

NOTICE INVITING TENDER (NIT)

TURNKEY PACKAGE FOR SUPPLY, LAYING, JOINTING, TESTING AND COMMISSIONING OF 66KV 3X300 SQ MM CABLE INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR WITH REQUIRED ACCESSORIES AS PER THE SCOPE OF WORK IN BYPL, DELHI

**NIT NO: CMC/BY/25-26/RS/SkS/SV/22
[RFx Number: 2200000153]**

Due Date for Submission: 21.11.2025, 15:00 HRS

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

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VOLUME – I: INFORMATION TO BIDDER (ITB)

SECTION – I: REQUEST FOR QUOTATION

1.00 EVENT INFORMATION

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

Table 1: Package Details

Package Description	Tender Fee (₹)	Estimated Cost (₹)	EMD Amount (₹)	BYPL Project Site Location
Turnkey Package for Supply, Laying, Jointing, Testing and Commissioning of 66kv 3x300 Sq Mm Cable Infeed Near Mandawali Railway Station upto Gufa Wala Mandir with Required Accessories as per the Scope of Work in BYPL, Delhi	1,180	11.50 Crore	11.50 Lakh	Near Mandawali Railway Station, Delhi

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

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

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

S. No.	Events	Due date & Time
1	Date of availability of tender documents from BYPL Website & SRM	up to 21.11.2025, 15:00 Hours
2	Date & Time of Pre-Bid Meeting Pre-Bid Meeting will be done online, Register in advance for this meeting via, the Zoom Meeting link: https://zoom.us/j/96397729602?pwd=07qhCg2bFYMHwF8EZm7Cabe2tzPaNt.1 After registering, you will receive a confirmation email containing information about joining the meeting.	07.11.2025, 14:00 Hours
3	Last Date of receipt of pre-bid queries, if any (Queries to be submitted via e-mail)	07.11.2025 up to 18:00 Hours
4	Last Date of replies to all the pre-bid queries as received	12.11.2025 up to 17:00 Hours
5	Last date and time of receipt of Complete Bids (Tender Fees, EMD, Part A & Part B)	21.11.2025, 15:00HRS

6	Date & Time of Opening of PART A – EMD and Technical Bid	21.11.2025, 16:00HRS
7	Date & Time of opening of Price/RA of qualified bids	Will be notified to the qualified bidders through our website/e- mail

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

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

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

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

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

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

Opening of Bids:

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

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

All envelopes shall be duly superscribed **"Turnkey Package for Supply, Laying, Jointing, Testing and Commissioning of 66kv 3x300 Sq Mm Cable Infeed Near Mandawali Railway Station upto Gufa Wala Mandir with Required Accessories as per the Scope of Work in BYPL, Delhi" "NIT NO: CMC/BY/25-26/RS/SkS/SV/22 [RFx Number: 2200000089] DUE ON 21.11.2025, 15:00 Hr."**

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

- Tender is received after the due date and time.
- Tender fee of requisite value is not submitted.
- Earnest Money Deposit (EMD) of requisite value & validity is not submitted.
- Financial Bid, as per the prescribed Price Schedule, is not submitted.
- The bid is incomplete in any respect.

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/25-26/RS/SkS/SV/22 [RFx Number: 2200000153]	Page 3 of 21	Bidders seal & Signature

- f) The required documents in support of the Qualification Requirements mentioned in Section 1, Clause 2.0 of this Tender Document are not furnished.
- g) Complete documents and details as per the Bid Index for Part-A (Technical Bid) at Appendix I – Annexure 1.01 are not enclosed.
- h) Filled in Schedule of Deviations as per Annexure is not submitted.

2.00 QUALIFICATION CRITERIA

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

Qualification Criteria QC -01: Cable In-feed Works

2.01 Technical Criteria:

SI No.	Criteria	Documents to be submitted by Bidder
1	The bidder shall be a legally constituted entity operating in India, being any one of the following: a) A proprietorship firm registered and operating in India b) A partnership firm registered under the Indian Partnership Act, 1932 c) A company incorporated under the Companies Act, 2013 (or erstwhile Companies Act, 1956) d) A Limited Liability Partnership (LLP) registered under the Limited Liability Partnership Act, 2008 e) Any other entity duly registered under applicable Indian laws The bidder must fulfill one of the following categories:	
	a. The bidder should have its own manufacturing facility in India for the last three (03) years for 33KV or higher voltage grade Power Cables through Dry Cure CCV or VCV line.	i. Self-Undertaking
	b. Bidder should be an EPC company engaged in turnkey execution of 33KV or higher voltage grade cable laying work from the last three (03) years. EPC Bidder shall supply all the Cables required for the Cable In-feed works from the manufacturer meeting the Qualification Criteria mentioned in QC-03	i. Company Incorporation certificate ii. Self-Undertaking iii. Documents of Cable OEM as per QC-02
2	Bidder along with consortium, should have experience in turnkey projects including design, supply, laying, testing & commissioning of 33KV or higher voltage grade cables in any utilities/ SEB's/ PSU's/ reputed company wherein the end-user shall be utilities/ SEB's/ PSU's/ Government Organizations having minimum cumulative 25 KM cable quantity in last Seven (07)	i. Turnkey Purchase order/Work order copy (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.09) ii. Work completion certificate copy iii. Consortium Agreement

	years from the date of bid opening.	
	Cable manufacturer (OEM) along with Consortium Partner can jointly fulfil the Qualification Criteria.	
3	The Bidder along with consortium, shall submit two (2) years of satisfactory performance of at least two (2) executed Turnkey Projects of 33KV or higher voltage grade power cables SITC work execution, out of which one certificate should be of more than 10KM cable quantity in the last 7 years from the date of bid opening from any utilities/ SEB's/ PSU's/Government Organizations. In case of bidder has a previous association with BRPL/BYPL for similar project, product and service, the performance feedback for that bidder by BRPL/BYPL shall only be considered irrespective of the performance certificate issued by any third organization	Performance certificate (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.10)
4	Bidder shall procure equipment from the approved Bidder list of BYPL for individual items (mentioned in Scope/Specifications). The bidder is supposed to have an agreement with the manufacturer/services provider in India to provide support to BYPL for any supply, services & spares related issues for the time stipulated in the specification or service life of the equipment.	Undertaking by bidder for Backup support by OEMs
5	The bidder must possess valid ISO 9001:2015 certification or above.	Valid copy of Certification
6	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 where copy of valid license shall be submitted to BYPL before the start of the work OR Bidder to give the undertaking that it will be obtained by them before the start of the work at site.	i. Electrical Contractor License Copy ii. Self-Undertaking if not available

2.02

Commercial Criteria:

SI No.	Criteria	Documents to be submitted by Bidder
7	The bidder must have an Average Annual Sales Turnover of not less than INR 100 Crore in the last three (3) financial years (i.e. FY 2022-23, 2023-24, and 2024-25).	i. Audited Balance Sheet and Profit & Loss Account Or ii. Duly certified CA certificate having UDIN to be submitted

		(Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
8	The bidder must submit an undertaking stating that no litigation is pending with BYPL or any of its group/associate companies as of the date of bid opening.	Self-Undertaking (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
9	The bidder must submit an undertaking (self-certification) that they have not been blacklisted or debarred by any Central / State Government Institution or Electricity Utility in India as of the date of bid opening.	Self-Undertaking (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
10	The bidder must hold a valid PAN and GST Registration Number, and shall undertake to comply with all other applicable statutory laws and regulations prior to commencement of supply/work.	i. Copies of PAN and GST registration certificates ii. Self-undertaking confirming compliance with all statutory obligations (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)

