and line supply b. Logic - Sync check relay installed on line panel will compare magnitude and phase sequence of line and bus voltages. If the variations are within the range set in the relay, sync check relay will allow the closing of line breaker.
18.4	Live Bus – Dead Bus	<ul style="list-style-type: none"> a. Application – Required for charging of dead bus through another live bus. b. Logic – Sync check relay installed on bus coupler/bus section panel will check voltage of both buses and derive that one bus is dead and other bus is live i.e dead bus is being charged from live bus. Hence Sync check relay will allow the bus coupler/bus section breaker to close in this condition.
18.5	Live Bus – Live Bus	<ul style="list-style-type: none"> a. Application – Required for paralleling of two buses/bus sections. b. Logic – Sync check relay installed on bus coupler/bus section panel will compare the magnitude and phase sequence of voltage of both buses (or bus sections). If the variations are within the range set in the relay, sync check relay will allow the bus coupler/bus section breaker to close.

19 ETHERNET SWITCHES & FIBRE OPTICS

19.1	Ethernet Switch	
19.1.1	Numbers	Two at each site
19.1.2	FO Port	16 Nos
19.1.3	RJ 45 Port	4 Nos
19.1.4	Communication Protocol	IEC 61850
19.1.5	Network Protocol	PRP
19.1.6	Downlink Rate	100 MBPS
19.1.7	Uplink Rate	1 GBPS
19.1.8	Coating	Conformal
19.1.9	Power Supply Voltage	220 / 50 VDC as per site condition
19.1.10	Grade	Industrial
19.1.11	Certification required	KEMA,CE & FCC for IEC 61850 compliance
19.1.12	Operating Temperature	
19.1.13	Mounting	In Switchgear Panel
19.1.14	Blinking LED Indicators	On each RJ45 ports

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

19.1.15	Separate Maintenance/console Part	Required
19.1.16	Latency	Less than or equal to 10 ms
19.1.17	Fibre Optic Compatibility	Multimode, 1310 nm
19.1.18	Placement	Din Rail Arrangement Inside Switchgear
19.2	Fibre Optics (Patch Cord) and Ethernet cable	
19.2.1	Connection	From Relays, Meters to Ethernet Switch
19.2.2	Mode of Fibre Optics	Multimode
19.2.3	Wavelength	1310 nm
19.2.4	Ethernet Cable Type	CAT VI
19.2.5	Associated Connectors and Accessories	Required

20 SPACE HEATERS

20.1	Type	Thermostat controlled with switch for isolation
20.2	Location	In Breaker & HV cable compartment, mounted on an insulator. Heater position in cable compartment should be easily accessible after cable termination. Heater position in breaker chamber shall be accessible with breaker racked-in.

21 SOCKETS, SWITCHES ,ILLUMINATION LAMPS & MCBs

21.1	Illumination lamp with switch	For LV & cable chamber
21.2	Universal type (5/15 A) Socket with Switch	In LV chamber
21.3	MCBs	<ul style="list-style-type: none"> a. MCBs of Proper rating may be provided. b. Although Main MCB shall be directly wired up to Trip Circuit, No other MCB shall be provided in between c. Rating of MCB shall be 300% of full load current of relevant circuit

22 NAMEPLATES AND MARKING

22.1	Nameplates	To be provided as per the following description
22.1.1	Equipment Nameplates	<p>a. All equipment mounted on front side as well as equipment mounted inside the panels shall be provided with individual name plates with equipment designation engraved.</p> <p>b. All front mounted equipment shall be also provided at the rear with individual name plates engraved with tag numbers corresponding to the one shown in the panel internal wiring to facilitate easy tracing of the wiring.</p>
22.1.2	Feeder Nameplates	<p>a. Large and bold name plate carrying the feeder identification/ numbers shall be provided on the top of each panel on front as well as rear side. On rear side, nameplate should be provided on frame.</p> <p>b. Rear bottom of each panel shall have a nameplate clearly indicating the following: Customer Name – BSES Delhi; PO No. & date; Drawing Reference No. etc.</p>
22.1.3	Rating Plate	<p>Following details are to be provided on Panel rating plate:</p> <ol style="list-style-type: none"> Customer Name – BSES Yamuna Power Limited PO No. & Date – Complete CT Rating plate details Complete PT Rating plate details Complete CB Rating Plate details Date of Manufacturing- Warranty Period- Customer care No- Control Voltage-
22.1.4	Material	Non-rusting metal or 3 ply lamicaid. Nameplates shall be black with white engraving lettering. Stickers are

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

		not allowed.
22.1.5	Fixing	All nameplates/rating plates shall be riveted to the panels at all four corners. Bolting/screwing is not acceptable.
22.2	Markings	Each switch shall bear clear inscription identifying its function. Similar inscription shall also be provided on each device whose function is not otherwise identified. If any switch or device does not bear this inscription separate nameplate giving its function shall be provided for it. Switch shall also have clear inscription for each position indicating e.g. Trip-Neutral close, ON-OFF etc.

23 SURFACE TREATMENT & PAINTING

23.1	Surface Treatment	Sand blasting or by seven tank process.
23.2	Paint type	Powder coated. Pure polyester base grade-A structure finish.
23.3	Paint shade	RAL 7032 for external & internal surface
23.4	Paint thickness	Minimum 50 microns

24 APPROVED MAKES OF COMPONENTS

24.1	Numerical Relays	Siprotec series of Siemens, Micom series of Schneider/Alstom. Numerical relays used in complete switchboard should be of same make. Use of two different makes of relays in a switchboard is not acceptable.
24.2	Transformer monitoring cum AVR relay	A-eberle
24.3	Electromechanical Relays	Alstom/Schneider/Siemens/ABB/ER
24.4	Aux Relays	ABB/Jyoti/Omran
24.5	Contactors	ABB/Siemens/Telemecanique

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

24.6	Instrument transformers	ECS/ Pragati/ Gemini/Schneider/CGL/Kappa/Narayan power tech
24.7	MCBs	Siemens/Schneider/Legrand/ABB
24.8	Control switches	Switron/Kaycee
24.9	Test terminal blocks	IMP/Schneider/Alstom
24.10	Terminal blocks	Elmex/Connectwell
24.11	Indicating lamps	Siemens/ Teknic/ Binay
24.12	Surge Suppressors	Oblum/Tyco
24.13	Meters	Rishabh(Rish delta Energy)/Conzerv
24.14	Ethernet Switch	Ruggedcom/Hirschman

25 INSPECTION , TESTING & QUALITY ASSURANCE

25.1	Type Tests	The product must be of type tested as per applicable Indian standards / IEC
25.1.1	Type test report validity period	Last five years from date of bid submission. Bidder with type test report more than 5 years old needs to re-conduct the tests without any commercial implication to BSES
25.1.2	Pressure relief device operation	Test certificate for panel to be submitted
25.2	Acceptance & Routine tests	As per the specification and relevant standards. Charges for these tests shall be deemed to be included in the equipment price. In addition to these tests, following tests have to be carried out as acceptance tests -
25.2.1	Primary injection test	To be carried out on panels selected for testing
25.2.2	Temperature rise test	One panel per Purchase order (PO with minimum 10 panels) without any commercial implication to BSES. In-house testing is acceptable.
25.2.3	Paint Thickness/ Peel off	To be carried out on panels selected for testing

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

25.3	Inspection	The purchaser/owner reserves the right to witness all the acceptance/routine tests during inspection.
25.4	Notice to purchaser for conducting type tests	At least three weeks in advance
25.5	Quality Assurance	
25.5.1	Vendor quality plan	To be submitted for purchaser approval
25.5.2	Inspection points	To be mutually identified & agreed in quality plan

26 PACKING

26.1	Packing Protection	Against corrosion, dampness, heavy rains, breakage and vibration. During transportation/ transit and storage, panels may be subjected to outdoor conditions. Hence, packing of each panel shall be weatherproof.
26.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification
26.3	Details of Packing Identification Label on each packing case	<ul style="list-style-type: none"> 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. Project Details g. Manufacturer / Supplier's name h. Address of Manufacturer / Supplier / it's agent i. Description and Quantity j. Country of origin k. Month & year of Manufacturing l. Case measurements m. Gross and net weights in kilograms n. All necessary slinging and stacking instructions

**27 SHIPPING**

27.1	Shipping	<p>The bidder shall ascertain at an early date and definitely before the commencement of manufacture, any transport limitations such as weights, dimensions, road culverts, Overhead lines, free access etc. from the Manufacturing plant to the project site. Bidder shall furnish the confirmation that the proposed Packages can be safely transported, as normal or oversize packages, up to the site. Any modifications required in the infrastructure and cost thereof in this connection shall be brought to the notice of the Purchaser.</p> <p>The seller shall be responsible for all transit damage due to improper packing.</p>
------	----------	---

28 HANDLING AND STORAGE

28.1	Handling and Storage	<p>Manufacturer instruction shall be followed. Detail handling & storage instruction sheet / manual needs to be furnished before commencement of supply.</p>
------	----------------------	--

29 DEVIATION

29.1	Deviation	<p>Deviations from this Specification shall be provided in excel sheet with 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.</p>
------	-----------	--

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

30 ACCESSORIES & TOOLS

30.1	Type and Quantity	Bidder to indicate
30.2	Special tools & tackles required for erection, testing, commissioning and maintenance of the switchboard	The cost of these items shall be indicated separately in the bid as optional.
30.3	Suitable handling truck / trolley for lifting and moving the circuit breaker	To be supplied. (Two trolleys for each type/rating of breaker)

31 DRAWINGS & DATA SUBMISSION MATRIX

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A3/A4 sheet (based on legibility) in box file with separators for each section. PDF shall also be provided of all documents via USB. Deviation sheet and GTP shall be provided in excel sheet .Language of the documents shall be English only. Deficient/ improper document/ drawing submission shall be liable for rejection.

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
31.1	Contact Person Name, Email ID and Mobile Number	Required			
31.2	Consolidated Deviation Sheet	Required	Required		
31.3	GTP	Required	Required		
31.4	Relevant Type Test as per IS/IEC	Required			
31.5	Power Cable and control cable Philosophy and Schedule		Required		
31.6	Manufacturer's quality assurance plan and certification for quality standards		Required		
31.7	Sizing Calculation of Associated Equipment		Required		

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

31.8	Recommended Spares Apart from spares stated in Spec(for five years of operation)		Required		
31.9	11 kV / 33 kV Switchgear drawing				
31.9.1	General Arrangement	Required	Required		
31.9.2	Sectional Layout		Required		
31.9.3	Door Layout		Required		
31.9.4	LV Box Internal Layout		Required		
31.9.5	SLD	Required	Required		
31.9.6	Schematic Circuit diagram and Scheme of Each type of Panel		Required		
31.9.7	Communication Architecture		Required		
31.9.8	Bus Bar Arrangement		Required		
31.9.9	QAP		Required		
31.9.10	Panel wise BOQ		Required		
31.9.11	Logic Operation Diagram		Required		
31.9.12	Plan		Required		
31.9.13	Synch Logic Diagram		Required		
31.9.14	Foundation Diagram		Required		
31.9.15	DI sheet		Required		
31.9.16	DO Sheet		Required		
31.9.17	TB Details		Required		
31.9.18	Make of all Component as per specification		Required		
31.10	Drawing of CT, PT and Surge Arrestor		Required		
31.11	Drawing of Substation Room		Required		
31.12	Ventilation detail requirement of GIS Room		Required		

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

31.13	Installation, erection and commissioning manual for switchgear		Required		
31.14	Inspection Reports			Required	
31.15	As manufacturing Drawings			Required	
31.16	Operation and Maintenance Manual			Required	Required
31.17	Trouble shooting manual			Required	Required
31.18	As built Drawings				Required
31.19	Test Report				Required
31.20	Weekly progress report				Required

ANNEXURE – A - SCOPE OF SUPPLY

Scope of supply should include the following –

- 1.1 Design, manufacture, assembly, testing at manufacturer's works, properly packed for transport, supply and FOR delivery at site of following 11kV / 33kV Switchgears as per enclosed specification and single line diagram.
- 1.2 Base channel frame of the switchgears with hardware.
- 1.3 Two trolleys for breaker of each size are to be provided per switchboard.
- 1.4 Programming software and communication cord for numerical relays.
- 1.5 Unit price of 33kV Incomer with Distance relay as primary protection and 33kV Incomer with Line differential relay as primary protection should be mentioned separately in the bid. Primary protection to be used in Incomer panel will be finalized based on site requirement.
- 1.6 Unit price of Bus PT should be indicated separately in the bid to enable addition/deletion based on site requirement.
- 1.7 Bidder should indicate price of one set of special tools and tackles (if any) required for maintenance of switchgear and its components.
- 1.8 Bidder should indicate price of each spare as per Annexure E.
- 1.9 All relevant drawings, data and instruction manuals.

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

ANNEXURE – B – TRANSFORMER MONITORING CUM AVR RELAY

1	General features	
1.1	Technology and Functionality	Microprocessor based with provision for multifunction control and monitoring.
1.2	Mounting	Flush Mounting
1.3	Architecture	Hardware and software architecture shall be modular and disconnectable to adapt the control unit to the required level of complexity as per the application.
1.4	Programming and configuration	AVR shall utilize a user friendly setting and operating multilingual software in windows environment with menus and icons for fast access to the data required.
1.5	User Machine Interface	UMI with an alphanumeric key pad and graphical LCD display with backlight indicating measurement values and operating messages. Capability to access and change all settings and parameters.
1.6	PC Interface port	Front port (preferably serial) for configuration using PC. Cost of licensed software and communication cord, required for programming of offered protection relays using PC, shall be mentioned separately in the bid.
1.7	SCADA Interface port	LC Type Dual fibre optic port for interfacing with SCADA on IEC 61850 & PRP compatible. Through these ports relays shall be connected to Ethernet switches.
1.8	Self diagnosis	Shall be able to detect internal failures. A watchdog relay with changeover contact shall provide information about the failure.
1.9	Cable Termination	Termination of cable shall be at rear side.
1.10	Auxiliary supply	220VDC or 48VDC
2	Inputs and Outputs	
2.1	CT Input	1/5A selectable through programming
2.2	PT Input	110VAC
2.3	Binary Inputs	Sixteen programmable binary inputs should be provided

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

2.4	Analog Inputs (4-20mA)	One input to be provided
2.5	PT-100 direct input	Two inputs to be provided
2.6	Direct Resistance Input	For tap position indication (18 steps)
2.7	Binary Outputs	Ten programmable binary outputs should be provided
3	Control	
3.1	Control Tasks	Ability to implement control functions through programmable logics
3.2	Voltage setting	Programmable Voltage set point
3.3	Voltage Regulation	Raise/Lower tap position to maintain the preset value of voltage.
3.4	Voltage Regulation modes	Automatic and Manual
3.5	Operation Modes	Local and Remote
3.6	Fan and Pump control	To be provided
3.7	Transformer Paralleling	Capability to parallel transformers whose AVR's are interconnected via a communication network.
4	SCADA Interfacing	
4.1	Configuration of DIs for routing alarm/trip signals to SCADA.	DI-1 – Buchholz trip DI-2 – OSR Trip DI-3 – PRV trip DI-4 – SPR trip DI-5 – OTI trip DI-6 – WTI trip DI-7 – Buchholz alarm DI-8 – Oil Level low alarm (MOG alarm) DI-9 – WTI alarm DI-10 – OTI alarm DI-11 – Tap changer trouble/stuck/out of step DI-12 – Tap changer motor supply fail DI-13 – Tap changer in local control All signals from DI-1 to DI-10 are to be wired up from transformer trouble auxiliary relays.
4.2	Configuration of DOs for	DO-1 – Tap raise

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

	executing commands from SCADA through interface port/CRP	DO-2 – Tap lower DO-3 – Fan group 1 control DO-4 – Fan group 2 control
4.3	Spare DIs and DOs	To be wired upto the terminal block.
5	Measurement, Event Recording and Monitoring	
5.1	Measured Quantities (optional)	Voltage, Current, Active Power, Reactive Power, Apparent Power, Power factor, frequency
5.2	Event Recording	Facility for recording parameters during various events such as tap change, change in binary input status etc.
5.3	Monitoring	Capability to monitor important transformer parameters such as Oil temperature, Winding Temperature etc and give indication/alarm when the value of a particular parameter exceeds the preset value.

ANNEXURE – C - TECHNICAL PARTICULARS

1.0	SWITCHGEAR		
1.1	Type	Metal clad, air insulated with VCB type circuit breaker	
1.2	Service	Indoor	
1.3	Mounting	Free standing, floor mounted	
1.4	System Voltage	11 KV	33kV
1.5	Voltage variation	+/- 10%	
1.6	Frequency	50 Hz +/- 5%	
1.7	Phase	3	
1.8	Rated voltage	12 KV	36 kV
1.9	Rated current	As per SLDs given in Annexure-F	
1.10	Short time rating for 3 sec.	25kA	25kA
1.11	Internal arc classification and rating		
1.11.1	Classification	IAC – A - FLR	IAC – A - FLR
1.11.2	Rating	25kA for 1 second	25kA for 1 second.
1.12	Insulation level (PF rms / Impulse peak)	28 kV / 75 kV	70 kV/ 170 kV
1.13	System ground	Effectively earthed	Effectively earthed
1.14	Enclosure degree of protection	IP – 4X for high voltage compartment and IP – 5X for metering and protection compartment	
1.15	Bus bar - Main	Rating as per SLDs given in annexure - F, Short time rating as per clause 1.10.	
1.15.1	Material	Tinned Electrolytic copper	
1.15.2	Bus bar sleeve	Sleeved with shrouds on joints. Tape on joints is not acceptable.	
1.15.3	Bus identification	Colour coded	
1.15.4	Temperature rise	40 deg. C for conventional joints. 55 deg. C for silver plated joints	
1.16	Auxiliary bus bar	Electrolytic grade tinned copper	

TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

1.17	Auxiliary DC Supply	220 V DC / 48 V DC	
1.18	Auxiliary AC supply	240 V AC 50 Hz	
1.19	Hardware	Stainless steel.	
1.20	Earth bus	Aluminium	
1.21	Bus duct entry	From top (where ever applicable)	
1.22	Power cable entry	From bottom and rear	
1.23	Control cable entry	From bottom and front (i.e breaker compartment)	
2.0	CIRCUIT BREAKER		
2.1	Voltage class, insulation level, short time rating	As specified for switchgear	
2.2	Rated current	As per SLDs given in annexure - F. Use of two breakers in parallel to meet the required current rating shall not be acceptable.	
2.3	Duty cycle	O – 0.3 sec – CO - 3min - CO	
2.4	Short circuit rating		
2.4.1	A.C sym. breaking current	25kA	25kA
2.4.2	Short circuit making current	62.5kA	62.5kA
2.5	Operation time		
2.5.1	Break time	Not more than 4 cycles	
2.5.2	Make time	Not more than 5 cycles	
2.6	Range of Auxiliary Voltage		
2.6.1	Closing	85% - 110%	
2.6.2	Tripping	70% - 110%	
2.6.3	Spring Charging	85% - 110%	
2.7	No. of spare aux. Contacts of Breaker, for Owner's use.	Minimum 6 NO + 6 NC	
2.8	No. of spare contacts of Service and Test position limit switch	2 NO	


TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

3.0	CURRENT TRANSFORMERS	
3.1	Voltage class, insulation level and short time rating	As specified for switchgear
3.2	Type	Cast resin, window / bar primary type
3.3	Class of insulation	Class E or better
3.4	Ratio	As per SLDs given in annexure - F
3.5	Number of secondaries	As per SLDs given in annexure - F
3.6	Accuracy class	
3.6.1	Protection core	5P20
3.6.2	Protection (Diff. / REF)	PS
3.6.3	Metering	0.2s
3.6.4	Core balance CT	PS
3.7	Burden (VA)	Adequate for the protection & instruments offered
3.8	Excitation current of PS Class CTs	30 mA at $V_k/4$
3.8	Knee Point Voltage of PS Class CTs (V_k)	$\geq 40 (R_{ct} + 4)$
3.9	Primary operating current sensitivity of CBCTs	5A
4.0	VOLTAGE TRANSFORMERS	
4.1	Type	Cast resin, draw out type, single phase units
4.2	Rated Voltage	
4.2.1	Primary	11000/sq.rt.3 33000/sq.rt.3
4.2.2	Secondary	110V/sq.rt.3
4.3	No. of phases	3
4.4	No. of secondary windings	2
4.5	Method of connection	Star/Star
4.6	Rated voltage factor	1.2 continuous, 1.9 for 30 seconds
4.7	Class of insulation	Class E or better


TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)

4.8	Accuracy class		
4.8.1	Protection	3P	
4.8.2	Metering	0.2	
4.9	Primary and secondary fuses	HRC current limiting type, Primary fuse replacement shall be possible with VT in withdrawn position	
5.0	HV FUSES		
5.1	Voltage class	12kV	36kV
5.2	Rupturing capacity	50kA	
5.3	Rated current	As per application	
6.0	SURGE ARRESTORS	For 11kV switchgear	For 33kV switchgear
6.1	Rated Voltage	9kV	30kV
6.2	Maximum continuous operating voltage (MCOV)	7.65kV	25kV
6.3	Discharge current	10kA	10kA
6.4	Discharge class	3	3

Note - The auxiliary DC voltage shall be checked on a case to case basis by Purchaser

	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

ANNEXURE – D - GUARANTEED TECHNICAL PARTICULARS (DATA BY BIDDER)

Vendor must submit clause wise compliance in Excel sheet against specification at the time of drawing approval clearly highlighting the deviations from specification against each clause.

BSES	BSES-TS-66-HTSWG-R0
TECHNICAL SPECIFICATION OF HT INDOOR SWITCHGEAR (33 & 11kV)	

ANNEXURE – E – SPARES REQUIREMENT

Unit rate of all below mentioned spares have to be provided in the bid.

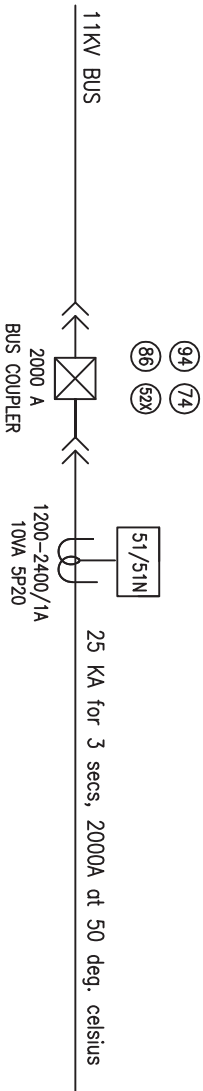
S No.	Description	Qty
1	Line voltage transformer	3 (1 set)
2	Bus voltage transformer	3 (1 set)
3	Current transformer of each ratio	3 (1 set)
4	Trip Coil	4
5	Closing Coil	4
6	CB Spring charging motor	2
7	Auxiliary switch	2 sets (2 Nos. each type)
8	Bursting disc / pressure relief plate complete	2
9	Numerical relay of each type	1 nos. (each type)
10	Ethernet Switch	1 No (Each Site)
11	Optical Fibre	20% of Supplied Items
12	CAT VI Ethernet cable for Communication	20% of Supplied Items
13	Vacuum Interrupter Bottle	1 set (3 nos.) of each rating
14	Breaker contacts for busbar	1 set (3 nos.) of each rating
15	Breaker testing cable with plug suitable for breaker on one side and plug suitable for the panel on the other side	3 meter(each type)
16	SCADA Spare	20% of Supplied Items

ANNEXURE – F – SLDs

LEGEND

SYMBOL	DESCRIPTION
	11KV SF6/VACUUM CKT. BKR. DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

SYMBOL	DESCRIPTION
	ENERGY METER
	NEGATIVE PHASE SEQUENCE PROTECTION
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

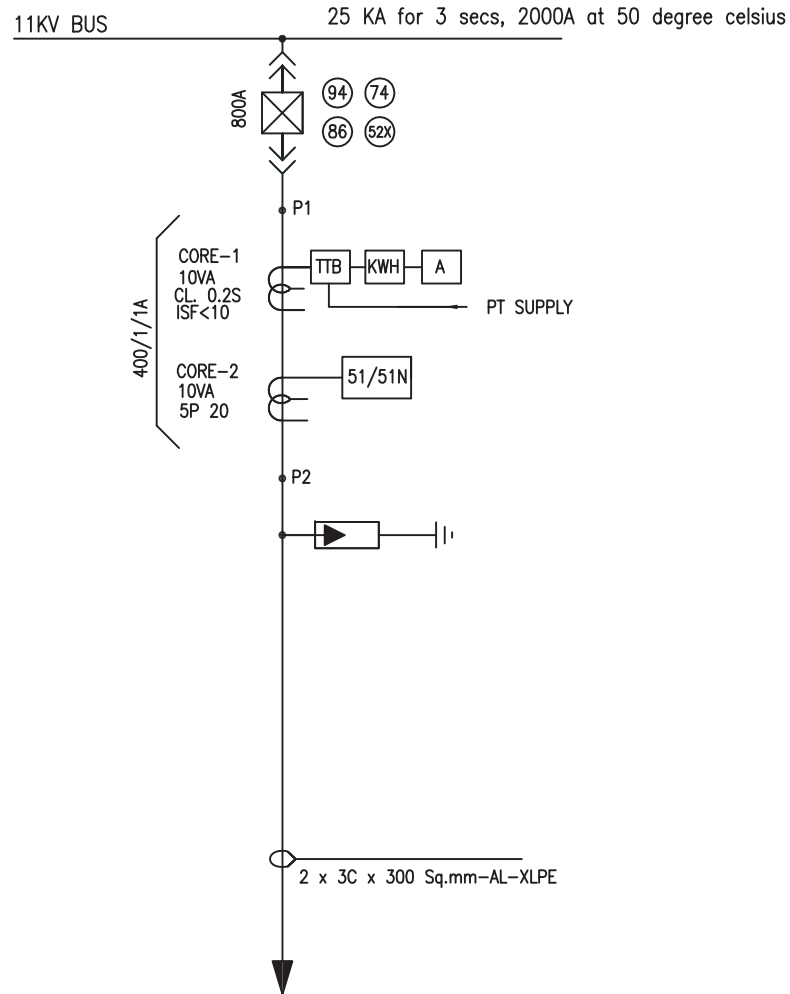


NOTE:-
1. REFER CLAUSE 16 OF SPECIFICATION
FOR DETAILED FUNCTIONAL REQUIREMENTS OF
PROTECTION RELAYS

DRAWN	KK/AH
CHECKED	SS/G/AS
APPD.	GS/G/N
DATE	28/04/22
SCALE	N/S

TITLE:-
STANDARD SLD FOR 11KV
BUS SECTION

BSES
SPECIFICATION NO. BSES-TS-66-HTSWG-RO
SLD-SWG-11KV-02



LEGEND

SYMBOL	DESCRIPTION
	11KV SF6/VACUUM CKT. BKR. DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

SYMBOL	DESCRIPTION
	ENERGY METER
	NEGATIVE PHASE SEQUENCE PROTECTION
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

NOTE:-

1. KWH METER NOT IN SUPPLIER'S SCOPE
2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS

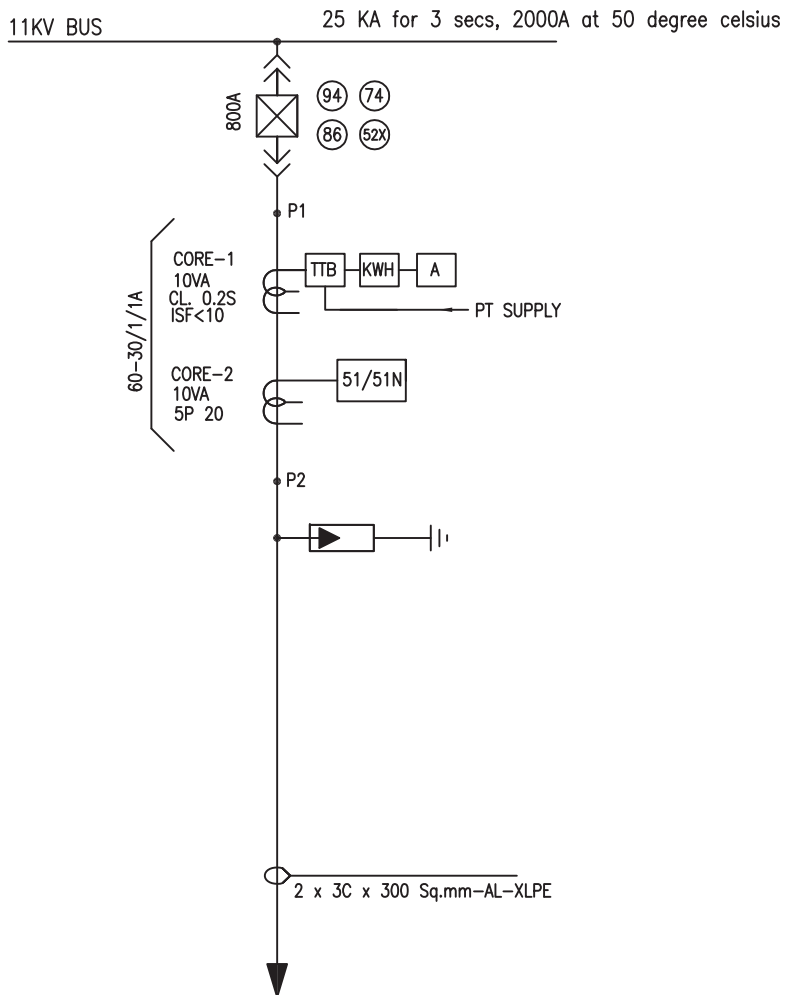
DRAWN	R.K/A/H H.K
CHECKED	S.G/A.S
APPD.	G.S/G.N
DATE	29.04.22
SCALE	NTS

TITLE:-
STANDARD SLD FOR 11KV
OUTGOING FEEDER

BSES

SPECIFICATION NO. BSES-TS-66-HTSWG-RO
SLD-SWG-11KV-03

155 ANNEXURE – F4



LEGEND

SYMBOL	DESCRIPTION
	11KV SF6/VACUUM CKT. BKR. DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

SYMBOL	DESCRIPTION
	ENERGY METER
	NEGATIVE PHASE SEQUENCE PROTECTION
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

NOTE:--

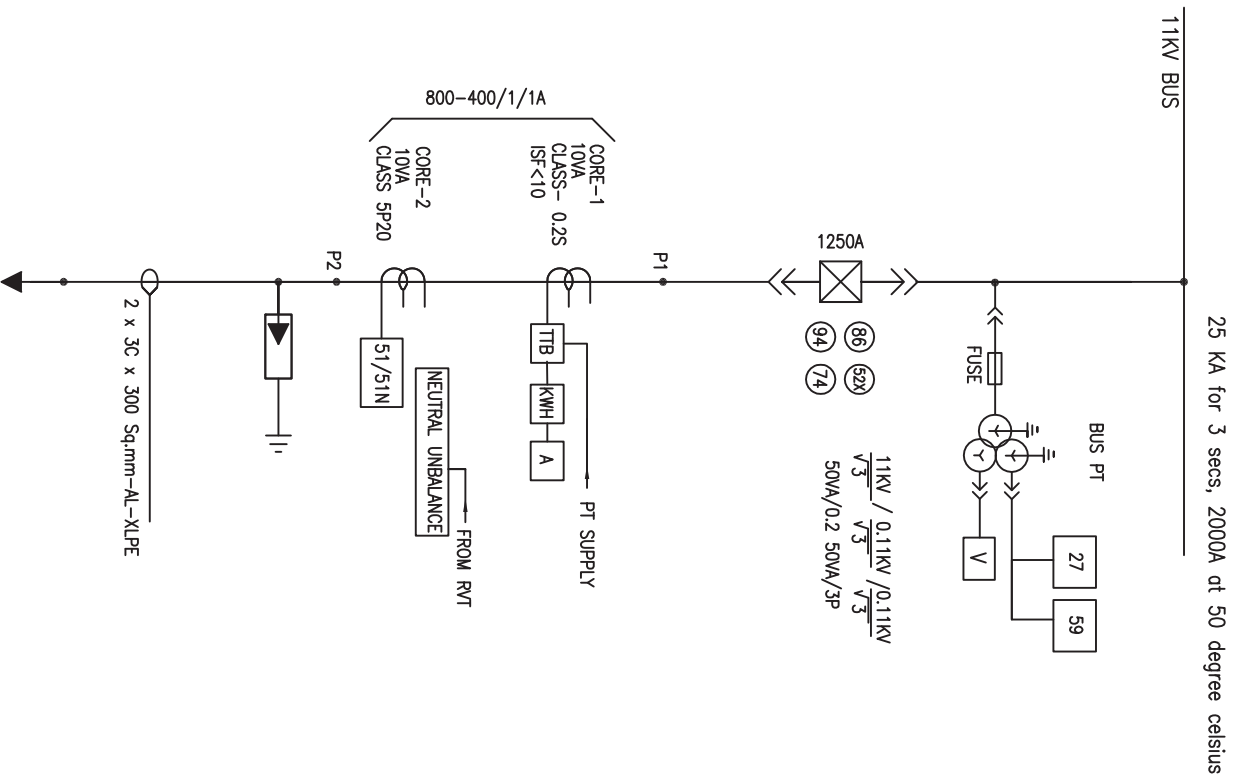
1. KWH METER NOT IN SUPPLIER'S SCOPE
2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS

DRAWN	R.K/A.H H.K
CHECKED	S.G/A.S
APPD.	G.S/G.N
DATE	29.04.22
SCALE	NTS

TITLE:--
STANDARD SLD FOR 11KV
STATION TRANSFORMER FEEDER

BSES

SPECIFICATION NO. BSES-TS-66-HTSWG-R0
SLD-SWG-11KV-04



LEGEND

SYMBOL	DESCRIPTION
	11KV SF6/VACUUM OKT. BKR. DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

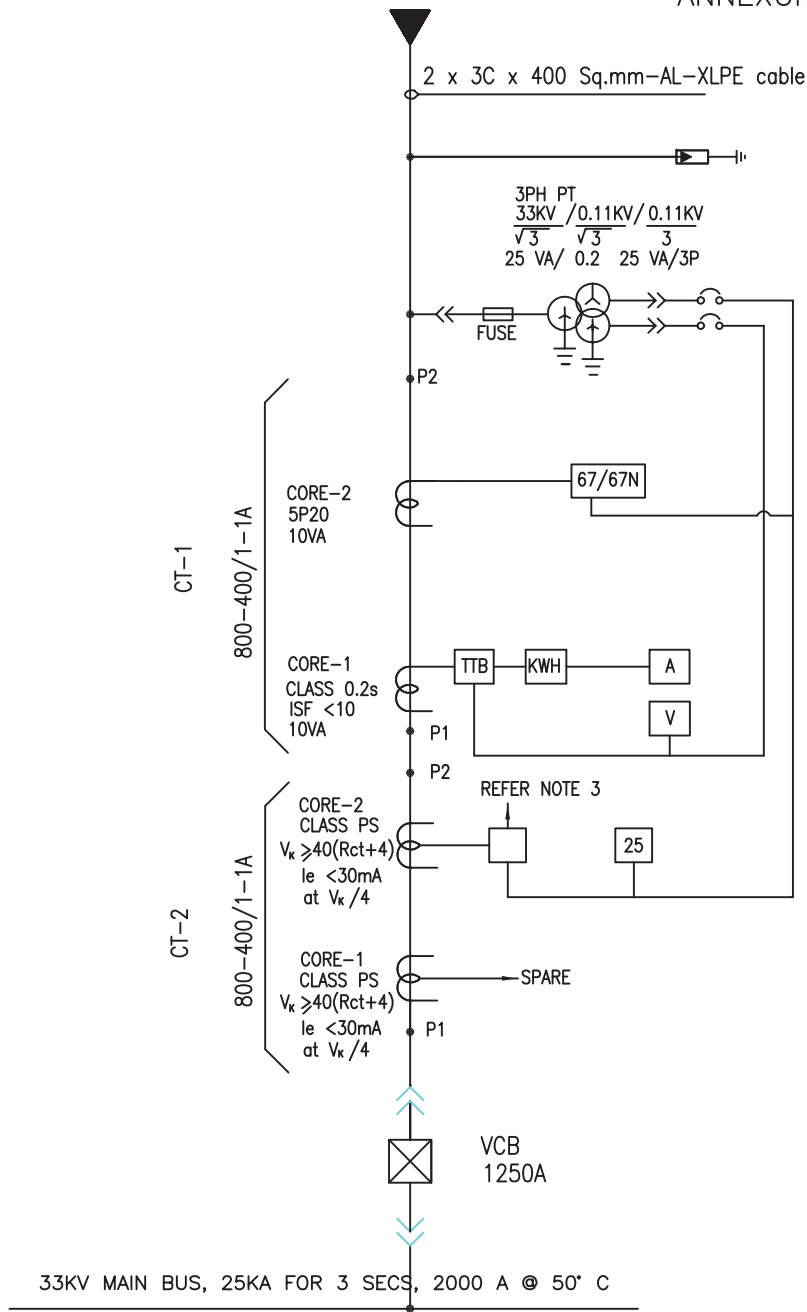
SYMBOL	DESCRIPTION
	ENERGY METER
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

NOTE:-

1. KWH METER NOT IN SUPPLIER'S SCOPE
2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS
3. ONE BPT TO BE CONSIDERED FOR EACH CAPACITOR PANEL

DRAWN	R.K/A/H	TITLE:-	
CHECKED	S.G/A/S	STANDARD SLD FOR 11KV	
APPD.	G.S/G/N	CAPACITOR FEEDER	
DATE	28.04.22		
SCALE	NTS		

SPECIFICATION NO. BSES-TS-66-HTSWG-RO
SLD-SWG-11KV-05



LEGEND

SYMBOL	DESCRIPTION
	11KV SF6/VACUUM CKT. BKR. DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

SYMBOL	DESCRIPTION
	ENERGY METER
	NEGATIVE PHASE SEQUENCE PROTECTION
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