Qualification Criteria QC -02: Cable In-feed works - Criteria for the selection of Cable Supplier

2.03

Technical Criteria:

SI No.	Criteria	Documents to be submitted by Bidder
1	The Bidder should have its own manufacturing facility in India for the last three (03) years for the offered or higher voltage grade Power Cables.	i. OEM Valid Certificate of Incorporation & Factory (Manufacturing) Licence. ii. Detailed list of manufacturing units, their locations, and the specific works from which supplies shall be made against this tender, submitted by the OEM.
2	The bidder must have a Dry cure and Dry cooling CCV/VCV line for manufacturing of the offered or higher voltage grade cables.	i. Self-Undertaking
3	The bidder should have supplied at least 25 KMS of the offered or higher voltage grade Power Cables. in the last Seven (07) years from the date of bid opening from to any utilities/ SEB's/ PSU's/ reputed companies wherein the end-user shall be utilities/ SEB's/ PSU's.	i. Summary list of executed Purchase orders (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.09) ii. Copies of the relevant Purchase Orders iii. Material delivery clearance certificate copy or Invoice Copies or Delivery completion/ Performance certificate
4	Performance certificate for minimum two (2) years of satisfactory performance for the offered or higher voltage grade Power Cables supplied in last seven (7) years from the date of bid opening from utilities/ SEB's/ PSU's/ Government Organizations.	Performance Certificates (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.10)

	In case of bidder has a previous association with BRPL/BYPL for similar project, product and service, the performance feedback for that bidder by BRPL/BYPL shall only be considered irrespective of the performance certificate issued by any third organization.	
5	The bidder should have a manufacturing capacity of a minimum 20 km per month for the offered or higher voltage grade Power Cables.	Installed Manufacturing Capacity (duly certified by the CE/CA/DIC/Self-Undertaking/ Government Organisation/ others)
6	The bidder must possess valid ISO 9001:2015 certification or above.	Valid copy of Certification
7	The bidder must possess valid BIS Licence.	Valid copy of Licence
8	In case of Bidder is not registered with BYPL, factory inspection, and evaluation shall be carried out to ascertain the bidder's manufacturing capability and quality procedure. However, BRPL reserves right to carry out factory inspection and evaluation for any bidder prior to technical qualification evaluation.	i. Self-Undertaking

2.04

Commercial Criteria:

Sl No.	Criteria	Documents to be submitted by Bidder
9	The bidder must have an average annual sales turnover of not less than INR 100 Crore in the last three (3) financial years (i.e. FY 2022-23, 2023-24, and 2024-25).	i. Audited Balance Sheet and Profit & Loss Account Or ii. Duly certified CA certificate having UDIN to be submitted (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
10	The bidder must submit an undertaking stating that no litigation is pending with BYPL or any of its group/associate companies as of the date of bid opening.	Self-Undertaking (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
11	The bidder must submit an undertaking (self-certification) that they have not been blacklisted or debarred by any Central / State Government Institution or Electricity Utility in India as of the date of bid opening.	Self-Undertaking (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)
12	The bidder must hold a valid PAN and GST Registration Number, and shall undertake to comply with all other applicable statutory laws and regulations prior to commencement of supply/work.	i. Copies of PAN and GST registration certificates ii. Self-undertaking confirming compliance with all statutory obligations (as per the format enclosed in APPENDIX I - ANNEXURE – 1.15) (Details to be submitted as per the format enclosed in APPENDIX I - ANNEXURE – 1.14)

TERMS & CONDITIONS TO APPLY AS CONSORTIUM:

- i. The Cable OEM (manufacturer of the offered cable in the NIT or higher voltage grade power cables) may collaborate with BYPL enlisted contractor to form a consortium and submit Bid for this tender, provided they jointly qualify as per qualification criteria of the tender.
- ii. The Cable OEM shall act as the Lead Partner and Bidder within the consortium and must be supported by a power of attorney, duly signed by the legally authorized signatories of all partners. Refer to Annexure-I for the sample format.
- iii. Bidder will be authorized to incur liabilities and receive instructions on behalf of all partners in the Consortium. The entire execution of the contract, including payment, will be conducted exclusively with the Bidder. This authorization will be evidenced by submitting a Power of Attorney signed by the legally authorized signatories of all partners.
- iv. Bidder will be solely responsible for executing the contract in accordance with the NIT. A copy of the agreement between the consortium partners, which includes this provision, must be submitted with the Bid.
- v. In the event of any default by partner/partners of the Consortium, BYPL reserves the right to get the work executed from any other source at the Risk & Cost of the Bidder. The Extra Expenditure so incurred shall be debited to the Bidder.
- vi. Responsibilities in respect of execution of tendered work by the Bidder as well as of each Consortium member shall be clearly indicated in the agreement.
- vii. The Consortium agreement shall not be cancelled or amended unilaterally without consent of the purchaser and a statement to this effect should appear in the consortium agreement.
- viii. A firm can submit only one bid in the same bidding process, either individually as a bidder or as a partner of a Consortium. A bidder who submits or participates in more than one bid will cause all the bids in which the bidder has participated to be disqualified.

Original consortium agreement on Non judicial stamp paper duly registered with sub registrar office/Notarized of appropriate value satisfying the above conditions shall be submitted along with the bid indicating role and duties of each consortium member.

Note:

- **In case of non-furnishing the requisite documents along with the bid, the bid will be considered as non-responsive and bid may be summarily rejected.**
- **Purchase & Work Orders shall be issued in favour of the Bidder only.**

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

As an exception to the foregoing Clause 2.00 above:

- a. Sanctions: Firms, which includes any of the Consortium members in case of bidding Consortium Partner as per Clause 2.00 above, blacklisted by the Purchaser/ CPSEs or any of their subsidiaries / Government of India/ any Regulatory Authority, as on the date of submission of Bid, are not eligible to bid.

- b. Suspension: Firms, which includes any of the Consortium members in case of bidding Consortium Partner as per Clause 2.00 above, under suspension by the Purchaser as the result of the operation of a Bid-Securing Declaration or Proposal-Securing Declaration, shall not be eligible to bid.
- c. Prohibitions: Firms, which includes any of the Consortium members in case of bidding Consortium Partner as per Clause 2.00 above, and individuals of a country or goods/ works/services manufactured/ produced in a country shall be ineligible, if as a matter of law or official regulations, the Government of India prohibits commercial relations with that country.
- d. Restrictions under Rule 144 (xi) of GFR 2017: Restrictions on procurement from a bidder of a country which shares a land border with India.

3.00 BIDDING AND AWARD PROCESS

Bidders are requested to submit their offer strictly in line with this tender document. Normally, the deviations to tender terms are not admissible and the bids with deviations are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still, in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the "Annexure - Schedule of Deviations" and the same shall be submitted as a part of the Technical Bid.

3.01 BID SUBMISSION

BIDS ARE INVITED THROUGH THE E-PROCUREMENT PORTAL:

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

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

1. Mr Sumit Verma, E-mail: Sumit.Ra.Verma@@reliancegroupindia.com
2. Mr Rakesh Sharma, E-mail: Rakesh.Ku.Sharma@reliancegroupindia.com, with your details as per below:

- a) Existing Vendor Code with BYPL or its Group/Associates Companies (if available):
- b) Trade Name:
- c) Address of Principal Place of Business:
- d) Contact Person's Name:
- e) Contact Person's Designation:
- f) Contact Person's Mobile No.:
- g) Contact Person's email ID:
- h) Also, attach a valid copy of the Power of Attorney in favour of the above-mentioned Contact Person for being authorized to receive user ID and password on behalf of their organization.