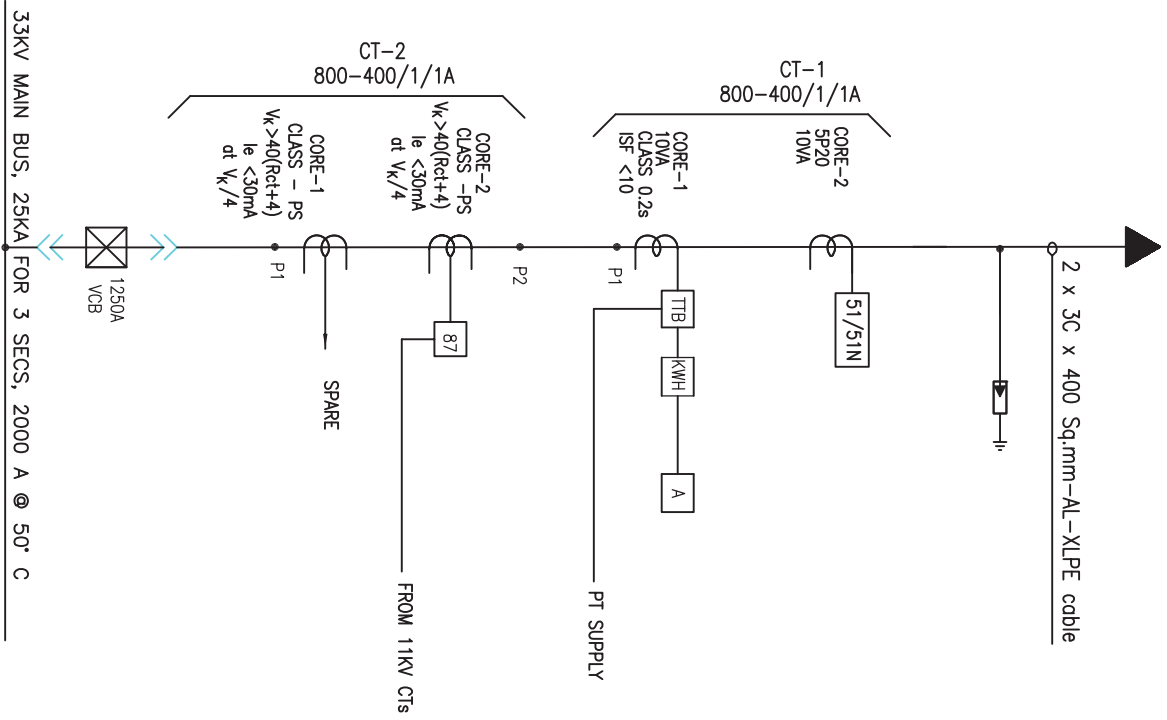
- NOTE: 1. KWH METER NOT IN SUPPLIER'S SCOPE
 2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS
 3. LINE DIFFERENTIAL OR DISTANCE RELAY. REFER CLAUSE 16.7.1 OF SPECIFICATION

DRAWN	R.K/A.H H.K
CHECKED	S.G/A.S
APPD.	G.S/G.N
DATE	29.04.22
SCALE	NTS

TITLE
TYPICAL SLD FOR
33KV INCOMER

BSES

SPECIFICATION NO. BSES-TS-66-HTSWG-R0
SLD-SWG-33KV-01



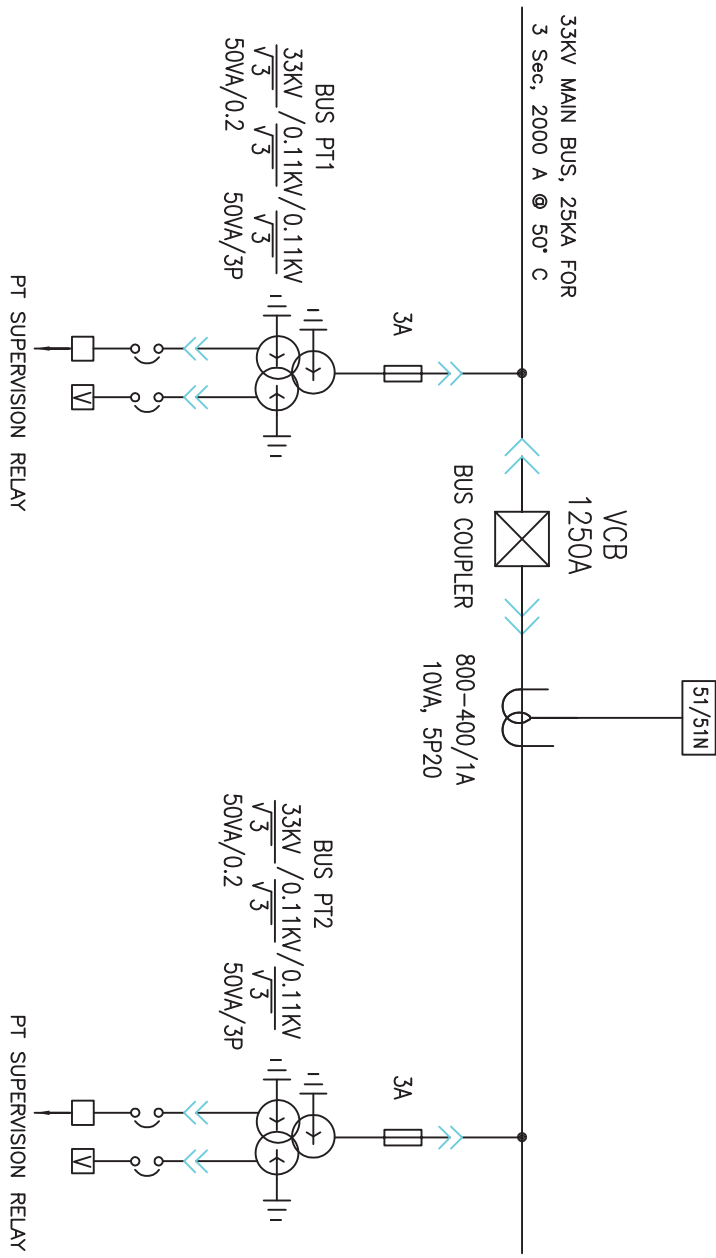
LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	11kV SF6/VACUUM CXT. BKRL DRAWOUT TYPE		ENERGY METER
	CURRENT TRANSFORMER		NEGATIVE PHASE SEQUENCE PROTECTION
	POTENTIAL TRANSFORMER		SYNC CHECK
	SURGE ARRESTOR		O/C & E/F RELAY
	FUSE		UNDER VOLTAGE RELAY
	BREAKER AUX CONTACT MULTIPLIER		DIFFERENTIAL RELAY
	TRIP CIRCUIT SUPERVISION RELAY		DISTANCE RELAY
	ANTI PUMPING RELAY		OVER VOLTAGE RELAY
	HIGH SPEED TRIP RELAY		REF RELAY
	VOLTMETER		DIRECTIONAL O/C & E/F RELAY
	AMMETER		TEST TERMINAL BLOCK

NOTE: 1. KWH METER NOT IN SUPPLIER'S SCOPE
2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS

DRAWN	R K/A/H	TITLE TYPICAL SLD FOR 33/11KV TRANSFORMER FEEDER	SPECIFICATION NO. BSES-TS-66-HTSWG-R0 SLD-SWG-33KV-02
CHECKED	S.G/A/S		
APPD.	G.S/G/N		
DATE	29.04.22		
SCALE	NTS		





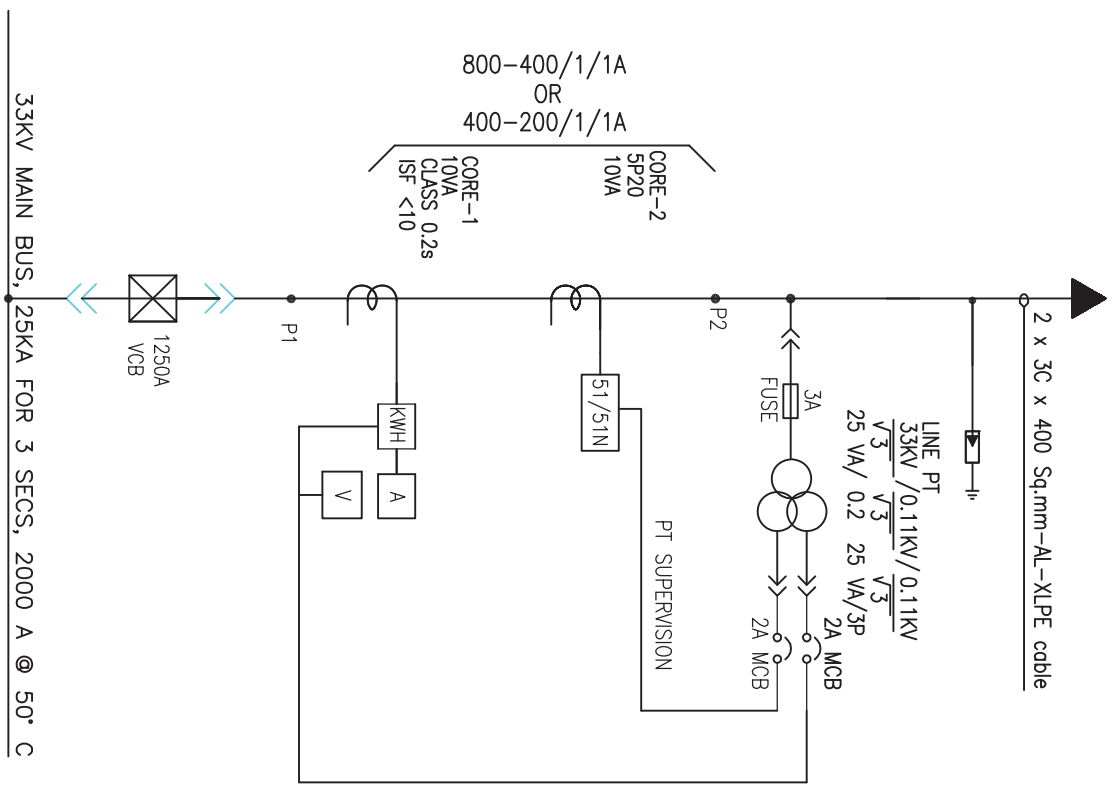
LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	11KV SF6/VACUUM CKT. BKR. DRAWOUT TYPE		ENERGY METER
	CURRENT TRANSFORMER		NEGATIVE PHASE SEQUENCE PROTECTION
	POTENTIAL TRANSFORMER		SYNC CHECK
	SURGE ARRESTOR		O/C & E/F RELAY
	FUSE		UNDER VOLTAGE RELAY
	BREAKER AUX CONTACT MULTIPLIER		DIFFERENTIAL RELAY
	TRIP CIRCUIT SUPERVISION RELAY		DISTANCE RELAY
	ANTI PUMPING RELAY		OVER VOLTAGE RELAY
	HIGH SPEED TRIP RELAY		REF RELAY
	VOLTMETER		DIRECTIONAL O/C & E/F RELAY
	AMMETER		TEST TERMINAL BLOCK

NOTE:-
 1. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS

DRAWN		R.K/A/H		TITLE TYPICAL SLD FOR 33KV BUS COUPLER CUM BUS PT
CHECKED		S.G/A/S		
APPD.		G.S/G.N		
DATE		29.04.22		
SCALE		NTS		
				SPECIFICATION NO. BSES-TS-66-HTSWG-R0 SLD-SWG-33KV-03





LEGEND

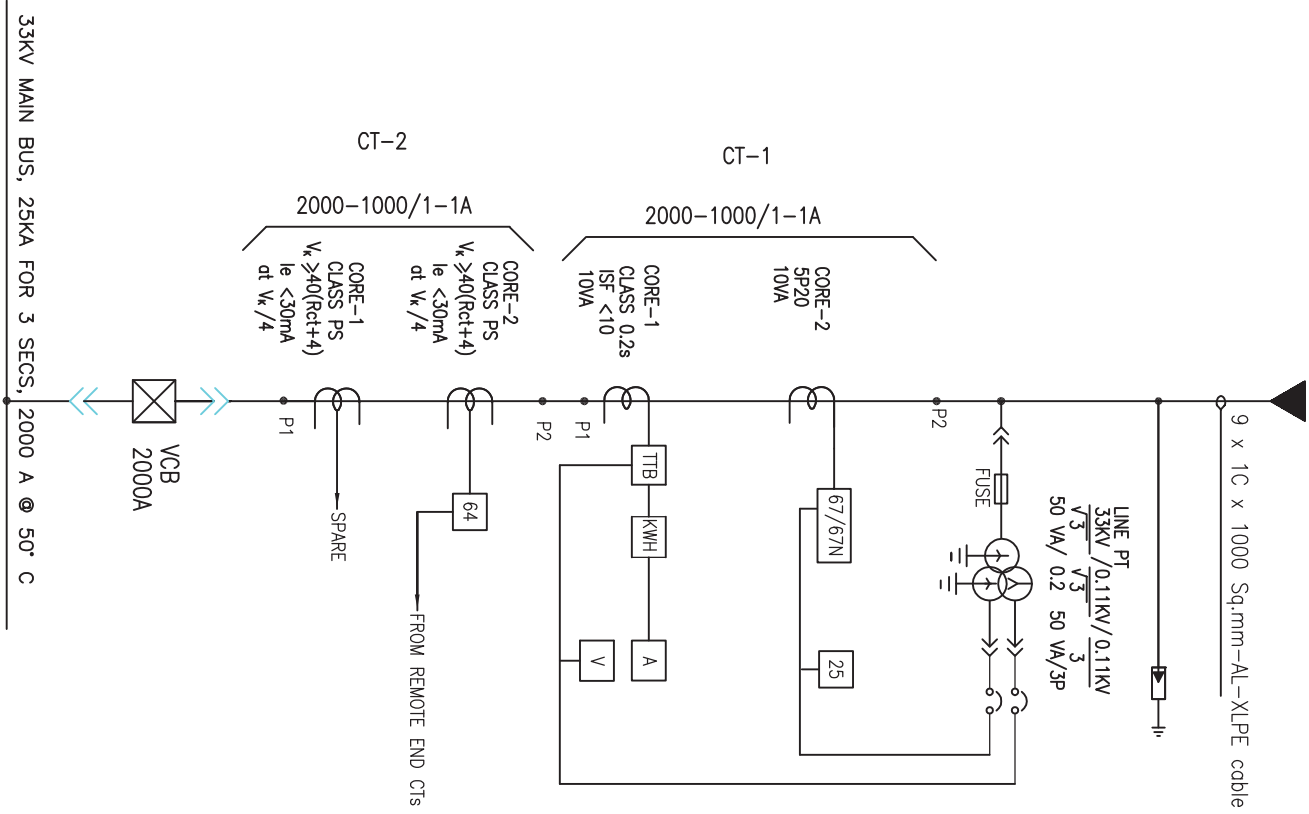
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	11KV SFR/VACUUM CKT. BKR DRAWOUT TYPE		ENERGY METER
	CURRENT TRANSFORMER		NEGATIVE PHASE SEQUENCE PROTECTION
	POTENTIAL TRANSFORMER		SYNC CHECK
	SURGE ARRESTOR		O/C & E/F RELAY
	FUSE		UNDER VOLTAGE RELAY
	BREAKER AUX CONTACT MULTIPLIER		DIFFERENTIAL RELAY
	TRIP CIRCUIT SUPERVISION RELAY		DISTANCE RELAY
	ANTI PUMPING RELAY		OVER VOLTAGE RELAY
	HIGH SPEED TRIP RELAY		REF RELAY
	VOLTMETER		DIRECTIONAL O/C & E/F RELAY
	AMMETER		TEST TERMINAL BLOCK

NOTE: 1. KWH METER NOT IN SUPPLIER'S SCOPE
 2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS
 3. TTB NOT REQUIRED IN THIS PANEL

DRAWN	R.K/A.H	TITLE	TYPICAL SLD FOR 33 KV OUTGOING FEEDER (FOR INSTALLATION AT KCC CONSUMERS PREMISES)
CHECKED	S.G/A.S		
APPD.	G.S/G.N		
DATE	29.04.22		
SCALE	NTS		



SPECIFICATION NO. BSES-TS-6-HTSWG-R0
 SLD-SWG-33KV-04



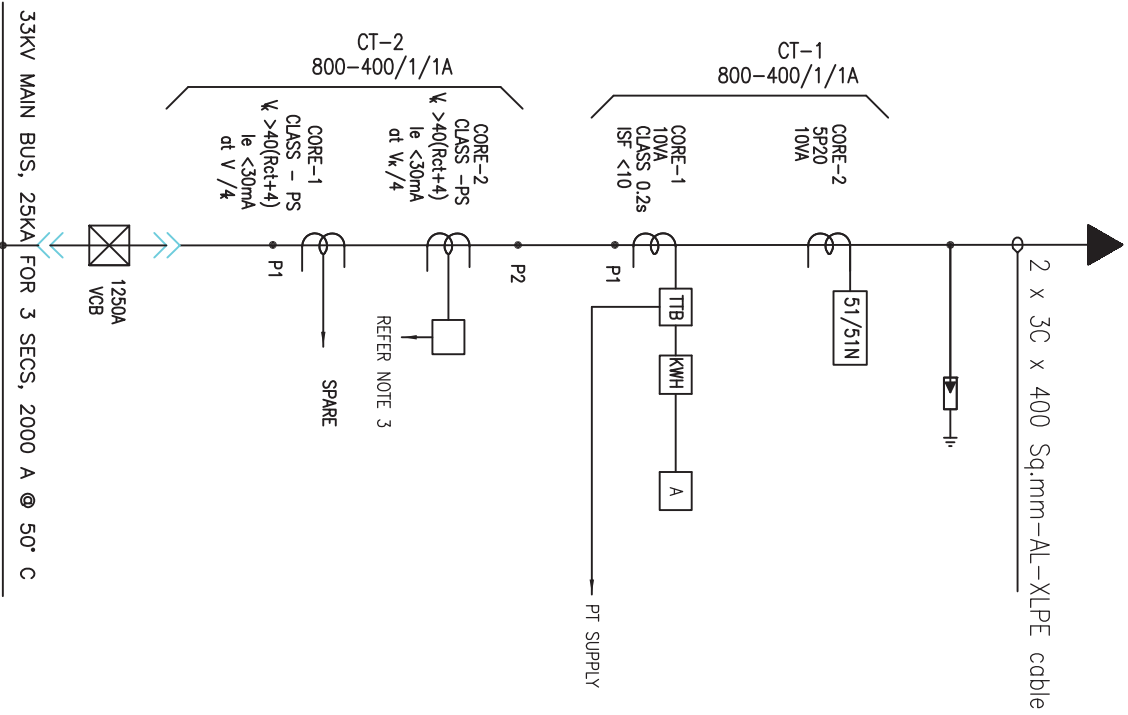
LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	11KV SF6/VACUUM CRT. BKR. DRAWOUT TYPE		ENERGY METER
	CURRENT TRANSFORMER		NEGATIVE PHASE SEQUENCE PROTECTION
	POTENTIAL TRANSFORMER		SYNC CHECK
	SURGE ARRESTOR		O/C & E/F RELAY
	FUSE		UNDER VOLTAGE RELAY
	BREAKER AUX CONTACT MULTIPLIER		DIFFERENTIAL RELAY
	TRIP CIRCUIT SUPERVISION RELAY		DISTANCE RELAY
	ANTI PUMPING RELAY		OVER VOLTAGE RELAY
	HIGH SPEED TRIP RELAY		REF RELAY
	VOLTMETER		DIRECTIONAL O/C & E/F RELAY
	AMMETER		TEST TERMINAL BLOCK

NOTE: 1. KWH METER NOT IN SUPPLIER'S SCOPE
 2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS

DRAWN	R.K./A.H	TITLE	TYPICAL SLD FOR 33KV INCOMER FROM 66/33KV AUTO TRANSFORMER
CHECKED	S.G./A.S		
A.P.P.D.	G.S./G.N	SPECIFICATION NO. BSES-JS-66-HTSWG-R0	
DATE	29.04.22	SLD-SWG-33KV-05	
SCALE	NTS		





LEGEND

SYMBOL	DESCRIPTION
	11KV SF6/VACUUM C.T. BKR DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

SYMBOL	DESCRIPTION
	ENERGY METER
	NEGATIVE PHASE SEQUENCE PROTECTION
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

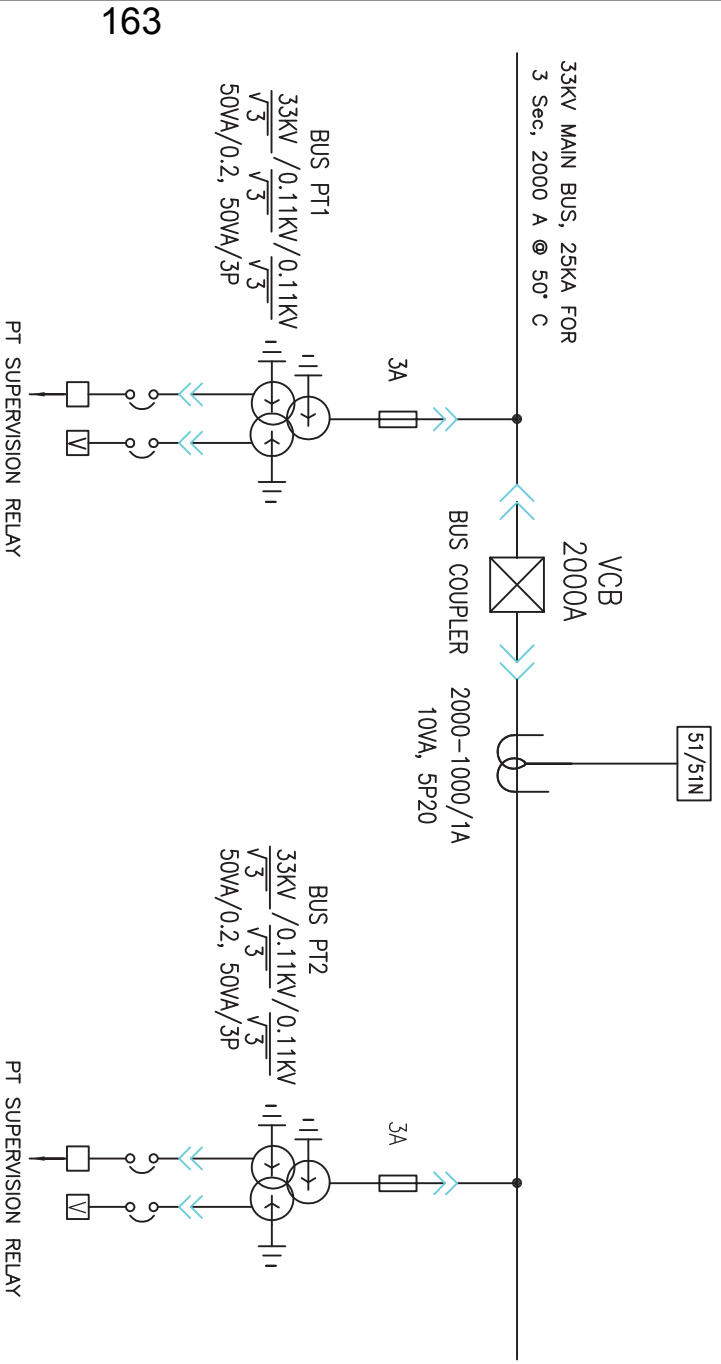
- NOTE: 1. KWH METER NOT IN SUPPLIER'S SCOPE
2. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS
3. LINE DIFFERENTIAL OR DISTANCE RELAY. REFER CLAUSE 16.12.1 OF SPECIFICATION

DRAWN	R.K/A.H
CHECKED	S.G/A.S
APPD.	G.S/G.N
DATE	29.04.22
SCALE	NTS

TITLE
TYPICAL STD FOR 33KV
OUTGOING FROM 66/33KV
AUTO TRANSFORMER

SPECIFICATION NO. BSES-JS-66-HTSWG-R0
SLD-SWG-33KV-06





LEGEND

SYMBOL	DESCRIPTION
	11kV SF6/VACUUM Ckt. BKR DRAWOUT TYPE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	SURGE ARRESTOR
	FUSE
	BREAKER AUX CONTACT MULTIPLIER
	TRIP CIRCUIT SUPERVISION RELAY
	ANTI PUMPING RELAY
	HIGH SPEED TRIP RELAY
	VOLTMETER
	AMMETER

SYMBOL	DESCRIPTION
	ENERGY METER
	NEGATIVE PHASE SEQUENCE PROTECTION
	SYNC CHECK
	O/C & E/F RELAY
	UNDER VOLTAGE RELAY
	DIFFERENTIAL RELAY
	DISTANCE RELAY
	OVER VOLTAGE RELAY
	REF RELAY
	DIRECTIONAL O/C & E/F RELAY
	TEST TERMINAL BLOCK

NOTE:-
 1. REFER CLAUSE 16 OF SPECIFICATION FOR DETAILED FUNCTIONAL REQUIREMENTS OF PROTECTION RELAYS

DRAWN	R.K/A.H
CHECKED	H.K
APPD.	S.G/A.S
DATE	G.S/G.N
SCALE	29.04.22
	NTS

TITLE
 TYPICAL SLD FOR BUS COUPLER CUM BUS PT PANEL FOR 33KV SWITCH BOARD OF 66/33KV AUTO TRANSFORMER

BSES	
SPECIFICATION NO. BSES-TS-66-HTSWG-R0	SLD-SWG-33KV-07

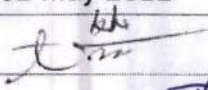

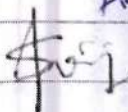
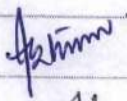
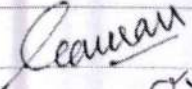
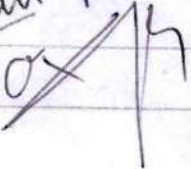
BSES

Technical Specification

Of

Direct Current Distribution Board

Specification no – BSES-TS-71-DCDB-R0

Rev:		0
Pages:		1 of 16
Date:		02 May 2022
Prepared by	Abhishek Harsh	
	Amar Singh	
Reviewed by	Srinivas Gopu	
	Abhinav Srivastava	
Approved by	Gaurav Sharma	
	Gopal Nariya	


TECHNICAL SPECIFICATION FOR DCDB
INDEX

1	SCOPE.....	3
2	STANDARDS AND CODES.....	3
3	SERVICE CONDITION.....	3
4	CONSTRUCTION.....	4
5	CONFIGURATION	5
6	BUSBARS.....	6
7	TERMINALS AND WIRING.....	6
8	METERS, INDICATIONS, PUSH BUTTONS & HEATERS	7
9	NAME PLATES & MARKINGS.....	7
10	FINISH.....	8
11	APPROVED MAKES OF COMPONENTS	8
12	INSPECTION AND TESTING	9
13	PACKING, SHIPPING, HANDLING AND SITE SUPPORT	9
14	DEVIATIONS.....	10
15	DOCUMENT SUBMISSION	10
16	GUARANTEED TECHNICAL PARTICULARS	11



TECHNICAL SPECIFICATION FOR DCDB

1 SCOPE

This specification covers the design, engineering, manufacture, assembly and testing at Manufacturer's works and supply of 220 VDC/50 VDC Distribution board (DCDB) along with all hardware and accessories required for installation and operation.

Specification covers Type 1 and Type 2 DCDB. Type 1 DCDB is for Grid Substations while Type 2 DCDB is for BSES HT Customers.

2 STANDARDS AND CODES

2.1	IS:8623	Specification for factory built assemblies of switchgear & control gear for voltages up to and including 1000V AC/1200 V DC.
2.2	IS 60947-1	Specification for Low-voltage Switchgear and Controlgear - Part 2 :Circuit Breakers
2.3	IS:10118	Code of practice for selection, installation and maintenance switchgear and control gear
2.4	IS:2705	Current transformers
2.5	IS:3231	Electrical relays for power system protection
2.6	IS:1248	Electrical Indicating instruments
2.7	IS:4794	Switches and push buttons
2.8	IS:6005	Code of practice of phosphating iron and steel
2.9	IS:5082	Wrought Aluminium and aluminum alloys for electrical purposes
2.10	IS 3043	Code of practice for Earthing

3 SERVICE CONDITION

3.1	Location	Indoor
3.2	Average grade atmosphere	Heavily polluted, Dry
3.3	Maximum altitude above sea level	1000M
3.4	Ambient air temperature	Highest 50Deg C Average 40Deg C
3.5	Minimum ambient air temperature	0 Deg C
3.6	Relative Humidity	100%

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

3.7	Rainfall	750mm concentrated in four months
3.8	Seismic Zone	IV

4 CONSTRUCTION

4.1	General construction	It shall be free-standing type comprising dust-tight and vermin-proof sheet steel cabinets suitable for indoor installation with IP-54 degree of protection. Necessary busbar support insulators, cable glands, cable supports and terminal blocks etc. The board shall preferably be of single front type.
4.2	Material	The Board shall be made cold rolled steel sheet having Thickness of 2.5 mm of load bearing member and 2 mm for Doors and covers , suitably reinforced to provide flat level surfaces. No welds, rivets, hinges or bolts shall be visible from outside.
4.3	Equipment Mounting	All switches provided on the distribution board shall be on front side of the cabinets, operable from outside. All instruments and control devices shall be mounted on the front of cabinets and fully wired to the terminal blocks.
4.4	Busbar housing	The busbars shall be housed in totally enclosed busbar chambers. Incoming connections from the busbar to various feeders shall be designed so as not to disturb cable connections. Busbar arrangement should ensure safety of the operation/maintenance personnel and facilitate working on any outgoing module without the need for switching off in-feed to the adjacent modules, as far as possible
4.5	Cable alleys	A cable alley preferably 230 mm wide shall be provided in each vertical section for taking cables into the compartments. Cable alleys shall be provided on sides of busbar chamber.
4.6	Cable entry	Cable entry should be from bottom
4.7	Cable glands	Compression type cable glands shall be provided to hold the cables to avoid any pressure or tension on the terminal block connections.
4.8	Gland Plate	Gland plate shall be 3.0mm thick.
4.9	Doors	The doors of cabinets shall be lockable and shall be fitted with double lipped gaskets.
4.10	Gasket	All doors, removable covers and panels shall be gasketed all around with neoprene gaskets. Gaskets shall be embedded through machine only.
4.11	Ventilating louvers	Ventilating louvers shall have screens and filters. The screens shall be made of either brass or GI wires mesh.

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

4.12	Foundation	The panels shall be fixed on the embedded foundation channels with intervening layers anti vibration strips made of shock absorbing materials.
4.13	Base Frame	Base frames shall be supplied along with panels. 100mm channel painted black.
4.14	Mounting	Equipment on front of panel shall be flush mounted. No equipment shall be mounted on the doors.
4.15	Working level	The center lines of switches, push buttons and indicating lamps shall not be less than 750mm and higher than 1600mm from panel base.
4.16	Dimension	500(L)X500(D)X1800(H) mm ³

5 CONFIGURATION

5.1	Incomers	One incomers having Double Pole DC MCB with Aux Switch.			
5.2	Outgoing feeders	All outgoing feeders shall have MCB. Number of outgoing feeders shall be as per table attached			
Application	No of Poles	Type-1		Type-2	
		Rating of MCB (In Amp)	Quantity	Rating of MCB (In Amp)	Quantity
Incomer	2	100	1	50	1
Emergency Lighting DB	2	32	1	16	1
Fire Alarm System	2	32	1	16	0
SCADA	2	32	2	16	1
CRP/33 kV/66 kV Switchgear	2	32	4	16	1
11 kV Switchgear	2	32	4	16	0
Testing Purpose	2	32	1	16	1
NIFPS	2	32	4	16	0
Spare 1	2	100	1	50	1
Spare 2	2	32	4	16	2

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

6 BUSBARS

6.1	Material	Busbar shall be of tinned electrolytic copper or Aluminium
6.2	Size	Suitable for carrying the rated continuous current of 100 A and short circuit current of 15 kA. Busbars shall be continuous throughout the panel. Temperature rise should be limited to 40 degrees over ambient.
6.3	Supports	The busbar shall be supported by means of durable non-hygroscopic, non-combustible and non-tracking polyester fiberglass material or porcelain. Supports shall be capable of withstanding the maximum short circuit stresses.
6.4	Sleeves and shrouds	Busbars shall be encased in heat-shrinkable sleeves of insulating material which shall be suitable for the operating temperature of busbars during normal service. The busbar joints shall be provided with removable thermosetting plastic shrouds.

7 TERMINALS AND WIRING

7.1	Wiring	
7.1.1	Grade and type	1100 V grade, PVC insulated, FRLS type stranded flexible copper wire.
7.1.2	Ferruling	Each wire shall bear an identifying ferrule or tag at each end or connecting point.
7.1.3	Spare	20% Spare Wiring
7.2	Terminals	Terminals of appropriate size shall be provided inside each cabinet for incoming and outgoing cables.
7.2.1	Grade	1100 V grade, moulded piece terminals complete with insulated barriers, washers, nuts and lock nuts.
7.2.2	Power Terminals type	Stud type, nut driver operated
7.2.3	Control terminals type	Stud type, screw driver operated
7.2.4	Spare terminals	20% spare terminals should be provided in each terminal block.
7.2.5	Accessibility	Placement of terminals shall enable proper cable termination. Terminals shall be readily accessible for inspection and maintenance.
7.2.6	Marking	The terminals shall be serially numbered to facilitate installation and maintenance.

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

8 METERS, INDICATIONS, PUSH BUTTONS & HEATERS

8.1	Meters	
8.1.1	Ammeter	DC Moving coil ammeter of size 96 sq.mm. with external shunt. Rating of Ammeter shall be 0-100A DC.
8.1.2	Voltmeter	DC Moving coil voltmeter of size 96.sq.mm to read the DC Bus voltage. Rating of Voltmeter shall be 0-300VDC
8.1.3	Type	Digital type, connected through instruments transformers of suitable rating.
8.2	Indicating lamps	Indicating lamps shall be of low wattage cluster LED type.
8.2.1	Incomer/ Outgoing On	Red
8.2.2	Incomer/ Outgoing Off	Green
8.2.3	Incomer/ Outgoing Trip	Amber
8.3	Push buttons	For manual operation of incomer MCB
8.4	Heaters	Cubicle space heater having rating of 100W. Thermostat for space heater shall be provided with temperature range 0-90°
8.5	CFL	Cubicle lamp shall be provided in DCDB having rating of 11 W.

9 NAME PLATES & MARKINGS

9.1	Panel nameplate	Panel shall have a nameplate clearly indicating the following: a. Panel Serial No.- b. Customer Name - BSES Yamuna/Rajdhani Power Ltd c. PO No. & date - d. Type of Panel - e. Current rating - f. Guarantee period -
9.2	Feeder nameplate	Large and bold name plate carrying the feeder identification shall be provided on the top.
9.3	Equipment nameplate	a. All equipment mounted on front side as well as equipment mounted inside the panels shall be provided with individual name plates with equipment designation engraved. b. All front mounted equipment shall be also provided at the rear with individual name plates engraved with tag numbers corresponding to the one shown in the

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

		panel internal wiring to facilitate easy tracing of the wiring.
9.4	Material	Non-rusting metal or 3 ply lamicaid. Nameplates shall be black with white engraving lettering. Stickers are not allowed.
9.5	Fixing	All nameplates/rating plates shall be riveted to the panels at all four corners. Bolting/screwing is not acceptable.
9.6	Markings	Each switch shall bear clear inscription identifying its function. Similar inscription shall also be provided on each device whose function is not other wise identified. If any switch or device does not bear this inscription separate nameplate giving its function shall be provided for it. Switch shall also have clear inscription for each position indicating e.g. Trip-Neutral close, ON-OFF etc.

10 FINISH

10.1	Primer	Two coats
10.2	Paint	Two finishing coats of epoxy based paint of Shade RAL 7032 with glossy finish.
10.3	Paint thickness	50 microns (minimum)

11 APPROVED MAKES OF COMPONENTS

11.1	Switch	Siemens / L&T (Salzer)
11.2	HRC Fuse Links	GE/ Siemens/ L&T
11.3	Meters	Rishabh/Schneider/AE
11.4	Terminals	Connectwell/Elmex/Wago/Phoenix
11.5	Push buttons / Actuator	L&T/Siemens/Vaishno/Schneider
11.6	MCB	Datar/Legrand/Hager/Schneider/ABB
11.7	Indicating lamps	Vaishno/Binay/Teknic/Siemens/Mimic/C&S

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

12 INSPECTION AND TESTING

12.1	Type test	Equipment should be of type tested quality only, type test certificate to be submitted along with offer. If the manufacturer's lab is accredited by govt. / authorized body then it shall be acceptable for type testing.
12.2	Acceptance & Routine tests	As per relevant Indian standard

13 PACKING, SHIPPING, HANDLING AND SITE SUPPORT

13.1	Packing Protection	The packing shall be fit to withstand rough handling during transit and storage at destination. The test set should be properly protected against corrosion, dampness & damage.
13.2	Packing for accessories and spares	Robust non-returnable packing case with all the above protection & identification Label. The bidder should get the packing list approved before dispatching the material.
13.3	Packing Identification Label	On each packing case, following details are required:
13.3.1	Individual serial number	
13.3.2	Purchaser's name	
13.3.3	PO number (along with SAP item code, if any) & date	
13.3.4	Equipment Tag no. (if any)	
13.3.5	Destination	
13.3.6	Manufacturer / Supplier's name	
13.3.7	Address of Manufacturer / Supplier / it's agent	
13.3.8	Description	
13.3.9	Country of origin	
13.3.10	Month & year of Manufacturing	
13.3.11	Case measurements	
13.3.12	Gross and net weight	

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

13.3.13	All necessary slinging and stacking instructions	
13.4	Shipping	The seller shall be responsible for all transit damage due to improper packing.
13.5	Handling and Storage	Manufacturer instruction shall be followed.
13.6	Detail handling & storage instruction sheet / manual to be furnished before commencement of supply.	

14 DEVIATIONS

14.1	Deviation	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. No deviation will be acceptable post order.
------	-----------	---

15 DOCUMENT SUBMISSION

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A3/A4 sheet in box file with separators for each section. Also provide USB containing pdf with bid for soft copy. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
15.1	Contact Person Name, Email ID and Mobile Number	Required			
15.2	Deviation Sheet	Required	Required		
15.3	Type Test	Required			
15.4	Any Technological Advancement in DCDB	Required			
15.5	Manufacturer's quality assurance plan and certification for quality standards				
15.6	General Arrangement		Required		
15.7	Door Layout		Required		
15.8	Internal Layout		Required		

BSES	BSES-TS-71-DCDB-R0
TECHNICAL SPECIFICATION FOR DCDB	

15.9	SLD		Required		
15.10	Schematic Circuit diagram		Required		
15.11	Bus Bar Arrangement		Required		
15.12	Cable Alley Arrangement		Required		
15.13	GTP	Required	Required		
15.14	QAP		Required		
15.15	BOQ		Required		
15.16	Foundation diagram		Required		
15.17	TB Detail		Required		
15.18	Name Plate Detail		Required		
15.19	Make of all Component as per specification		Required		
15.20	Inspection Report			Required	
15.21	As manufacturing Drawings			Required	
15.22	Operation and Maintenance Manual			Required	Required
15.23	Trouble shooting manual			Required	Required
15.24	As built Drawings				Required
15.25	Test Report				Required

16 GUARANTEED TECHNICAL PARTICULARS

Vendor must submit clause wise compliance in Excel sheet against specification at the time of drawing approval clearly highlighting the deviations from specification against each clause.

S. No.	Description	Specification requirement	Bidder's Data
16.1	GENERAL FEATURES		
16.1.1	Make		
16.1.2	Type		
16.1.3	Reference Standard		
16.1.4	Rated Operational voltage	220 VDC/50 VDC	


TECHNICAL SPECIFICATION FOR DCDB

16.1.5	Rated Nominal Current	100	
16.1.6	Rated Insulation voltage	1100V	
16.1.7	Rated Impulse withstand voltage	8kV	
16.1.8	Service supply for heating, lighting and power sockets	240VAC±10%	
16.1.9	Mounting	Floor (Free standing)	
16.1.10	Connections	Cable entry – Bottom	
16.1.11	Configuration	Single front	
16.1.12	Enclosure thickness		
a	Load Bearing Member	≥2.5mm	
b	Doors and Covers	≥2 mm	
c	Gland Plate	3 mm	
16.1.13	Enclosure Material	CRCA Sheet	
16.1.14	Enclosure degree of protection	IP 54	
16.1.15	Power Cable Termination	Suitable for 4CX50 Sq.mm Al	
16.1.16	Paint shade	RAL 7032 (Siemens Grey)	
16.1.17	Typical vertical section (Overall dimension (mm) and weight (Kg))	Required	
16.1.18	Incomer		
16.1.19	Outgoings		
16.1.20	Dimensions of the DCDB Panel	500(L)X500(D)X1800(H) mm ³	
16.1.21	Weights of the DCDB Panel	(in kg.)	
16.1.22	Marking on the panel	As per the specification	
16.1.23	Cable Alley Width	230 mm	
16.1.24	Cable Gland	Compression Type	
16.1.25	Gasket Material	Neoprene	


TECHNICAL SPECIFICATION FOR DCDB

16.1.26	Ventilating louvers	Required	
16.1.27	Base Frame	100mm channel	
16.2	MCB		
16.2.1	Make	Datar/Legrand/Hager/Schneider/ABB	
16.2.2	Incomer	100A/50 A	
16.2.3	Emergency Lighting DB	32A/16 A	
16.2.4	Fire Alarm System	32A/16 A	
16.2.5	SCADA	32A/16 A	
16.2.6	CRP	32A/16 A	
16.2.7	11 kV Switchgear	32A/16 A	
16.2.8	Testing Purpose	32A/16 A	
16.2.9	NIFPS	32A/16 A	
16.2.10	Spare 1	100A/50 A	
16.2.11	Spare 2	32A/16 A	
16.3	BUS AND BUS TAPS		
16.3.1	Make		
16.3.2	Material	Tinned electrolytic copper or Aluminum	
16.3.3	Reference standard		
16.3.4	Continuous Current (at site condition, 50°C ambient) within cubicle		
16.3.5	Short Circuit withstand Current for 1 sec	15 KA	
16.3.6	Cross sectional Area		
16.3.7	DC resistance	ohm/m/ph	
16.3.8	Reactance	ohm/m/ph	


TECHNICAL SPECIFICATION FOR DCDB

16.3.9	Losses-middle phase	w/m/ph	
16.3.10	Minimum clearance of bus bar and joints	Required	
16.3.11	Phase to phase (mm)		
16.3.12	Phase to earth (mm)		
16.3.13	Bus bar insulation	i. Heat shrinkable sleeves rated for maximum operating voltage	
		ii. Cast resin shrouds for joint	
16.3.14	Bus joints	Silver	
16.3.15	Bus bar support insulator	Required	
16.3.16	Spacing (mm)		
16.3.17	Make		
16.3.18	Type		
16.3.19	Reference standard		
16.3.20	Voltage class (kV)		
16.3.21	Minimum creepage distance (mm)		
16.3.22	Cantilever strength (Kg/sq.cm.)		
16.4	Wiring and Terminals		
16.4.1	Wiring		
a	Grade and type	1100 V grade, PVC insulated, FRLS type stranded flexible copper wire.	
b	Ferruling	Each wire shall bear an identifying ferrule or tag at each end or connecting point.	
c	Spare	20% Spare Wiring	
16.4.2	Terminals		
a	Grade	1100 V grade, moulded piece terminals complete with insulated barriers, washers, nuts and lock nuts.	
b	Power Terminals type	Stud type, nut driver operated	
c	Control terminals type	Stud type, screw driver operated	
d	Spare terminals	20% spare	


TECHNICAL SPECIFICATION FOR DCDB

e	Accessibility	Placement of terminals shall enable proper cable termination. Terminals shall be readily accessible for inspection and maintenance.	
f	Marking	The terminals shall be serially numbered to facilitate installation and maintenance.	
16.5	METERS, INDICATIONS, PUSH BUTTONS & HEATERS		
16.5.1	Ammeter	DC Moving coil ammeter of size 96 sq.mm. with external shunt. Rating of Ammeter shall be 0-100A DC.	
a	Model No Ammeter		
b	Make of Ammeter		
16.5.2	Voltmeter	DC Moving coil voltmeter of size 96.sq.mm to read the DC Bus voltage. Rating of Voltmeter shall be 0-300VDC	
a	Model No Voltmeter		
b	Make of Voltmeter	Rishabh/Schneider/AE	
c	Type	Digital type	
16.5.3	Indicating lamps	Cluster LED type.	
a	Make of Indicating lamps	Vaishno/Binay/Teknic/Siemens/Mimic/C &S	
b	Incomer/ Outgoing On	Red	
c	Incomer/ Outgoing Off	Green	
d	Incomer/ Outgoing Trip	Amber	
e	Push buttons Make	L&T/Siemens/Vaishno/Schneider	
16.5.4	Heaters	Cubicle space heater having rating of 100W. Thermostat for space heater shall be provided with temperature range 0-90 ^o	
16.5.5	CFL	Cubicle lamp shall be provided in DCDB having rating of 11 W.	
16.6	NAME PLATES & MARKINGS		


TECHNICAL SPECIFICATION FOR DCDB

a	Panel nameplate	Panel Serial No.-	
b		Customer Name - BSES Yamuna/Rajdhani Power Ltd	
c		PO No. & date -	
d		Type of Panel -	
e		Current rating -	
f		Guarantee period -	
16.6.1	Feeder nameplate	As per Spec	
a	Equipment nameplate	As per Spec	
b	Material	As per Spec	
c	Fixing	As per Spec	
d	Markings	As per Spec	
16.7	FINISH		
a	Primer	Two coats	
b	Paint	Two finishing coats of epoxy based paint of Shade RAL 7032 with glossy finish.	
c	Paint thickness	50 microns (minimum)	


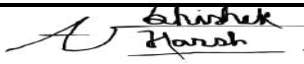




Technical Specification

For

415 V AC Distribution Board

Specification no – BSES-TS-70-ACDB-R0

Rev	0	
Page	1 of 17	
Date	05 May 2022	
Prepared by	Jeena Borana	 <small>b8b1c444-d6e3-4459-b793-d46d1e00a2fc</small>
	Abhishek Harsh	 <small>3267d7c3-82b5-46cb-b5a6-867ee7820a34</small>
Reviewed by	Srinivas Gopu	 <small>5d32525e-ed3a-4f41-b1c7-b8a5e77d1519</small>
Approved by	Gaurav Sharma	 <small>23dc2de2-95de-4472-99a7-dea873f472b6</small>

INDEX

1	SCOPE	3
2	STANDARDS & CODES	3
3	SERVICE CONDITIONS	3
4	ACB CONFIGURATION	4
5	CONSTRUCTION	5
6	BUSBAR	7
7	MCCB	7
8	CURRENT TRANSFORMER.....	8
9	TERMINALS AND WIRING	8
10	METERS, INDICATIONS AND PUSH BUTTONS	9
11	NAME PLATES & MARKINGS	9
12	FINISHING	10
13	APPROVED MAKE OF COMPONENTS.....	10
14	QUALITY ASSURANCE PLAN, INSPECTION AND TESTING	11
15	PACKING, SHIPPING, HANDLING & SITE SUPPORT	11
16	DEVIATIONS.....	12
17	DOCUMENT SUBMISSION MATRIX.....	12
	ANNEXURE A GUARANTEED TECHNICAL PARTICULARS	14

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

1 SCOPE

This specification covers the design, engineering, manufacture, assembly and testing at manufacturer's works and supply of 415V AC Distribution board (ACDB) along with all hardware and accessories required for installation and operation.

Specification covers Type 1 and Type 2 ACDB. Type 1 ACDB is for Grid Substations while Type 2 ACDB is for BSES HT Customers.

2 STANDARDS & CODES

2.1	IS:8623	Specification for factory built assemblies of switchgear & control gear for voltages up to and including 1000V AC/1200 V DC.
2.2	IS 60947-1	Specification for Low-voltage Switchgear and Control gear - Part 2 : Circuit Breakers
2.3	IS:10118	Code of practice for selection, installation and maintenance switchgear and controlgear
2.4	IS:2705	Current Transformers
2.5	IS:3231	Electrical relays for power system protection
2.6	IS:1248	Electrical Indicating instruments
2.7	IS:4794	Switches and push buttons
2.8	IS:6005	Code of practice of phosphating iron and steel
2.9	IS:5082	Wrought Aluminum and aluminum alloys for electrical purposes
2.10	IS 3043	Code of practice for Earthing

3 SERVICE CONDITIONS

3.1	System Configuration	3 Phase 4 Wire with neutral solidly grounded
3.2	Supply Voltage	415 volt +/- 10%
3.3	Supply frequency	50Hz
3.4	Location	Indoor
3.5	Average grade atmosphere	Heavily polluted, Dry
3.6	Maximum altitude above sea level	1000M
3.7	Ambient air temperature	Highest 50Deg C Average 40Deg C
3.8	Minimum ambient air temperature	0 Deg C
3.9	Relative Humidity	100%
3.10	Rainfall	750mm concentrated in four months

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

4 ACB CONFIGURATION

4.1 TYPE 1 ACDB CONFIGURATION

4.1.1	Incomers	<ul style="list-style-type: none"> a. Two incomers, each having Motorized 630A MCCB. MCCBs shall have microprocessor based over current and earth fault release. b. Auto changeover shall be provided between the two incomers c. Manual castle key interlock required between two incomers d. Castle key for Local /Remote operation 			
4.1.2	Outgoing feeders	<ul style="list-style-type: none"> a. The number of outgoing feeders from AC boards shall be such that each substation equipment is fed by separate feeder (refer below). b. Utilization category of MCBs shall be C. 			
	Application	Type of Switchgear	No of Poles	Rating (A)	Quantity
4.1.3	Transformer Oil filtration	MCB	4	200	2
4.1.4	Welding(Outdoor)	MCB	2	63	4
4.1.5	Power Socket(Indoor)	MCB	4	32	5
4.1.6	Outdoor Lighting	MCB	4	32	2
4.1.7	Indoor Lighting	MCB	4	32	2
4.1.8	Battery Charger	MCB	4	63	2
4.1.9	BMK	MCB	4	32	8
4.1.10	Marshalling Box(PTR)	MCB	4	32	3
4.1.11	AC Supply	MCB	4	32	2
4.1.12	UPS	MCB	2	16	1
4.1.13	11kV Switchgear	MCB	2	32	3
4.1.14	CRP	MCB	2	32	2
4.1.15	RTU/SCADA	MCB	2	16	2
4.1.16	Fire Fighting	MCB	2	16	2
4.1.17	EPAX	MCB	2	16	1

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

4.1.18	Power Socket (Outdoor)	MCB	2	16	4
--------	---------------------------	-----	---	----	---

4.2 TYPE 2 ACDB CONFIGURATION

4.2.1	Incomers	<ul style="list-style-type: none"> a. Two incomers, each having Motorized 400 A MCCB. b. Auto changeover shall be provided between the two incomers c. Manual castle key interlock required between two incomers d. Castle key for Local /Remote operation 			
4.2.2	Outgoing feeders	<ul style="list-style-type: none"> a. The number of outgoing feeders from AC boards shall be such that each substation equipment is fed by separate feeder (refer below). b. Utilization category of MCBs shall be C. 			
	Application	Type of Switchgear	No of Poles	Rating (A)	Quantity
4.2.3	Welding	MCB	2	63	1
4.2.4	Power Socket	MCB	4	32	3
4.2.5	Outdoor Lighting	MCB	4	16	2
4.2.6	Indoor Lighting	MCB	4	16	2
4.2.7	Battery Charger	MCB	4	32	2
4.2.8	AC Supply	MCB	4	32	2
4.2.9	Switchgear	MCB	2	32	2
4.2.10	RTU/SCADA	MCB	2	16	2
4.2.11	Fire Fighting	MCB	2	16	2

5 CONSTRUCTION

5.1	General construction	<ul style="list-style-type: none"> a. Board shall be of modular construction with provision for compartmentalization for Incomer and non-compartmentalization for outgoing feeders. b. It shall be free-standing type comprising dust-tight and vermin-proof sheet steel cabinets suitable for indoor installation with IP-54 degree of protection. c. Necessary busbar support insulators, cable glands, cable supports and terminal blocks etc. The board shall be of single front type.
-----	----------------------	---


TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD

5.2	Material	The Board shall be made out of at least 2.5 mm thick cold rolled steel sheet (CRCA), suitably reinforced to provide flat level surfaces. No welds, rivets, hinges or bolts shall be visible from outside.
5.3	Equipment Mounting	<ul style="list-style-type: none"> a) All switches provided on the distribution board shall be on front side of the cabinets, operable from outside. b) All MCBs shall be flush mounted operable from front side of ACDB. c) All instruments and control devices shall be mounted on the front of cabinets and fully wired to the terminal blocks.
5.4	Operating Height	≤ 1.6 meter
5.5	Busbar housing	<ul style="list-style-type: none"> a) The busbars shall be housed in totally enclosed busbar chambers. b) Incoming connections from the busbar to various feeders shall be designed so as not to disturb cable connections. c) Busbar arrangement should ensure safety of the operation/maintenance personnel and facilitate working on any outgoing module without the need for switching off in-feed to the adjacent modules, as far as possible
5.6	Outgoing Cable Termination	For Outgoing cable termination, vertical arrangement of Terminal Blocks shall be provided with ratings in descending order.
5.7	Cable glands	Compression type cable glands shall be provided to hold the cables to avoid any pressure or tension on the terminal block connections.
5.8	Gland Plate	Gland plate shall be 3.0mm thick with metallic knockout punches
5.9	Doors	<ul style="list-style-type: none"> a) The doors of cable cabinets shall be lockable hinged type b) Doors shall be fitted with double lipped gaskets. c) Bus bar side shall have bolted doors.
5.10	Drawing Pocket	Shall be Provided to keep "As Built Drawings"

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

6 BUSBAR

6.1	Material	Busbar shall be of aluminum.
6.2	Size (phase and neutral)	a) Main busbar - 80x10 sqmm for Type 1 ACDB b) Main busbar – 50X10 sqmm for Type 2 ACDB c) Busbar dropper size Incomers - MCCB-80x10 sqmm for Type 1 ACDB d) Busbar dropper size Incomers - MCCB-50x10 sqmm for Type 2 ACDB
6.3	Supports	The busbar shall be supported by means of durable non-hygroscopic, non-combustible and non-tracking polyester fiberglass material or porcelain. Supports shall be capable of withstanding the maximum short circuit stresses
6.4	Sleeves and shrouds	Busbars shall be encased in heat-shrinkable sleeves of insulating material which shall be suitable for the operating temperature of busbars during normal service. The busbar joints shall be provided with removable thermosetting plastic shrouds.

7 MCCB

7.1	MCCB type	4 pole
7.2	MCCB design ambient temperature	50deg C
7.3	MCCB Housing	Thermoplastic material resistant to fire & abnormal heat , non hygroscopic
7.4	MCCB Terminal	Silver coated copper with phase barriers, spreader terminals & shrouds
7.5	De-rating at 50Deg ambient temperature	No derating (0%)
7.6	MCCB rated 3 phase short circuit breaking capacity Ics = Icu	36kA minimum at 415v and 50Hz
7.7	MCCB rated 3 phase short circuit withstand capacity, Icw	8kA for 1sec
7.8	MCCB SC making current capacity	75kA peak
7.9	MCCB rated insulation level	1000V
7.10	MCCB mechanical & electrical endurance	As per IS 13947 / IEC
7.11	MCCB utilization category	B as per IS / IEC 947
7.12	MCCB indications	ON, OFF & TRIP
7.13	MCCB protection	MCCBs shall have microprocessor based over current and earth fault release.

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

7.14	Tripping characteristic required	
7.14.1	Overload setting	Range 60-100%In (Set on 95%)
7.14.2	Short Circuit setting	Range 200-1200%In (Set on 300%)
7.14.3	Earth fault setting	To be provided
7.15	MCCB Clearances in air	As per table XIII of IS 13947-1
7.16	MCCB temperature rise limits	As per table 2 & 3 of IS 13947-1
7.17	MCCB Ingress Protection	IP2X Minimum (pollution degree minimum 2)
7.18	MCCB additional features	Sealing/padlocking of operating knob in OFF position Sealing/padlocking of operating knob in OFF position isolation suitable with positive contact

8 CURRENT TRANSFORMER

8.1	Type	Cast-resin type, Class-E insulation, rated for 120% current continuous
8.2	Provision	Shall be provided in incomer for metering. Separate Neutral CT shall be connected in the neutral for detecting earth fault for both the incomer.
8.3	Secondary current	5A
8.4	Metering CT Class	1.0
8.5	Burden	Based on requirement

9 TERMINALS AND WIRING

9.1	Secondary Wiring	
9.1.1	Grade and type	1100 V grade, PVC insulated, FRLS type stranded flexible copper wire.
9.1.2	Ferruling	Each wire shall bear an identifying ferrule or tag at each end or connecting point.
9.1.3	Size	Appropriate size copper based on rated current and application subject to a minimum of 2.5sqmm copper
9.2	Terminals	Terminals of appropriate size shall be provided inside each cabinet for incoming and outgoing cables.
9.2.1	Grade	1100 V grade, molded piece terminals complete with insulated barriers, washers, nuts and lock nuts.
9.2.2	Power Terminals type	Stud type, nut driver operated

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

9.2.3	Control terminals type	Stud type, screw driver operated suitable for minimum 6sqmm wire.
9.2.4	Spare terminals	20% spare terminals should be provided in each terminal block.
9.2.5	Accessibility	Placement of terminals shall enable proper cable termination. Terminals shall be readily accessible for inspection and maintenance.
9.2.6	Marking	The terminals shall be serially numbered to facilitate installation and maintenance.
9.3	Cable troughs	Shall be provided for wiring of each terminal block with 50% spare capacity

10 METERS, INDICATIONS AND PUSH BUTTONS

10.1	Meters	
10.1.1	Multifunction Meter	For incomer feeders. Meter should have facility to store peak load current in memory.
10.1.2	Type	Digital with inbuilt phase selector
10.1.3	Communication Protocol	RS485 on MODBUS
10.1.4	Accuracy Class	1.0
10.1.5	Auxiliary supply	240VAC with 10% tolerance
10.2	Indicating lamps	Indicating lamps shall be of low wattage cluster LED type.
10.2.1	Incomer/ Outgoing On	Red
10.2.2	Incomer/ Outgoing Off	Green
10.2.3	Incomer/ Outgoing Trip	Amber
10.3	Push buttons	For manual operation of incomer

11 NAME PLATES & MARKINGS

11.1	Panel nameplate	Panel shall have a nameplate clearly indicating the following: a) Manufacturer's Name & Country: b) Panel Serial No.: c) Customer Name: BSES Yamuna / Rajdhani Power Ltd d) PO No. & date: e) Type of Panel: f) Current rating: g) Rated Voltage and Frequency: h) Month and year of Manufacture: MM/YYYY i) Guarantee period:
------	-----------------	---

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

11.2	Feeder nameplate	Large and bold name plate carrying the feeder identification shall be provided on the top of each module. Blank insert type name plates shall be provided on each outgoing feeder.
11.3	Equipment nameplate	a) All equipment mounted on front side as well as equipment mounted inside the panels shall be provided with individual name plates with equipment designation engraved. b) All front mounted equipment shall also be provided at the rear with individual name plates engraved with tag numbers corresponding to the one shown in the panel internal wiring to facilitate easy tracing of the wiring.
11.4	Danger plate	Panel shall have a danger plate of anodized aluminum clearly indicating the danger logo and voltage details.
11.5	Material	Non-rusting metal or 3 ply lamicaid. Nameplates shall be black with white engraving lettering. Stickers are not allowed.
11.6	Fixing	All nameplates/rating plates shall be riveted to the panels at all four corners. Bolting/screwing is not acceptable.
11.7	Markings	Each switch shall bear clear inscription identifying its function. Similar inscription shall also be provided on each device whose function is not otherwise identified. If any switch or device does not bear this inscription separate nameplate giving its function shall be provided for it. Switch shall also have clear inscription for each position indicating e.g. Trip-Neutral close, ON-OFF etc.

12 FINISHING

12.1	Primer	Two coats
12.2	Finish	Powder Coating
12.3	Colour shade	RAL 7032 (Siemens Grey)
12.4	Paint thickness	70 microns (minimum)

13 APPROVED MAKE OF COMPONENTS

13.1	Switch	Siemens / L&T (Salzer)
13.2	HRC Fuse Links	GE/ Siemens/ L&T
13.3	Meters	Rishabh/Schneider/AE
13.4	AC Contractors	L&T/Siemens/Telemecanique/GE/ABB
13.5	Terminals	Connectwell/Elmex/Wago/Phoenix
13.6	Push buttons / Actuator	L&T/Siemens/Vaishno/Schneider
13.7	MCCB	L&T/Siemens/ ABB/GE/Schneider
13.8	MCB	Datar/Legrand/Hager/Schneider/ABB
13.9	Indicating lamps	Vaishno/Binay/Teknic/Siemens/Mimic/C&S

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

14 QUALITY ASSURANCE PLAN, INSPECTION AND TESTING

S No.	Parameters	Technical Requirements
14.1	Quality Assurance Plan	QAP Shall be submitted by vendor for approval. Inspection and testing of the material shall be carried out accordingly.
14.2	Type test	Equipment should be of type tested quality only, type test certificate to be submitted along with offer. Test reports from CPRI/ERDA accredited laboratory only acceptable.
14.3	Routine /Acceptance test	As per relevant Indian standard
14.4	Inspection	<ul style="list-style-type: none"> a) The buyer reserves the right to inspect equipment at the Seller's works at any time prior dispatch, to verify compliance with the specifications. b) In-process and final inspection call intimation shall be given in 15 days advance to purchaser. c) In the event of any discrepancy in the test reports i.e. test reports not acceptable or any type tests (including special /additional tests, if any) not carried out, same shall be carried out without any cost implication to BSES before dispatch of equipment.
14.5	Test certificates	Test certificates (routine and acceptance) shall be submitted along with the dispatch documents.

15 PACKING, SHIPPING, HANDLING & SITE SUPPORT

15.1	Packing Protection	The packing shall be fit to withstand rough handling during transit and storage at destination. The test set should be properly protected against corrosion, dampness & damage.
15.2	Packing for accessories and spares	Robust non-returnable packing case with all the above protection & identification Label. The bidder should get the packing list approved before dispatching the material.
15.3	Packing Identification Label	<p>On each packing case, following details are required:</p> <ul style="list-style-type: none"> 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 i) Country of origin j) Month & year of Manufacturing

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

		k) Case measurements l) Gross and net weight m) All necessary slinging and stacking instructions
15.4	Shipping	The seller shall be responsible for all transit damage due to improper packing.
15.5	Handling and Storage	Manufacturer instruction shall be followed.
15.6	Detail handling & storage instruction sheet / manual to be furnished before commencement of supply.	

16 DEVIATIONS

16.1	Deviation	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. No deviation will be acceptable post order.
------	-----------	---

17 DOCUMENT SUBMISSION MATRIX

Drawing submission shall be as per the matrix given below.

- All documents/ drawing shall be provided in soft copy only through mail.
- Language of the documents shall be English only.
- Incomplete submission shall be liable for rejection.
- Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch
- No submission is acceptable without check list compliance.
- Order of documents shall be strictly as per the check list.
- 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.	Documents to be submitted	Bid	Approval	Pre Dispatch
17.1	Guaranteed Technical Particulars (GTP)	Required	Required	
17.2	Deviation Sheet, if any	Required	Required	
17.3	GA drawing, SLD, Wiring Diagram	Required	Required	

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

S No.	Documents to be submitted	Bid	Approval	Pre Dispatch
17.4	Type test reports(not more than 5 years old) from CPRI/ERDA	Required	Required	
17.5	Reference List of major customers using the offered product from last 5 years	Required		
17.6	Performance certificates executed in last 5 years			
17.7	Make of Raw Materials	Required	Required	
17.8	Manufacturer's Quality Assurance Plan		Required	
17.9	Complete product catalogue and Manual		Required	Required
17.10	Test certificates of all raw materials			Required
17.11	Inspection and routine test reports, carried out in manufacturer's works			Required

BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	

ANNEXURE A GUARANTEED TECHNICAL PARTICULARS

S. No.	Description	Specification requirement	Vendor Data
1.0	GENERAL FEATURES		
1.1	Make		
1.2	Type		
1.3	Reference Standard		
1.4	Rated Operational voltage	415V AC \pm 10%	
1.5	Rated Nominal Current	630A	
1.6	Rated frequency	50 Hz (+3%, -5%)	
1.7	Rated Insulation voltage	1100V	
1.8	Rated Impulse withstand voltage	8kV	
1.9	Service supply for heating, lighting and power sockets	240VAC \pm 10%,	
1.10	Mounting	Floor (Free standing)	
1.11	Connections	Cable entry – Bottom	
1.12	Configuration	Single front	
1.13	Enclosure thickness		
1.13.1	Load Bearing Member	\geq 2.5mm	
1.13.2	Doors and Covers	\geq 2 mm	
1.14	Enclosure Material	CRCA Sheet/GI	
1.15	Enclosure degree of protection	IP 54	
1.16	Mechanical safety interlocks	As specified in technical specification	
1.17	Incomer Power Cable Termination	2Rx4Cx300sqmm	
	Outgoing Cable Termination	a) 200A MCB- 4Cx150sqmm b) 63A MCB- 4Cx50sqmm c) 32A MCB- 4Cx25 sqmm d) 16A MCB- 2Cx10 sqmm	
	Cable Termination Type	From Bottom of Panel	
	Clearance	150 mm clearance to be maintained from the bottom of the TB and the gland plate	
1.18	Paint shade	RAL 7032 (Siemens Grey)	
1.19	Typical vertical section (Overall dimension (mm) and weight (Kg))	Required	
1.19.1	Incomer		
1.19.2	Outgoings		
1.20	Dimensions of the ACDB Panel	L (mm) X D (mm) X H (mm)	

TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD

S. No.	Description	Specification requirement	Vendor Data
1.21	Weights of the ACDB Panel	(in kg.)	
1.22	Marking on the panel	As per the specification	
2.0	INCOMER MCCB		
2.1	Make & Model of MCCB	Required	
2.2	Catalogue of MCCB	Required	
2.3	Continuous Current at 40 deg C/ 50 deg C	630A	
2.4	Rated ultimate breaking capacity at rated voltage	50kA	
2.5	Rated service breaking capacity Ics	Ics = 100% Icu at rated voltage	
2.6	Rated making current	Icm = 220% Icu	
2.7	Utilization Category	A	
2.8	Overload setting	50 -100% (Inverse time characteristics)	
2.9	Overcurrent setting	200-1000% (Instantaneous characteristics)	
2.10	Earthfault setting	20-100% (Instantaneous)	
2.11	Dimension(HxWxD)	Required	
2.12	Weight	Required	
3.0	BUS AND BUS TAPS		
3.1	Make		
3.2	Material and grade of buses and joints	High conductivity electrolytic grade aluminum	
3.3	Reference standard		
3.4	Continuous Current (at site condition, 50°C ambient) within cubicle	630A	
3.5	Cross sectional Area		
3.6	DC resistance	ohm/m/ph	
3.7	Skin-effect ratio		
3.8	Reactance	ohm/m/ph	
3.9	Losses-middle phase	w/m/ph	
3.10	Minimum clearance of bus bar and joints	Required	
3.10.1	Phase to phase (mm)		
3.10.2	Phase to earth (mm)		
3.11	Bus bar insulation	a. Heat shrinkable sleeves rated for maximum operating voltage b. Cast resin shrouds for joint	

TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD

S. No.	Description	Specification requirement	Vendor Data
3.12	Bus joints	Silver	
3.13	Bus bar support insulator	Required	
3.13.1	Spacing (mm)		
3.13.2	Make		
3.13.3	Type		
3.13.4	Reference standard		
3.13.5	Voltage class (kV)		
3.13.6	Minimum creepage distance (mm)		
3.13.7	Cantilever strength (Kg/sq.cm.)		
4.0	CURRENT TRANSFORMER		
4.1	Make		
4.2	Type	Resin Cast	
4.3	Reference standard		
4.4	CT ratios		
4.5	Class of Insulation	Class-E	
4.6	Protection class	5P20	
4.7	Metering class	5	
4.8	VA burden for Relaying CT-Incomer	Based on requirement.	
5.0	AMMETERS/MULTIFUNCTION METERS AND VOLTMETERS		
5.1	Make & Model no.		
5.2	Type	Digital with inbuilt phase selector	
5.3	Communication Protocol	RS485 on MODBUS	
5.4	Accuracy class	1	
6.0	CONTROL & INDICATIONS		
6.1	Push button		
6.1.1	Make and model no.		
6.1.2	Type	Flush mounted type with touch proof terminals	
6.2	LEDs		
6.2.1	Make & Model no.		
6.2.2	Type	Flush mounted type with touch proof terminals	
7.0	TERMINAL BLOCKS		
7.1	Make & Model no.		
7.2	Spare terminals	Equal to 20% of active terminals in each TB	
7.3	Power terminals	Stud type, screw driver operated	


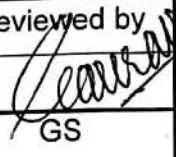
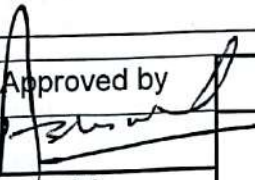
BSES	BSES-TS-70-ACDB-R0
TECHNICAL SPECIFICATION FOR 415V AC DISTRIBUTION BOARD	


S. No.	Description	Specification requirement	Vendor Data
7.4	Control terminals	Stud type, screw driver operated suitable for minimum 6sqmm wire.	
8.0	TESTS		
8.1	Confirmation of routine tests to be performed as per IS 60947	Yes/No	
8.2	IP 55 test shall be carried out during inspection	Yes/No	
8.3	Confirmation of Type tests to be performed (or report submitted) as per IS 60947	Type test report no./date	
8.4	Confirmation of Acceptance tests to be performed during inspection as per IS 60947	Yes/No	
8.5	Temperature rise test to be carried out at NABL accredited lab.	Yes/No	
9.0	Deviation sheet against each clause of the specification	To be submitted	

TECHNICAL SPECIFICATION

FOR


11KV AUTO SWITCHED CAPACITOR BANK

Prepared by 	Reviewed by 	Approved by 	Rev	02
AH	GS	AA	Date	01 st Aug 2018

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


INDEX

1.0	RECORD OF REVISION	3
2.0	SCOPE OF SUPPLY	4
3.0	CODES & STANDARDS	4
4.0	SERVICE CONDITIONS.....	5
5.0	GENERAL.....	5
6.0	SINGLE PHASE CAPACITOR UNIT	7
7.0	VACUUM CONTACTOR FOR AUTO SWITCHING	7
8.0	SERIES REACTOR	8
9.0	RVT	8
10.0	APFC	9
11.0	ISOLATOR.....	10
12.0	LIGHTNING ARRESTOR	10
13.0	PERFORMANCE	10
14.0	LABELS & FINISH	11
15.0	APPROVED MAKES OF COMPONENTS.....	12
16.0	INSPECTION & TESTING.....	12
17.0	TYPICAL SCHEME OF HT CAPACITOR BANK	13
18.0	MANDATORY SPARES.....	13
19.0	DRAWING AND DATA SUBMISSION MATRIX.....	13
20.0	GUARANTEED TECHNICAL PARTICULARS.....	15

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

1.0 RECORD OF REVISION

S. No	Item/ Clause No	Change/ Addition	Reason of Change/Addition
1	5.13	Peek Hole in Enclosure doors	To see the status of Capacitor bank fuse
2	5.14	Exhaust Fan with Air filter And Canopy	For heat suppression in capacitor bank compartment
3	5.21	Cutout space for Power Cable Entry	For ease of Power Cable Entry
4	6.10	Inclusion of External Fuse	For Ease of O&M
5	7.1	Addition of Shreem make vacuum contactor	Vacuum contactor of Shreem complies the specification of BSES Yamuna Power Limited
6	8.10	Class of Insulation	For more clarity on Series Reactor Data
7	9.0	Updation of RVT data	For More clarity on RVT Data
8	10.4	Communication Protocol as Modbus	For Communication with SCADA
9	10.7	Supply of APFC has been changed to 48-220 VDC to 220 VAC	No vendor provides APFC with Auxilliary voltage 48-220 VDC
10	14.6	Inclusion of Warranty period, and Customer care Number in Name Plate rating	For ease of O&M
11	15.0	Approved Make Table	For Quality Products
12	17.0	Typical SLD	Upgradation of SLD due to stepped Capacitor Bank
13	20.0	Inclusion of Drawing and Data Submission Matrix	To streamline drawing/document submission


 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

2.0 SCOPE OF SUPPLY

- a. This specification covers the design, manufacturing, testing, supply, erection & commissioning of 7.2 MVAR (One fixed step of 1.8 MVAR and three steps of 1.8 MVAR), 12.65 KV three phase outdoor Auto Switched Capacitor Bank with bus bar arrangement at site in an enclosure including but not limited to 0.2% series reactors, capacitor switch/contactors, Isolator cum earth switch, HT fuses, RVT, APFC Panel and all necessary equipment for auto switching. No Equipment should lie outside the enclosure apart from APFC panel which shall be the part of VCB panel. Necessary space will be provided for APFC panel in switchboard. Fitting and wiring of this panel shall be in vendor's scope. (Although in case of unavailability of space in switchboard, separate wall mounted panel shall be provided by the vendor). Isolator, Earth Switch etc should be incorporated in enclosure only. NDR will not be the part of vendor's scope but wiring for NDR shall be in vendor's scope.
- b. This specification shall be used in conjunction with all specifications, data sheets, single line diagrams, and other drawings attached to the tender.