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

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

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

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

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

Head of Department

Contracts & Materials Deptt.

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

Kindly Note:

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

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

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

S. No.	Descriptions	Type of Documents/Format
A.1	Bid Details	
1	Bid Index for Part-A (Technical Bid)	In the prescribed format enclosed at APPENDIX I ANNEXURE – 1.01
2	Cover Letter, if any	Standard Format
3	Bid Form (Unpriced) Duly Signed	Duly Signed Bid Form as per enclosed format at APPENDIX I ANNEXURE – 1.02
4	Tender Fee	Non-refundable demand draft or online transfer of the requisite amount through IMPS/NEFT/RTGS for Rs 1,180/-, Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.03
5	EMD	Online transfer of the requisite amount through IMPS/NEFT/RTGS or FD or BG in the prescribed stamp paper & format enclosed at APPENDIX I ANNEXURE – 1.05, EMD Details Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.04
6	Power-of-Authorization/ Authorization Letter	In the standard stamp paper/letter
A.2	Technical Bid	
7	Communication Details of the Bidder	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.06
8	Manufacturer Authorization Form (as applicable)	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.07
9	Technical Qualifying Criteria Compliance Index & Documents	Documentary evidence in support of qualifying criteria mentioned in Section 1 Clause 2.00. Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.08, ANNEXURE – 1.09 & ANNEXURE – 1.10
10	Schedule of Deviations - Technical	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.11
11	Technical Details/ Filled in Guaranteed Technical particulars	Bidder shall submit duly filled GTP with all Technical documents

	(GTP) as per specification	
12	Technical Drawings as per specification	Bidder shall submit all Drawings as per the specification
13	Type Test Reports	Bidders shall submit a copy of type test reports in their technical bids in support of technical specifications. Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.12
14	Sample Submission Details (if applicable as per specification)	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.13
15	Product Catalogue (If applicable)	Bidders shall submit a copy of the product catalogue in their technical bids in support of technical specifications
16	Manufacturer's Quality Assurance Plan	Bidders shall submit a copy of MQP in their technical bids in support of technical specifications
17	Other drawings/ documents mentioned in technical specification	Bidders shall submit a copy of documents in their technical bids in support of technical specifications
18	Testing Facilities	Bidder shall submit the details of testing facilities available at their works/factory.
A.3 Commercial Bid		
19	Company Profile, Organization Chart & Manpower Details.	Bidder shall submit the details of Organization & Manpower with qualification and experience.
20	Commercial Qualifying Criteria Compliance Index & Documents	Documentary evidence in support of qualifying criteria mentioned in Section 1 Clause 2.00. Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.14
21	Undertakings	Duly signed self-undertakings as per enclosed format at APPENDIX I ANNEXURE – 1.15
22	Schedule of Deviations - Commercial	Duly filled and signed as per enclosed format at APPENDIX I ANNEXURE – 1.16
23	Acceptance Form For Participation in Reverse Auction Event	Duly signed Acceptance Form For Participation In Reverse Auction Event as per enclosed format at APPENDIX I ANNEXURE – 1.17
24	Commercial Terms and Conditions	Acceptance of Commercial Terms and Conditions viz. Delivery Schedule/Period, Payment terms, PBG etc. Duly filled and signed as per enclosed format at APPENDIX II ANNEXURE – 2.05
25	Un price Bid Duly Signed	Item wise marked as "Quoted" & Duly Signed Un price Bid as per enclosed format at VOLUME – II - FINANCIAL BID (PRICE FORMAT)
26	Signed Tender document	Original Tender documents duly stamped & signed on each page as a token of acceptance

PART B:: FINANCIAL BID comprising of

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

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

REVERSE AUCTION CLAUSE:: Purchaser reserves the right to use the reverse auction as an optional tool through SAP-SRM as an integral part of the entire tendering process. All techno-

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commercially qualified bidders shall participate in the reverse auction. **Reverse Auction may be conducted at the buyer's discretion on Lump-sum basis, for the Total Landed Cost (including supply and services), on a package-wise basis, or on a sub-package-wise basis.**

Notwithstanding anything stated above, the Purchaser reserves the right to assess the bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final. Bidder is to submit their acceptance as per the format APPENDIX I ANNEXURE – 1.17.

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

4.00 AWARD DECISION

- 4.01 Purchaser intends to award the business on the lowest bid basis, so suppliers are encouraged to submit the bid competitively. The decision to place a LOI/Purchase Order solely depends on the purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.
- 4.02 In the event of your bid being selected by the purchaser (and/or its affiliates) and you subsequent DEFAULT on your bid; you will be required to pay the purchaser (and/or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in NIT/RFQ.
- 4.03 In case any supplier is found unsatisfactory during the delivery process, the award may be cancelled and BYPL reserves the right to award other suppliers who are found fit.
- 4.04 Contract Price/Rate shall remain "FIRM" till the validity of the Contract.
- 4.05 Quantity Variation: The purchaser reserves the right to vary the quantity based on the actual requirements.
- 4.06 The purchaser reserves all the rights to award the contract to one or more bidders to meet the Project execution requirement or nullify the award decision without citing any reason.

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 before participating. In addition to other remedies available, we reserve the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the Terms & Conditions. Bidders who violate the marketplace rules or engage in behaviour that disrupts the fair execution of the marketplace restrict a bidder to the length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

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

6.00 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 honour these confidentiality provisions will be excluded from participating in future bidding events.

7.00 CONTACT INFORMATION

Technical clarification, if any, as regards this RFQ shall be sought in writing and sent by e-mail/post/courier to the 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	Abhishek Harsh GM (CES)	abhishek.harsh@relianceada.com
	Srinivas Gopu GM (CES)	srinivas.gopu@relianceada.com
	Amit Tomar Asstt. VP (HOD-CES)	Amit.As.Tomar@reliancegroupindia.com
Commercial		
C&M Dept. 3 rd Floor, A-Block, BSES Yamuna Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Sumit Verma GM (C&M)	Sumit.Ra.Verma@reliancegroupindia.com
	Santosh Singh Addl. VP (Head-Procurement)	Santosh.Kum.Singh@reliancegroupindia.com
	Robin Sebastian VP (HOD-C&M)	Robin.Sebastian@reliancegroupindia.com

SECTION – II: INSTRUCTION TO BIDDERS

A. GENERAL

- 1.00 BSES Yamuna Power Ltd, hereinafter referred to as "The Purchaser" is 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

- 2.01 The scope of work under this contract shall include the turnkey execution on End to End Basis, including but not limited to Design, Engineering, Manufacture, Shop Testing, Inspection, Packing, Dispatch, Supply, Loading, Unloading, Storage At Site, Assembly, Erection, Complete Pre-Commissioning Checks, Testing & Commissioning at Site, Obtaining Statutory Clearance & Certification From Electrical Inspector And Handing Over Of Complete Projects Covered Under Scope Of this tender To BSES Yamuna Power Ltd. (BYPL) including comprehensive Marine cum Storage cum Erection Insurance Policy (MSE) "on Turnkey Basis".

Single purchase order will be placed for Supply & Services (ETC/Civil) which inter-alia includes the Scope of Work as mentioned/required.

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

4 COST OF BIDDING

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

B. BIDDING DOCUMENTS

5.00 BIDDING DOCUMENTS

- 5.01 The Scope of Work, Bidding Procedures and Contract Terms are described in the Bidding Documents.

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

6.00 AMENDMENT OF BIDDING DOCUMENTS

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

C. PREPARATION OF BIDS

7.00 LANGUAGE OF BID

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

8.00 DOCUMENTS COMPRISING THE BID

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

9.00 BID FORM

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

10.00 EMD

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

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

- (a) Bank Guarantee drawn in favour of BSES Yamuna Power Ltd, payable at Delhi or
- (b) Fixed Deposit (lien marked in favour of BSES Yamuna Power Limited) payable at Delhi.
- (c) Online transfer of requisite amount through IMPS/NEFT/RTGS to BYPL account mentioned herein in **Appendix II - BYPL BANK DETAILS WITH IFSC CODE.**

EMD shall be valid for One Hundred Eighty (180) days after the due date of submission drawn in favour of BSES Yamuna Power Ltd.

The EMD may be forfeited in the case of:

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

11.00 BID PRICES

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

12.00 BID CURRENCIES

- 12.01 Prices shall be quoted in Indian Rupees Only.

13.00 PERIOD OF VALIDITY OF BIDS

- 13.01 Bids shall remain valid for 180 days from the due date of submission of the Bid.
- 13.02 Notwithstanding Clause 13.01 above, the Purchaser may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing and sent by post/courier.

14.00 ALTERNATIVE BIDS

- 14.01 Bidders shall submit Bids, which comply with the Bidding Documents. Alternative Bids will not be considered. The attention of Bidders is drawn to the provisions regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the Bidding Documents.

15.00 FORMAT AND SIGNING OF BID

- 15.01 The original Bid Form and accompanying documents, must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0.
- 15.02 The original Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid. The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of the authority of the person signing on behalf of the Bidder shall be furnished with the bid. A bid by a person who affixes to his signature the words 'President', 'Managing Director', 'Secretary', 'Agent' or other designations without disclosing his principal will be rejected.

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

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

D. SUBMISSION OF BIDS

16.00 SEALING AND MARKING OF BIDS

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

17.00 DEADLINE FOR SUBMISSION OF BIDS

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

18.00 ONE BID PER BIDDER

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

19.00 LATE BIDS

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

20.00 MODIFICATIONS AND WITHDRAWAL OF BIDS

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

E. EVALUATION OF BID

21.00 PROCESS TO BE CONFIDENTIAL

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

22.00 CLARIFICATION OF BIDS

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

23.00 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

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

24.00 EVALUATION AND COMPARISON OF BIDS

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

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/25-26/RS/SkS/SV/22 [RFx Number: 2200000153]	Page 18 of 21	Bidders seal & Signature

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

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

(a) Delivery Schedule

(b) Conformance to Qualifying Criteria

(c) Deviations from Bidding Documents

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

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

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

F. AWARD OF CONTRACT

25.00 CONTACTING THE PURCHASER

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

25.02 Any effort by a Bidder to influence the Purchaser and/or 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.

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

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

27.00 AWARD OF CONTRACT

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

27.02 The Purchaser intends to issue separate individual Purchase/Work Orders which inter-alia includes the Scope of Work as mentioned/required in the NIT viz.

a) Purchase Order for Supply

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

c) Work Order for Civil (If applicable)

28.00 THE PURCHASER'S RIGHT TO VARY QUANTITIES

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

29.00 LETTER OF INTENT/ NOTIFICATION OF AWARD

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

30.00 CONTRACT PERFORMANCE BANK GUARANTEE (CPBG)

30.01 Within 28 days of the receipt of Letter of Intent/Notification of Award from the Purchaser, the successful Bidder shall furnish the Performance Bank Guarantee for an amount of 10% (Ten percent) of the Total Contract Price (including GST). The Performance Bond shall be valid up to contract completion. Upon submission of the performance security, the EMD shall be released.

31.00 CORRUPT OR FRAUDULENT PRACTICES

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

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

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

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

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

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

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

32.00 STATUTORY GUIDELINES & REGULATIONS

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

33.00 SAFETY

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

34.00 PRIORITY OF CONTRACT DOCUMENTS

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

i) Contract Agreement/Purchase Order.

(a) Special Conditions of Contract

(b) General Conditions of Contract

(ii) The Letter of Acceptance/ Intent

(iii) Agreed Minutes of the Tender Negotiation Meetings

(iv) Agreed Minutes of the Tender Technical Meetings

(v) The Priced Bill of Quantities

(vi) The Technical Specifications / Scope of work

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

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

BID INDEX FOR PART-A (TECHNICAL BID)

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

NIT & RFX No.:

Bidder's Name:

Bidder's Bid Reference No. & Date:

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

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 the Financial Bid or such other sums as may be determined in accordance
with the terms and conditions of the contract. The amounts are in accordance with the Price
Schedules attached herewith and are made part of this bid.
3. If our Bid is accepted, we undertake to deliver the entire goods as per the delivery schedule
mentioned in Section IV from the date of award of the purchase order/letter of intent.
4. If our Bid is accepted, we will furnish a performance bank guarantee for due performance of the
Contract in accordance with the Terms and Conditions.
5. We agree to abide by this Bid for 180 days from the due date of bid submission and it shall remain
binding upon us and may be accepted at any time before the expiration of that period.
6. We declare that we have studied the provision of Indian Laws for the supply/services of
equipments/materials and the prices have been quoted accordingly.
7. Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof,
shall constitute a binding contract between us.
8. We understand that you are not bound to accept the lowest or any bid you may receive.
9. There is provision for Resolution of Disputes under this Contract, by the Laws and Jurisdiction of
Contract.

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

Signature..... In the capacity of

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

(IN BLOCK CAPITALS)

TENDER FEE DETAILS

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

EMD DETAILS

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

(FORMAT FOR EMD BANK GUARANTEE)

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

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

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

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

The conditions of this obligation are:

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

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

This guarantee will remain in force up to and including One Hundred Eighty (180) 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/25-26/RS/SKS/SV/22 [RFx Number: 2200000153]	Page 5 of 22	Bidders seal & Signature

COMMUNICATION DETAILS OF THE BIDDER

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

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

Date:
Tender No.:

To

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

Sir,

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

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

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

Yours Sincerely,
For

Authorized Signatory

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

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

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

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

Note –

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

SCHEDULE OF DEVIATIONS - TECHNICAL

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

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

Technical Deviations:-

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

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

Seal of the Bidder:

Signature:

Name:

TYPE TEST REPORTS (SEQUENCE OF TESTS SHALL BE STRICTLY IN ACCORDANCE WITH RELEVANT IS/IEC)

S No	Test Description	Reference Standard	Reference Standard Clause No.	Name of Testing Lab	Test Report Reference Number	Date of Issue of Report	Report Enclosed on Bid Page No	
							From	To
1								
2								
3								
4								
5								
6								
7								

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

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

UNDERTAKINGS
(To be submitted on Bidders Letter Head)

Date:

Tender No.:

To

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

Sir,

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

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

Yours Sincerely,

For

Authorized Signatory

Name : _____

Designation : _____

Seal : _____

APPENDIX I NIT NO: CMC/BY/25-26/RS/SkS/SV/22 [RFx Number: 2200000153]	Page 15 of 22	Bidders seal & Signature

SCHEDULE OF DEVIATIONS - COMMERCIAL

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

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

Commercial Deviations:-

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

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

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

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder)

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

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

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

Signature & seal of the Bidder

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CODE OF CONDUCT FOR SUPPLIERS

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

A. Promote Environmental Sustainability

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

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

B. Commitment to Human Rights, Labour and the Society

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

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

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Ensure that the activities of suppliers do not harm the health and safety of their own employees, suppliers and subcontractors, local communities/population, and finally the users of its products and services, which is in accordance with the BSES's Mission Zero Harm in Health and Safety.