3.0 CODES & STANDARDS

Indian Electricity Rules	
Indian electricity act	
CBIP manual	
IS 13925 part 1,2 & 3	Shunt capacitors above rated voltage 1000v
IS 11298 part 3	Plastic films for capacitors
IS 9921-1985	Isolator
IS 5553	Series reactor
IS 2099	Bushings for voltages above 1000v
IS 12672	Internal fuses & disconnectors for shunt capacitors
IS 2705	Current transformers
IS 13067	Impregnant for power capacitors
IS5	Color of mixed paints
IS 3156	RVT
IS 15086	Surge arrestor
IS 3070 (Pt 3)	Surge arrestor
IS 2629	Recommended practice for Hot dip galvanizing of steel
IS 4759	Hot dip Zinc coating on Steel structures and other allied products
IEC 60871	Shunt capacitors for AC power Systems
IEC 61000	Automatic Power Factor Controller
IS 9920-2002	Vacuum Contactors/Capacitor Switch

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

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

4.0 SERVICE CONDITIONS


4.1	Max Ambient Temperature	50 deg C
4.2	Max Daily average ambient temp	40 deg C
4.3	Min Ambient Temp	0 deg C
4.4	Maximum Humidity	95%
4.5	Minimum Humidity	10%
4.6	Maximum annual rainfall	750 mm
4.7	Average no of rainy days per annum	60
4.8	Rainy months	June to Oct
4.9	Altitude above MSL	300 M
4.10	Seismic Zone	IV

5.0 GENERAL

5.1	Capacitor Scheme	3 Phase, 7.2 MVAR @ 12.65KV, Single Star with RVT protection.
5.2	Switching	Auto switched in three steps of 1.8 MVAR with one fixed step of 1.8 MVAR. Auto switching will be controlled by APFC.
5.3	Service location	Suitable for outdoor use
5.4	Connection	Single star for individual steps
5.5	HT capacitor bank assembly	a. Individual single phase capacitor units mounted on steel stand / rack & connected externally by sleeved flexible copper connectors b. Sleeves to be Red, Yellow, Blue, & Black in colour.
5.6	Interchangeability	Between various single phase capacitor units without disturbing other units
5.7	Capacitor bank enclosure	For enclosing complete capacitor bank including capacitor units, Reactors, flexible copper connectors, RVT & terminal bus bar. Enclosure's door shall be provided with limit switch having interlock with Isolator and Circuit breaker.
5.8	Enclosure size	Max 6m X 1.5m
5.9	Enclosure mounting	Panel mounted
5.10	Degree of Ingress Protection for Bank Enclosure	IP55

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

5.11	Enclosure side walls	CRCA metal may be used for enclosure with thickness of loaded parts-2mm and unloaded parts-1.5mm
5.12	Enclosure doors of width 1500mm	Hinged, center opening, double leaf type, two doors provided on adjacent side walls with bolting as well as padlocking and interlocking facility.
5.13	Peek hole	Peek hole shall be provided in each door to see the status of fuse of Capacitor Bank
5.14	Exhaust Fan with Air filter And Canopy	Exhaust fan shall be provided in each step for heat suppression in compartment. Exhaust fan must operate of that step when capacitor bank is in ON condition.
5.15	Enclosure top cover	CRCA sheet metal 2mm thick with stiffeners
5.16	Door Interlock	Doors shall be provided with solenoid type lock to avoid door opening (after tripping of breaker) for a minimum of 10 minutes.
5.17	Earth Connection	All wire CRCA Sheet metal side walls/, doors & top cover shall be connected to each other by metallic jumper links, two earth studs with hole size for M10 bolt to be provided on enclosure frame bottom
5.18	Bus bar for HV cable termination	One for each phase mounted on porcelain or epoxy insulators
5.19	Bus bar material	Tinned copper, sized for 150% of rated current and rated fault duty
5.20	Bus bar arrangement	Suitable for outdoor termination of HT cable size up to 2 x 3C x 300sqmm for each phase
5.21	Cutout space for Power Cable Entry	Suitable for outdoor termination of HT cable size up to 2 x 3C x 300sqmm for each phase. (Preferebly-400x400 mm ²)
5.22	External hardware for HT capacitor bank enclosure (nuts/bolts/handles)	Stainless steel
5.23	GA drawing	Manufacturer shall submit the G.A. Drawings for Capacitor Bank with mounting of series reactor inside the bank.
5.24	Power Frequency Withstand Voltage	28kVrms
5.25	Impulse Withstand Voltage	75kVp


 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

6.0 SINGLE PHASE CAPACITOR UNIT

6.1	Single phase capacitor unit	Totally enclosed, leak proof, dust proof suitable for outdoor application, comprising individual capacitor elements connected in series & parallel groups. Continuous operating current shall be minimum 1.43 times to max. 1.65 times as per clause 6.2 of IS 13925.
6.2	Capacitor unit size	Preferred size is 200kVAR, however higher unit sizes may be considered if the space availability at site is scarce
6.3	Capacitor element	Developed from alternate layers of conducting metal foil & dielectric film
6.4	Conducting layer material	Aluminum foil
6.5	Dielectric material	Hazy Poly Propylene (APP), Double layer minimum
6.6	Cooling	Natural air
6.7	Impregnating liquid	Non PCB(Poly chlorinated Biphenyl), less toxic, with low bio-accumulation and bio-degradable liquid filled under vacuum
6.8	Capacitor unit enclosure	Fabricated from sheet metal CRCA steel of thickness 2mm minimum, hermetically sealed & hydraulically tested
6.9	Discharge device	For each single phase capacitor unit
6.10	Fuse	External HRC Fuse
6.11	Surge arrestor	Gap less metal oxide type
6.12	Rated voltage	9kV
6.13	Maximum continuous operating voltage	7.65kV
6.14	Discharge current	10 kA
6.15	Spare capacitor unit	One capacitor unit for each bank

7.0 VACUUM CONTACTOR FOR AUTO SWITCHING

7.1	Rated Voltages	12 KV
7.2	Rated Continuous Current	200% of full load current (minimum) of unit being switched
7.3	Rated Capacitor Switching Current	150% of full load current (minimum) of unit being switched
7.4	Frequency	50 Hz
7.5	Control supply	230 V Single phase AC supply
7.6	Type	Vacuum
7.7	Installation	Inside Enclosure
7.8	Mechanical Endurance	10000 operations (minimum)
7.9	Electrical Endurance	10000 electrical operations at rated capacitive switching current (minimum)
7.10	Indicator	To show number of operations

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


7.11	Trip lever	For emergency tripping operation
7.12	Closing lever	For capacitor bank discharging
7.13	Make	ABB/EPCOS/SHREEM

8.0 SERIES REACTOR

8.1	Series Reactor	<p>Shall be provided fulfilling following requirement,</p> <ul style="list-style-type: none"> a. Parallel switching of one bank with another two bank in service b. Suitable design calculation shall be submitted at the time of drawing approval c. Reactors shall be suitably designed to limit inrush current with proper calculation to be submitted to BYPL. d. The series reactor shall be designed to suit the final capacity of Capacitor Bank e. The manufacturer shall submit the G.A. Drawings for Capacitor Bank with mounting of series reactor inside the bank
8.2	Series reactor continuous rating	0.2% of capacitor bank rating
8.3	Series reactor rated voltage	Same as capacitor bank rated voltage
8.4	Series reactor rated frequency	50Hz
8.5	Series reactor single phase unit connections	Connected between single phase capacitor units and neutral star point
8.6	Series reactor type	Dry type with air natural cooling
8.7	Series reactor power frequency withstand voltage	28 KV
8.8	Series reactor lightning impulse withstand voltage	75 KV
8.9	Series reactor short time withstand current rating for 3 seconds	16 times capacitor rated current at 130% rated voltage
8.10	Class of Insulation	F

9.0 RVT


9.1	Type	Resin cast suitable for Panel Mounting
9.2	Application	Indoor inside the outdoor panel
9.3	Connection	Star/Star-Open delta winding(11KV/Sqrt 3:110 V/Sqrt 3: 190 V)
9.4	Winding	Three winding Star/Star –Open Delta. Secondary winding in Star shall be for Metering and

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

		secondary winding for open delta shall be for Residual/ Unbalance voltage Protection.
9.5	Protection	One RVT for All banks' protection. NDR (Neutral Displacement Relay) will not be in vendor's scope. Although its wiring shall be in vendor's scope.
9.6	Accuracy Class	0.5/ 3 PR
9.7	Nominal System Voltage	11 KV
9.8	Highest System Voltage	12 KV
9.9	Power frequency withstand voltage	28 kVrms(As per IS 13925 Part 1 Table 3A)
9.10	Lightning impulse withstand voltage	75 kV Peak(As per IS 13925 Part 1 Table 3A)

10.0 APFC

10.1	Installation	Indoor Type. To be fitted in VCB panel.
10.2	Power Factor Setting Range	0.7 Inductive to 0.7 Capacitive
10.3	DIs and DOs	DIs and DOs shall be as per control scheme suitable for auto switching of 3 phase, 7.2MVAR capacitor bank in three stages i.e steps of 1.8MVAR (0.6MVAR per phase). Automatic control has to be achieved by switching of vacuum contactors/switches provided in the capacitor bank to achieve the set power factor. At least 4 Dis and 4 Dos shall be spare for future use
10.4	Interface	Scada Compatible with RS-485 communication port and Modbus protocol. In case of any other port, suitable convertor shall be provided by the vendor). Integration of APFC with RTU and Capacitor bank shall be in bidder's scope.
10.5	Operation	Both Automatic and Manual Mode. Shall switch ON and OFF the bank through vacuum contactor/switch as per the desired power factor value. Over riding provision shall also be made for electrical switching ON and OFF of the capacitor contactor/switch by operator from APFC panel. The switching ON operation should take place after period of 10 minutes. The switching OFF operation of relevant step shall be instantaneous.
10.6	Ingress Protection(Except for Terminals)	IP 42
10.7	Auxiliary Supply	220 VAC
10.8	Current Measuring	0 - 5A, suitable for CT x/1A and x/5A

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

10.9	Display	Power, Energy, Voltage, Current, Average PF, Missing Reactive Power, Supplied Reactive Power, Total no of switching of each vacuum contactor/isolator, ON and OFF indication of Vacuum contactor/switch, THD measurement with odd harmonics coefficient
10.10	Size	Maximum 150x150 mm ²
10.11	Logging	Recording of Electrical Data upto last 2 months in the form of Hourly Records, Fault Records and Daily Records
10.12	Protection	Over/Under Load, Over/Under Frequency, Load Unbalance, Over Current, Over Temperature
10.13	NDR Relay	Not Required
10.14	LED Required on APFC For ON and OFF Status of Each step	8

11.0 ISOLATOR


11.1	Installation	Outdoor
11.2	Rated Voltage	11 KV
11.3	Type	Single throw double break off, off load type, triple pole horizontal gang operated with earth switch. Mechanical interlock should be provided between isolator and Earth Switch.
11.4	Operation Type	Manual

12.0 LIGHTNING ARRESTOR

12.1	Voltage Rating	9 kV
12.2	Type	Gapless ZnO type
12.3	Discharge Class	III
12.4	Nominal Discharge Current	10 kA

13.0 PERFORMANCE


13.1	Over voltage operation	as per IS 13925 part1
13.2	Over current operation	as per IS 13925 part1
13.3	Operating temperature category	+5/C as per IS 13925 part1
13.4	Discharge characteristic as per IS 13925 part1	a. Each capacitor single phase unit residual voltage after disconnection from mains supply

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

		shall be 50V (maximum) within 10 minutes b. Capacitor bank residual voltage after disconnection from mains supply shall be 50V (maximum) within 10 minutes
13.5	Power loss and tangent of Loss angle (tan δ)	To be specified by manufacturer as per IS 13925 part1

14.0 LABELS & FINISH

14.1	Rating plate for HT Capacitor bank	
14.2	Material	Anodized aluminum 16SWG
14.3	Background	Satin silver
14.4	Letters, diagram & border	Black
14.5	Process	etching
14.6	Bank Name plate details	Mfg name, Mfg Sr. No., Month & year of Mfg, equipment type, total output rating, Bank Capacitance in μ F, Bank watt losses, Owner name & order number, Temp. category, connection diagram, Warranty period, Customer care Number
14.7	Rating plate for each single phase capacitor unit	Anodized aluminum with white character on black background and details as per clause no 10.1 of IS 13925
14.8	Unit Name plate details	Mfg name, Mfg Sr. No., Month & year of Mfg, equipment type, total output rating, unit Capacitance in μ F, unit watt losses, Temp. category, Discharge device rating, connection diagram, Owner name & order number, Guarantee period, unit wt. in kG,
14.9	Danger plate on front & rear side of wired mesh enclosure	Anodized aluminum with white letters on red background
14.10	Painting - Capacitor single phase unit	
14.11	Surface preparation	Shot blasting or chemical 7 tank process
14.12	External finish	Powder coated pure-polyester base Mat finish, shade– Siemens Gray RAL 7032, uniform thickness 50 microns minimum
14.13	Painting–frame enclosure	a. Chemical 7 tank process for surface b. Hot dipped Galvanized with uniform thickness 65 microns minimum as per IS 2629 and 4759.
14.14	SLD	SLD of Approved drawing must be engraved in inside the enclosure door

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

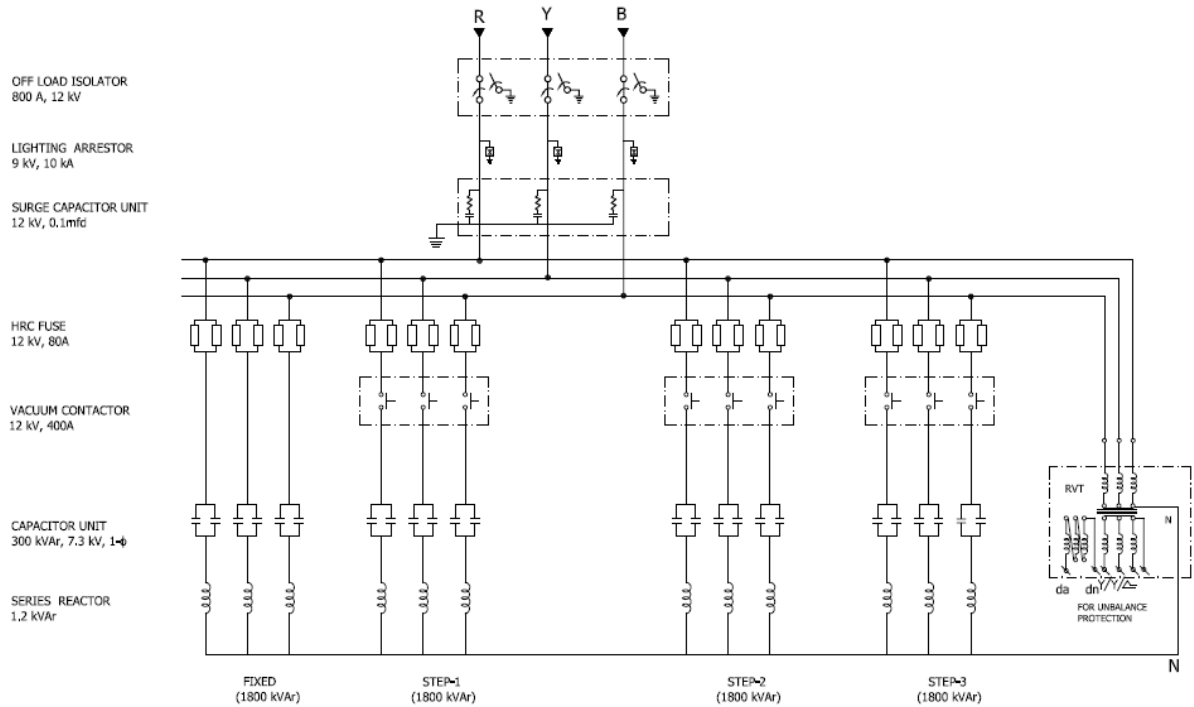
15.0 APPROVED MAKES OF COMPONENTS

15.1	APFC	Beluk/ABB/EPCOS/Shreem
15.2	Vacuum Contactor	ABB/ EPCOS/Shreem
15.3	RVT	Pragati/Kappa
15.4	Electromechanical Relays	Alstom/Schneider/Siemens/ABB/ER
15.5	Miniature Relays	ABB/Jyoti/Omran
15.6	Contactors	ABB/Siemens/Telemecanique
15.7	Instrument transformers	ECS/ Pragati/ Gemini/Schneider/CGL/Kappa/Narayan power tech
15.8	MCBs	Siemens/Schneider/Legrand/ABB
15.9	Control switches	Switron/Kaycee
15.10	Test terminal blocks	IMP/Schneider/Alstom
15.11	Terminal blocks	Elmex/Connectwell
15.12	Indicating lamps	Siemens/ Teknik/ Binay
15.13	Surge Suppressors	Oblum/Tyco
15.14	Meters	Rishabh/Conzerv

16.0 INSPECTION & TESTING

16.1	Type test	Equipment of type tested quality only, type test certificate to be submitted along with offer.
16.2	Routine test	As per relevant Indian standard
16.3	Acceptance test as per IS	To be performed in presence of Owner at manufacturer works, as per relevant Indian standard along with BOM.

17.0 TYPICAL SCHEME OF HT CAPACITOR BANK



18.0 MANDATORY SPARES


Following spares have to be provided for each capacitor bank set of 7.2 MVAR

- Capacitor Units – 2 nos
- Series Reactors – 2 nos
- Vacuum Switch/ Contactor – 2 nos


19.0 DRAWING AND DATA SUBMISSION MATRIX

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A3/A4 sheet in box file with separators for each section. PDF shall also be provided of all documents via USB. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection.

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
19.1	Contact Person Name, Email ID and Mobile Number	Required			
19.2	Consolidated Deviation Sheet	Required	Required		
19.3	GTP	Required	Required		

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


19.4	Relevant Type Test as per IS/IEC	Required			
19.5	Power Cable and control cable Philosophy and Schedule		Required		
19.6	Manufacturer's quality assurance plan and certification for quality standards		Required		
19.7	Sizing Calculation of Associated Equipment		Required		
19.8	Recommended Spares Apart from spares stated in Spec(for five years of operation)		Required		
19.9	11 kV Auto Switched Capacitor Bank				
19.9.1	General Arrangement	Required	Required		
19.9.2	Sectional Layout		Required		
19.9.3	Door Layout		Required		
19.9.4	SLD	Required	Required		
19.9.5	Schematic Circuit diagram and Scheme		Required		
19.9.6	Bus Bar Arrangement		Required		
19.9.7	QAP		Required		
19.9.8	BOQ		Required		
19.9.9	Logic Operation Diagram		Required		
19.9.10	Plan		Required		
19.9.11	Interlock Diagram		Required		
19.9.12	Foundation Diagram		Required		
19.9.13	DI sheet		Required		
19.9.14	DO Sheet		Required		
19.9.15	TB Details		Required		
19.9.16	Make of all Component as per specification		Required		

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


19.9.17	Drawing of Outdoor yard providing Position of Capacitor Bank		Required		
19.10	Installation, erection and commissioning manual for Bank		Required		
19.11	Inspection Reports			Required	
19.12	As manufacturing Drawings			Required	
19.13	Operation and Maintenance Manual			Required	Required
19.14	Trouble shooting manual			Required	Required
19.15	As built Drawings				Required
19.16	Test Report				Required
19.17	Weekly progress report				Required

20.0 GUARANTEED TECHNICAL PARTICULARS


S. No	Description	Specification Requirement	Bidder's Data
20.1	General		
20.1.1	Reference Standard	IS-13925,Part 1,2012	
20.1.2	Capacitor Scheme	3 Phase, 7.2 MVAR @ 12.65KV,Single Star with RVT protection.	
20.1.3	Switching	Auto switched in three steps of 1.8 MVAR with one fixed step of 1.8 MVAR	
20.1.4	Service location	Outdoor	
20.1.5	Connection	Single star for individual steps	
20.1.6	HT capacitor bank assembly	a. Individual single phase capacitor units mounted on steel stand / rack & connected externally by sleeved flexible copper connectors	
		b. Sleeves to be Red, Yellow, Blue, & Black in colour.	
20.1.7	Capacitor bank enclosure	No component shall be outside the enclosure	
20.1.8	Enclosure size	Max 6m X 1.5m	
20.1.9	Enclosure mounting	Panel mounted	
20.1.10	Degree of Ingress Protection for Bank Enclosure	IP55	
20.1.11	Enclosure side walls	CRCA metal with thickness of loaded parts-2mm and unloaded	

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


		parts-1.5mm	
20.1.12	Enclosure doors	Hinged, center opening, double leaf type, two doors provided on adjacent side walls with bolting as well as padlocking and interlocking facility.	
20.1.13	Peek hole	Peek hole shall be provided in each door to see the status of fuse of Capacitor Bank	
20.1.14	Exhaust Fan with Air filter And Canopy	Exhaust fan must ON when that particular bank is in ON condition	
20.1.15	Enclosure top cover	CRCA sheet metal 2mm thick with stiffeners	
20.1.16	Door Interlock	Solenoid type lock to avoid door opening (after tripping of breaker) for a minimum of 10 minutes.	
20.1.17	Earth Connection	All wire CRCA Sheet metal side walls/, doors & top cover shall be connected to each other by metallic jumper links, two earth studs with hole size for M10 bolt to be provided on enclosure frame bottom	
20.1.18	Bus bar for HV cable termination	One for each phase mounted on porcelain or epoxy insulators	
20.1.19	Bus bar material	Tinned copper, sized for 425 A rated current and Fault Current 26.3 kA for 3 Sec	
20.1.20	Bus bar arrangement	Suitable for outdoor termination of HT cable size up to 2 x 3C x 300sqmm for each phase	
20.1.21	Cutout space for Power Cable Entry	400x400 mm ²	
20.1.22	External hardware for HT capacitor bank enclosure (nuts/bolts/handles)	Stainless steel	
20.1.23	Power Frequency Withstand Voltage	28kVrms	
20.1.24	Impulse Withstand Voltage	75kVp	
20.2	Capacitor Unit		
20.2.1	Make		
20.2.2	Continuous operating current	Continuous operating current shall be minimum 1.43 times to max. 1.65 times as per clause 6.2 of IS 13925.	
20.2.3	Capacitor unit size	Preferred size is 200kVAR, however higher unit sizes may be considered if the space availability at site is scarce	
20.2.4	Capacitor element	Developed from alternate layers of conducting metal foil & dielectric film	
20.2.5	Conducting layer material	Aluminum foil	

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


20.2.6	Dielectric material	Hazy Poly Propylene (APP), Double layer minimum	
20.2.7	Cooling	Natural air	
20.2.8	Impregnating liquid	Non PCB(Poly chlorinated Biphenyl), less toxic, with low bio-accumulation and bio-degradable liquid filled under vacuum	
20.2.9	Capacitor unit enclosure	CRCA steel of thickness 2mm minimum, hermetically sealed & hydraulically tested	
20.2.10	Discharge device	For each single phase capacitor unit	
20.2.11	Fuse	External HRC Fuse	
20.2.12	Surge arrestor	Gap less metal oxide type	
20.2.13	Rated voltage	9kV	
20.2.14	Maximum continuous operating voltage	7.65kV	
20.2.15	Discharge current	10 kA	
20.2.16	Losses	≤0.2 Watts/kVAR	
20.2.17	Power Frequency Withstand Voltage	28 kVrms(As per IS 13925 Part 1 Table 3A)	
20.2.18	Impulse Withstand Voltage	75 kV Peak(As per IS 13925 Part 1 Table 3A)	
20.2.19	Discharging Values	Less than 50 V in 10 Minutes	
20.3	VACUUM CONTACTOR		
20.3.1	Make	ABB/EPCOS/SHREEM	
20.3.2	Reference Standard	IEC 62271-103/IS 9920 (Part IV)	
20.3.3	Rated Voltages	12 KV	
20.3.4	Rated Continuous Current	≥164 A	
20.3.5	Rated Capacitor Switching Current	≥124 A	
20.3.6	Short Time withstand current for 1 sec		
20.3.7	Power Frequency Withstand Voltage	28 kVrms(As per IS 13925 Part 1 Table 3A)	
20.3.8	Impulse Withstand Voltage	75 kV Peak(As per IS 13925 Part 1 Table 3A)	
20.3.9	Opening Time(lower and Upper limit)	35/60 ms	
20.3.10	Closing Time(lower and Upper limit)	60/90 ms	
20.3.11	Frequency	50 Hz	
20.3.12	Control supply	230 V Single phase AC supply	
20.3.13	Type	Vacuum	
20.3.14	Installation	Inside Enclosure	
20.3.15	Mechanical Endurance	10000 operations (minimum)	
20.3.16	Electrical Endurance	10000 electrical operations at rated capacitive switching current (minimum)	

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	


20.3.17	Indicator	To show number of operations	
20.3.18	Trip lever	For emergency tripping operation	
20.3.19	Closing lever	For capacitor bank discharging	
20.4	Series Reactor		
20.4.1	Make		
20.4.2	Reference Standard	IS:5553 (Part 3)	
20.4.3	Series Reactor	Submission of Suitable design Calculation	
20.4.4	Series reactor continuous rating	1.2 kVAR	
20.4.5	Series reactor rated voltage	Same as capacitor bank rated voltage	
20.4.6	Series reactor rated frequency	50Hz	
20.4.7	Series reactor single phase unit connections	Connected between single phase capacitor units and neutral star point	
20.4.8	Series reactor type	Dry type with air natural cooling	
20.4.9	Series reactor power frequency withstand voltage	28 kVrms(As per IS 13925 Part 1 Table 3A)	
20.4.10	Series reactor lightning impulse withstand voltage	75 kV Peak(As per IS 13925 Part 1 Table 3A)	
20.4.11	Rated Current	82.15A	
20.4.12	Series reactor short time withstand current rating for 3 seconds	16 times capacitor rated current at 130% rated voltage	
20.4.13	Class of Insulation	F	
20.5	RVT		
20.5.1	Make		
20.5.2	Reference Standard	IS 3156	
20.5.3	Application	Indoor inside the outdoor panel	
20.5.4	Type	Resin cast suitable for Panel Mounting	
20.5.5	Connection	Star/Star-Open delta winding(11KV/Sqrt 3:110 V/Sqrt 3: 190 V)	
20.5.6	Accuracy Class	0.5/ 3 PR	
20.5.7	Nominal System Voltage	11 kV	
20.5.8	Highest System Voltage	12 kV	
20.5.9	Power frequency withstand voltage	28 kVrms(As per IS 13925 Part 1 Table 3A)	
20.5.10	Lightning impulse withstand voltage	75 kV Peak(As per IS 13925 Part 1 Table 3A)	
20.5.11	Winding	Three winding Star/Star –Open Delta. Secondary winding in Star shall be for Metering and secondary winding for open delta	

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

		shall be for Residual/ Unbalance voltage Protection.	
20.5.12	Protection	One RVT for All banks' protection	
20.6	APFC		
20.6.1	Make	Beluk/ABB/EPCOS/Shreem	
20.6.2	Reference Standard		
20.6.3	Installation	Indoor Type and To be fitted on VCB Panel	
20.6.4	Power Factor Setting Range	0.7 Inductive to 0.7 Capacitive	
20.6.5	DIs and Dos	4 Dis and 4 Dos shall be spare for future use	
20.6.6	Interface	Scada Compatible with RS-485 communication port and Modbus protocol. In case of any other port, suitable convertor shall be provided by the vendor) . Integration of APFC with RTU and Capacitor bank shall be in bidder's scope.	
20.6.7	Operation	Both Automatic and Manual Mode	
20.6.8	Ingress Protection	IP 54	
20.6.9	Auxilliary Supply	48-250 VDC	
20.6.10	Current Measuring	0 - 5A, suitable for CT x/1A and x/5A	
20.6.11	Display	Power, Energy, Voltage, Current, Average PF, Missing Reactive Power, Supplied Reactive Power, Total no of switching of each vaccum contactor/isolator , ON and OFF indication of Vaccum contactor/switch, THD measurement with odd harmonics coefficient	
20.6.12	Size	Maximum 150x150 mm ²	
20.6.13	Logging	Recording of Electrical Data upto last 2 months in the form of Hourly Records, Fault Records anmd Daily Records	
20.6.14	Protection	Over/Under Load, Over/Under Frequency, Load Unbalance, Over Current, Over Temperature	
20.6.15	Space Required in Switchgear Panel for APFC		
20.6.16	NDR Relay offered	No	
20.6.17	Number of LED required on APFC for Cap bank ON and OFF status of	8	

 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

	each stage		
20.7	ISOLATOR		
20.7.1	Make		
20.7.2	Reference Standard		
20.7.3	Installation	Outdoor	
20.7.4	Rated Voltage	11 KV	
20.7.5	Type	Single throw double break off, off load type ,triple pole horizontal gang operated with earth switch. Mechanical Interlock should be provided between isolator and Earth Switch	
20.7.6	Operation Type	Manual	
20.8	Lightning Arrestor		
20.8.1	Reference Standard	IS 3070-1993(Part-3)	
20.8.2	Voltage Rating	9 kV	
20.8.3	Type	Gapless ZnO type	
20.8.4	Discharge Class	III	
20.8.5	Nominal Discharge Current	10 kA	
20.8.6	Power frequency withstand voltage	28 kVrms(As per IS 13925 Part 1 Table 3A)	
20.8.7	Lightning impulse withstand voltage	75 kV Peak(As per IS 13925 Part 1 Table 3A)	
20.9	Labels and Finish		
20.9.1	Rating plate for HT Capacitor bank		
20.9.2	Material	Anodized aluminum 16SWG	
20.9.3	Background	Satin silver	
20.9.4	Letters, diagram & border	Black	
20.9.5	Process	etching	
20.9.6	Bank Name plate details	Mfg name, Mfg Sr. No., Month & year of Mfg, equipment type, total output rating, Bank Capacitance in μ F, Bank watt losses, Owner name & order number, Temp. category, connection diagram, Warranty period, Customer care Number	
20.9.7	Rating plate for each single phase capacitor unit	Anodized aluminum with white character on black background and details as per clause no 10.1 of IS 13925	
20.9.8	Unit Name plate details	Mfg name, Mfg Sr. No., Month & year of Mfg, equipment type, total output rating, unit Capacitance in μ F, unit watt losses, Temp. category, Discharge device rating, connection	


 BSES BSES Yamuna Power Limited	SP-ASCB-82-R2
TECHNICAL SPECIFICATION FOR 11 KV AUTO SWITCHED CAPACITOR BANK	

		diagram, Owner name & order number, Guarantee period, unit wt. in kG,	
20.9.9	Danger plate on front & rear side of wired mesh enclosure	Anodized aluminum with white letters on red background	
20.9.10	Painting - Capacitor single phase unit		
20.9.11	Surface preparation	Shot blasting or chemical 7 tank process	
20.9.12	External finish	Powder coated pure-polyester base Mat finish, shade- Siemens Gray RAL 7032, uniform thickness 50 microns minimum	
20.9.13	Painting-frame enclosure	a. Chemical 7 tank process for surface	
		b. Hot dipped Galvanized with uniform thickness 65 microns minimum as per IS 2629 and 4759.	
20.9.14	SLD	SLD of Approved drawing must be engraved in inside the enclosure door	


BSES

TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION

**TECHNICAL SPECIFICATION
FOR
SCADA NETWORK & INTEGRATION**


PREPARED BY

RK


APPROVED BY

AV

REV

02

DATE

17th Jan 2023

PAGE

1 OF 15



INDEX

1.0	SCOPE.....	3
2.0	SCADA NETWORK.....	3
3.0	SCADA INTEGRATION.....	5
4.0	SPARES	8
5.0	DOCUMENTATION	8
6.0	TRAINING.....	7
7.0	DEVIATIONS	7


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION
1.0 SCOPE

- A. This specification is intended to cover the supply, erection, testing and commissioning of SCADA Network and Integration associated hardware/software (like protocol converters), cables, accessories and other material required for interfacing of all electrical equipments with existing ABB RTU560 for efficient and trouble free operation.
- A.1. ABB RTU panel is multi processor CMR02 based having required nos. of co processor and main processor and having redundant power supply. Main processor is having Ethernet ports and serial ports. Ethernet port of main processor is connected to LAN Switch (to be provided by BSES) for communication with Master Control Centre on IEC 104 Protocol.
- A.2. The co processors are having Ethernet ports which are responsible to communicate to all numerical relays and Digital RTCC on IEC 61850 protocol.
- A.3. The co processors are having serial ports which are responsible to communicate to all multifunction meters (MFMs) and battery charger on Modbus protocol through RS485 network.
- A.4. The main processors and co processors are having the licenses of IEC61850, MODBUS RTU MASTER & PLC, Archive, HMI, IEC 103 and IEC 104.
- B. The devices i.e. Numerical relays, digital RTCC, MFMs, battery charger etc. on serial and LAN should have redundant media and redundant co processor connectivity.
- C. This specification shall be used in conjunction with all specifications, data sheets, single line diagrams, and other drawings attached to the specification / purchase requisition.

2.0 SCADA NETWORK

2.1	INFRASTRUCTURE	<ul style="list-style-type: none"> i. All numerical relays & transformer monitoring units shall be connected to RTU in parallel redundancy protocol (PRP). ii. The communication shall be made in 1+1 mode, including the links between numerical relays & TMUs to switch and up to RTU, such that failure of one set of communication shall not affect the normal operation of system. However it shall be alarmed in RTU. iii. Data exchange is to be realized on dual star Bus topology using IEC 61850 protocol with a redundant managed switched on Ethernet communication infrastructure. iv. MFMs shall be connected to RTU through RS485 network with SPD so loop shall be prepared in daisy chain fashion. v. Devices connected to single loop shall not be more than 10 IEDs.
-----	----------------	--


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION

		vi. Network architecture shall be approved by BYPL SCADA team.
2.2	SCOPE OF WORK	<ul style="list-style-type: none"> i. Laying and termination of cat 6 cables from CRP switch to RTU Switch shall be done in suitable size of PVC Pipe. ii. Laying and termination of RS 485 cables shall be done in PVC Pipe of minimum 2 inch. iii. Laying and termination of FO patch cord from IEDs to CRP LAN Switch through suitable size PVC conduit.
2.3	SCOPE OF SUPPLY	<ul style="list-style-type: none"> i. All the hardware required to extend the relay signals to the RTU shall be supplied along with the switchboards. ii. Aux supply of these hardware devices shall be same as grid control voltage having wide range (-20% to +20%). iii. All communication hardware or protocol converters required for compatibility with existing RTU system shall be in bidder's scope.
2.3.1	Ethernet switches	<p>The IEC 61850 compliant Managed Ethernet switch shall meet the demand of power system automation systems (IEC 61850-3, IEEE 1613 compliance).</p> <ul style="list-style-type: none"> i. Ethernet switch shall be layer 2 industrial grade. ii. Ethernet switch shall be modular with SFP for copper and LC multimode fiber port. iii. Ethernet switch port shall be approve by engineering in charge of SCADA. iv. Ethernet switch shall be 19" rack mounted. v. Ethernet switch shall operate at grid supply voltage with range +20% to -20% VDC. vi. Operating Temperature: -40°C to +85°C. vii. All port shall be user configurable with minimum configuration of 100Mbps. viii. Communication type: Fiber Optics media and LC Connector compatible with IEDs supplied with CRP, As Per Site and Ethernet copper CAT6 OR above cable. Further approval at the time of final engineering approval. ix. LED indicators on all ports shall be blinking with data transfer. x. The switch should have a diagnostic/ error/ warning LED.


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION

		<ul style="list-style-type: none"> xi. It should support remote user setting configuration. xii. It should own separate maintenance/ console port. xiii. Latency shall be not more than 10ms. xiv. Should be KEMA, CE and FCC Certified. xv. Switch should be extendable for future expansion. xvi. Minimum 20% spares of utilized hardware and accessories to be provided by the supplier/ BA. xvii. On-site warranty for the switch must be 5 years. The warranty certificate is required to be submitted by the supplier/ BA to BYPL at the time of SAT. xviii. Shall be suitably mounted in CRP/switchgear panel. xix. Ethernet Switch shall have required nos. of ports (having RJ45 Ports / FO Ports). Minimum 20% spare ports shall be provided. Final approval at the time of detail engineering. xx. Power Supply of EFS shall be Dual redundant with pluggable terminal block. xxi. Shall have Environmental conditions compliance as per <ul style="list-style-type: none"> • IEC60068-2-1 COLD TEMPERATURE • IEC60068-2-2 DRY HEAT • IEC60068-2-30 HUMIDITY • IEC60068-21-1 VIBRATION • IEC60068-21-2 SHOCK xxii. Shall have Features: <ul style="list-style-type: none"> • Management through Web-based HTTPS, Telnet, CLI • SNMP supported • Remote Monitoring with RBAC • Diagnostics with logging and alarms • Console ports xxiii. Shall have Product conformity <ul style="list-style-type: none"> • acc. to IEEE 802.3-10BaseT Yes • acc. to IEEE 802.3u-100BaseTX Yes • acc. to IEEE 802.3u-100BaseFX Yes • acc. to IEEE 802.3ab-1000BaseT Yes • acc.toIEEE802.3ad-Link Aggregation Yes • acc. to IEEE 802.3x-Flow Control Yes • acc. to IEEE 802.1d-MAC Bridges Yes
--	--	---


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION

		<ul style="list-style-type: none"> • acc. to IEEE 802.1d-STP Yes • acc. to IEEE 802.1p-class of service Yes • acc. to IEEE 802.1Q-VLAN tagging Yes • acc. to IEEE 802.1Q-2005 (formerly IEEE 802.1s) MSTP Yes • acc. to IEEE 802.1w-RRS Yes • acc. to IEEE 802.1x-port based Network Access Control <p>xxiv. Shall have Mode Store and Forward</p> <p>xxv. Shall have Protection class IP4X, Conformal Coating, IPV6</p> <p>xxvi. Shall have Authorized Repair center of original Ethernet switch manufacture in India.</p> <p>xxvii. Shall have Uplink Rate 1 GBPS and Downlink Rate 100 MBPS</p> <p>BYPL approved Makes Make 1 Ruggedcom 2 Hirschmann</p> <p>The specified makes are to be strictly adhered to and no change will be considered hereto.</p>
2.3.2	Interface between Numerical Relay and switch	<p>LC multimode duplex fibre optic patch cords connecting the numerical relay to switch shall be supplied by the bidder..</p> <p>Make- Preston or equivalent</p>
2.3.3	Interface between RTU and Ethernet switch	<p>CAT 6 STP Cable shall be in bidder scope.</p> <p>Make- D-link, Belden or equivalent</p>
2.3.4	Interface between MFM and RTU	<p>RS485 Belden class cable shall be provided by bidder.</p> <p>Make- Belden or equivalent</p>
2.3.5	Communication hardware	<p>All hardware like LAN Switch, FO cables, protocol converters required for interfacing IEDs like protection relays, multifunction meters, transformer monitoring relays, battery charger controllers etc. to RTU should be included in scope of supply.</p>


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION
3.0 SCADA INTEGRATION

3.1	INFRASTRUCTURE	Numerical relays should be IEC 61850 compatible having dual fibre PRP optic ports. Through these ports relays shall be connected to CRP switches that further extended to existing RTU system through CAT6 LAN cable.
3.2	SCOPE OF WORK	<ul style="list-style-type: none"> i. Configuration of IEDs (primary, backup) and multifunction meters for SCADA signals as per <u>Annexure 1: Signals related with 11KV panels</u> and <u>Annexure 2: Signals Related with MFM</u> to communication the same in existing RTU 560A Co Processor CMR02. ii. For communication configuration and troubleshooting of Relays and MFM, required software, ICD file (IED configuration description file), SCD file (substation configuration description file), communication cables and documents to be handed over to team SCADA BYPL. iii. Providing protocol mapping/node details for signals listed in <u>Annexure 1: Signals related with 11KV panels</u> and <u>Annexure 2: Signals Related with MFM</u> and communication configuration details for RTU configuration. iv. Simulation of all configured signals (<u>Annexure 1: Signals related with 11KV panels</u> and <u>Annexure 2: Signals Related with MFM</u>) over LAN on IEC 61850 and over RS 485 on modbus on separate terminal with same configuration settings. v. Testing & commissioning of Numerical relays, and Multifunction meters for all related signals upto RTU. vi. Testing of Indications, Command, Interlocks as per scheme, Relay soft interlock testing from Relay HMI as well as simulation of SCADA command through configured output of Relay. vii. Downloading of Disturbance records and uploading/downloading of configuration file to and from IEDs facility from remote through switches at pre decided IPs shall be provided. viii. Demonstration of operational compatibility with SCADA. ix. Point to Point testing all signals to BYPL SCADA at MCC and BCC.


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION

3.3	SCOPE OF SUPPLY	
3.3.1	Configuration Software and Tools	All software and configuration tools required for configuration of SCADA Network should be included in scope of supply.