3. Child Labour

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

4. Forced Labour

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

5. Wages and Working hours

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

6. Freedom of Association and Collective Bargaining

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

7. Non-Discrimination and Equal opportunity

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

8. Zero Tolerance towards Harassment

- 8.1. Treat all employees with respect and dignity and furthermore ensure that their own suppliers treat their employees in the same manner.
- 8.2. No tolerance towards unacceptable treatment of employees, such as physical punishment or torture, sexual harassment³, or abuse, mental or physical coercion or verbal abuse, or the threat of any such treatment.

- 8.3. No worker should be subjected to any physical, sexual, psychological, or verbal harassment, abuse or other form of intimidation.

C. Ethical Integrity and Legality

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

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

- 5.3. Neither receive nor offer or make, directly or indirectly, any illegal payments, remunerations, gifts, donations or comparable benefits that are intended, or perceived, to obtain uncompetitive favours for the conduct of its business with BSES.
- 5.4. Neither directly or indirectly offer any gift, entertainment, trip, discount, service, or other benefit to any official of BSES or his/her close relations which would or be capable of compromising, influencing, liable to corrupt the integrity and objectivity of that person.
6. Competition, Confidentiality and Data Privacy
 - 6.1. All market survey/other entities information must be obtained and used legitimately and in compliance with all applicable laws and regulations.
 - 6.2. No attempt should be made to divulge to BSES any information about any other entity in violation of any law or agreement.
 - 6.3. Likewise, BSES's confidential information must not be shared with any Supplier unless expressly permitted by BSES in writing by authorised signatory under the respective purchase order or agreement, as the case may be.
7. Transparency and Ethics
 - 7.1 Fair competition

Avoid any action that may constitute an illegal practice of unfair competition and ensure compliance with applicable competition laws.
 - 7.2 Corporate image and reputation

Suppliers must NOT:

 - Make false statements or provide any misleading information regarding its products/services.
 - Give the impression of representing or being the spokesperson of BSES while getting associated with any religious/political party or for activities in their personal capacity.
8. Protection of Intellectual Property and No Misuse or Improper use of BSES's assets/ property
 - 8.1. Respect and protect all confidential information and intellectual property of BSES.
 - 8.2. Do not misuse and share assets of BSES and employ them only for the purpose of conducting the business for which they are duly authorised by BSES. These include tangible assets such as equipment and machinery, systems, facilities, materials, and resources and intangible assets such as intellectual property rights, processes, know how & technology, proprietary information, etc.
 - 8.3. Safeguard, secure, and protect BSES's assets and information technology from theft, destruction, misappropriation, wastage, and abuse.
 - 8.4. Promptly report loss, theft or destruction of any intellectual property and data of the Company or that of any Supplier.
9. Financial Records and Accuracy in Books
 - 9.1. Have accounting practices in place to ensure accuracy of its financial books and records.
 - 9.2. Ensure accurate accounting and proper reporting of information pertaining to the business and financial results in accordance with applicable Accounting Standards [Generally Accepted Accounting Principles (GAAP)].
 - 9.3. Ensure compliance to applicable laws and regulations with respect to accounting and taxation and timely discharge of tax liability.
10. Sanction Laws
 - 10.1 Do not engage in any dealings or transactions with any person, or in any country or territory that are subject to global / regional sanctions as mentioned herein below in clause 10.2. BSES is vigilant of its suppliers who may be on a sanctions list or have a related company in a country subject to global/regional sanctions. In case of any concerns, the supplier

should immediately report to BSES.

- 10.2 Do not be subject to or the target of any economic or financial sanctions or trade embargoes imposed, administered or enforced by the U.S. Government including without limitation by the World Bank or by the United Nations Security Council, the European Union, the United Kingdom including by Her Majesty's Treasury or the Department of Business, Innovation and Skills, a relevant regulatory authority or the Minister of Foreign Affairs of Canada under the Special Economic Measures Act or the United Nations Act or legislation or regulations with similar purpose or effect or any other relevant sanctions authority of any other country (collectively, 'Sanctions Laws') nor is the Company or any of its subsidiaries / affiliates located, organised or resident in a country or territory that is the subject of the target of Sanctions Laws
- 10.3 Do not take any action which places or is likely to place BSES in violation of Sanctions Laws and/ or breaches affecting the reputation and/ or business interests of BSES

11. Responsible Sourcing

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

12. Quality of Product and Services

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

13. Corporate Citizenship

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

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

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

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

GENERAL CONDITIONS OF CONTRACT (GCC)

GENERAL CONDITIONS OF CONTRACT (GCC)

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

1. General Instructions & Applicability

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

2. Definitions and Interpretations

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

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

3. Contract Documents Priority & Formation

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

4. Governing Laws & Dispute Resolution

- 4.1. The Contract shall be governed by and interpreted in accordance with the laws of India.
- 4.2. Any dispute, controversy, or claim arising out of or relating to this Contract, or the breach, termination, or invalidity thereof, shall first be sought to be resolved amicably through mutual consultation between the Parties.
- 4.3. In the event that an amicable resolution is not achieved within a reasonable period, the dispute shall be referred to arbitration in accordance with the provisions of the Arbitration and Conciliation Act, 1996, as amended by the Arbitration and Conciliation (Amendment) Act, 2023. The Arbitral Tribunal shall consist of three (3) arbitrators — one to be appointed by each Party, and the third, who shall act as the presiding arbitrator, to be jointly appointed by the two arbitrators so nominated.
- 4.4. The seat and venue of arbitration shall be New Delhi, India, and the language of proceedings shall be English. The arbitral award rendered by the Tribunal shall be final and binding upon both Parties.

5. Change in Law

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

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

6. Site Examination & Local Conditions

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

7. Language, Measurement & Precedence

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

8. Scope of Work & Responsibilities

- 8.1. The scope of work under this Contract shall encompass turnkey execution on an end-to-end basis, including but not limited to Design, Engineering, Manufacture, Shop Testing, Inspection, Packing, Dispatch, Supply, Loading, Unloading, Storage at Site, Assembly, Erection, Complete Pre-Commissioning Checks, Testing & Commissioning at Site, Documentation, Training, Obtaining Statutory Clearances & Certifications from the Electrical Inspector, and the Final Handing Over of the Complete Projects covered under this tender to BSES Yamuna Power Ltd. (BYPL). This shall include comprehensive Marine cum Storage cum Erection Insurance Policy (MSE), provided on a turnkey basis.
- 8.2. All works shall be performed strictly in accordance with the NIT conditions and applicable technical specifications. The Contractor shall comply rigorously with all relevant laws, codes, safety regulations, labour statutes, and environmental standards.
- 8.3. The detailed scope of supplies and services for the successful completion, testing, commissioning, and handover of the awarded packages shall be as set forth in the NIT. The Bidder shall quote against the Bill of Quantities listed in Section II of this RFQ. Any materials or services not specifically mentioned in the BOQ but required for successful erection, testing, and commissioning shall be deemed included within the Bidder's scope.
- 8.4. Variations in quantities or additional requirements, if any, will be communicated to the successful Bidder during project execution, with site conditions potentially influencing such changes.
- 8.5. All related drawings, data, and instruction manuals shall be provided as required.

- 8.6. Digital Documentation & E-Governance: All submissions, including but not limited to drawings, Quality Assurance Plans (QAP), Factory Acceptance Test (FAT) and Site Acceptance Test (SAT) reports, invoices, test certificates, and project progress reports shall be provided digitally via the Purchaser's designated portal or email as specified.
- 8.7. Unforeseeable Sub-Surface Conditions: If during execution the Contractor encounters sub-surface conditions differing from those indicated by existing soil tests or its own investigations, necessitating changes in method or corrective actions, all associated costs shall be borne solely by the Contractor. No time or cost compensation shall be granted by the Purchaser for such conditions.
- 8.8. Construction Water and Power: The Contractor shall arrange and bear all costs for construction water and power supply, including installation, operation, and maintenance of pumps, storage tanks, and distribution systems as required on site.
- 8.9. Watch & Ward and Lighting: The Contractor shall be solely responsible for the provision and maintenance of lights, guards, fencing, and security arrangements, including round-the-clock security with CCTV coverage for materials stored on site. Adequate trained security personnel must be deployed at storage yards, stores, and work areas to prevent theft, pilferage, or damage. Compliance with BYPL's site safety and security regulations is mandatory.
- 8.10. Site Office, Facilities & Storage at Site: The Contractor shall arrange accommodation and conveyance for its staff and shall be allocated sufficient space for site stores. Storage must allow easy access for identification and inspection, comply with IS: 4082, and all incoming/outgoing materials must be recorded in a register maintained by the Contractor. The Contractor assumes full responsibility for safeguarding all materials and shall provide adequate weather protection. BYPL disclaims any liability for loss or damage. The Contractor shall maintain site cleanliness and prevent pollution; breach of this will result in removal of personnel and penalties at the discretion of the Engineer-in-Charge (EIC).
- 8.11. The Contract Price inclusive of insurance for loading/unloading, storage, handling, and erection during execution. No separate charges for barricading or watch & ward will be paid. No idle labour charges shall be admissible for any work suspension or stoppage caused by the Company or other reasons.
- 8.12. Identity Cards (ID Cards) shall be issued exclusively by BYPL Security ID Card Cell. Contractors must maintain records and return IDs upon employee termination. Non-compliance will attract penalties. A detailed employee deployment list must be submitted to BYPL Security before contract commencement.
- 8.13. Site Supervision and Advance Intimation: The Contractor shall appoint a dedicated Site In-Charge or Project Manager and support team to be present on-site throughout contract duration, as certified by the EIC. The Contractor is responsible for supervision by qualified personnel to ensure compliance with drawings, specifications, and instructions. The Contractor shall submit for approval the site organizational structure and personnel details upon receipt of the LOI or Work Order.
- 8.14. Written approvals from the EIC must be obtained before commencement of works, including timely submissions of plans for resource deployment, material procurement, and key activities.
- 8.15. The contractor should register/enroll on 'Call Before U Dig'(CBuD) Mobile App. Activated by the Department of Telecommunications (DoT) and do the digging only after prior intimation through 'Call Before U Dig' (CBuD) Mobile App. and as per its terms and conditions.
- 8.16. Coordination with Other Agencies: The Contractor shall collaborate closely with BYPL and other appointed agencies, extending site facilities, plants, and equipment as requested without additional cost.

- 8.17. The Contractor shall procure necessary permissions (e.g., road cutting clearance) from local authorities; statutory fees will be borne by BYPL.
- 8.18. All labor, equipment, tools, scaffolding, and materials form part of the Contractor's scope. A qualified workforce and technical staff list must be submitted to the EIC promptly post-award, including relevant certifications.
- 8.19. The Contractor shall arrange accommodation and transport for staff at site.
- 8.20. Delivery of major items (GIS, PTR, Cable, etc.) must align with site progress. OEM shall perform joints and terminations; the Contractor shall provide full support.
- 8.21. The Contractor shall manage receipt, unloading, marking, staking, and storage of materials, ensuring insurance coverage. Copies of insurance policies must be provided to BYPL. Any damage or loss requires immediate claim lodging by the Contractor, with prompt replacement to avoid delays.
- 8.22. Material movement (loading/unloading) and use of cranes, hydras, trailers fall under the Contractor's responsibility.
- 8.23. Adequate weather protection is required for materials against sun and rain.
- 8.24. Cable Handling: During trenchless or open digging, underground cable damage risks mandate pre-excitation use of Cable Route Tracer devices approved by BYPL; reports must be submitted for clearance. Failure to comply shall result in heavy penalties for cable damage.
- 8.25. Cable laying works require follow-up sheath voltage tests, availability of appropriate tools/testing equipment, and submission of cable laying schedules for quality checks.
- 8.26. Statutory Compliance and Certification: Obtaining Electrical Inspection Clearance (EIC) certification from BSES Electrical Inspector (up to 33kV) and other statutory authorities (above 33kV) for substation commissioning is the sole responsibility of the Contractor.

9. Specifications, Codes & Standards

- 9.1. The Bidder shall follow all codes and standards referred in the Contract Document. Codes and standards not specifically mentioned in the Contract Document may be followed by the Bidder with the prior written approval of BYPL, provided materials, supplies and equipment according to the standard are equal to or better than the corresponding standards specified in the Contract.
- 9.2. Product manufacturer or brand names cited in the Contract Documents serve solely to define the required type and quality of products. The Bidder shall not substitute or alter the specified brands or product qualities without the express prior written consent of BYPL. All products and equipment must be used or installed in full compliance with the original manufacturer's guidelines unless otherwise instructed by BYPL.
- 9.3. In all cases, the Bidder must comply with relevant codes, standards, and requirements prescribed by any applicable government agencies.
- 9.4. In the absence of specific BSES standards, the Bidder shall follow the relevant Indian Standards (IS) or International Electrotechnical Commission (IEC) standards as applicable.

10. Representations and Warranties

- 10.1. The Contractor represents and warrants that it possesses full legal capacity, valid licenses, permits, and approvals required to perform all obligations under this Contract.
- 10.2. The Contractor warrants that all Goods supplied under this Contract:
- 10.2.1. Are brand new and free from any defects in design, materials, and workmanship
 - 10.2.2. Fully conform to the Contract specifications and requirements
 - 10.2.3. Are suitable and fit for the intended purpose as specified in the Contract documents
- 10.3. The Contractor further warrants that all Services performed shall be executed with the highest degree of skill, care, and diligence consistent with Good Industry Practice and prevailing professional standards.

11. Ethics, Integrity & Code of Conduct

- 11.1. The Contractor shall fully comply with all anti-bribery, anti-corruption, conflict of interest, gifts and gratuities, and integrity policies issued or communicated by the Purchaser. For Contracts exceeding specified thresholds, the Contractor shall be required to execute an Integrity Pact as per the Purchaser's guidelines.
- 11.2. Any breach of these ethics and integrity obligations by the Contractor may lead to disciplinary actions including, but not limited to, termination of the Contract, forfeiture of performance security deposits, recovery of losses incurred by the Purchaser, debarment from future procurement opportunities, and reporting to relevant regulatory or enforcement authorities.