4.0 SPARES

4.1		<ul style="list-style-type: none"> i. Bidder shall submit list of recommended spares for BSES BYPL SCADA approval. ii. Recommended minimum 20% spares of supplied SCADA accessories for SCADA interface to be supplied by bidder. Price for spares shall be included in CRP package. All spares shall be tested in our premises
-----	--	---

5.0 DOCUMENTATION

5.1	Documents for approval	<ul style="list-style-type: none"> i. The bidder shall ensure that all necessary drawings, write-up, information, etc required to fully describe the equipment are to be submitted for approval. ii. The manual shall clearly indicate in English the installation and connection method. Check up, maintenance and calibration method shall also be provided in the manuals.
-----	------------------------	---

6.0 TRAINING

5.1	Training at site	Training to BYPL SCADA's engineers at site by domain expert (two day training- one day in classroom and one day on site) with hands on.
-----	------------------	---

7.0 DEVIATIONS

6.1	Deviation	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. No deviation will be acceptable post order.
-----	-----------	---


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION
Annexure 1 (Signal List- 11kV)
A. 11kV Outgoing feeders- IEC 61850 Protocol

S.No.	Signal List	DI/ AI soft through N.Relay/ BCU	DO soft through N.Relay/ BCU	Signal Type
1.	Breaker ON	✓		DPI
2.	Breaker OFF			SPI
3.	Trip Ckt Healthy	✓		SPI
4.	Spring Charge	✓		SPI
5.	Breaker in Service	✓		SPI
6.	Breaker in Test	✓		SPI
7.	Auto Trip (86) Operated	✓		SPI
8.	Panel DC Fail	✓		SPI
9.	L/R switch in SCADA	✓		SPI
10.	Relay Int Fault	✓		SPI
11.	Over Current Operated	✓		SPI
12.	Earth Fault Operated	✓		SPI
13.	BKR Close COMMAND		✓	DCO
14.	BKR Open COMMAND			
15.	Auto Trip (86) relay reset from Remote		✓	SCO
16.	3Phase R, Y, B- Current & Voltage, Active Power, Reactive Power, Power factor, Max. Demand, Neu. Current	✓		AI/ MV
17.	Fault current and phase indication of faulty phase viz. R, Y, B, Earth, Unbalance (O/C & E/F Relay), Disturbance Records, Fault Graphs for Remote diagnosis purpose	✓		AI/MV

Note: Signals like Panel DC Fail and Relay Int Fault to be taken from adjacent panel


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION
B. 11kV Incomers: IEC 61850 Protocol

S.No.	Signal List	DI/ AI soft through N.Relay/ BCU	DO soft through N.Relay/ BCU	Signal Type
1.	Breaker On	✓		DPI
2.	Breaker OFF			
3.	Trip Ckt Healthy	✓		SPI
4.	Spring Charge	✓		SPI
5.	Breaker in Service	✓		SPI
6.	Breaker in Test	✓		SPI
7.	Auto trp (86) Operated	✓		SPI
8.	VT fuse Blown- Metering	✓		SPI
9.	VT fuse Blown- Protection	✓		SPI
10.	Panel DC Fail	✓		SPI
11.	L/R Switch in SCADA	✓		SPI
12.	Relay Int Fault	✓		SPI
13.	Over Current Operated (All Stages)	✓		SPI
14.	Earth Fault Operated (All Stages)	✓		SPI
15.	Under Voltage Prot. Operated	✓		SPI
16.	Over Voltage Prot. Operated	✓		
17.	REF Operated	✓		SPI
18.	BKR Close COMMAND		✓	DCO
19.	BKR Open COMMAND			
20.	Auto trip (86) relay reset from Remote		✓	SCO
21.	3Phase R, Y, B- Current & Voltage, Active Power, Reactive Power, Power factor, Max. Demand, Neu. Current	✓		AI/ MV
22.	Fault current and phase indication of faulty phase viz. R, Y, B, Earth, Unbalance (O/C & E/F Relay), Disturbance Records, Fault Graphs for Remote diagnosis purpose	✓		AI/MV

Note: Signals like Panel DC Fail and Relay Int Fault to be taken from adjacent panel


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION
C. 11kV Bus Coupler: IEC 61850 Protocol

S.No.	Signal List	DI/ AI soft through N.Relay/ BCU	DO soft through N.Relay/ BCU	Signal Type
1.	Breaker On	✓		DPI
2.	Breaker OFF			
3.	Trip Ckt Healthy	✓		SPI
4.	Spring Charge	✓		SPI
5.	Breaker in Service	✓		SPI
6.	Breaker in Test			
7.	Auto trip (86) Operated	✓		SPI
8.	Panel DC Fail	✓		SPI
9.	L/R Switch in SCADA			SPI
10.	Relay Int. Fault	✓		SPI
11.	PT MCB- Metering operated	✓		SPI
12.	PT MCB- Protection operated	✓		SPI
13.	Over Current Operated	✓		SPI
14.	Earth Fault Operated	✓		SPI
15.	BKR Close COMMAND		✓	DCO
16.	BKR Open COMMAND			
17.	Fault current and phase indication of faulty phase viz. R, Y, B, Earth, Unbalance (O/C & E/F Relay), Disturbance Records, Fault Graphs for Remote diagnosis purpose	✓		AI/MV

Note: Signals like Panel DC Fail and Relay Int Fault to be taken from adjacent panel


TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION
D. 11Kv Capacitors: IEC 61850 Protocol

S.No.	Signal List	DI/ AI soft through N.Relay/ BCU	DO soft through N.Relay/ BCU	Signal Type
1.	Breaker On	✓		DPI
2.	Breaker OFF			
3.	Bank ISO ON	✓		DPI
4.	Bank ISO OFF			
5.	Trip Ckt Healthy	✓		SPI
6.	Spring Charge	✓		SPI
7.	Breaker in Service	✓		SPI
8.	Breaker in Test	✓		SPI
9.	Master Trip (86) Operated	✓		SPI
10.	Bus PT fuse Blown-Metering	✓		SPI
11.	Bus PT fuse Blown-Protection	✓		SPI
12.	Panel DC Fail	✓		SPI
13.	L/R Switch in SCADA	✓		SPI
14.	Over Current Operated	✓		SPI
15.	Earth Fault Operated	✓		SPI
16.	Under Volt. Prot. Operated	✓		SPI
17.	Over Volt. Prot. Operated	✓		SPI
18.	Neg. Phase sequence Operated	✓		SPI
19.	Timer Relay operated/ Normal	✓		DPI
20.	Relay Int. Fault	✓		SPI
21.	BKR Close COMMAND		✓	DCO
22.	BKR Open COMMAND			
23.	BANK ISO OPN		✓	DCO
24.	BANK ISO CLS			
25.	Master trip (86) reset from remote		✓	SCO
26.	3phase R, Y, B- Curr & Volt, React. Pow, Neu. Curr	✓		AI/ MV
27.	Fault current and phase indication of faulty phase viz. R, Y, B, Earth, Unbalance (O/C & E/F Relay), Disturbance	✓		AIMV

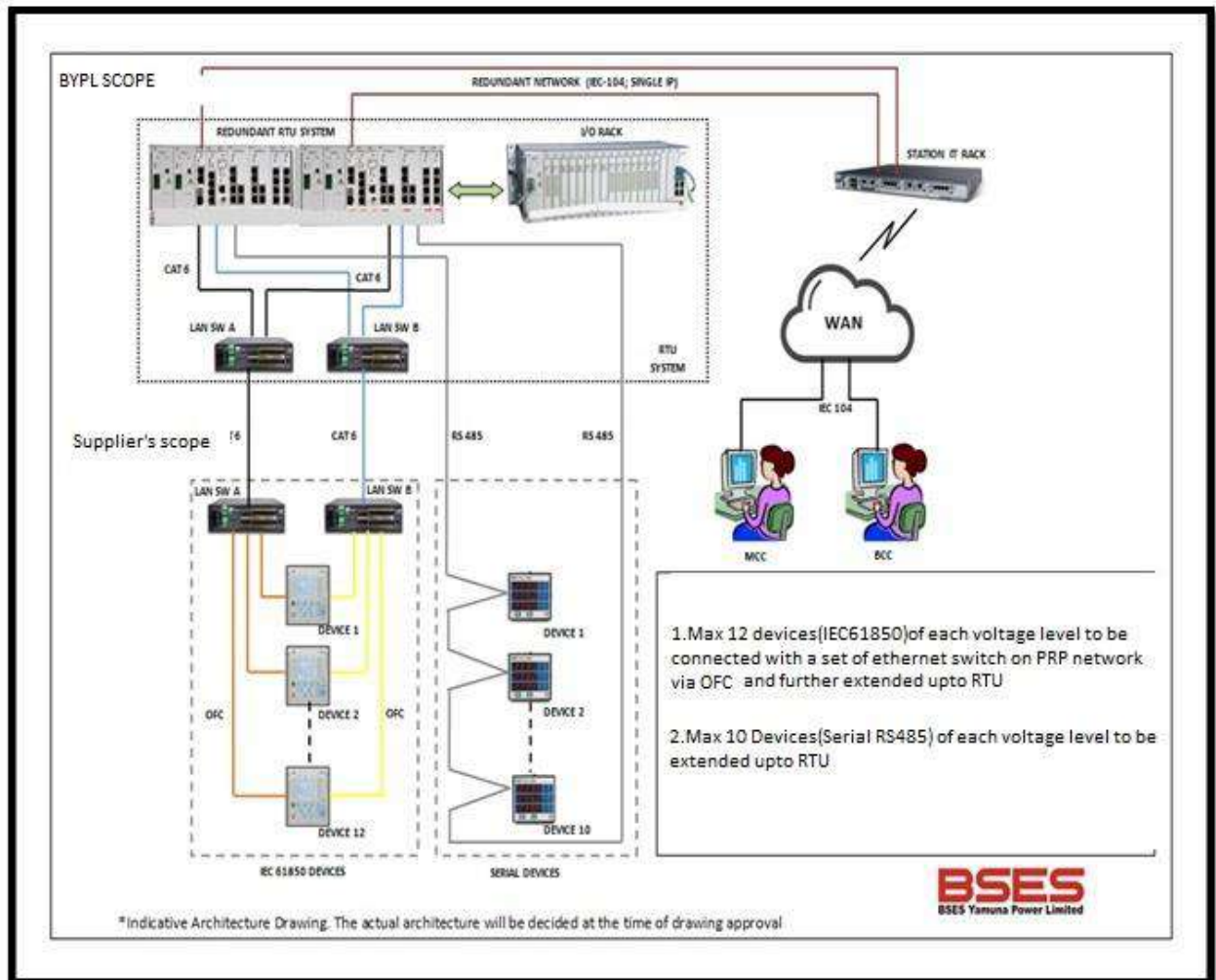

TECHNICAL SPECIFICATION FOR SCADA NETWORK & INTEGRATION

	Records, Fault Graphs for Remote diagnosis purpose			
--	--	--	--	--

Annexure 2: Signals Related with MFM

Sr. No.	Signal Detail	Type of Signal on Modbus
	Measurement Signals	
1	Active Power	Measured Float
2	Current Bph	Measured Float
3	Current Rph	Measured Float
4	Current Yph	Measured Float
5	Frequency	Measured Float
6	Power Factor	Measured Float
7	Reactive Power	Measured Float
8	Voltage BR	Measured Float
9	Voltage RY	Measured Float
10	Voltage YB	Measured Float
11	Neutral Current	Measured Float
12	THD	Measured Float
13	Max Demand	Measured Float
14	Apparent power	Measured Float

(This is the indicative IO list, however the signal list may vary during the engineering time)

Annexure 4:
SCADA Network Architecture




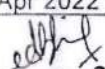
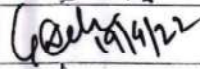

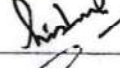


Annexure 5: (List of Abbreviations)

1. SCADA: Supervisory Control and Data Acquisition
2. RTU: Remote Terminal Unit
3. C&R: Control and Relay
4. MFM: Multi Function Meter
5. BYPL: BSES Yamuna Power Ltd.
6. MCC: Master Control Center
7. BCC: Business Continuity Center
8. IED: Intelligent Electronic Devices
9. IEC: International Electrotechnical Commission
10. KEMA: Keuring van Elektrotechnische Materialen te Arnhem
11. CE: Conformité Européene
12. FCC: Federal Communications Commission
13. PRP: Parallel Redundancy Protocol
14. LAN: Local Area Network
15. NIFPS: Nitrogen Injection Fire Protection System
16. APFC: Automatic Power factor Controller
17. HMI: Human Machine Interface
18. PVC: Polyvinyl Chloride
19. OFC: Optical Fiber Cable
20. MV: Measured Value
21. SPD: Surge Protection Device
22. DCO: Double Command Input
23. DPI: Double Point Indication
24. MV: Measured Value
25. SCO: Single Command Input
26. SPI: Single Point Indication

BSES

**Technical Specification
For Heat Shrinkable &
GIS Cable Termination Kit
(11 kV, 33 kV, 66 kV XLPE Insulated Cables)**

Specification no – BSES-TS-45-TERM-R0

Rev:	0	
Pages	22	
Date:	19 Apr 2022	
Prepared by	Abhishek Vashistha	
	Gautam Deka/Pronab Bairagi	
Reviewed by	Puneet Duggal	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	



BSES-TS-45-TERM-R0

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

Index

Record of Revision	3
1.0.0 Scope of work	4
2.0.0 Codes & standards	4
3.0.0 Cable Construction	5
4.0.0 Cable Termination Kits	7
5.0.0 Quality Assurance (QA)	12
6.0.0 Deviations	13
7.0.0 Delivery	13
8.0.0 Inspection Expenses	13
9.0.0 Penalty	13
Annexure – A: Guaranteed Technical Particulars (GTP)	14
Annexure – B: Kit Content Table (KCT)	16
Annexure – C: Routine and Acceptance Test	17
Annexure – D: Technical Deviation Sheet	17
Annexure – E: Service Conditions	18
Annexure – F: Bimetallic Aluminium / Copper Lug	19
Annexure – G: Aluminum/Copper Lug For XLPE Cable	20
Annexure – H: SOP	21




BSES-TS-45-TERM-R0

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

Record of Revision

Item/Clause No.	Change in Specification	Approved By	Rev

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

1.0.0 Scope of work

Heat Shrinkable & GIS Termination Kits, suitable for 11 kV & 33 kV, 66 kV XLPE / PILC cables, shall be designed, manufactured, tested, packed and delivered by the Vendor, as per Purchaser's requirements.

2.0.0 Codes & standards

2.1.0 National Standards:

SL	Standard Number	Title
2.1.1	IS – 13573: 2011	Joints & Terminations of Polymeric Cables for working voltages from 6.6 kV up to and including 33 kV Performance Requirements and Type Tests
2.1.2	IS – 7098 Part 2 : 2011	Cross-linked Polyethylene (XLPE) Insulated PVC sheathed cables : Part 2 : For working voltages from 3.3 kV up to and including 33 kV
2.1.3	IS – 692: 1994	Paper insulated lead-sheathed cables (PILC) for rated voltages up to and including 33 kV specification
2.1.3	IS – 10810: 1984	Methods of test for cables
2.1.4	IS – 7098 Part 3 : 2019	Cross-linked polyethylene insulated thermoplastic sheathed Cables specification: Part 3 - For working voltages from 66 kV up to and including 220 KV

2.1.1 International Standards:

S No.	Standard Number	Title
2.2.1	EA TS – 09 – 13	Electricity Association – Technical Specification -09-13 Material component for use in Electric Power Cable Termination & Joints for System voltage above 1000 V up to 36 kV
2.2.2	IEEE – 48	Standards Test Procedures and requirements for high voltage alternating current cable termination
2.2.3	IEC – 60183	Guide to the selection of high voltage cables
2.2.4	IEC – 885 Part 1-3	Electric test methods for electric cables
2.2.5	IEC – 60840	Power cable with extruded insulation and their accessories for rated voltage above 30 Kv (Um=36 kV) up to 150 KV (Um=170 kV) – test methods and requirements.



Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

3.0.0 Cable Construction

Normal sizes of XLPE cables used in BSES system and the construction features of these cables are indicated below:

- a. 11 kV, 3-core x 150 sq mm AL
- b. 11 kV, 3-core x 300 sq mm AL
- c. 11 kV, 3-core x 400 sq mm AL
- d. 11 kV, 3-core x 400 sq mm AL(OFC Embedded)
- e. 11 kV, 1-core x 1000 sq mm AL
- f. 11 kV, 1-core x 150 sq mm AL HTAB with copper metallic screen
- g. 11 kV, 1-core x 150 sq mm AL HTAB with Aluminium wire metallic screen
- h. 11 kV, 1-core x 95 sq mm AL HTAB with copper metallic screen
- i. 11 kV, 1-core x 95 sq mm AL HTAB with Aluminium wire metallic screen
- j. 33 kV, 3-core x 400 sq mm AL
- k. 33 kV, 3-core x 400 sq mm AL (OFC Embedded)
- l. 33 kV, 1-core x 1000 sq mm AL
- m. 66 kV, 1-core x 630 sq mm AL
- n. 66 kV, 1 core x 1000 sq mm AL
- o. 66 kV, 3-core x 300 sq mm AL
- p. 66 kV, 3-core x 300 sq mm AL(OFC Embedded)

PILC type Cables:

3-core 240 or 300 sq. Mm. Al

3.1.0	Conductor	For XLPE : a) Electrolytic Grade stranded Aluminium Conductor / Annealed Copper Conductor b) Grade: H2/ H4 as per IS: 8130/84 (For Al) c) Shape: Compacted Circular d) Class 2 For PILC : a) 11 kV : sector-shaped b) 33Kv: oval-shaped
3.2.0	Conductor Screen	For XLPE : Extruded Semi Conducting material For PILC : 11 kV : no conductor screen 33 kV : carbon paper
3.3.0	Insulation	For XLPE: Extruded TR XLPE For PILC: Layers of impregnated papers



Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

3.4.0	Insulation Screen	<p>Non Metallic Screen: For XLPE Insulated cable: a) For 11, 33 U/G cable and HTAB cable - Freely strippable Semi Conducting (without application of heat) b) For 66kV cable - Firmly bonded semi conducting</p> <p>Metallic Screen: a) For For 11, 33 & 66 Kv U/G cable – Copper Tape b) For HTAB – option 1 – Copper Tape (old installations) and option 2 – Aluminium wire (new installations) For PILC : a) 11 kV : absent (Belted) b) 33kV: metallised paper tape</p>
3.5.0	Water Swellable Tape	<p>For XLPE: Semi-conducting Water Swellable Tape shall be provided under the copper tape on each core. For PILC : not applicable</p>
3.6.0	Filler	<p>For XLPE: All interstices, including centre interstices filled by PP filler. Note- In special cases, for 66kV 3CX300 sqmm, 33kV, 3CX400 and 11kV 3CX400 cable are with-36 nos. Single mode and 12 nos. Multi modes OFC are also inbuilt as filler.Requirement of cable joint kit with OFC shall be fulfilled as per tender requirement For PILC : a) 11 kV : Crushed paper filler b) 33kV: Jute twine</p>
3.7.0	Over all three cores	<p>XLPE : Binder tape PILCA : 11 kV : belt paper 33kV: Copper Woven Fabric tape</p>
3.8.0	Inner Sheath	<p>For XLPE: Extruded Inner Sheath of Black PVC type ST-2. For PILC : Lead alloy sheath</p>
3.9.0	Bedding Tape	<p>For XLPE: not applicable For PILC: two layers of paper, followed by compounded (bituminized) cotton tape.</p>
3.10.0	Copper Woven Fabric Tape (CWF tape)	<p>For XLPE : not applicable For PILC : a) 11 kV : absent (Belted cable) b) 33 kV : applicable for screened cable</p>
3.11.0	Armour	<p>For XLPE : a) Galvanised Steel round Wires/ Galvanised steel flat strip armour (For 3 core cables) b) Hard drawn Aluminium Wire (For 1 core cables) c) Aluminium or lead sheathed for 1Core 66kV cables For PILC : a) 11 kV double steel tape armour</p>
3.12.0	Binder Tape	<p>For XLPE: Rubberised cotton tape</p>

BSES	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

3.13.0	Outer Sheath	For XLPE: Extruded outer sheath of PVC (ST-2) for 11 kV/ 33 KV and HDPE for 66kV Cable with termite- repellent. For 66kV Cable- HDPE extruded semicon layer or HDPE with graphite layer. For PILC : compounded (bituminised) Jute/PVC
3.14.0	HTAB Cable (1CX150 and 1CX95) core construction	Aluminium conductor-conductor semicon screen- TR XPLE insulation- insulation semicon screen-Water Swell-able tape -Round wire armour installation) / Copper Tape (old installation)) Water Swell-able tape-outer sheath

4.0.0 Cable Termination Kits


General Technical Requirements for Cable Termination Kits are as follows:

4.1.0	Scope	Design, manufacture, testing and supply of Cable Termination Kits for H. T. Power Cables.				
4.2.0	Functional Requirements					
4.2.1	Conductor Connection	Voltage Grade	Cable Size	Application	Material of Lug	Connection Method
		11 kV	3Cx150, 3Cx300 and 3Cx400 sq mm	Indoor	Bi-Metal	Crimping
				Outdoor	Bi-Metal/ Aluminium as per tender requirement	Crimping
			1Cx1000 sq mm	Indoor	Aluminium	Crimping
			Outdoor	Aluminium	Crimping	
		HTAB (indoor not required)	1Cx95	Outdoor	Aluminium	Crimping
			1Cx150	Outdoor	Aluminium	Crimping
		33 kV	3Cx400 sq mm	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
			1Cx1000 sq mm	Indoor	Aluminium	Crimping
			Outdoor	Aluminium	Crimping	
		66 kV	3Cx300	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
			1Cx630, 1Cx1000 sq mm	Indoor	Aluminium	Crimping
			Outdoor	Aluminium	Crimping	
* For Bimetallic Lug Copper portion shall be tinned						



Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

		<p>a) For GIS cable termination kits: Plug in type, Conductor connection assembly shall be by standard method of split, silver-plated copper cone and pressure-fit contact assembly or as per manufacturer's standard.</p> <p>b) Top corners of all lugs shall be circular shape not rectangular. Refer Annexure F for details.(Except GIS kit)</p>			
4.2.2	Stress Control System	<p>a) The earthed insulation screen of an XLPE cable is terminated at a suitable distance from the conductor.</p> <p>b) The tube is in electrical contact with insulation screen.</p> <p>c) Impedance of the tube shall be constant up to an operating temperature and shall be within the range 1×10^{08} ohm-cm to 8×10^{08} ohm-cm.</p> <p>d) Length of stress control tube for 11 kV and 33 kV shall be 130 mm and 260 mm respectively or according to insulation tube length. For 66kV termination kits, stress control tube shall be as per type tested design.</p> <p>e) The physical and electrical properties shall conform to ESI 09: 13.</p> <p>f) For GIS cable termination kits Stress control shall be by means of a polymeric stress cone. External profile of the cone shall match inner profile of GIS epoxy bushing. Vendor shall specify the material (EPDM / Silicone) of the cone.</p>			
4.2.3	Insulation Protection	<p>a) XLPE insulation shall be protected by means of an outer tube, resistant to tracking and weathering.</p> <p>b) One end of the tube shall be coated internally with red sealant mastic for a length of 50 mm.</p> <p>c) Physical and Electrical properties shall conform to ESI 09: 13.</p> <p>d) Insulation Tube length for termination- shall be 650 mm for both Indoor and Outdoor Termination kits of 11kV, 3CX150, 3CX300 and 3CX400 sqmm cable. All other accessories related to termination shall be according to 650mm insulation tube length.</p>			
4.2.3.1	Outer Anti-tracking Tube	Outer length of the tube shall be controlled by providing creepage Extension Shed having the same material composition as the tube. These lengths are given in the table below: Creepage distance shall be 31mm/kV minimum.			
4.2.3.2	OFC (66kV, 3CX300 sqmm , 33kV, 3Cx400 sqmm and 11kV, 3Cx400 sqmm cable)	Termination kit for OFC (36 single mode and 12 nos. Multi mode) shall be supplied along with termination kit.			
Cable System		Length of tube (mm)		Creepage Extension Shed (No.)	
Voltage	Cores	Indoor	Outdoor	Indoor	Outdoor
11 kV	3 – core	650	650	Nil	2

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	


	1 – core	340	340	NIL	2
33 kV	3 – core	800	1200	2	5
	1 – core	600	600	2	5

4.2.3.3	Oil Barrier Tube (applicable for PILC cable termination)	<p>a) Transparent tube is used for restoring the insulation provided by belt paper, which is terminated at the crotch.</p> <p>b) 33 kV PILC Termination: The oil barrier tube provides an oil-resistant layer to contain impregnating compound within, thus preventing anti-tracking tube coming in contact with the impregnating compound.</p>
4.2.4	Environmental Sealing System	<p>a) Red Sealant Mastic Tape: This tape, used for sealing at ends, shall be synthetic rubber-based and resistant to tracking and weathering. Sufficient quantity of this tape shall be provided.</p> <p>b) Lug-sealing Sleeve: It shall have the same material composition as outer anti-tracking tube. The sleeve shall be fully coated internally with red sealant mastic tape. Length of the sleeve shall be so as to cover half length of the lug barrel and an equal length of track-resistant tube.</p> <p>c) Conductive Break-out: It shall be provided over the crotch for 3-core cables. The break-out base shall overlap PVC outer sheath by a 50 mm. Minimum.</p> <p>d) For GIS termination kits : Environmental sealing of cores below the switchgear shall be by means of a trifurcation kit, consisting of heat shrinkable conductive break-out and heat-shrinkable conductive tube of total length of 6 metres supplied in one roll.</p>




Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

4.2.5	Earth Bond System	<p>Minimum Armour Fault Current Carrying capacity of cables is as following: 11 kV U/G Cable – 11 kA for 1 sec 33 kV Cable – 31.5 kA for 1 sec 66 kV Cable – 31.5 kA for 1 sec 11 kV HTAB Cable – 11 kA for 1 sec</p> <p>Fault current requirement shall be met by Tinned copper braid as per following: 11 kV U/G cables – Three No's 25 sq mm each 33 kV Cable – Four No's of 50 sq mm each 66 kV Cable – Four No's of 50 sq mm each HTAB Cable with copper tape metallic screen – Three No's of 25 sq mm each</p> <p>Length of the copper braided conductor shall be 750 mm.</p> <p>Each copper braided conductor shall be supplied with copper lug, crimped at one end</p> <p>For HTAB Cable with Aluminium wire metallic screen – Tinned copper braid is not required. 1 No's of Aluminium crimping lug of 120 sq mm cross section area shall be provided instead</p>
4.2.6	Suppression of electrical discharges	<p>Following materials are required for use during cable termination :</p> <p>a) Silicone-based compound Required for filling-in minute services/ surface cracks over XLPE insulation. b) Polymeric mastic Required for application over semicon screen, for, eliminating any air-entrapment at any cut point on the surface. It should have sufficient elongation and electrical properties compatible with stress control tube.</p>
4.2.7	Installation. Instruction Sheet	<p>It shall be in English and Hindi language and shall be provided inside every kit.</p>
4.2.8	Paper Measuring Tap	<p>Required for use during cable preparation / terminations.</p>
4.2.9	Identification Tag (for traceability)	<p>a) An aluminum pouch with paper tag & sealing arrangement at one end shall be provided. b) This tag is required to be tied over the cable at one side of the joint. c) The paper tag shall give following information 1) Vendor kit designation 2) Division 3) Breakdown ID/Shutdown ID/Scheme No. 4) Cable section 5) Type of joint 6) Size of Joint 7) Make of joint 8) Voltage class</p>

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	


		<p>9) Serial no. of kit 10) Vendor lot & batch no 11) Month & year of manufacturing 12) Date of installation 13) Name of joiner 14) Name of vendor supervisor 15) Name of BSES supervisor 16) Remarks In addition to above Stainless Steel Tag shall be provided with following details for straight through joint</p> <p style="padding-left: 40px;">a. Manufacturing month and year (MM/YY format) b. Manufacturer name i.e Comp c. Manufacturer own sl no for future tracing</p>
4.3.0	Technical Particulars	Vendor shall submit Guaranteed Technical Particulars (GTP) as per Annexure A.
4.4.0	Type Tests	<p>i. Termination Kit shall be of type-tested quality from CPRI/ERDA/KEMA/CESI as per the BIS/IEC/IEEE within last 5 years.</p> <p>ii. In case of type test is more than 5 years old but less than 10 years old, bidder has to give undertaking that there is no changes in design.</p> <p>iii. In case of type test report is more than 10 years old, bidder has to conduct type test from CPRI/ERDA/KEMA/CESI as per the BIS/IEC/IEEE without any cost implications to BSES</p>
4.5.0	Testing & Inspection	
	a) Tests	All the routine and acceptance tests shall be carried out as per ESI guidelines. (Also refer Annexure -C)
	b) Inspection	<p>1) Buyer reserves the right to witness all tests specified on individual H. S. components, Moulded components or completed Cable Termination Kit.</p> <p>2) Buyer reserves the right to inspect Cable Termination Kit at the Seller's works at any time, prior to dispatch, to verify compliance with the specification.</p> <p>3) In-process and final inspection call intimation shall be given in 10 days advance to purchaser.</p>
	c) Test Certificates	Three sets of complete Test Certificates (Routine & Acceptance tests) shall be submitted along with the delivery of Cable Termination Kits.
4.6.0	Documents	"Documents" refer to Documents, Data, Manuals, etc. (Scanned copy of signed documents also shall be part of entire soft file (e-file) or CD.)

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

4.6.1	Along with the Bid	Vendor shall submit signed 3 sets (plus 1 set of soft copy) of following documents: a) GTP (duly filled-in) (as per Annexure - A). b) Cross-sectional drawings for components Assembly c) Type Test Certificates d) Complete Catalogue and Instructions. e) Any other document.
4.6.2	After Award of Contract	Vendor shall submit signed 2 sets (plus 1 set of soft copy) of above mentioned documents within 15 days, for Purchaser's approval.
4.6.3	"As-Built" documents	Final signed "As-built" documents for the equipment in 3 sets (hard copy), 1 no. soft copy and 1 no. CD. These documents shall include signed Routine & Acceptance Test Certificates also.
4.7.0	Packing, Marking, Shipping, Handling and Storage	Every component/kit/box shall be properly sealed/ packed for protection against damage.
a)	Identification Labels:	<p>Markings / Labels shall be on both sides of every packed box.</p> <ol style="list-style-type: none"> 1) Identification number/type designation (as per manufacturer's standard) 2) Voltage grade, size, description of the Kit (including the voltage grade, size, type of the cables, for which it is to be used) 3) Batch no., lot no., etc. 4) Quantity 5) a) Purchase Order no. & date b) Purchaser's name c) BSES's SAP code number 6) Weight (kg) of each Cable Termination Kit and of each box containing kits. 7) Manufacturer's name 8) Month & Year of Manufacturing 9) Date of packing, Shelf life (if applicable) 10) In case, the termination kit is for RMU, following text shall be written in bold letters, with higher font size : "For RMU Application".
b)	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

5.0.0 Quality Assurance (QA)

5.1.0	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.
5.2.0	Sampling Method	Sampling Method for quality checks shall be as per manufacturer's standard practice / ESI guidelines and Purchaser's prior approval shall be taken for the same.
5.3.0	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

6.0.0 Deviations

6.1.0.	Deviations	<p>a) Deviations from this specification shall be listed by bidder clause wise along with optional offer and has to submit the list along with bid./quotation. BSES will review the deviations and if BSES is agreed with the deviation, seller has to take written confirmation from BSES on deviation during tender evaluation..</p> <p>b) In the absence of any list of deviations from the Seller with bid as well as written confirmation from BSES on deviations, it will be assumed by the Buyer that the Seller complies with the Specification fully.</p> <p>c) Any deviations mentioned in any other submitted bid documents (i.e.in filled GTP, Catalog, BSES old approval, buyer's/seller's standards etc) by seller without separate deviation sheets will not consider as a deviation from this tech spec at any stage of contract.</p>
--------	------------	---

7.0.0 Delivery


7.1.0.	Delivery	Despatch of Material: Vendor shall despatch the material, only after the Routine Tests/Final Acceptance Tests (FAT) of the material witnessed/waived by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser.
--------	----------	--

8.0.0 Inspection Expenses

Not Applicable

9.0.0 Penalty


Joint/Termination failure under warranty in regards to poor quality joint, poor work man ship, etc. shall be in the account of vendors. All kind of losses due to Joint/Termination failure shall be recovered from vendor.

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

Annexure – A: Guaranteed Technical Particulars (GTP)

The Seller is deemed to have examined all parts of the Specification documents and to have been fully informed, as to the nature of work and the conditions related to its performance.

S No.	Description	Purchase requirement	Vendor's data
1	Manufacturer's name		
2	Purchase Order no. & date		
3	Guarantee Period (minimum)	60 Months (from date of commissioning) / 66 Months (from date of receipt at Purchaser's store), whichever is earlier	
4	Applicable IS / IEC Standard followed by Vendor (incl. type test standard)		
5	Voltage Grade (kV)		
5.1	Lightning Impulse Voltage Withstand Test		
5.2	4Uo AC voltage withstand test for 4 hours	To be conducted on Installed joint at works	
6	Continuous operating temperature	90 deg. C	
7	Functional Requirements		
7.1	Method of Stress Control and Discharge Suppression		
7.2	Method of Insulation build-up and screening		
7.3	Method of earth bond a) Size and no. of braids b) Size of armour support c) No. of hose clips		
7.4	Method of mechanical protection a) for 3-core Cable b) for 1-core Cable		
7.5	Method of protection against corrosion (type & coating thickness of protective layer on steel mat)		
7.6	Method of conductor continuity a) For crimping connector b) For mechanical connector		

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

18	Printing details on each of the Heat- shrinkable and Moulded components	(Mention the text, presently printed on each of the component)	
19	OFC kit (For OFC embedded cable only 66Kv, 3CX300 sqmm , 33Kv, 3cx400 sqmm and 11kv, 3cx400 sqmm)	Yes/no	

Annexure – B: Kit Content Table (KCT)

Vendor shall submit KCT as a consolidated table, consisting of all data, such as:

A. Heading

1. Voltage grade, size, description of the Kit
(Including the voltage grade, size, type of the cables, for which it is to be used)
2. Type designation (as per manufacturer's standard)

B. Details / Parameters

(For each component/item of the KCT)


1. Lot no. /Batch no., etc.
2. Item number (manufacturer's standard)
3. Description
 - a) Material, type, make and grade
 - b) Dimensions cross sectional area
 - c) Colour,
 - d) Other description, if any
4. Function of the item
5. Quantity
6. Make/Name/Location of manufacturer/sub-vendor
7. a) Minimum supplied (or in expanded form) diameter
 - b) Maximum freely recovered diameter
8. a) Minimum supplied (or in expanded form) thickness
 - b) Maximum freely recovered thickness

C. Notes on the KCT

Markings, printings, other details for individual/group of components are to be mentioned on KCT. For example:

- a) Printing of item code, size, batch no., etc.
- b) Printing on components
- c) Other embossing or engraving, if any.

(Note: Vendor may attach an Annexure, for any additional information, if required.)

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

Annexure – C: Routine and Acceptance Test

A. Visual Examination

Condition of selected items / components, as per sampling method, shall be recorded. Some of the normal check-points can be as follows:

1. Every component shall be verified in quantity and description as per KCT.
2. All items shall be free from any defects, pin holes, cracks, etc.
3. Metallic components to be free from sharp edges.

B. Measurements of Dimensions

(Required / observed dimension — length, diameter, etc.)

1. Supplied dimensions
2. Recovered dimensions

C. Destructive Testing

On various heat-shrinkable / moulded components of ready Kits

(Items 3 and 4 are applicable only for heat-shrinkable components)

1. Tensile Strength
2. Wall Thickness Ratio
3. Heat Shock
4. Longitudinal Change, after full recovery
5. Ultimate Elongation
6. Low Temperature Flexibility
7. Dielectric Strength
8. Volume Resistivity

D. Routine Test Reports (RTR)

(Typical)

Each RTR shall clearly indicate P.O. no. & date and also BSES's SAP code no. RTR shall record the serial numbers of the kits selected, as per vendor's sampling method. Following details, besides vendor's/manufacturers standard check-points, shall appear in every RTR.

Annexure – D: Technical Deviation Sheet

Sr No.	Clause No.	Deviation



BSES-TS-45-TERM-R0

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

Annexure – E: Service Conditions

(Atmospheric conditions at Site)

1	Delhi	
a)	Average grade Atmospheric Condition:	Heavily Polluted, Dry
b)	Maximum altitude above sea level	1000 M
c)	Ambient Air temperature	Highest 50 deg C, Average 40 deg C
d)	Minimum ambient air temperature	0 deg C
e)	Relative Humidity	90 % Max
f)	Thermal Resistivity of Soil	150 Deg. C cmm
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months



BSES-TS-45-TERM-R0

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

Annexure – F: Bimetallic Aluminium / Copper Lug

**LUG FOR
240/300 sqmm CABLE**

**LUG FOR
120/150 sqmm CABLE**

CONDUCTIVE MATERIAL

ALUMINIUM BARREL
 COPPER PLAM
 FINAL METAL STATE JOINING METHOD

ALUMINIUM BARREL >=99.95%
 FULLY ANNEALED, INCLUDING JOINT
 BARREL SHALL BE FRICTION WELDED TO THE PLAM THUS ACHIEVING THE
 THE BEST POSSIBLE TRANSITION BETWEEN THE COPPER PLAM AND ALUMINIUM
 BARREL

FINISH
 BRIGHT

1) ALL TEST SHALL BE CARRIED OUT AS PER ICE-61238-1
 2) BARRELS SHALL BE CAPPED AND FILLED WITH GREASE SD AS TO
 AVOID OXIDATION OF THE ALUMINIUM
 3) LUGS SHALL HAVE MARKING AS MAKE & SIZE ENDESSSED ON LUG.