12. Sustainability, ESG & Legal Compliance

- 12.1. The Contractor shall implement an Environmental, Social, and Governance (ESG) program appropriate to the scope of work, which shall include but is not limited to:
- 12.1.1. Compliance with applicable Extended Producer Responsibility (EPR), electronic waste, hazardous waste, plastic waste, and battery waste management regulations;
 - 12.1.2. Adherence to RoHS/REACH standards where applicable;
 - 12.1.3. Design and supply of energy-efficient products meeting prescribed star ratings or efficiency classes;
 - 12.1.4. Take-back and responsible disposal or recycling of packaging and end-of-life equipment where mandated;
 - 12.1.5. Occupational health and safety management systems aligned with IS/ISO 45001;
 - 12.1.6. Social safeguards including prohibition of child labour, forced labour, assurance of fair wages, and provision of safe and dignified workplaces.
 - 12.1.7. Adoption of environmentally responsible practices such as waste minimization, recycling, and strict prohibition of hazardous materials usage, in accordance with relevant laws and regulations.
- 12.2. The Contractor shall support the Purchaser's Scope-3 greenhouse gas emissions tracking efforts by submitting quarterly reports detailing the embodied carbon content of supplied goods (where available) and associated logistics emissions. The Contractor shall provide reasonable assistance in this regard at no additional cost.
- 12.3. The Contractor shall prioritize the use of recycled or returnable packaging materials and minimize single-use plastics except where necessary for product protection. All wooden packaging shall be sourced from legally compliant suppliers. Pallets, drums, and similar packaging materials shall be collected and returned for reuse or recycling where feasible.
- 12.4. The Contractor shall maintain accurate records, documentation, and evidence of compliance with all ESG requirements and shall provide such information to BYPL or relevant authorities as reasonably requested, in the format and frequency specified.

13. Data & Cybersecurity

- 13.1. For any scope involving software, firmware, or networking components, the Contractor shall:
- 13.1.1. Provide comprehensive cyber hardening guidelines;
 - 13.1.2. Maintain a vulnerability disclosure window of thirty-six (36) months following delivery;
 - 13.1.3. Deliver timely security patches and firmware updates as they become available;
 - 13.1.4. Supply a software bill of materials (SBOM) listing all software components included;
 - 13.1.5. Ensure no hard-coded credentials exist in delivered software or devices.
 - 13.1.6. Any connection to the Purchaser's network must be authorized in writing prior to implementation.
- 13.2. The Contractor shall handle any personal data processed in relation to this Contract in full compliance with applicable data protection laws. Appropriate technical and organizational security measures must be implemented, and the Contractor must promptly notify the Purchaser of any data breaches or security incidents impacting Purchaser data.

14. Local Content and Eligibility

- 14.1. The Contractor shall comply fully with the Public Procurement (Preference to Make in India) Order and related norms. This includes submitting accurate declarations of local content in goods and services, and consenting to verification and audits by the Purchaser or authorized agencies. Any false or misleading declarations shall entitle the Purchaser to disqualify the Contractor, terminate the Contract, and impose debarment as per applicable regulations.
- 14.2. Bidders originating from countries sharing land borders with India must adhere to the registration and eligibility criteria specified by the Government of India. Failure to comply with these requirements will render the bid ineligible for consideration and may lead to Contract termination if discovered post-award.

15. Manufacturing Approvals & Clearances

- 15.1. Transmittal approval documents - including Guaranteed Technical Parameters (GTP), drawings, Quality Assurance Plans (QAP), and other relevant documents - shall be submitted as per the approved project schedule to the designated BYPL official for review and approval. BYPL shall provide approval or comments within seven (7) calendar days of the initial submission. Should resubmission be required, the Contractor shall complete it within five (5) calendar days. Subsequent approvals or comments from BYPL on such resubmissions will be issued within five (5) calendar days. Repeated resubmissions are discouraged and may impact timelines.
- 15.2. Manufacturing activities shall commence only after the Contractor receives formal transmittal approval and manufacturing clearance from BYPL.
- 15.3. All documents submitted for transmittal approval must reflect pre-award discussions and confirmations between BYPL and the Contractor to ensure accuracy and compliance.
- 15.4. Delays in obtaining transmittal approval shall not be accepted as valid grounds for extension of delivery timelines or waiver of liquidated damages.
- 15.5. The Contractor shall submit the complete Quality Assurance Plan (QAP) or Factory Quality Plan (FQP) covering the entire scope within four (4) weeks of issuing the Letter of Acceptance (LOA) or Purchase Order for Employer/Owner approval. All works shall be conducted strictly in accordance with the approved QAP.

16. Errors, Omissions & Discrepancies

GENERAL CONDITIONS OF CONTRACT (GCC) NIT NO: CMC/BY/25-26/RS/SkS/SV/22 [RFx Number: 2200000153]	Page 9 of 45	Bidders seal & Signature

- 16.1. The Contractor shall be solely responsible for all discrepancies, errors, and omissions found in the drawings, documents, or any other information submitted by it, regardless of whether such submissions have been approved, reviewed, or accepted by BYPL. Notwithstanding the foregoing, any design or drawing errors directly resulting from inaccurate or incomplete data or written instructions furnished by BYPL shall not be attributed to the Contractor.

17. Quantity Variations, Extra Items/Works

- 17.1. The Contractor shall execute and complete the Work fully in accordance with the Contract and under the directions and satisfaction of the Engineer-in-Charge (EIC).
- 17.2. The EIC may issue, at their discretion, further drawings, written instructions, details, directions, and explanations (hereinafter referred to as "EIC's Instructions"), relating to:
- 17.2.1. Variation or modification in design, quality, specifications, quantity; omission or substitution of any work.
 - 17.2.2. Timing or sequencing of work.
 - 17.2.3. Discrepancies between drawings, Bill of Quantities, and/or specifications.
 - 17.2.4. Removal and substitution of any materials, equipment, or resources brought to site by the Contractor.
 - 17.2.5. Execution of additional work deemed necessary for completion.
 - 17.2.6. Removal and/or re-execution of any work executed.
 - 17.2.7. Substitution of any personnel employed on site.
 - 17.2.8. Rectification of defects under the "Defects Liability" clause.
 - 17.2.9. Opening for inspection of any covered work.
 - 17.2.10. Changes in lines, levels, positions, or dimensions of any part of the Work.
- 17.3. The Contractor shall comply promptly with all EIC's Instructions. Verbal instructions involving variations must be confirmed in writing by the Contractor within seven (7) days and approved in writing by the EIC.
- 17.4. If the EIC's Instructions require work beyond the Contract scope and are not due to Contractor's breach, the EIC shall compensate the Contractor for such work as extra, valued as provided herein.
- 17.5. Variations shall not invalidate or vitiate the Contract. The value of all variations shall be considered in the final certification.
- 17.6. No variation shall be undertaken without written instructions from the EIC, except for quantity variations resulting naturally from site conditions. Verbal instructions must be confirmed in writing by the EIC within thirty (30) days of Contractor's written confirmation.
- 17.7. Extra or additional work instructed by the EIC shall be valued at Contract rates. Absent applicable rates, pricing shall be agreed based on:
- 17.7.1. Quoted rates for similar tender items.
 - 17.7.2. If unavailable, calculation based on:
 - 17.7.2.1. Direct labour costs plus indirect charges, based on related BIS codes and standard consumption factors or as accepted by EIC.
 - 17.7.2.2. Material cost inclusive of taxes, duties, and delivery to site with invoice proof.
 - 17.7.2.3. Plant and equipment hire and operational charges per standard norms or as accepted by EIC.
 - 17.7.2.4. Overheads and profit payable to Contractor.
- 17.8. If work is incomplete or non-compliant with specifications, the EIC may approve payment at reduced rates considered reasonable.