SIZE	ALUMINIUM					COPPER						
	NA	ØC	B	G	H	I	ØD	J	F	K	L	
120/150	15.3	21.5	6.00	NA	8.30	2.30	17.0	35.0	4.20	7.3	3.00	110.0
240/300	21.9	31.0	7.00	8.30	9.00	2.00	17.0	35.0	4.20	7.3	3.17	117.0

DRAWN	RASHI	TITLE:-	
CHECKED	ANISH		BIMETALLIC
DATE	11/04/13		ALUMINIUM/COPPER LUG
SCALE	1/1		

DRG.DND-
CSB/09/17/046

REV. 0

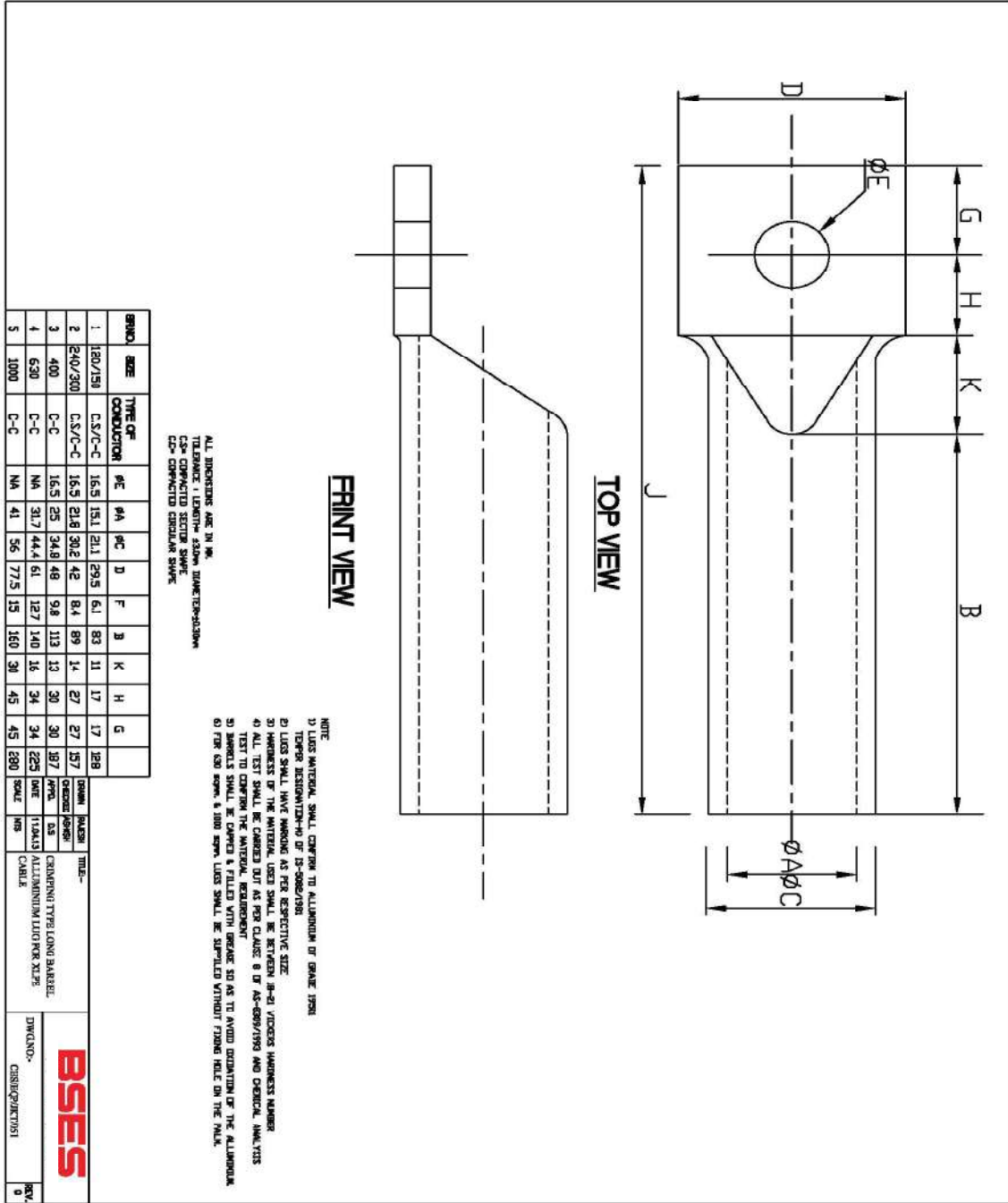
NOTE-ALL DIMENSIONS ARE IN MM.




BSES-TS-45-TERM-R0

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)


Annexure – G: Aluminum/Copper Lug For XLPE Cable



	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

Annexure-H

SOP FOR REPAIRING OF CABLE FAULT (Shall be part of PO)		
Sl. No	Activity	Responsibility
Initiation		
1	Identify and isolate fault and inform GNIIT in case of cable fault	Break down team
2	Updation of the details in OMS against respective feeder tripping event.	GNIIT
Fault Location		
1	Information sent to FLC team and SDO.	GNIIT
2	Mobilize FLC team and cable jointing contractor.	SDO
3	Identification of fault location	FLC Team
Preparation for Jointing		
1	Seeking permission from road owning agency	SDO
2	Payment of RR charges to Road owning agency	Finance
3	Digging	Cable jointing contractor
4	Cut faulty section and Pre-test (HV test) cable for multiple fault	Cable jointing contractor
5	BOQ estimation for jointing work (type, size and length of cable, type of jointing kit)	Cable jointing contractor
6	Filling material reservation slip (MRS) in SAP	SDO
7	Issuing and transporting material from store.	Cable jointing contractor
Jointing		
1	Cable preparation (overlap length of cable, slide of armour, build up with inner sheath etc)	Cable jointing contractor (for jointing details refer to manufacturer instruction manual)
2	Copper tape shields	
3	Core preparation	
4	Location of parts in completed joints	
5	Earthing of connection	
6	Completion of joints	
7	Take Photographs before, during and after jointing and send to CES	SDO
8	Supervision during jointing	SDO
9	Sending failed joint to Division store	Cable jointing contractor
Completion and reporting		
1	Intimate to breakdown team about joint completion.	Cable jointing contractor
2	Conduct HV test	Break down team
3	Restore of Supply through jointed cable	Break down team
4	Backfilling, compaction of excavated soil and removing of excess earth from the site	Cable jointing contractor

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

5	Completion information in Job Card (Details of work done, material consumption, location, feeder name and joint tag no., date, supervisor name, jointer name) sent to SDO	Cable jointing contractor
6	Above information sent to GNIIT	SDO
7	Send information about GPS location of Cable fault to GIS	SDO
8	Daily report of cable jointing to CES	Division Head
9	Updating of information in OMS including supervisor name, jointer name, feeder name	GNIIT
10	Information to include GPS location of cable fault.	GNIIT

Special Note-

- 1) Joints to be done preferably during day. In case of constraints, DGM (O&M) to authorize for night time jointing with supervisor
- 2) Daily joint report to be shared with CES
- 3) Bi-monthly analysis of faulty joint for ensuring warranty compliance to be organized at circle level by contractor in presence of DGM (O&M) and CES
- 4) Certification of job card for payment by DGM (O&M) subject to OMS compliance CES to check any gaps.
- 5) After completion of jointing (33kV and 66kV), all the joints shall be covered with RCC coffin. Coffin shall be filled with white sand complete from the hole provided at the top of the coffin.



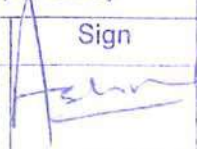
BSES

SP-LTJKT-06-R1

Technical Specification For LT Cable Joints and Terminations


Technical Specification For LT Cable Joints and Terminations

Specification no – SP-LTJKT-06-R1

Prepared by		Reviewed by		Approved by		Rev	Date
Name	Sign	Name	Sign	Name	Sign		
AV		GS		AA		R1	02/06/2017


Technical Specification For LT Cable Joints and Terminations
Index

Record of Revision	3
1.0.0 Scope of supply	4
2.0.0 Codes & standards	4
3.0.0 Distribution System Data.....	4
4.0.0 Environmental Condition Delhi.....	4
5.0.0 Cable Construction:.....	5
6.0.0 Cable Jointing Kits.....	5
7.0.0 Cable Termination Kits	6
8.0.0 Properties of Heat shrinkable components:	7
9.0.0 Quality Assurance, Inspection & Testing	8
10.0.0 Packing and Marking Shipping, Handling and Storage	9
11.0.0 Deviations.....	9
12.0.0 Drawing Submission:.....	9
Annexure A: Drawing of Al Crimping Ferrule.....	10
Annexure B: Drawing of Worm Drive Clip.....	11
Annexure C: Drawing of Solid Collet.....	12
Annexure D: Drawing of Aluminum Lug.....	13

	SP-LTJKT-06-R1
Technical Specification For LT Cable Joints and Terminations	

1.0.0 Scope of supply

Design, manufacture, testing of LT jointing and termination kits (1.1 KV) at manufacturers works before dispatch, packing, delivery of material and submission of documents to purchaser.

2.0.0 Codes & standards

S No.	Title	Indian Standard
2.1	Cable accessories for extruded power cable	IS 13573 (Part 1):2011
2.2	Cross-linked Polyethylene (XLPE) Insulated PVC sheathed cables : Part 1 : For working voltages from up to and including 1.1 kV	IS – 7098 Part 1 : 1988
2.3	Methods of test for cables	IS - 10810: 1984
2.4	Ferrule	IS:8308, IS:5082
2.5	Electricity Association - Technical Specification -09-13 Material component for use in Electric Power Cable Termination & Joints for System voltage above 1000 V up to 36 kV	EA TS - 09 - 13
2.6	Test method for electric cables	IEC 885 Part 1 -3
2.7	Power cables with extruded Insulation and their accessories for rated voltages from 1kV up to 30kV.	IEC 60502-2009
2.8	Standards Methods for Liquid, Inclined -Plane Tracking and Erosion of Insulation Material.	ASTM D 2303
2.9	Specification, for 1.1 kV Cable joint & Terminations kit.	EN 50393

3.0.0 Distribution System Data

3.1	Supply	a. Single Phase 2 wire (AC) b. 3 Phase 4 Wire (AC)
3.2	Voltage	240 V \pm 6% (415V Phase to phase)
3.3	Frequency	50 Hz \pm 5%
3.4	System Neutral	Solidly Earthed

4.0.0 Environmental Condition Delhi

4.1	Average grade atmospheric Condition	Heavily Polluted, Dry
4.2	Maximum altitude above sea level	1000 M
4.3	Ambient Air temperature	Highest 50 Deg C, Average 40 Deg C
4.4	Minimum ambient air temperature	0 Deg C
4.5	Relative Humidity	100 % Max
4.6	Thermal Resistivity of Soil	150 Deg C cm/W
4.7	Seismic Zone	4
4.8	Rainfall	750 mm concentrated in four months

Technical Specification For LT Cable Joints and Terminations
5.0.0 Cable Construction:

5.1	Size of the cables	<ol style="list-style-type: none"> 1. 2C X 10 Sqmm – circular 2. 2C X 25 Sqmm - filler 3. 4C X 25 Sqmm 4. 4C X 50 Sqmm 5. 4C X 95 Sqmm 6. 4C X 150 Sqmm 7. 4C X 300 Sqmm
5.2	Conductor	<ol style="list-style-type: none"> a. Electrolytic Grade stranded Aluminum Conductor b. Grade: H2/ H4 as per IS: 8130/84 (For Al) c. Shape: compacted sector shaped stranded d. Class 2
5.3	Insulation	Extruded XLPE
5.4	Inner sheath	Extruded Inner Sheath of Black PVC type ST-2.
5.5	Armour	Galvanized steel flat strip armour GI Wire
5.6	Outdoor Sheath	Extruded outer sheath of PVC (ST-2)
5.7	Maximum Conductor Temperature	Continuous- 90 Deg C, Short Circuit- 250 Deg C

6.0.0 Cable Jointing Kits

6.1	Type	Heat Shrinkable straight through joint Kits.
6.2	Size	Suitable for cable sizes mentioned in clause no. 3.1 and Purchaser's Requisition.
6.3	Conductor Connection	<ol style="list-style-type: none"> a. By long barrel AL Ferrule (Please refer drawing mentioned in annexure 'x'. b. Corrosive inhibition paste (M/s Jainson or equivalent) inside the ferrule with plastic end caps. c. Ferrule shall be marked for size of the cable for which it is suitable. d. Crimping mark shall be provided on ferrule. e. Inner edge of ferrules should be chamfered for easy insertion of cable core.
6.4	Insulation	<ol style="list-style-type: none"> a. Heat shrinkable Insulating tubing for providing insulation over ferrule. b. The reinstated insulation of each core over conductor connector (Ferrule) shall have a single length of heat shrinkable tubing, recovered over the connector with a final minimum overlap of 30 mm on each core. The minimum recovered thickness of insulation shall be 1.5 mm.
6.4.1	Core spacers	Shall be provided.
6.5	Armour Continuity	A flexible tinned copper conductor of braided construction shall provide electrical continuity of steel wire armour. The conductor shall be bonded to the armour wires by a combination of a galvanized steel ring inserted under the

Technical Specification For LT Cable Joints and Terminations

		wires and stainless steel horse clips (steel grade SS 304). The arrangement shall ensure that temperature rise at bonding point is limited to 160 °C.
6.5.1	Conductor Size	Tinned Copper Conductor/strip/braid
6.5.2	25 Sqmm	16 sq.mm
6.5.3	50 Sqmm	30 sq.mm
6.5.4	95 Sqmm, 150 Sqmm and 300 Sqmm	50 sq.mm
6.6	Mechanical Protection:	The joint shall incorporate a steel screen surrounding the insulated core for full length of the joint. The metallic screen shall be in electrical contact with steel wire armour, but shall not be considered as forming part of armour continuity bond. The steel screen in combination with external heat shrinkable tube shall provide protection to the insulated cores from damages by impacts.
6.7	Covering over the Joints:	The Joint shall be protected from corrosion by heat shrinkable tubes internally coated with mastic or heat activated sealant to provide an environmental seal to the joint. One or two tubes shall be provided. Length of the outer sealing sleeve shall be 500 mm for 25 sq.mm & shall be 1000 mm for 300 sq.mm.
6.8	Identification:	Heat shrinkable tubing shall be printed with batch no./Date/Shrinkage ratio/size etc.

7.0.0 Cable Termination Kits

7.1	Type	Heat Shrinkable outdoor termination Kits.
7.2	Size	Suitable for cable sizes mentioned in clause no. 3.1 and Purchaser's Requisition.
7.3	Conductor Connection	<ol style="list-style-type: none"> By long barrel AL Lug (Please refer drawing mentioned in annexure 'x'). Corrosive inhibition paste (M/s Jainson or equivalent) inside the ferrule with plastic end caps. Lug shall be marked for size of the cable for which it is suitable. Crimping mark shall be provided on ferrule. Inner edge of Lug should be chamfered for easy insertion of cable core.
7.4	Insulation	<ol style="list-style-type: none"> The minimum length of outer sleeve shall be shall be 1000mm. It shall also have UV rating to protect from direct sun light exposure. Each Phase and neutral tube shall have different colour for easy identification. Preferably, Red, Yellow, Blue colour to be used for Phases and Black for neutral. If the same is not possible then at least, Red colour to be used for Phases and Black for neutral.

Technical Specification For LT Cable Joints and Terminations


		d. Lug seal with HMA to be provided for lug sealing.
7.4.1	Core spacers	Shall be provided.
7.5	Armour Continuity	<p>A flexible tinned copper braid Insulated with Heat shrink tube shall provide electrical continuity of steel wire armour. The fault current capacity of copper braid should withstand the cable fault current capacity based upon different size of cable as defined in IS: 13234. The conductor shall be bonded to the armour wires by a combination of galvanized steel ring inserted under the wires and stainless steel horse clips (steel grade SS 304). The arrangement shall ensure that temperature rise at bonding points shall be limited to permissible temperature of cable. Earthing braid should be provided with length sufficient to take one complete turn on armour and then continue to the other end of the armour with one turn around, This one turn will ensure the firm contact with the armour to tighten this braid worm drive clips two per side to be provided with back up ring the remaining 70 % of braid will be insulated with heat shrink tubes to ensure the Insulated earth at Heat shrink breakout region.</p>

8.0.0 Properties of Heat shrinkable components:

8.1	Heat Shrinkable Components General properties	Components shall be capable of being stored without deterioration within temperature range of 10 Deg C to 45 Deg. C and shall have unlimited shelf life. Sealant activated by heat shall be used in conjunction with heat shrinkable components to provide an environmental seal to the completed joint.
8.2	Electric Strength	≥ 8 kV/mm
8.3	Heat shock 250 °C for 15 Min.	No splitting, dripping or flowing.
8.4	Tensile Strength	≥ 12 Mpa (120 kg/sq.mm)
8.5	Elongation	$\geq 200\%$
8.6	After Thermal Ageing at 120°C for 500Hrs.	
8.7	Tensile Strength	≥ 10 Mpa (100 kg/sq.mm)
8.8	Elongation	$\geq 100\%$


Technical Specification For LT Cable Joints and Terminations
9.0.0 Quality Assurance, Inspection & Testing

9.1	Vendor Quality Plan	To be submitted for purchaser's approval.
9.2	Sampling methods	Sampling Method for quality checks shall be as per relevant IS/ IEC/ EA TS-09-13 guidelines and Purchaser's prior approval shall be taken for the same.
9.3	Inspection Hold- Points	To be mutually identified, agreed and approved in Quality Plan.
9.4	Type test	<ul style="list-style-type: none"> a. Joints and terminations shall be type tested from CPRI / ERDA as per IS 13573 -Part1. b. Randomly selected sample shall also be type tested without any commercial implication from the offered lot in the event of order. c. Loose components shall be tested as per EA TS -09-13.
9.5	Routine tests	As per relevant IS and EA TS -09-13
9.6	Acceptance test	<ul style="list-style-type: none"> a. Visual Inspection- The offered kits shall be free from any visible defects, b. Physical verification of contents - all the contents shall be checked as per kit contents list enclosed by the bidder, c. Electric Strength test for Insulation tubing. d. Elongation tests for all types of tubing. e. Wall thickness ratio f. Longitudinal change after full recovery. g. Tracking and corrosion resistance test. h. Tensile strength.
9.7	Inspection	<ul style="list-style-type: none"> a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller'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 as per clause 14.3 relevant standards and tampers logics as per approved GTP. All the equipments including tamper logs kits/ jigs should be calibrated. c. In-process and / or final inspection call intimation shall be given in advance to purchaser.
9.8	Guaranteed Life	Joint shall be guaranteed for a period of 66 months against defective design & material & shall be replaced free of cost to BSES if failed due to design / material defect.

	SP-LTJKT-06-R1
Technical Specification For LT Cable Joints and Terminations	

10.0.0 Packing and Marking Shipping, Handling and Storage

10.1	Packing	<ul style="list-style-type: none"> a. In 7 Ply corrugated box made out of 150 GSM Virgin Kraft Paper. b. Protection against shocks & vibration
10.2	Packing identification labels	Manufacturer Name, Number of items, Month & Year of manufacturing, Shelf life of Kit, Property of BSES
10.3	Corrugated Box contents	Kit components in proper packing with label indicating component name, quantity & shelf life. Bill of material sheet Instruction sheet for step by step jointing in English & Hindi

11.0.0 Deviations

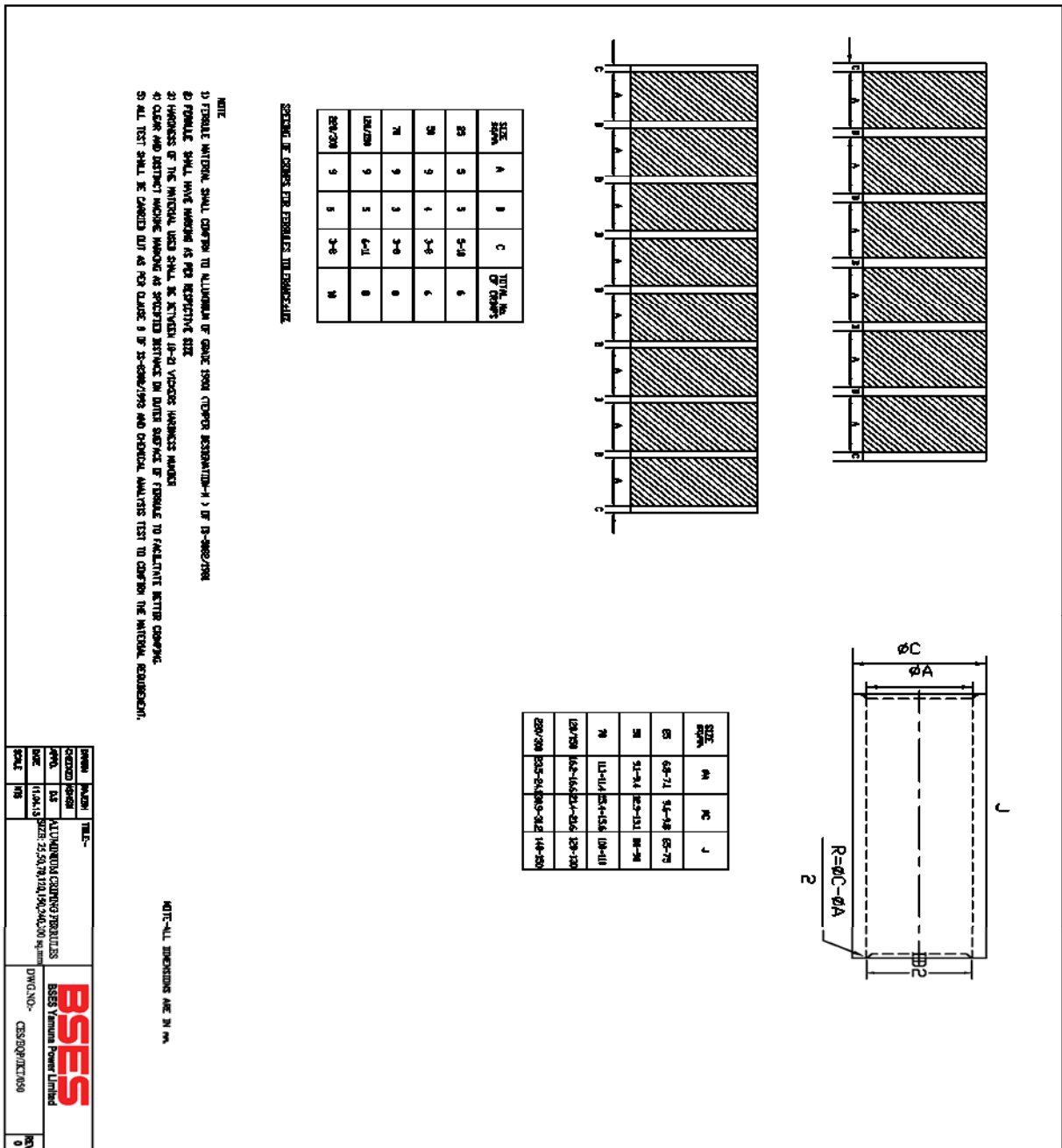
12.1	Deviations to this specification to be submitted in writing by Vendor. Bidder to submit copy of this specification along with company seal & signature on each page.
------	--

12.0.0 Drawing Submission:

12.1	The seller has to submit following: along with bid
12.1.1	GTP (duly filled-in)
12.1.2	Deviation sheet, if any.
12.1.3	GA / cross sectional drawing of complete joint/ termination and individual components.
12.1.4	01 no's sample of each type of kit.
12.1.5	Detailed reference list of customers using the offered product during the last 5 years with similar design and rating
12.1.6	Manufacturer's quality assurance plan and certification for quality standards
12.1.7	Type test reports for the same type, size & rating.
12.1.8	Complete product catalogue and Manual.
12.1.9	Recommended accessories or any other hardware for five years of operation.
12.2	Seller has to submit following drawings for buyer's Approval (A) / Reference (R) After award of contract -
12.2.1	Program for production and testing (A)
12.2.3	Guaranteed Technical Particulars (A) and Kit contents.
12.2.4	GA drawing
12.2.5	Detailed installation and commissioning instructions
12.2.6	Quality plan and field quality plan.
12.3	Submittals required prior to dispatch
12.3.1	Inspection and test reports, carried out in manufacturer's works
12.3.2	Test certificates of all bought out items
12.3.5	Number of Documents required at different stages shall be per Annexure- A
12.3.6	Duly signed & stamped copies of the drawings / documentation are required to be submitted to BSES for approval.

Technical Specification For LT Cable Joints and Terminations

Annexure A: Drawing of AI Crimping Ferrule

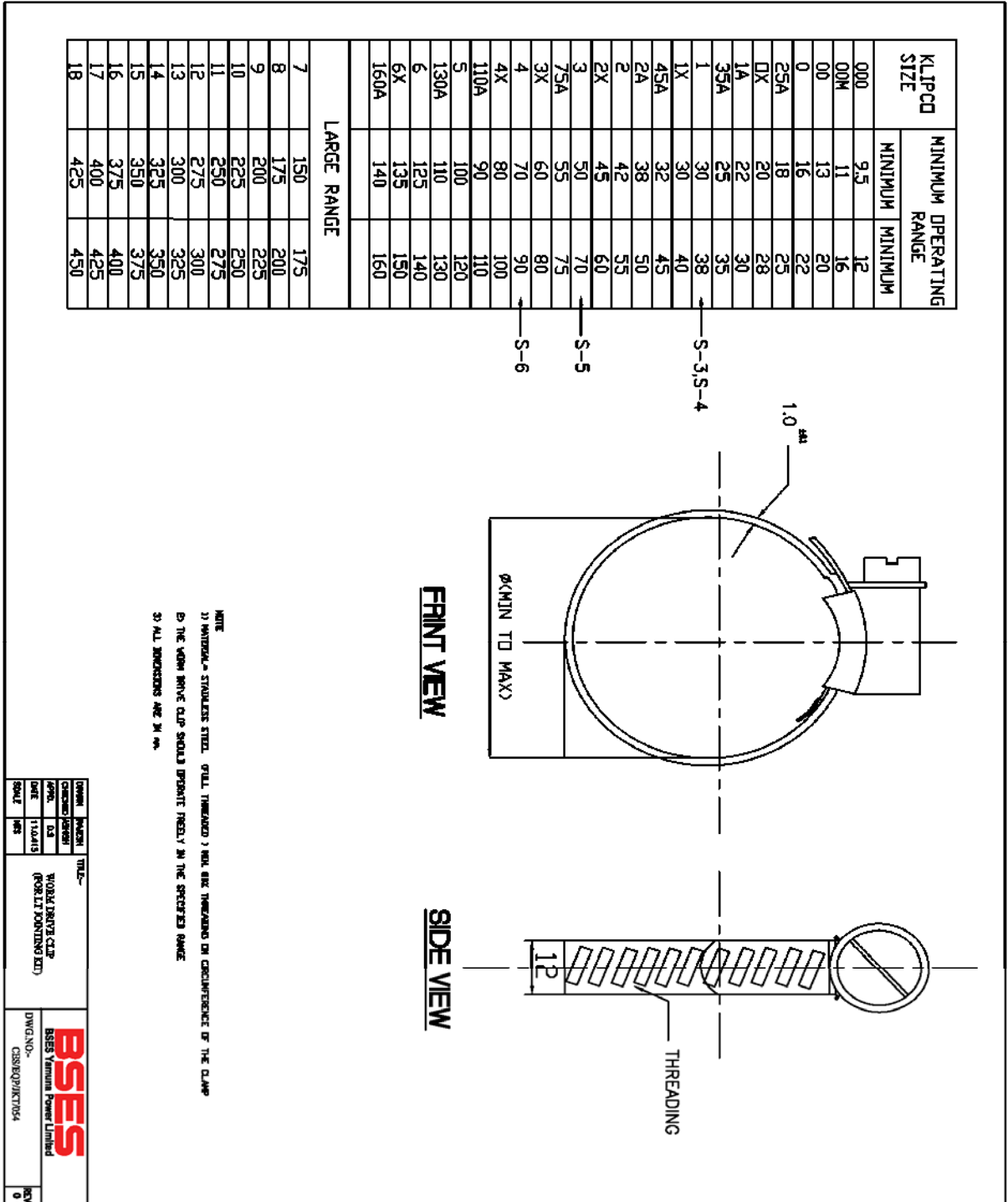




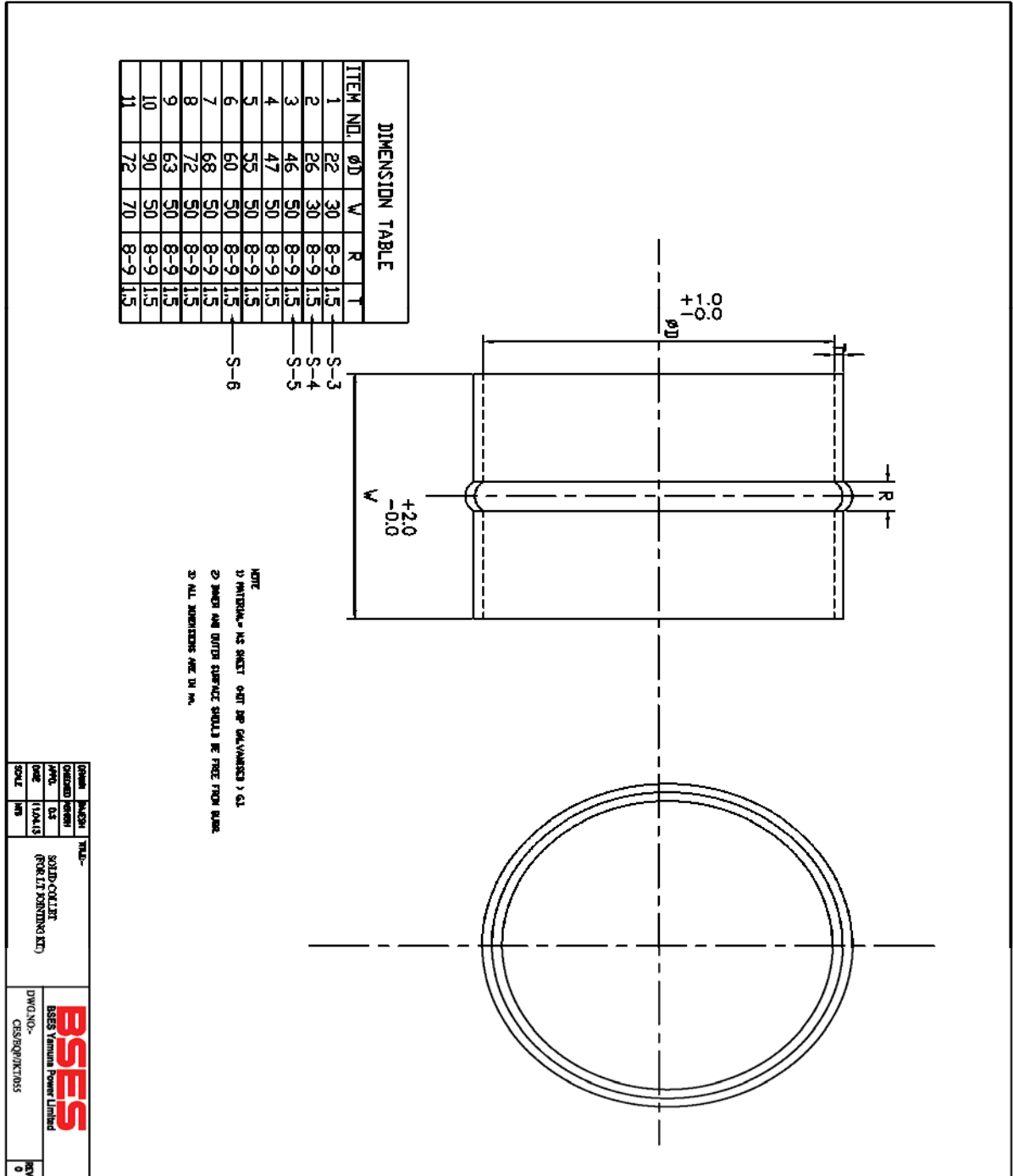
SP-LTJKT-06-R1

Technical Specification For LT Cable Joints and Terminations

Annexure B: Drawing of Worm Drive Clip

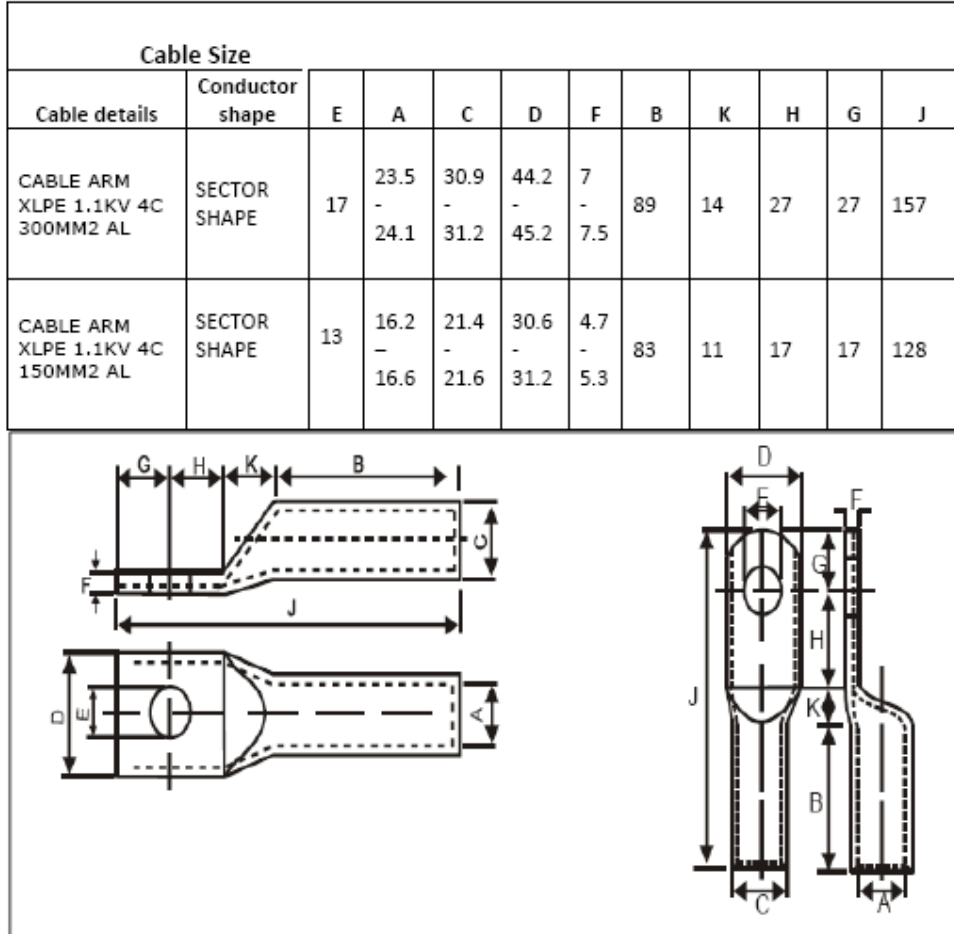


Annexure C: Drawing of Solid Collet



Technical Specification For LT Cable Joints and Terminations

Annexure D: Drawing of Aluminum Lug



NOTE: ALL DIMENSIONS ARE IN MM



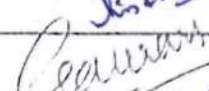
BSES

TECHNICAL SPECIFICATION

FOR

FRLS CONTROL CABLE

SPECIFICATION NO. – BSES-TS-57-CCAB-R0

Rev:	0	
Pages:	11	
Date:	20 April 2022	
Prepared by	Abhishek Vashistha	
	Rohit Patil	
Reviewed by	Puneet Duggal	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	



TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE

INDEX

1.0	SCOPE.....	3
2.0	STANDARDS & CODES.....	3
3.0	SERVICE CONDITIONS.....	4
4.0	DESIGN FEATURES.....	4
5.0	QUALITY ASSURANCE PLAN, INSPECTION AND TESTING	6
6.0	PACKING, SHIPPING, HANDLING & SITE SUPPORT	7
7.0	DEVIATIONS.....	7
8.0	DOCUMENT SUBMISSION MATRIX.....	8
	Annexure – A: Guaranteed Technical Particulars (Data by Supplier).....	9


TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE
1.0 SCOPE

The scope of supply includes Design, Manufacture, Testing at manufacturer's works before dispatch, packing, delivery including unloading and stacking at site/store of Control Cable complete with all accessories.

2.0 STANDARDS & CODES

Materials, equipments and methods used in the manufacture of Cable shall conform to the latest edition of following:

S No.	STANDARD	DESCRIPTION
2.1	IS- 1554 Part-1	PVC insulated Cables
2.2	IS- 5831 : 1984	PVC insulation & sheath of electric cables.
2.3	IS- 10810 : 1984	Methods of test for cables.
2.4	IS- 8130 : 1984	Conductors for insulated electric cables and flexible cords.
2.5	IS- 3961 Part 2	Recommended current ratings for PVC insulated and PVC sheathed heavy duty Cables
2.6	IS- 3975 : 1999	Mild steel wires, formed wires and tapes for armouring of cables.
2.7	IS- 10418 : 1982	Drums for Electric Cables
2.8	IEC 60228 Ed.3.0 b	Conductors of insulated cables.
2.9	IEC 60332-3-21 Ed.1.0 b	Tests on electric cables under fire conditions. Part 3-21. Tests on bunched wires or cables.
2.10	IEC 60502-1 Ed. 2.1 b	Power cables with extruded insulation and their accessories for rated voltage from 1kV upto 30kV –Part 1: cables for rated voltages of 1kV and 3kV
2.11	IEC 60811	Common test methods for insulating and sheathing materials of electric cables.
2.12	IEC 60885 Ed.1.0 b	Electric test methods for electric cables.
2.13	IEC 60227	PVC insulated cables of rated voltages up to and including 450/750 V.
2.14	IEC 60028 Ed. 2.0 b	International Standard of Resistance for Copper
2.15	ASTMD 2843	Standard Test Method for density of Smoke from the burning or decomposition of cables
2.16	ASTM 2863	Standard Test Method for measuring of minimum oxygen concentration
2.17	IEC 60754-1	Test on gases evolved during combustion of materials for cables. Part 1 – Determination of the Halogen Acid gas Content

BSES	BSES-TS-57-CCAB-R0
TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE	

3.0 SERVICE CONDITIONS

Control Cables to be supplied against this specification shall be suitable for satisfactory operation under the following conditions-

3.1	Average grade atmosphere	Heavily polluted, Dry
3.2	Maximum altitude above sea level	1000M
3.3	Relative Humidity	100%
3.4	Ambient air temperature	Highest 50 Deg C Average 40 Deg C Minimum 0 Deg C
3.5	Operating temperature	0 Deg C - 50 Deg C
3.6	Rainfall	750mm concentrated in four months

4.0 DESIGN FEATURES

(Refer Annexure – “A”)

S No.	Parameters	Technical Requirements
4.1	Cable construction Features	Size & dimensions of each item mentioned under this clause shall be followed as detailed out in GTP, refer Annexure A
4.2	Conductor	<ul style="list-style-type: none"> Stranded, plain copper, circular Shall be made from high conductivity copper rods
4.3	Insulation	Extruded PVC Insulation Type A as per IS 5831
4.4	Core Identification	As per IS 1554 Part 1
4.5	Inner Sheath	Extruded Inner Sheath of Black PVC type ST-2 as per IS 5831
4.6	Armour	<ul style="list-style-type: none"> As per Clause 13.2 of IS 1554 Part-1: Galvanized steel round wire armour. Minimum area of coverage of armouring shall be not less than 90 %. (refer Annex C of IS 1554-part 1 for % calculation)



TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE

S No.	Parameters	Technical Requirements
4.7	Outer Sheath	a) Extruded outer sheath of PVC type ST-2 as per IS 5831 having FRLS properties b) Color : Black c) The Outer Sheath shall be embossed with: <ol style="list-style-type: none"> i. The voltage designation ii. Type of construction / cable code (for e.g. AYWY) iii. Manufacturers Name or Trade mark iv. Number of Cores and nominal cross sectional area of conductors v. The drum progressive length of cable and individual drum number at every meter. (By Printing) vi. Name of buyer i.e. BSES vii. Month & Year of Manufacturing viii. P.O. No. and P.O. Date
4.8	FRLS Properties	a) Oxygen Index : Not less than 29% as per ASTM 2863 b) Temperature Index: 250°C at Oxygen Index 21 (when tested as per ASTM D 2863) c) Max Acid Gas Generation – Not more than 20% as per IEC -60754-1 d) Light Transmission - Minimum 40% when tested as per ASTM D 2843 (Smoke Density rating shall be max 60%) e) Flammability Test – As per IEC 60332-III, Cat – B, IEC 60332- I, IS- 10810 – Part 53, IS:10810 – Part 61 & 62 (Category A)
4.9	Sealing of cable end	Both ends of the cable shall be sealed with PVC Cap.
4.10	Drum length & tolerance	500 mtr (+/- 5%)
4.11	Overall tolerance in cable length	- 2 %
4.12	Short length of cables	a) Minimum acceptable short length shall be above 100 meters. Manufacturer shall be required to take prior approval from engineering for any short length supply. b) Manufacturer shall not be allowed to put two cable pieces of different short lengths in same cable drum. c) Only 1% of the total ordered quantity.

BSES	BSES-TS-57-CCAB-R0
TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE	

5.0 QUALITY ASSURANCE PLAN, INSPECTION AND TESTING

S No.	Parameters	Technical Requirements
5.1	Quality Assurance Plan	QAP Shall be submitted by vendor for approval. Inspection and testing of the material shall be carried out accordingly.
5.2	Type test	Cables must be of type tested as per relevant IS/IEC/ASTM. Type test conducted either from CPRI/ERDA/NABL third party accredited lab will be treated as valid. Type test reports shall be submitted for the type, size & rating of cable offered along with bid.
5.3	Routine test	Each drum length of cable shall be subjected to the routine tests as mentioned in IS 1554 part -1
5.4	Acceptance Tests	The sampling & acceptance tests Shall be conducted, as per IS 1554 Part-1 and approved QA plan, for each lot of cable during the inspection of lot at manufacturer's works.
5.5	Inspection	<ul style="list-style-type: none"> a) The buyer reserves the right to inspect cables at the Seller's works at any time prior dispatch, to verify compliance with the specifications. b) In-process and final inspection call intimation shall be given in 15 days advance to purchaser. c) In the event of any discrepancy in the test reports i.e. test reports not acceptable or any type tests (including special /additional tests, if any) not carried out, same shall be carried out without any cost implication to BSES before dispatch of cable.
5.6	Test certificates	Test certificates (routine and acceptance) shall be submitted along with the dispatch documents.

	BSES-TS-57-CCAB-R0
TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE	

6.0 PACKING, SHIPPING, HANDLING & SITE SUPPORT

6.1	Packing	The cable shall be wound on wooden drums (with anti termite treatment and M.S. spindle plate with nut-bolts). Cable should be packed conforming to Indian / international standards. The drum shall be fully enclosed by suitable packing preferably PP sheeting.
6.2	Drum identification label	The following information shall be marked on the drum: a) Drum identification number b) Trade name or trade mark; if any c) Name of manufacturer d) Name of buyer i.e. BSES e) Cable voltage grade f) Cable code (e.g. YWY) g) Number of cores and cross sectional area h) Purchase order number with SAP item code i) Year and month of manufacturing j) Direction of rotation of drum (an arrow) k) Net weight of cable in drum and gross weight of cable with drum l) Batch no or Lot no. m) Cable length initial reading & end reading shall be marked on drum. Cable starting end shall be taken out from winding to read this drum reading with proper sealing to protect against external damage.
6.3	Shipping	The seller shall give complete shipping information concerning the gross weight, size of each packing.
6.4	Handling & Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet/manual needs to be furnished before commencement of supply.
6.5	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

7.0 DEVIATIONS

7.1	Deviation	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.
-----	-----------	---



BSES-TS-57-CCAB-R0

TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE
8.0 DOCUMENT SUBMISSION MATRIX

Document/Drawing submission shall be as per the matrix given below. All documents/drawings shall be provided in soft copy only in returnable Pen drives. Language of the documents shall be English only. Incomplete submission shall be liable for rejection.

S No.	Description	Bid	Approval	Pre Dispatch
8.1	Guaranteed Technical Particulars (GTP)	required	required	
8.2	Deviation Sheet, if any	required	required	
8.3	Detailed cross sectional drawing of cable	required	required	
8.4	Dimensional drawing of Cable Drum		required	
8.5	Type test reports for the offered type and rating of cable	required	required	
8.6	BIS Certificate	required		
8.7	Make of Raw Materials	required	required	
8.8	Cable de-rating factors	required	required	
8.9	Manufacturer's Quality Assurance Plan		required	
8.10	Detailed installation & commissioning instructions		required	
8.11	Test certificates of all raw materials			required
8.12	Inspection and routine test reports, carried out in manufacturer's works			required



BSES-TS-57-CCAB-R0

TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE
Annexure – A: Guaranteed Technical Particulars (Data by Supplier)

(Standard Cable sizes are 2Cx2.5, 4Cx2.5, 6C X 2.5, 8Cx2.5, 10Cx2.5, 12C X 2.5 mm²)

For each size separate GTP need to be furnished

***For any size other than standard sizes mentioned, GTP should be as per IS or requirement whichever applicable**

Sr.	Description	Buyer's requirement	Vendor's Data
	Purchase Req. No.	
	Guarantee Period: 5 Years	60/66 Months	
1.0	Make	To be specified by vendor	
2.0	Type (AS PER IS 1554 part -1)	YWY	
3.0	Voltage Grade (KV)	1.1	
4.0	Maximum Conductor temperature		
a)	Continuous (° C)	70°C	
b)	Short time (° C)	160°C	
5.0	Conductor		
a)	Size (mm ²)	2.5	
b)	No. of wires in each conductor	As per Manufacturer standard	
c)	Dia. of wires in each conductor before compaction (mm)	As per Manufacturer standard	
d)	Shape of Conductor	As per Clause 4.2 of specification	
e)	Diameter over conductor mm	To be specified by vendor	
f)	Maximum Conductor resistance at 20 ° C (Ohm/Km)	As per Table 2 of IS 8130	
6.0	Insulation	As per Table 1 of IS:5831 – 1984	
a)	Nominal thickness (mm)	As per Clause 4.3 of specification & Table 2 of IS 1554(Part-1)	
b)	Minimum thickness (mm)		
c)	Core Identification	As per IS 1554 Part 1	
d)	Approx. dia. over Insulation (mm)	To be specified by	



BSES-TS-57-CCAB-R0

TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE

Sr.	Description	Buyer's requirement	Vendor's Data
		vendor	
7.0	Inner Sheath	As per Table 2 of IS:5831 – 1984	
a)	Minimum thickness (mm)	As per Table 4 of IS 1554(Part-1)	
b)	Approx. dia. Over sheath (mm)	To be specified by vendor	
8.0	Galvanized Steel Armour	As per IS 1554-part 1	
a)	Number of armour wire	As per Manufacturer Std.	
b)	Nominal dia. of Round Wire	As per Table 5 of IS 1554(Part-1)	
c)	Dia. over armour – approx.	To be specified by vendor	
d)	Lay Ratio	To be specified by vendor	
e)	Confirm minimum 90% coverage (submit calculation)		
9.0	Outer Sheath (FRLS)	As per Table 2 of IS:5831 – 1984	
a)	Thickness (min)	As per Table 7 of IS 1554(Part-1)	
b)	Color	Black	
10.0	Approx. overall dia. (mm)	To be specified by vendor	
11.0	Drum length & tolerance	As per clause 4.10 of specification	
12.0	End Cap	Required	
13.0	Drums provide with MS Spindle plate & Nut bolts arrangement	Required	
14.0	Net Weight of cable (Kg/Km.) – approx.	To be specified by vendor	



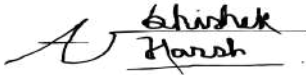


BSES-TS-57-CCAB-R0

TECHNICAL SPECIFICATION FOR FRLS CONTROL CABLE

Sr.	Description	Buyer's requirement	Vendor's Data
15.0	Continuous current rating for standard I.S. condition laid Direct		
a)	In ground 30° C Amps	To be specified by vendor	
b)	In duct 30° C Amps	To be specified by vendor	
c)	In Air 40° C Amps	To be specified by vendor	
16.0	Short circuit current for 1 sec of conductor. (KAmp)	To be specified by vendor	
17.0	Electrical Parameters at Maximum Operating temperature:		
a)	Resistance (Ohm/Km) (AC Resistance)	To be specified by vendor	
b)	Reactance at 50 C/s (Ohm/Km)	To be specified by vendor	
c)	Impedance (Ohm/Km)	To be specified by vendor	
d)	Capacitance (Micro farad / KM)	To be specified by vendor	
18.0	Recommended minimum bending radius x O/D	
19.0	FRLS Properties		
a)	Oxygen Index	To be specified by vendor	
b)	Temperature Index	To be specified by vendor	
c)	Max Acid Gas Generation	To be specified by vendor	
d)	Light Transmission / Smoke Density	To be specified by vendor	



Technical Specification
of
Illumination and Lighting System
Specification no – BSES-TS-98-ILS-R0

Rev	0	
Page	1 of 12	
Date	06 May 2022	
Prepared by	Abhishek Harsh	 <small>3267d7c3-82b5-46cb-b5a6-867ee7820a34</small>
Reviewed by	Srinivas Gopu	 <small>5d22525e-ed2e-4f41-b1c7-b2a5e77d4f519</small>
Approved by	Gaurav Sharma	 <small>23dc2de2-95de-4472-99a7-dea873f472b6</small>


TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM
NDEX

1.	SCOPE.....	3
2.	STANDARDS AND CODES.....	3
3.	ILLUMINATION SYSTEM	4
4.	DISTRIBUTION PILLARS FOR NORMAL ILLUMINATION SYSTEM	6
5.	LIGHTING DISTRIBUTION BOARDS.....	7
6.	MAIN EMERGENCY LIGHTING BOARD	8
7.	LUMINAIRES	8
8.	JUNCTION BOXES/WALL BOXES	10
9.	AUTOMATIC LIGHTING CONTROLLER	10
10.	SOCKETS & SWITCHES.....	10
11.	NAMEPLATE & MARKING	11
12.	APPROVED MAKE OF COMPONENTS	11
13.	INSPECTION & TESTING	12
14.	DEVIATION.....	12

BSES	BSES-TS-98-ILS-R0
TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM	

1. SCOPE

The specification covers the design, engineering, manufacture, assembly and testing at manufacturer's work, supply and installation of Illumination system for substation including normal distribution pillars, normal lighting board, emergency distribution pillar, emergency lighting board, Junction boxes, Illumination lamps with required lux level.

2. STANDARDS AND CODES

Standard Code	Standard Description
IS 16101 : 2012	General Lighting -LEDs and LED modules – Terms and Definitions
IS16102(Part 1) 2012	Self-Ballasted LED Lamps for General Lighting Services, Part 1 Safety Requirements
IS16102(Part 2) 2012	Self-Ballasted LED Lamps for General Lighting Services, Part 2 Performance Requirements
IS16103(Part 1) 2012	Led Modules for General Lighting, Part 1 Safety Requirements
IS16103(Part 2) 2012	Led Modules for General Lighting, Part 2 Performance Requirements
IS15885(Part2/Sec13)	Safety of Lamp Control Gear , Part 2 Particular Requirements , Section 13 dc. or ac. Supplied Electronic Control gear for Led Modules
IS16104 : 2012	d.c. or a.c. Supplied Electronic Control Gear for LED Modules - Performance Requirements
IS16105 : 2012	Method of Measurement of Lumen Maintenance of Solid State Light (LED) Sources
IS16106 : 2012	Method of Electrical and Photometric Measurements of Solid-State Lighting (LED) Products
IS 16107(Part 1)2012	Luminaires Performance ,Part 1 General Requirements
IS 16107(Part 2)2012	Luminaires Performance, Part 2 Particular Requirements ,Section 1 LED Luminaire
IS 16108 : 2012	Photo biological Safety of Lamps and Lamp Systems
IS 10322 : 2012	Luminaires: Part 5 Particular requirements, Section 3 Luminaires for road and street lighting
IS 5	Colours for Ready Mixed Paints and Enamels
IS 613	Copper Rods and Bars for electrical purposes
IS 694	PVC Insulated cables for working voltages up to and including 1100 V
IS 2551	Danger notice plates
IS 5082	Wrought Aluminium and Aluminium alloy bars, rods, tubes and sections for electrical purpose
IS 6665	Code of practice for industrial lighting
IS 13703	LV Fuses for voltage not exceeding 1000V ac or 1500V dc
IS 10118	Code of Practice for Selection, Installation and Maintenance of Switchgear and Controlgear
International Standard	

BSES	BSES-TS-98-ILS-R0
TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM	

IEC 62612	Self-ballasted LED lamps for general lighting services for voltage above 50 V — Performance requirements
IEC : 60598-2-3	Particular requirements - Luminaires for road and street lighting
IEC 62471	Photo biological safety of lamps and lamp systems
IEC 62778	Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires
IEC 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
IEC 60439	Low Voltage Switchgear and Controlgear assemblies - Type tested and partially type tested assemblies
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60947-1	Low Voltage Switchgear and Controlgear - General Rules
IEC 60947-2	Low Voltage Switchgear and Controlgear - Circuit breakers
IEC 61643	Low-voltage surge protective devices

3. ILLUMINATION SYSTEM

3.1.	Lux level requirement	<p>3.1.1. The design of the illumination system shall ensure availability of the average illumination levels as specified below with the maximum possible uniformity in the entire substation. The illumination system shall consist of the normal lighting system and emergency lighting system. The minimum illumination levels shall be as specified below(Reference IS3646(Part II)).</p> <table style="margin-left: 20px;"> <tr> <td>3.1.1.1. Outdoor Substation</td> <td>:</td> <td>20 lux</td> </tr> <tr> <td>3.1.1.2. Roads within substation</td> <td>:</td> <td>20 lux</td> </tr> <tr> <td>3.1.1.3. Boundary wall of the substation</td> <td>:</td> <td>10 lux</td> </tr> <tr> <td>3.1.1.4. Control room</td> <td>:</td> <td>300 lux</td> </tr> <tr> <td>3.1.1.5. Switchgear Room</td> <td>:</td> <td>200 lux</td> </tr> <tr> <td>3.1.1.6. Battery room</td> <td>:</td> <td>100 lux</td> </tr> <tr> <td>3.1.1.7. Stair case</td> <td>:</td> <td>100 lux</td> </tr> <tr> <td>3.1.1.8. Transformers</td> <td>:</td> <td>100 lux</td> </tr> </table> <p>3.1.2. The illumination level of specific spots such as operating mechanisms of Capacitor bank isolator, oil level and temperature gauges of transformer etc. shall be minimum 50 Lux. Contractor shall design the lighting system with the help of desired software. Owner shall verify the same post commissioning with lux meter to check the levels. In case desired lux levels are not met contractor has to install addition fitting in outdoor and indoor location as per requirement.</p> <p>3.1.3. Complete design calculation sheets for arriving at the number of luminaires required for the normal and emergency requirements shall be furnished by the bidder. Design calculation sheets for the selection of cables, MCB, HRC fuses, bus bars, etc. are also required to be furnished for Owner's approval.</p>	3.1.1.1. Outdoor Substation	:	20 lux	3.1.1.2. Roads within substation	:	20 lux	3.1.1.3. Boundary wall of the substation	:	10 lux	3.1.1.4. Control room	:	300 lux	3.1.1.5. Switchgear Room	:	200 lux	3.1.1.6. Battery room	:	100 lux	3.1.1.7. Stair case	:	100 lux	3.1.1.8. Transformers	:	100 lux
3.1.1.1. Outdoor Substation	:	20 lux																								
3.1.1.2. Roads within substation	:	20 lux																								
3.1.1.3. Boundary wall of the substation	:	10 lux																								
3.1.1.4. Control room	:	300 lux																								
3.1.1.5. Switchgear Room	:	200 lux																								
3.1.1.6. Battery room	:	100 lux																								
3.1.1.7. Stair case	:	100 lux																								
3.1.1.8. Transformers	:	100 lux																								

TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM

3.2.	Illumination circuit	<p>3.2.1. The illumination system load and welding load in the substation area shall be supplied from 415/230 volt ACDBs to be provided in the substation control room. Requisite numbers of 3-phase, 4-wire, cable circuits for illumination system and welding socket outlets shall be extended from the above board. The laying of cables from the Board to the illumination system/welding socket outlets and their installation are included in the Bidder's scope.</p> <p>3.2.2. Each outgoing cable circuit for illumination loads from the 415 volt switchboard shall terminate in the respective outdoor pillar boxes located in the substation. Outgoing feeders from the illumination shall be taken to the various illumination points in the substation. Necessary fuses shall be provided near light fixtures in the substation.</p> <p>3.2.3. The emergency illumination load shall be supplied from the main emergency illumination board located in the control room. Necessary cable circuits with appropriate fuses shall be provided by the Contractor for the supply system for emergency illumination load of the substation.</p> <p>3.2.4. Emergency DC lighting system shall be provided in the substation wherever required. The emergency lighting shall be adequate for safe movement by the operating personnel in the substation in the event of failure of normal lighting system. Number of lights shall be decided at the time of detailed engineering. A total of minimum 12 no's individually controllable 60 watt lamps shall be provided in the substation.</p>
3.3.	Wiring	<p>3.3.1. All lighting fixtures and 5A convenience outlets shall be wired with 1.1 KV grade PVC insulated extra flexible, multistranded, copper conductor cables of size not less than 2.5 sq.mm.</p> <p>3.3.2. For 15A heavy-duty outlets copper conductor cables of size not less than 6 sq. mm shall be used.</p> <p>3.3.3. The wiring shall consist of phase, neutral and ground. For grounding the lighting fixtures/convenience outlets etc., GI wire of size not less than 14 SWG shall be used. The phase and neutral conductor shall be suitably colour coded.</p> <p>3.3.4. Supply shall be looped between the lighting fixtures of the same circuit by using junction boxes. For this purpose one (1) 100 mm x 100 mm square junction box shall be provided for each lighting fixture. For recessed lighting fixtures, supply shall be extended from the junction boxes to the fixtures by means of flexible conduits. While for stem-mounted/wall-mounted lighting fixtures the junction box shall be mounted below one of the mounting stems.</p> <p>3.3.5. For lighting branch circuits the nos. of lighting switches shall be decided keeping in mind the ease of control, as well as to limit the current to 2.5A per circuit.</p> <p>3.3.6. For convenience outlets, the bidder shall design the wiring scheme so as to limit 6 nos. of 5A outlets per branch</p>

BSES	BSES-TS-98-ILS-R0
TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM	

		<p>circuit and two nos. of 15A outlets per branch circuit.</p> <p>3.3.7. All wiring materials such as terminals, crimping lugs, ferrules etc. shall also be provided by the Contractor.</p> <p>3.3.8. No section of the conduit shall be filled with more than 70% of its area. Any consumable material that is required for pulling the wires through conduit shall also be provided by the Contractor.</p> <p>3.3.9. Lighting fixtures coming in one area shall be evenly distributed between three phases so that tripping of one phase or two phases does not cause total loss of illumination in that area.</p>
3.4.	Required documents to be submitted	Complete manufacturer's literature/catalogues, performance curves, illumination distribution curves, G.A. drawings, specification sheets, etc. as relevant in respect of all materials/equipment to be supplied shall be submitted by the Contractor.
3.5.	Illumination system check after installation	After completion of installation of the illumination system in the substation, the actual illumination level at different locations shall be measured by the Contractor in the presence of Owner's authorised representative. If the average value of the measured illumination levels is found to fall short of the specified levels, the Contractor shall have to provide additional lighting fixtures so as to achieve the specified levels of illumination at no additional cost to the Owner. While measuring the illumination levels due allowance shall be made on account of maintenance factor. The specified lux levels shall be suitably increased to cover maintenance factor of 0.6 for outdoor areas.

4. DISTRIBUTION PILLARS FOR NORMAL ILLUMINATION SYSTEM

4.1.	Construction	<p>4.1.1. Distribution pillars of adequate dimensions shall be constructed from sheet steel having a thickness not less than 2 mm.</p> <p>4.1.2. The pillars shall be totally enclosed weather-proof, dustproof, vermin-proof, having hinged doors with locking arrangement and shall be capable of being mounted in the substation.</p> <p>4.1.3. The pillars suitable for cable entry at the bottom shall be designed for easy access of connections to terminals and inspection of equipment mounted therein.</p> <p>4.1.4. The degree of protection of the board shall be IP55.</p> <p>4.1.5. The enclosure shall be painted externally with Shade No., 692 of IS:5 and internally with brilliant white of semi-glossy finish of IS:5.</p>
4.2.	Configuration	<p>4.2.1. Each pillar shall accommodate the following:</p> <p>4.2.2. One incoming, 4-pole (3 phase and neutral) isolating switch with MCB of appropriate current rating.</p> <p>4.2.3. 3-phase and neutral bus bars of appropriate current rating.</p> <p>4.2.4. Single-pole earth leakage circuit breakers of suitable current ratings on all outgoing circuits.</p>

BSES	BSES-TS-98-ILS-R0
TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM	

		<p>4.2.5. Neutral links for all outgoing circuits.</p> <p>4.2.6. Cable lugs, compression type cable glands, name plates, circuit numbers, earthing lugs, etc. to make the pillar complete in all respects.</p> <p>4.2.7. 20% spare outlets shall be provided for outgoing feeders.</p> <p>4.2.8. Three (3) indicating lamps with fuses to indicate that supply is 'ON'.</p>
--	--	---

5. LIGHTING DISTRIBUTION BOARDS

5.1.	Construction	<p>5.1.1. Metal-clad enclosure with minimum 2 mm CRCA sheets for load-bearing members and 1.6 mm for non load-bearing members suitably reinforced with structural.</p> <p>5.1.2. 3-phase, 4-wire bus bar system with high conductivity aluminium busbars mounting on FRP insulators having anti-tractive property with minimum 25 mm phase-to-phase and minimum 19 mm phase-to-earth clearances. The busbars shall be uniform throughout the length of the LDB and busbar joints shall be silver plated and covered with shrouds.</p> <p>5.1.3. All cables shall enter from the bottom.</p> <p>5.1.4. The degree of protection for the LDB shall be IP-54.</p> <p>5.1.5. The enclosure shall be painted externally with Shade No., 692 of IS:5 and internally with brilliant white of semi-glossy finish of IS:5.</p>
5.2.	Configuration	<p>Each LDB shall accommodate the following:</p> <p>5.2.1. One incoming, 4-pole (3 phase and neutral) isolating switch with MCB of appropriate current rating.</p> <p>5.2.2. 3-phase and neutral bus bars of appropriate current rating.</p> <p>5.2.3. 4 Pole outgoing MCBs of appropriate rating</p> <p>5.2.4. Cable lugs, compression type cable glands, name plates, circuit numbers, earthing lugs, etc. to make the pillar complete in all respects.</p> <p>5.2.5. 20% spare outlets shall be provided for outgoing feeders.</p> <p>5.2.6. Three (3) Nos. indication lamps (Red, Yellow, Blue) shall be provided to indicate that the incoming supply is available. Similarly, 3 Nos. indication lamps shall be provided to indicate that the busbar is energised.</p>
5.3.	Busbar	<p>5.3.1. The busbars shall be suitable for short-time current rating of 40KA for 1 Sec.</p> <p>5.3.2. The busbar temperature rise shall not exceed 35 Deg C over an ambient of 50 Deg C.</p> <p>5.3.3. The LDBs shall be provided with a continuous busbar of 25 x 6 sq.mm (electrolytic copper) with suitable hardware for connection to the main grounding grid</p>

TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM
6. MAIN EMERGENCY LIGHTING BOARD

6.1.	Construction	6.1.1. Metal-clad enclosure with minimum 2 mm CRCA sheets for load-bearing members and 1.6 mm for non load-bearing members suitably reinforced with structural. 6.1.2. All cables shall enter from the bottom. 6.1.3. The degree of protection for the LDB shall be IP-54. 6.1.4. The enclosure shall be painted externally with Shade No., 692 to IS:5 and internally with brilliant white of semi-glossy finish to IS:5.
6.2.	Configuration	6.2.1. Each Board shall accommodate the followings: 6.2.2. Automatic changeover contactor. 6.2.3. Voltage sensing relays. 6.2.4. Time delay relay. 6.2.5. Bus Bars. 6.2.6. Two pole MCBs of adequate ratings for incoming and outgoing feeders. 6.2.7. Test switch, push button type. 6.2.8. Indicating lamps, ac - Green, dc - Red. 6.2.9. Terminals for remote indication 6.2.10. Cable lugs, compression type cable glands, name-plates, circuit numbers, earthing lugs and remote indication wiring upto substation 415V a.c. control board, to make the board complete in all respects.
6.3.	Changeover facility	The main emergency lighting board shall have an automatic changeover switch to energise the dc lighting system in the event of AC power failure. It shall have voltage-sensing relays to perform the changeover automatically when AC voltage of any one phase falls below 60 percent of 240 volts and continues at that low level for more than 10 seconds. These shall changeover from DC to AC again when 70 percent of 240 volt is restored and this continues for 10 seconds.
6.4.	Emergency Lighting Pillar	Local Emergency Lighting Pillar shall be identical in details to Lighting Distribution Pillar specified in clause 4 except that it shall have two pole isolating switch fuse unit on the incoming side and only two busbars and shall be without neutral links.

7. LUMINAIRES

7.1.	Luminaires type	Luminaires for use in normal and emergency illumination systems in the substation shall be suitable for LED lamps. All the luminaires shall be supplied complete with all accessories and lamps. The LED lamps ratings shall be adequate to achieve the required Lux level and calculation for number of luminaires shall be in the bidder's scope. Minimum rating shall be as follows - 7.1.1. Outdoor – 90W minimum 7.1.2. Indoor – 36W minimum
------	-----------------	---

TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM

7.2.	Flood lights	The flood light luminaires in the substation shall be fixed at suitable height on the substation structures/ building, so as to provide the specified average illumination in the substation area without causing any glare to the operational/ maintenance staff working in the substation. While fixing the luminaires it shall be ensured that the stipulated electrical clearances are not violated. The Contractor shall supply and install suitable type of non-metallc street light poles or octagonal galvanized poles required for installing the fittings for illuminating the roads, fence boundary wall etc.
7.3.	Reliability	Substation lighting circuits shall be divided into two or three sections and provided with time switches of suitable ratings.
7.4.	Design features for Outdoor Luminaires	
7.5.	Fixture	<p>7.5.1. The luminaries housing shall be either extruded or pressure die casted aluminium of minimum 1.6 mm thickness. Body must be Corrosion Resistant Powder Coated and UV resistant.</p> <p>7.5.2. The entire housing shall be dust and waterproof having Ingress protection of housing as IP65 or above as per IEC 60529.</p> <p>7.5.3. Luminaire should be covered with suitable Glass or diffuser with high Transitivity. All luminaires shall be supplied with either clear toughened glass or clear polycarbonate cover for better IP retention and higher life.</p>
7.6.	LED	<p>7.6.1. The luminous efficacy of LED luminaire shall be at least 85 lumen/watt.</p> <p>7.6.2. LED module efficacy shall not be less than 90 percent of the rated LED module Efficacy.</p> <p>7.6.3. Color Rendering Index (CRI) shall be at least 70</p> <p>7.6.4. Color Temperature shall be 5500-6500K</p> <p>7.6.5. Uniformity $E_{min}/E_{avg} > 0.4$, $E_{min}/E_{max} > 0.33$</p>
7.7.	LED Driver	<p>LED driver shall have following features:</p> <p>7.7.1. LED driver shall be applicable for Power supply 240V AC\pm10%, at 50Hz+3% / -5%.</p> <p>7.7.2. Output voltage of the driver shall be designed to meet the Power Requirements of the system.</p> <p>7.7.3. Power factor of complete fitting shall be more than 0.90 at full load.</p> <p>7.7.4. Total Harmonic Distortion (THD) shall be < 10 %</p>
7.8.	General Requirements	<p>7.8.1. The connecting wires used inside the Luminaire, shall be low smoke halogen free, fire retardant e-beam cable and fuse protection shall be provided in input side.</p> <p>7.8.2. The lumen maintenance of all the LED fixtures shall not be less than 70% after 50,000 hours.</p> <p>7.8.3. Built in protection features for Short circuit, Surges (at least upto 5kV), and overvoltage shall be provided.</p>


TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM

		<p>7.8.4. High /Low voltage cut-off shall be provided.</p> <p>7.8.5. The whole luminaire shall be eco-friendly green technology based i.e. mercury free.</p> <p>7.8.6. No UV and IR radiations shall be produced.</p> <p>7.8.7. Access of driver for maintenance shall be provided at the top/side of the luminaire fixture.</p> <p>7.8.8. All fasteners must be of stainless steel.</p>
--	--	--

8. JUNCTION BOXES/WALL BOXES

8.1.	Size	100 mm x 100 mm junction boxes and wall boxes of standard size shall be provided.
8.2.	Construction	Wall boxes and junction boxes shall be made of FRP with a thickness of 2.0mm. Necessary conduit termination fittings such as bushings, locknuts etc. also be provided.

9. AUTOMATIC LIGHTING CONTROLLER

9.1.	Size	Contractor shall provide microprocessor based automatic lighting controller for controlling switching arrangement of indoor and outdoor lighting. The controller shall have provision of setting 52 week ON / OFF time as per astronomical clock or as per user requirement. All abnormal events shall be recorded in the controller. Secure / Genus or equivalent are approved makes.
------	------	--

10. SOCKETS & SWITCHES

10.1.	Indoor	All sockets and switches shall be modular and universal type suitable for 5/15A
10.2.	Outdoor	Two nos transformer oil filtration sockets shall be provided, one at each transformer bay. These sockets shall be three phase industrial type and rated for 100A.

BSES	BSES-TS-98-ILS-R0
TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM	

11. NAMEPLATE & MARKING

11.1.	Name plate details of LED housing	<p>Followings shall be clearly engraved / embossed on the die cast housing of LED: Rated voltage or voltage range (marked 'V' or 'Volt');</p> <p>11.1.1. Rated current (marked 'A' or 'Ampere'); 11.1.2. Rated wattage (marked 'W' or 'Watts'); 11.1.3. Rated frequency (marked in 'Hz') 11.1.4. Rated lumen 11.1.5. Indian/International Standards to which it is manufactured 11.1.6. Month and year manufacture 11.1.7. Customer Name - BSES Yamuna / Rajdhani Power Ltd 11.1.8. Fitting serial number 11.1.9. PO no and date 11.1.10. Guarantee period</p>
11.2.	Panel nameplate and marking details	
11.2.1.	Panel nameplate	<p>Panel shall have a nameplate clearly indicating the following:</p> <p>11.2.1.1. Panel Serial No.- 11.2.1.2. Customer Name - BSES Yamuna/Rajdhani Power Ltd 11.2.1.3. PO No. & date - 11.2.1.4. Panel Name - 11.2.1.5. Current rating - 11.2.1.6. Guarantee period -</p>
11.2.2.	Feeder nameplate	Large and bold name plate carrying the feeder identification shall be provided on the top of each module.
11.2.3.	Danger plate	Panel shall have a danger plate of anodized Aluminium clearly indicating the danger logo and voltage details.
11.2.4.	Material	Anodized Aluminium 16SWG. Nameplates shall be satin silver in colour with black letters engraved on them. Stickers are not allowed.
11.2.5.	Fixing	All nameplates shall be riveted to the panels at all four corners. Bolting/screwing is not acceptable.

12. APPROVED MAKE OF COMPONENTS

12.1.	Relays	ABB/Jyoti/Omran
12.2.	HRC Fuse Links	GE/ Siemens/ L&T
12.3.	AC Contractors/ DC contactor	L&T/Siemens/Telemecanique/GE/ABB

BSES	BSES-TS-98-ILS-R0
TECHNICAL SPECIFICATION OF ILLUMINATION AND LIGHTING SYSTEM	

12.4.	Terminals	Connectwell/Elmex/Wago/Phoenix
12.5.	Push buttons / Actuator	L&T/Siemens/Vaishno/Schneider
12.6.	MCB	Legrand/Hager/Schneider/ABB
12.7.	LED	NICHIA/ OSRAM/ CREE/ PHILIPS//EDISON
12.8.	Luminaire fittings	GE/Philips/Crompton/Bajaj
12.9.	Indicating lamps	Vaishno/Binay/Teknic/Siemens/Mimic/C&S

13. INSPECTION & TESTING

13.1.	Type test	All Equipment should be of type tested quality only, type test certificate to be submitted along with offer. If the manufacturer's lab is accredited by govt. / authorized body then it shall be acceptable for type testing.
13.2.	Acceptance & Routine tests	As per relevant Indian standard

14. DEVIATION

14.1.	Deviation	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. No deviation will be acceptable post order.
-------	-----------	---



Technical Specification

For

Fire Retardant Coating on Cables

Specification no – BSES-TS-88-FRCC-R0

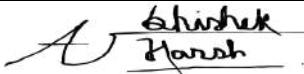


Rev:	0	
Page	1 of 8	
Date:	06 May 2022	
Prepared by	Abhishek Harsh	 <small>3267d7c3-82b5-46cb-b5a6-867ee7820a34</small>
Reviewed by	Srinivas Gopu	 <small>5d32525e-ed3a-4f41-b1c7-b8a5e77d1519</small>
Approved by	Gaurav Sharma	 <small>23dc2de2-95de-4472-99a7-dea873f472b6</small>



TABLE OF CONTENT

1.0	SCOPE	3
2.0	CODES & STANDARDS	3
3.0	SERVICE CONDITIONS	3
4.0	GENERAL FEATURES.....	4
5.0	DEVIATIONS	5
6.0	QUALITY, INSPECTION & TESTING.....	5
7.0	GTP	5
8.0	DRAWING AND DATA SUBMISSION MATRIX	5
9.0	PACKING.....	6
10.0	SHIPPING.....	7
11.0	HANDLING AND STORAGE	8

TECHNICAL SPECIFICATION FOR FIRE RETARDANT COATING ON CABLES**1.0 SCOPE**

- This specification covers the design, manufacture, testing, supply, erection & commissioning of Fire retardant coating on cables and its accessories.

2.0 CODES & STANDARDS

- Material, equipment and methods used in the manufacturing of fire retardant coating on cables shall confirm to the latest edition of following standard

Standard Name / No	Standard's Description
Indian Electricity Act	Latest Edition
CBIP manual	Latest Edition
IEC 60331-11	Tests for electric cables under fire conditions – Circuit integrity – Part 11: Apparatus – Fire alone at a flame temperature of at least 750 degree C
IEEE 383	IEEE Standard for Qualifying Electric Cables and Splices for Nuclear Facilities
IEC 60754-1	Test on gases evolved during combustion of materials from cables
ASTM D2843	Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
ASTM D2863	Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

3.0 SERVICE CONDITIONS

3.1	Max Ambient Temperature	50 deg C
3.2	Max Daily average ambient temp	40 deg C
3.3	Min Ambient Temp	0 deg C
3.4	Maximum Humidity	95%
3.5	Minimum Humidity	10%
3.6	Maximum annual rainfall	750 mm
3.7	Average no of rainy days per annum	60
3.8	Rainy months	June to Oct
3.9	Altitude above MSL	300 M
3.10	Seismic Zone	IV

BSES	BSES-TS-88-FRCC-R0
TECHNICAL SPECIFICATION FOR FIRE RETARDANT COATING ON CABLES	

4.0 GENERAL FEATURES

4.1	Base Type	Water based Intumescent coating
4.2	Color	Off white
4.3	Density	1.3 ± 0.05 g/cc
4.4	Mix ratio by weight	Single component
4.5	Solids by weight	64 ± 2 %
4.6	ph	8
4.7	Toxicity	Non-toxic, asbestos and lead free
4.8	DFT	1.6 mm
4.9	Coverage	3.2kg±0.10 kg/m ² @1.6mm DFT
4.10	Drying time	Surface dry in 30 mins
4.11	Functional Cure Time	48 hours
4.12	Application temperature	10-30°C
4.13	Temperature endurance	>1100°C
4.14	Application method	Brushing, Airless spraying
4.15	Fire Rating	2 Hours
4.16	Features	
4.16.1	Solvent free	Required
4.16.2	Eco friendly	Required
4.16.3	Free of any fibers including asbestos	Required
4.16.4	Single component, ready to apply/use	Required
4.16.5	Easy to apply using a paint brush/spray	Required
4.16.6	No de-rating effect on cables	Required
4.16.7	Added fire protection for existing cables	Required
4.16.8	Compatible with different sheathing chemistries of electrical cables	Required
4.17	Test	
4.17.1	Fire Resistance/Circuit Integrity	As per IEC 60331-11
4.17.2	Flame Retardance	As per IEEE 383
4.17.3	Flammability	As per IS 10810 (P-53)
4.17.4	HCL	As per IEC 60754-1
4.17.5	Smoke density	As per ASTM D2843
4.17.6	Limiting oxygen index	As per ASTM D2863
4.18	Make	Stanvac/3M/Demech

- Note- Any make other than specified in table above shall be subject to BSES Approval.

BSES	BSES-TS-88-FRCC-R0
TECHNICAL SPECIFICATION FOR FIRE RETARDANT COATING ON CABLES	

5.0 DEVIATIONS

Deviation from this specification shall be stated in writing with the tender by reference to the specification clause/ GTP/ Drawing and description of alternative offer. In absence of such a statement, it shall be assumed by the buyer that the seller complies fully with this specification.

6.0 QUALITY, INSPECTION & TESTING

6.1	Vendor quality plan	To be submitted for purchaser approval
6.2	Inspection points	To be mutually identified & agreed in quality plan
6.3	Type test	Equipment shall be type tested from CPRI/ERDA/NABL accreted lab as per IEC/IS/UL standard.
6.4	Routine test	As per relevant standard
6.5	Acceptance test	To be performed in presence of Owner at manufacturer works shall be as per approved QAP

7.0 GTP

Vendor must submit clause wise compliance against specification at the time of drawing approval.

8.0 DRAWING AND DATA SUBMISSION MATRIX

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
8.1	Contact Person Name, Email ID and Mobile Number	Required	Required		
8.2	Deviation Sheet (as per "Deviations" Clause)	Required			
8.3	GTP	Required	Required		
8.4	Relevant Type Test as per IS/IEC/UL	Required	Required		

BSES	BSES-TS-88-FRCC-R0
TECHNICAL SPECIFICATION FOR FIRE RETARDANT COATING ON CABLES	

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
8.5	Manufacturer's quality assurance plan and certification for quality standards		Required		
8.6	Sizing Calculation of Associated Equipment		Required		
8.7	Recommended Spares for five years of operation)		Required		
8.8	Drawings	Required	Required		
8.9	QAP		Required		
8.10	BOQ		Required		
8.11	Make of all Component as per specification		Required		
8.12	Installation, erection and commissioning manual		Required		
8.13	Inspection Reports			Required	
8.14	As manufacturing Drawings			Required	
8.15	Operation and Maintenance Manual			Required	
8.16	Trouble shooting manual			Required	
8.17	As built Drawings				Required

9.0 PACKING

9.1	Packing Protection	Against corrosion, dampness, heavy rains, breakage and vibration. During transportation/ transit and storage, module may be subjected to outdoor conditions. Hence, packing of each panel shall be weatherproof.
9.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label



BSES-TS-88-FRCC-R0

TECHNICAL SPECIFICATION FOR FIRE RETARDANT COATING ON CABLES

9.3	Packing Identification Label to be provided on each packing case with the following details
9.3.1	Individual serial number
9.3.2	Purchaser's name
9.3.3	PO number (along with SAP item code, if any) & date
9.3.4	Equipment Tag no. (if any)
9.3.5	Destination
9.3.6	Project Details
9.3.7	Manufacturer / Supplier's name
9.3.8	Address of Manufacturer / Supplier / it's agent
9.3.9	Description and Quantity
9.3.10	Country of origin
9.3.11	Month & year of Manufacturing
9.3.12	Case measurements
9.3.13	Gross and net weights in kilograms
9.3.14	All necessary slinging and stacking instructions

10.0 SHIPPING

10.1	Shipping	<p>The bidder shall ascertain at an early date and definitely before the commencement of manufacture, any transport limitations such as weights, dimensions, road culverts, Overhead lines, free access etc. from the Manufacturing plant to the project site. Bidder shall furnish the confirmation that the proposed Packages can be safely transported, as normal or oversize packages, up to the site. Any modifications required in the infrastructure and cost thereof in this connection shall be brought to the notice of the Purchaser.</p>
		<p>The seller shall be responsible for all transit damage due to improper packing.</p>

BSES	BSES-TS-88-FRCC-R0
TECHNICAL SPECIFICATION FOR FIRE RETARDANT COATING ON CABLES	

11.0 HANDLING AND STORAGE

11.1	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet / manual needs to be furnished before commencement of supply.
------	----------------------	---

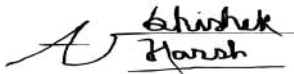




Technical Specification

Of

Insulated Floor Coating

Specification no – BSES-TS-75-INFC-R0

Rev:	0	
Pages:	1 of 7	
Date:	06 May 2022	
Prepared by	Abhishek Harsh	 <small>3267d7e3-82b5-46eb-b5a6-867ee7820a34</small>
Reviewed by	Srinivas Gopu	 <small>5d32525e-ed3a-4f41-b1c7-b8a5e77d1519</small>
Approved by	Gaurav Sharma	 <small>23dc2de2-95de-4472-99a7-dea873f472b6</small>



BSES-TS-75-INFC-R0

TECHNICAL SPECIFICATION OF INSULATED FLOOR COATING
INDEX

1	SCOPE.....	3
2	STANDARDS AND CODES.....	3
3	SERVICE CONDITION.....	3
4	GENERAL REQUIREMENTS OF INSULATING PAINTS ON FLOORS	3
5	TESTING AND INSPECTION	4
6	INSTALLATION	4
7	INSPECTION AND TESTING	5
8	PACKING, SHIPPING, HANDLING AND SITE SUPPORT	5
9	DEVIATIONS.....	6
10	DOCUMENT SUBMISSION	6
11	GUARANTEED TECHNICAL PARTICULARS	7

TECHNICAL SPECIFICATION OF INSULATED FLOOR COATING
1 SCOPE

This specification covers the basic requirement, the testing and inspection, supply and installation/fixing of insulating paints on floors in front of the switchgear panels at BYPL/BRPL grid locations.

2 STANDARDS AND CODES

2.1.	IS 15652:2006	Specification of Insulating mats for electrical purposes
2.2.	CEA guidelines, 2010	Measures relating to safety and Electric supply

3 SERVICE CONDITION

3.1	Location	Indoor
3.2	Average grade atmosphere	Heavily polluted, Dry
3.3	Maximum altitude above sea level	1000M
3.4	Ambient air temperature	Highest 50Deg C Average 40Deg C
3.5	Minimum ambient air temperature	0 Deg C
3.6	Relative Humidity	100%
3.7	Rainfall	750mm concentrated in four months
3.8	Seismic Zone	IV

4 GENERAL REQUIREMENTS OF INSULATING PAINTS ON FLOORS

4.1	General Properties	<p>a. The Insulating coating shall be self-levelling, solvent free, and have high breakdown voltage, loaded with special insulating additives.</p> <p>b. The material of the insulating floor shall be epoxy resin.</p> <p>c. It shall be resistant to chemicals and oils.</p> <p>d. It shall be tough, wear & weather resistant.</p> <p>e. It shall exhibit high build, high adhesion with smooth and glossy finish and slip resistant.</p> <p>f. It shall be easy to apply/install, clean and repair on floors.</p>
4.2	Colour of the finished item	The insulating floors shall be light Grey in colour


TECHNICAL SPECIFICATION OF INSULATED FLOOR COATING

4.3	Class of the insulating floor to be used	For 11kV voltage : Class B For 33kV voltage : Class C
4.4	Thickness of the paint on floor	For 33kV voltage : 3 mm +/- 10% For 11kV : 2.5 mm +/- 10%
4.5	AC proof voltage	For 33kV : 36kV minimum For 11kV: 22 kV minimum
4.6	Dielectric strength	For 33kV: 65kV rms For 11kV: 45kV rms

5 TESTING AND INSPECTION

5.1	Routine and Acceptance tests in the factory	All the routine and acceptance tests shall be performed as per IS 15652. The purchaser reserves the right to witness the tests at the time of inspection.
5.2	Inspection at site	The purchaser reserves the right to verify the material at the time of applying the insulating floors at site. Following tests shall also be verified at site: 1. Dielectric strength 2. Ac proof voltage 3. Thickness
5.3	Type Test Reports	All the Type test reports of the material to be used as the insulating floors as per IS 15652 from CPRI/ERDA shall be submitted.

6 INSTALLATION

BSES	BSES-TS-75-INFC-R0
TECHNICAL SPECIFICATION OF INSULATED FLOOR COATING	

6.1	Application of insulating paints	<p>a. The insulating paint shall be applied in accordance with manufacturer's installation procedure.</p> <p>b. The purchaser may witness the painting process.</p>
-----	----------------------------------	---

7 INSPECTION AND TESTING

7.1	Type test	Equipment should be of type tested quality only, type test certificate to be submitted along with offer. If the manufacturer's lab is accredited by govt. / authorized body then it shall be acceptable for type testing.
7.2	Acceptance & Routine tests	As per relevant Indian standard

8 PACKING, SHIPPING, HANDLING AND SITE SUPPORT

8.1	Packing Protection	The packing shall be fit to withstand rough handling during transit and storage at destination. The test set should be properly protected against corrosion, dampness & damage.
8.2	Packing for accessories and spares	Robust non-returnable packing case with all the above protection & identification Label. The bidder should get the packing list approved before dispatching the material.
8.3	Packing Identification Label	On each packing case, following details are required:
8.3.1	Individual serial number	
8.3.2	Purchaser's name	
8.3.3	PO number (along with SAP item code, if any) & date	
8.3.4	Equipment Tag no. (if any)	
8.3.5	Destination	
8.3.6	Manufacturer / Supplier's name	
8.3.7	Address of Manufacturer / Supplier / it's agent	
8.3.8	Description	
8.3.9	Country of origin	

BSES	BSES-TS-75-INFC-R0
TECHNICAL SPECIFICATION OF INSULATED FLOOR COATING	

8.3.10	Month & year of Manufacturing	
8.3.11	Case measurements	
8.3.12	Gross and net weight	
8.3.13	All necessary slinging and stacking instructions	
8.4	Shipping	The seller shall be responsible for all transit damage due to improper packing.
8.5	Handling and Storage	Manufacturer instruction shall be followed.
8.6	Detail handling & storage instruction sheet / manual to be furnished before commencement of supply.	

9 DEVIATIONS

9.1	Deviation	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. No deviation will be acceptable post order.
-----	-----------	---

10 DOCUMENT SUBMISSION

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A3/A4 sheet in box file with separators for each section. Also provide USB containing pdf with bid for soft copy. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
15.1	Contact Person Name, Email ID and Mobile Number	Required			
15.2	Deviation Sheet	Required	Required		
15.3	Type Test	Required			
15.5	Manufacturer's quality assurance plan and certification for quality standards		Required		
15.6	Datasheet		Required		


BSES-TS-75-INFC-R0
TECHNICAL SPECIFICATION OF INSULATED FLOOR COATING

15.7	Floor Layout		Required		
15.13	GTP	Required	Required		
15.14	QAP		Required		
15.15	BOQ		Required		
15.19	Make of all Component as per specification		Required		
15.20	Inspection Report			Required	
15.21	As manufacturing Drawings			Required	
15.22	Operation and Maintenance Manual			Required	Required
15.24	As built Drawings				Required
15.25	Test Report				Required




11 GUARANTEED TECHNICAL PARTICULARS

Vendor must submit clause wise compliance in Excel sheet against specification at the time of drawing approval clearly highlighting the deviations from specification against each clause.

TECHNICAL SPECIFICATION

FOR

CIVIL WORKS

Revision		2
Date		24/01/2023
Pages		Page 1 of 16
Prepared by	Mangal Sirothia	 95e1cbdd-7a80-4b39-b69d-b8520eb392a0
Reviewed by	Ashish Gupta	 94b6d815-d37c-4e5c-98b0-0e9970199bdc
Approved by	Surender Kumar	 9b1604a0-6698-45d7-b670-ab7fd03cba6c

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

Index

1	SCOPE.....	3
2	CODES & STANDARDS.....	3
3	GENERAL GUIDELINES.....	4
4	SCOPE OF SUPPLY AND WORK.....	5
5	DESIGNAND EXECUTION CRITERIA.....	5
6	INTERFACING.....	14
7	INSPECTION, TESTING& QUALITY CONTROL.....	14
8	STATUTORY RULES.....	14
9	DEVIATIONS.....	14
10	DOCUMENTATION.....	14
11	APPROVED MAKES.....	16

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

1 SCOPE

Specification covers design, engineering, material supply and civil works for new grid substations. All civil works shall satisfy the general technical requirements specified in other Sections of this Specification and as detailed below. They shall be designed to the required service condition / loads as specified elsewhere in this Specification or implied as per National and International Standards. Items/components of site not explicitly covered in the specification but required for completion of the project shall be deemed to be included in the scope.

2 CODES & STANDARDS

The following Indian Codes and Standards shall generally be used for design of civil and structural works. In all cases, the latest revisions with amendments, if any, shall be followed.

- a. National Building Code of India
- b. SP: 6 ISI handbooks for structural engineers.
- c. IS: 2062 Specification for Structural Steel (Standard quality).
- d. IS: 456 Code of practice for plain and reinforced concrete.
- e. IS: 800 Code of practice for general construction in steel.
- f. IS: 806 Code of practice for use of steel tubes in general building construction
- g. IS: 808 Rolled steel beam, channel & angle sections
- h. IS: 813 Scheme of symbols for welding.
- i. IS: 816 Code of practice for use of metal arc welding for general construction in mild steel.
- j. IS: 1080 Code of practice for design and construction of shallow foundations in soils (other than raft, ring and shell).
- k. IS: 875 Code of practice for design loads (other than earthquake) for buildings and structures.
- l. IS: 1893 Criteria for earthquake resistant design of structure
- m. IS: 1904 Code of practice for foundations in soil:-General requirements
- n. IS: 1905 Code of practice for structural safety of buildings
- o. IS: 2074 Ready mixed paint, air drying, red oxide chrome, priming
- p. IS: 2212 Code of practice for brick work

Rev no. 02		Page 3 of 16
------------	--	--------------

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

- q. IS: 2911 Code of practice for design & construction of pile foundation
- r. IS: 2950 Code of Practice for design and construction of raft foundations
- s. IS: 2974 Code of Practice for design and construction of machine foundations
- t. IS: 4326 Code of Practice for earthquake resistant design and construction of Buildings
- u. IS: 8009 Code of Practice for calculation of settlement of foundations: (parts 1 & 2)
- v. IS: 1829 Code practice for protection of iron and steel (Part I to III) structures for atmosphere corrosion
- w. IS: 13920 Code practice for ductile detailing of reinforced concrete structures subjected to seismic force

3 GENERAL GUIDELINES

- a. Building Design shall be in accordance with National Building code of India and other relevant Indian Standards.
- b. All civil works shall be carried out as per applicable Indian Laws, Standards and Codes. All materials shall be of best quality conforming to this specification, relevant Indian Standards and Codes.
- c. The specifications are intended for general description of work, quality and workmanship. The Specifications are not however exhaustive to cover minute details and the work shall be executed according to relevant latest Indian Standards/IRC specifications/CPWD specifications. In the absence of the above, the work shall be executed according to the best prevailing practices in the trade, recommendations of relevant American or British Standards or to the instructions of BSES Project Manager. The IS standards/IRC specifications/CPWD specifications to be followed are mentioned in the technical specifications attached hereto. They shall be latest edition/version of the same issued 15 days prior to the date of opening of this tender. The Contractor is expected to get himself clarified on any doubts about the specifications, etc. before bidding and the discussions recorded in writing with BYPL in respect of interpretation of any portion of this document.
- d. The Contractor shall furnish all design, drawings, labor, tools, equipment, materials, temporary works, constructional plant and machinery, fuel supply, transportation and all other incidental items not shown or specified but as may be required for complete performance of the Works in accordance with approved drawings, specifications and direction of BYPL
- e. The work shall be carried out according to the design/drawings to be developed by the bidder and approved by BYPL. Bidder shall develop design/repair work keeping in view the functional requirement of the substation facilities and providing enough space and access for operation, use and maintenance based on the input provided by BYPL. Certain minimum requirements are indicated in this specification for guidance purposes only.
- f. BYPL shall provide the land on as is basis; the bidder shall visit the substation site to ascertain the quantum of work, present condition of the land before submitting the offer. No request for commercial changes will be entertained post award of work due to any

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

claim related to site condition / plot condition. The layout and levels of all structure etc shall be made by the bidder at his own cost from the general grids of the plot and benchmarks set by the bidder and approved by BYPL in presence of engineer in charge.

- g. The bidder shall provide all instruments, materials and personnel to BYPL for checking the detailed layout and shall be solely responsible for the correctness of the layout and levels. The contractor shall make his own arrangements for water and electricity.
- h. The work shall be carried out according to the design / drawings to be developed by the Contractor and approved by BYPL. For all buildings, structures, foundations etc. necessary layout and details shall be developed by the Contractor keeping in view the functional requirement of the Sub-Station facilities and providing enough space and access for operation, use and maintenance based on the input provided by BYPL. Certain minimum requirements are indicated in this specification for guidance purposes only. However, the Contractor shall quote according to the complete requirements.
- i. The Contractor shall take all necessary precautions to protect all the existing equipment's, structures, facilities & buildings, etc. from damage. In case any damage occurs due to the activities of the Contractor on account of negligence, ignorance, accidental or any other reason whatsoever, the damage shall be made good by the Contractor at his own cost to the satisfaction of the Engineer. The Contractor shall also take all necessary safety measures, at his own cost, to avoid any harm / injury to his workers and staff from the equipment & facilities of the power station.
- j. During the progress of work, the Engineer will exercise supervision of the work to ensure that the technical provisions of the contract are being followed and the work is being executed accurately and properly. However, such supervision shall in no way relieve the Contractor of the responsibility for executing the work in accordance with the specifications.
- k. Before submitting the bid, the Contractor shall inspect and examine the site and its surroundings and shall satisfy himself as to the nature of the ground and subsoil, the availability of materials necessary for completion of the work, means of access to site and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his offer. No extra claim consequent on any misunderstanding or otherwise shall be allowed.

4 SCOPE OF SUPPLY AND WORK

All material required for civil work mentioned in this specification is included in scope of supply of the bidder. For Major Works, kindly refer Scope of Supply and Scope of Work of tender document.

5 DESIGN AND EXECUTION CRITERIA

5.1 Design Criteria

- a. The minimum grade of concrete shall be M-25 & Grade of Steel Fe 500D.

Rev no. 02		Page 5 of 16
------------	--	--------------

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

- b. Limit state method of design shall be adopted unless specified otherwise in the specification.
- c. For detailing of reinforcement IS: 2502 and SP: 16 shall be followed. Cold twisted deformed bars conforming to IS: 1786 shall be used as reinforcement. However, in specific areas mild steel (Grade I) conforming to IS:432 can also be used. Two layers of reinforcement (on inner and outer face) shall be provided for wall & slab sections having thickness of 150 mm and above. Clear cover to reinforcement towards the earth face shall be minimum 40 mm.
- d. The procedure used for the design of the foundations shall be the most critical loading combination of the steel structure and or equipment and/or superstructure and other conditions, which produces the maximum stresses in the foundation or the foundation component and as per the relevant IS Codes of foundation design. Detailed design calculations shall be submitted by the bidder showing complete details of work proposed to be used.
- e. Design shall consider any sub-soil water pressure that may be encountered following relevant standard strictly.
- f. Necessary protection to the foundation work. If required shall be provided to take care of any special requirements for aggressive alkaline soil. Black cotton soil or any other type of soil, which is detrimental / harmful to the concrete foundations.
- g. Foundation system adopted by Bidder shall ensure that relative settlement.

5.2 Design Loads for Equipment

Design criteria shall comprise the codes and standards used. Applicable climatic data including wind loads, earthquake factors maximum and minimum temperatures applicable to the building locations, assumptions of dead and live loads, including equipment loads, impact factors, Safety factors and other relevant information.

- a. Loads of equipment shall be considered as per manufacturer's certified drawings.
- b. The foundation shall be designed as per attached soil investigation report or bidder shall carryout investigation from BYPL approved vendor.
- c. Foundations shall be analyzed for all possible load combinations as per the relevant IS codes.
- d. Minimum reinforcement shall be governed by IS: 2974 and IS: 456.

5.3 Cement

- a. Unless otherwise specified or called for by Engineer, the fresh ordinary Portland cement conforming to IS-8112 of 1976 (latest revision) i.e. 43 grade shall be used for the works.

Rev no. 02		Page 6 of 16
------------	--	--------------

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

- b. The record of cement shall be maintained in M.A.S register by the contractor and verified by engineer of the BYPL.
- c. Cement shall be stored in a perfectly water-tight and well ventilated site store capable of accommodating cement to ensure continuity of the work and having a raised and perfect dry floor. Each parcel or consignment of cement shall be stacked separately therein to permit easy access for inspection and a record shall be kept so that each parcel or consignment may be identified. Cement which has become stale or otherwise unsuitable and any bags or the like containing hardened lumps or cakes of cement, consequent to storage at Contractor's site stores will be rejected and shall be removed from the site and disposed of as directed by the Engineer. The cost of such rejected quantities shall be borne by the Contractor.

5.4 Concrete

- a. Design Mix of M-25 grades of concrete as per provisions of IS: 456 and other applicable codes shall generally be used for civil work. RMC must be of ACC/Ultratech/Shree cement.
- b. The curing period shall commence immediately after the concrete is finally screened and continued a period of 21 days all civil works. The top and side surfaces of concrete shall be kept moist and be protected from the direct rays of the sun during the period. The Contractor shall submit to the Engineer's proposals for ensuring continuous protection of the concrete during the curing period.
- c. Mix Design shall be carried along with other Raw material testing from approved lab from approved lab and same shall be submitted for BYPL approval.

5.5 Steel

The reinforcing bars shall be Fe-500D generally conform to various requirements of IS: 1786 (for High Strength deformed steel bars and wires for concrete reinforcement).

5.6 Aggregates

- a. Aggregates shall consist of natural sand, crushed stone and gravel and shall be chemically inert, strong, hard, clean, durable against weathering of limited porosity, free from deleterious materials and shall conform to the applicable standards. If so desired by the Engineer, they shall be washed and screened.
- b. Sampling and testing shall be as per the applicable standards and shall be carried out under the supervision of Engineer. The cost of all test, sampling, etc. shall be borne by the Contractor.
- c. All coarse and fine aggregates shall be stacked separately and shall avoid contamination with foreign materials. Segregates aggregates shall be rejected.

- 5.7 The necessary arrangements for field test shall be done at site. The material testing register and weighing material register shall be maintained for field and lab mandatory test by the contractor's authorized site engineer, having degree in Civil Engineering or

Rev no. 02		Page 7 of 16
------------	--	--------------

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

minimum three year experience with diploma in civil engg. The copy of all the certificates shall be submitted to BSES officials. Water

- a. Water used for both mixing and curing shall be as per applicable standards.
- b. Potable waters are generally satisfactory. Where water can be shown to contain an excess acid, alkali, sugar or salt, Engineer may refuse to permit its use.
- c. Water test certificate provide by the vendor.

5.8 Bricks

- a. Bricks having minimum 75kg/cm^2 compressive strength can only be used for masonry work. Contractor shall ascertain himself at site regarding the availability of bricks of minimum 75kg/cm^2 compressive strength before submitting his offer.
- b. Ensure that the bricks are free from cracks, war page and of uniform colour.
- c. Manufacturer's test report & Material Test reports for all the materials shall be submitted for approval prior to the utilization for work.
- d. Contractor shall make his own arrangements for the storage of adequate quantity of material.

5.9 Levelling, Excavation, Backfill& Compaction

- a. Area shall be properly leveled before construction. If fill material is required, the fill material shall be suitable as per the requirement & level. The fill shall be such a material and the site so designed as to prevent the erosion by wind and water of material from its final compacted position or the in-situ position of undisturbed soil. Backfill material around foundations or other works shall be suitable for the purpose for which it is used and compacted to the density described under Compaction. If rocky strata available at site then bidder have to do all the necessary arrangements for rock cutting& its disposal.
- b. The thickness of fill material under the foundations shall be such that the maximum pressure from the footing, transferred through the fill material and distributed onto the original undisturbed soil will not exceed the allowable soil bearing pressure of the original undisturbed soil. For expansive soils the fill materials and other protections etc.to be used under the foundation is to be got approved by BYPL. All the area excavated in due course of construction must be filled by vendor. The area of future bay must be filled by vendor up to the proper level of yard.
- c. Whenever water table is met during the excavation, it shall be dewatered and water table shall be maintained below the bottom of the excavation level during excavation, concreting and backfilling.
- d. Material unsuitable for founding of foundations shall be removed and replaced by suitable fill material and to be approved by BYPL. Excavated material not suitable or not required for backfill shall be disposed off in areas as directed by BYPL. Excavation and backfill for foundations shall be in accordance with the relevant IS code.

Rev no. 02		Page 8 of 16
------------	--	--------------

TECHNICAL SPECIFICATION FOR CIVIL WORK

- e. The density to which fill materials shall be compacted shall be as per, relevant IS and as per direction of BYPL. All compacted sand filling shall be confined as far as practicable. Backfilled earth shall be compacted to minimum 95% of the Standard Proctor's density at OMC. The sub grade for the roads and embankment filling shall be compacted to minimum 95% of the Standard Proctor's density at OMC. Cohesion less material sub grade shall be compacted to 70% relative density (minimum).
- f. Anti termite chemical treatment shall be given to foundations of Enclosure, filling below the Enclosure floor etc. as per IS: 6313 and other relevant Indian Standards.

5.10 General Requirement Site Surfacing/Stone Filling

The material required for site surfacing/stone filling shall be free from all types of organic materials and shall be of standard quality, and as approved by BYPL. The material to be used for stone filling/site surfacing shall be uncrushed/crushed/broken stone of 20 mm nominal size (ungraded single size) conforming to Table 2 of IS:383 - 1970. Hardness, Flakiness shall be as required for wearing courses are given below:

- a. Sieve Analysis limits (Gradation)
(IS: 383 - Table - 2)

Sieve Size	% passing by weight
40mm	85 – 100
20mm	0 – 20
10mm	0 – 5

'One Test' shall be conducted for every 500 Cu.m.

- b. Hardness

Abrasion value (IS: 2386 Part-IV) - not more than 40%

Impact value (IS: 2386 Part-IV) - not *more* than 30% and frequency shall be one test per 500 cum with a minimum of one test per source

- c. Flakiness Index

One test shall be conducted per 500 cum of aggregate as per IS:2386 Part-I and maximum value is 25%

5.11 Admixtures & Additives

- a. Only approved admixtures shall be used in the concrete for the Works. When more than one admixture is to be used, each admixture shall be batched in its own batch and added to the mixing water separately before discharging into the mixer. Admixtures shall be delivered in suitably labeled containers to enable identification.
- b. Admixtures in concrete shall conform to IS: 9103. The waterproofing cement additives shall conform to IS: 2645. BYPL shall approve concrete Admixtures/ Additives.

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

- c. The contractor shall use water-reducing set-retarding admixture in some of the concrete. The use of such an admixture will not be approved to overcome problems associated with inadequate concrete plant capacity or improperly planned placing operations and shall only be approved as an aid to overcoming unusual circumstances and placing conditions.
- d. The water-reducing set-retarding admixture shall be an approved brand of Ligno-sulphonate type admixture.

5.12 Antiweed Treatment, Stone Spreading & PCC

- a. The Contractor shall furnish all labour, equipment and materials required for complete performance of the work in accordance with the drawings specification and as per the direction of BYPL.
- b. The contractor shall prepare the specified area before stonespreading. PCC must be carried out in two layers. First layer of 75 mm thickness nominal of grade 1:4:8 concreting and second layer of 75 mm thickness of grade 1:2:4 cement concrete.
- c. Along with PCC Stone spreading of 100cm thickness shall be done.
- d. Before taking up stone filling, antiweed treatment shall be applied in the specified area wherever gravel filling is to be done, and the area shall be thoroughly de-weeded including removal of roots. The recommendation of local agriculture or horticulture department shall be sought wherever feasible while choosing the type of chemical to be used. Nevertheless the effectiveness of the chemical shall be demonstrated by the contractor and monitored over a period of two to three weeks by the Engineer-in-Charge. The final approval shall be given. by Engineer-in-Charge and final approval given based in the results.
- e. The antiweed chemical shall be procured from reputed manufacturers. The dosage and application of chemical shall be strictly followed as per manufacturer's recommendation. The contractor shall be required to maintain the area free of weeds for a period of 1 year from the date of application of 1st dose of antiweed chemicals.
- f. In yard area red sand stone of 50 mm thickness must be laid above nominal PCC. Above sand stone gavel spreading of specified size must be laid.

5.13 Trench

- a. Trench shall be of RCC type.
- b. All the material wherever required for trenches shall be supplied by bidder.
- c. Power Cable trench and Control cable trench shall be separate
- d. The factory made precast removable RCC covers (with lifting arrangement) as per the layout drawing shall be provided. The precast covers shall be constructed using RCC of M35 grade. Trench cover must be of pre-cast concrete of grade not less than M-35 of appropriate load bearing capacity.

Rev no. 02		Page 10 of 16
------------	--	---------------

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

- e. Cable trench RCC covers shall be designed for self weight of top slab + UDL of 2000 Kg/m² + concentrated load of 200 kg at centre of span on each panel.
- f. Paved portion of cable trenches shall be repaired to withstand class AA Loading of IRC/relevant IS Code
- g. The top of trenches shall be kept at least 100 mm above the finished ground level. The top of cable trench shall be such that the surface rain water do not enter the trench.
- h. All metal parts inside the trench shall be connected to the earthing system at regular intervals.
- i. Wherever required, all the construction joints of cable trenches i.e. between base slab to base slab and the junction of vertical wall to base slab as well as from vertical wall to wall and all the expansion, joints shall be provided with approved quality PVC water stops of approx. 230 x 5 mm size for those sections where the ground water table is expected to rise above the junction of base slab and vertical wall of cable trenches.
- j. The repaired Cable trenches shall be blocked at the ends if required with brick masonry in cement sand mortar 1:6 and plaster with 15mm thick 1:6 cement and mortar.
- k. Angles 50x50x6 mm (minimum) with lugs shall be provided for edge protection all round edges of repaired RCC cable/pipe trenches supporting covers.
- l. Sealing of repaired cable trench must be made in such a manner that no rain water can accumulate in it.
- m. If trench passes through road/load bearing path then Box Culvert of Appropriate load bearing shall be used.
- n. All the floor openings in building shall be covered with 6mm thick Checkered plates.
- o. Trench in existing control room may be used for control cable/LT Power Cable laying but repairing and modification of the same shall be in vendor's scope. If new trench is required in control room then the same shall also be in vendor's scope.
- p. Hot deep GI Cable supporting angles/brackets shall be fixed with Hilti Anchor fastner on trench wall

5.14 Substation Building

- a. Building Shall comply fire safety norms as per relevant IS.
- b. Ground floor of the building shall be made for cable cellar.
- c. First floor of the building shall accommodate 11 kV and 33 kV Switchgear.

Rev no. 02		Page 11 of 16
------------	--	---------------

TECHNICAL SPECIFICATION FOR CIVIL WORK

- d. Second floor of the building, if applicable, shall accommodate auxiliary equipment as per scope of work of tender document. Building shall be designed considering load of additional floor and suitable provision shall be kept for future expansion.
- e. Height of 3.5 meter is recommended for cable cellar. However, height of cable cellar room shall be finalized during detailed engineering based on functional requirements of switchgear. Operation and maintenance considerations shall also be taken into account.
- f. Height of 4.5 meter is recommended for other floors, however it will be finalized during detailed engineering based on functional requirements of switchgear. Operation and maintenance considerations shall also be taken into account.
- g. Clear space of 1m at the rear and 2.5 m in front is mandatory for all equipment to ensure ease of operation and maintenance. However, clearances shall be optimized subject to functional requirements of equipment during detailed engineering.
- h. The minimum height of substation room/HV switch room/MV switch room shall be arrived at considering 1200 mm clearance requirement from top of the equipment to the below of the soffit of the beam.
- i. There shall be two entries and two exits for each floor and room.
- j. Motorized shutter shall be provided for entry and exit of switchgears.
- k. Rolling shutter, Doors and windows shall be provided in Building wherever required. Fire Doors/Fire windows shall be provided as per Fire norms/NBC.
- l. Two staircases shall be provided in substation building with granite finish and SS Railing of 304 grade. Proper access stairs shall be provided at all exists of the building.
- m. Kota stone shall be provided in cable cellar and switchgear room for flooring purpose.
- n. Finishing of walls shall be with three coats of Plastic Paint i.e. two coats during installation and one coat at the time of handover.
- o. External grit wash plaster of approved shade shall be provided, approved make water proofing compound shall be added in the plastering work.
- p. Internal Plaster work, putty, POP, primer and painting shall be provided inside building and common area with plastic paint.
- q. Epoxy flooring after installation of equipment on kota stone shall be provided in Switchgear room.
- r. Level of cable cellar room shall be above 1200 mm from FGL. FGL shall be kept about 500mm above the surrounding road level.
- s. Provision for Cable Entry and Exit in Switchgear room, Cable Cellar Room and capacitor bank room.

TECHNICAL SPECIFICATION FOR CIVIL WORK

- t. Provision of Lighting, Exhaust Fan, Ceiling Fan, Power Points for Cable Cellar and Switchgear Room shall be provided.
- u. Water proofing in three layers shall be done in roof slab and ground floor trench. Proofing shall be done by using Dr Fixit chemical.
- v. In case the building height requires the fire safety norms to be followed then properly designed firefighting system must be installed as per the norms of Delhi fire Service Department. All necessary clearance and certificate required from Delhi fire department must be in the scope of bidder.
- w. Green Building concept must be implemented in Substation Building design for maximum day lighting and ventilation.

5.15 Substation Road


- a. Inside substation roads to be provided for access along with car parking for three cars and two Wheeler parking for three vehicles. Building and parking are in the scope of bidder. Layout of the roads shall be based on layout drawing for the substation. Parking areas shall be provided for Site personnel and visitors as per layout drawing. Adequate turning space for vehicles shall be provided and bend radius shall be set accordingly. It has to be connected suitably with roads.
- b. All substation roads shall be constructed so as to permit transportation of all heavy equipment up to 60MT. The main approach roads upto Control Room Building and other relevant roads will be RCC/Cement Concrete Roads. The other connecting roads and pathways shall be of Paver blocks/ CC Road as per site requirement. The pavers blocks used for the roads shall be minimum 80mm thick with compressive strength not less than 450Kg/cm².
- c. Road construction shall be as per IRC standard.
- d. Adequate provision shall be made for road drainage.
- e. All the culverts and its allied structure (required for road/rail, drain, trench crossings, etc.) shall be designed for class AA loading as per IRC standard/IS code. All trenches inside the substation shall cross the road through culverts.

5.16 Fire wall

Fire Wall shall be of RCC construction, Height, width and fire rating shall be as per Fire safety norms. Wall shall be plaster painted as per Fire safety norms.

5.17 Boundary wall

RCC framed structure with brick infill masonry work in 1:4 cement sand mortar boundary wall shall be provided with column spacing of about 3m c/c, height of boundary wall shall be kept as 2.4m above FGL, above wall, Y shape Hot deep Galvanised angle shall be provided with 10 runs of galvanised punched tape and 750 dia concertina coil. Boundary wall shall have grit plaster on both the side. Below FGL, wall shall be designed as retaining wall as per site requirement.

	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

6 INTERFACING

The proper coordination & execution of all interfacing civil works activities shall plan in advance and execute in such a manner that interfacing activities do not become bottlenecks and dismantling, breakage etc. is reduced to minimum.

7 INSPECTION, TESTING & QUALITY CONTROL

- a. Detailed field quality plan shall be submitted for approval.
- b. Construction Quality shall be properly controlled by the bidder. Bidder shall work as per the Field Quality Plan provided by BYPL. All the Tests specified in the Field Quality Plan shall be done by bidder.
- c. Weekly construction status will be updated by the bidder to BYPL to assure the work progress & the construction quality.
- d. A Civil Engineer shall be deployed by the bidder for construction quality control. Civil Engineer has to review ongoing construction work, check materials and workmanship.
- e. Necessary arrangements for field tests shall be done at site. Bidder has to do the following tests from NABL accredited labs:
 - Raw material test : For Cement, sand , aggregates, water, brick, Steel
 - Cube Test for compressive strength of concrete

8 STATUTORY RULES

- a. Contractor shall comply with all the applicable statutory rules pertaining to factories act (as applicable far the State). Fire Safety Rules of Tariff Advisory Committee. Water Act for pollution control and coordinate with forest department for necessary approval prior to tree cutting.
- b. Plastering on structural members (in fire prone areas) etc. shall be made according to the recommendations of Tariff Advisory Committee.
- c. Statutory clearance and norms of State Pollution Control Board shall be followed as per Water Act for effluent quality from plant.
- d. Use of C&D waste material as per Order DPCC/EC/9311/WMC-11/2014-15/3044-3068 dt. 14.01.2020

9 DEVIATIONS

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. No deviation will be acceptable post order.

10 DOCUMENTATION

- a. Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided in Soft & Hard on A3/ A4 sheet in box file with separators for each

Rev no. 02		Page 14 of 16
------------	--	---------------

 BSES BSES Yamuna Power Limited	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

- b. This list is not exhaustive but indicative of minimum requirement only. Final list of drawings shall be prepared by successful bidder during detailed engineering.

S. No	Detail of Document	Bid	Drawing Approval	Pre construction	Post construction
1	Design calculation, general arrangement drawings, foundation drawing & detailed erection /Construction drawings including R/F drawings for Sub-Station Control Room Building		Required		Required
2	Field quality plan		Required	Required	
3	Foundation design & drawing of all equipment foundations		Required		Required
4	Structural steel fabrication drawings for equipment support structure		Required		Required
5	Foundation design & drawing of Power Transformer		Required		Required
6	Design & drawing of transformer grating, firewall & burnt oil tank		Required		Required
7	Foundation design & drawing for lighting pole		Required		Required
8	Foundation design & drawing for Capacitor Bank, Auxiliary Transformer and design of fencing For both.		Required		Required
9	Complete fencing along with gate for the Sub-Station yard		Required		Required
10	Details of Indoor and Outdoor Cable Trenches with cable tray supports and trench covers		Required		Required
11	Design & drawing of Rainwater Harvesting System, sewerage system including septic tank, Water supply arrangement, landscaping, etc		Required		Required
12	Design & drawing of roads and complete drainage system (with final connection to Rain Water Harvesting recharge pit) within Sub-Station including crossings		Required	Required	Required
13	Design & drawing Security room		Required	Required	Required

 BSES BSES Yamuna Power Limited	SP-SSCW-161
TECHNICAL SPECIFICATION FOR CIVIL WORK	

S. No	Detail of Document	Bid	Drawing Approval	Pre construction	Post construction
14	Design & drawing NIFPS system & underground water tank		Required	Required	Required

11 APPROVED MAKES

S No	Item Detail	Approved make	Remarks
1	Exhaust fan	Crompton/Havells/Bajaj	
2	Lighting fixture	Havells/Crompton/Philips	
3	Air conditioning System	Voltas/carrier/Hitachi	
4	Structural Steel Built up Section	Tata/SAIL/Jindal	
5	Ceramic tiles	Kajaria	Size not less than 600mmX300 mm
6	Toilets fittings	Jaquar/Hindware make	
7	Toilet door	Green ply	Both Side laminated
8	Toilet Flooring	Kajaria	Anti skid tiles of Size 600 mm X 600 mm
9	Grid building floor	Kota Stone	
10	Glass door fittings	Ozone make	As per approved Drawings
11	Mortise Lock and Door closer	Dorma/Dorset make	
12	Doors and Windows	Hindalco/Jindal	Aluminium powder coated
13	Electrical cable	Havells/Polycab/Finolex/KEI	
14	Electrical conduit	Setia	Heavy Duty
15	Switch socket	Anchor/Havells/Legrand	
16	Cement	ACC/Ultratech/J K Laxmi	
17	TMT Bar	Tata/Jindal/SAIL	
18	Plastic Paint	Asian/Nerolack/Berger	Three or more coat.
19	Sanitary pipes	Astral/Skipper/Ashirwad	Ring fitted
20	Almirah	Godrej/Tata	
21	Water Proofing	Dr fixit / BASF	