- 17.9. Contractor shall submit detailed rate analyses and supporting documents when requested. EIC's valuation of claims shall be final and binding.
- 17.10. Quantities listed in the Bill of Materials (BOM) are estimates and subject to re-measurement. Contractor shall not claim loss of profit or damages due to quantity differences or omission of work.
- 17.11. Rates in the BOM shall remain firm regardless of variations in quantities or total Contract sum.

18. Free Issue Materials/Equipments

- 18.1. Materials and equipment provided as Free Issue by the Purchaser to the Bidder for fulfilling obligations under this Agreement shall remain the exclusive property of the Purchaser. The Bidder shall clearly label and identify such Free Issue Items as the Purchaser's property until the completed Goods are delivered in accordance with the Agreement terms.
- 18.2. Risk of loss or damage to all Free Issue Items shall transfer to the Bidder upon receipt and shall remain with the Bidder until the completed Goods are delivered to the Purchaser as per the Agreement.
- 18.3. The Bidder shall take all necessary measures to preserve and maintain the Free Issue Items in good condition and shall utilize them solely for the purposes stated in the Agreement.
- 18.4. Disposal or management of any surplus Free Issue Items shall strictly follow written instructions provided by the Purchaser.
- 18.5. The Bidder shall execute and submit an Indemnity Bond, in a format approved by the Purchaser, covering the custody, use, and return of Free Issue Items.

19. Quality Assurance, Inspection, Testing and Test Certificates

- 19.1. The Contractor shall procure all equipment solely from authentic sources approved by the Company and as per Company specifications.
- 19.2. The Contractor shall prepare a detailed Quality Assurance Plan (QAP) and test procedures identifying all manufacturing stages, associated quality checks, raw material inspections, and Customer hold points. This document shall include inspection methods, acceptance criteria, and standards. The Contractor must obtain Purchaser approval prior to manufacturing commencement. The Purchaser retains the right to review Contractor's in-house inspection reports and quality checks at stages other than Customer hold points and may issue remarks requiring additional testing, rectification, or rejection, which the Contractor shall comply with.
- 19.3. Witness and Hold points represent critical inspections or tests during manufacturing where the Contractor must notify the Purchaser in advance to enable witnessing. Final inspection is a mandatory hold point. Work shall proceed beyond any hold point only after explicit clearance by the Purchaser or receipt of a witness waiver letter.
- 19.4. The Purchaser's waiver of any quality assurance activity at any stage shall not exempt the Contractor from fulfilling all Contract requirements, codes, and referenced standards, nor preclude the Purchaser from subsequently rejecting non-conforming materials or work.
- 19.5. The contractor shall submit all test certificates and joint inspection reports related to equipment's/materials, wherever applicable.
- 19.6. Manufacture items shall not be dispatched without prior receipt of a Material Dispatch Clearance Certificate (MDCC) or explicit instructions from the Purchaser.

- 19.7. All in-house testing and inspections shall be conducted at no additional cost. Such inspections shall be overseen by the Purchaser or its authorized third-party inspection agency. Costs of futile or abortive inspection visits shall be deducted from Contractor invoices.
- 19.8. The Purchaser reserves the right to send any supplied material to recognized laboratories for testing at any time, with testing costs borne by the Contractor. If materials fail to meet the specified technical requirements, the Contractor shall bear all associated charges and penalties. To prevent dispute, the Contractor should appoint a representative to witness material sealing at the storage site before dispatch for testing.

20. Inspection & Test Charges

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

21. Documentation

- 21.1. The Contractor shall procure all materials and equipment exclusively from BYPL-approved sources, strictly adhering to BYPL specifications and Transmittal Approvals. The Contractor shall submit copies of all relevant Material and Type Test Certificates, Operation and Maintenance (O&M) Manuals, as well as Approved and As-built drawings for the supplied equipment. Compliance with BYPL's specifications and Field Quality Procedures is mandatory and must be ensured by the Contractor throughout the project.

22. Packing, Handling, and Storage

- 22.1. Packing: The Contractor shall pack, or cause to be packed, all Commodities in suitable crates, boxes, drums, containers, cartons, or other appropriate packaging to ensure safe shipment by road or rail to BYPL's Delhi/New Delhi stores or site. Packaging shall provide adequate protection to prevent damage during transit. Wherever feasible, biodegradable packaging materials should be used in compliance with prescribed environmental standards.
- 22.2. Packing List: Each package shall contain a detailed packing list itemizing the contents with exact weight, external dimensions (length, width, and height), Item SAP Code, Purchase Order number, and date. One copy of the packing list must be enclosed inside each package delivered.
- 22.3. Prior to commencement of supply, the Contractor shall provide the Material Safety Data Sheet (MSDS) and detailed handling and storage instructions or manuals, where applicable. A copy

of these documents shall be submitted and maintained at the storage or site location along with the first lot of materials delivered.

23. Delivery Terms & Address

- 23.1. The Goods shall be delivered to BYPL's designated Store(s) and/or Site(s). All shipments shall be made on a Free on Road (FOR) destination basis, inclusive of any applicable local taxes and duties.
- 23.2. The Contractor shall be responsible for unloading of the Goods at the respective BYPL Store(s) or Site(s).
- 23.3. Where applicable, the Contractor shall ensure issuance of all required transit documents, including E Way Bills, necessary for lawful transportation of the Goods. The logistics partner or transporter shall not be held liable for any loss, penalties, or confiscation arising due to improper documentation or mis-declaration.

24. Transportation

- 24.1. The Contractor shall be responsible for arranging the transportation of Goods from the Contractor's or Sub-Contractor's works or warehouses to the Buyer's designated Store(s) or Site(s).
- 24.2. All charges related to transportation from the Contractor's works to the Buyer's Store(s) or Site(s) are deemed included in the total order value and shall not be billed separately.

25. Transit Insurance

- 25.1. The Contractor shall be responsible for arranging Transit Insurance for all materials and Goods.
- 25.2. In the event of damage or loss of cargo during transit, the Contractor shall coordinate directly with the relevant insurance company to procure insurance coverage, lodge claims, and facilitate settlement. Regardless of the insurance outcome, the Contractor must replace and deliver the damaged or lost Goods to the Purchaser within thirty (30) days of the incident, at the Contractor's sole expense, including all associated costs for replacement and delivery.

26. Acceptance & Rejection of Goods

- 26.1. Goods shall be accepted only upon receipt of the Material Dispatch Clearance Certificate (MDCC).
- 26.2. The Purchaser shall not accept materials if LR/ RR / Bilty and the Original Tax Invoice (Transporter Copy) are not handed over at store/site. The Contractor shall draw all dispatch documents in favour of Purchaser as Consigned to and billed to.
- 26.3. The materials shall be supplied during working hours from 10AM to 5PM. No delivery shall be effected after this time unless prior intimation is given to the Purchaser.
- 26.4. The Contractor shall take signature of the authorized person at store/site with Purchaser's seal duly receipting the materials and the quantities in the absence of which payment shall not be made by the Purchaser.

26.5. The Contractor shall ensure exact quantities are supplied as per MDCC and if the quantities are short-supplied, as per verification at the Contractor's store/site, the same shall be adjusted and net payment shall be made accordingly.

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

27. Price Validity

27.1. For Contractors awarded the contract, the agreed prices shall remain fixed and valid throughout the entire duration of the contract until its completion.

28. Prices/Rates/Taxes

28.1. Price basis for supply of materials & services:

28.1.1. The contract price/rates finalized for this contract shall be firm for the entire duration of the contract and are not subject to any variation and escalation for any reason whatsoever.

28.1.2. The supply prices are inclusive of packing, forwarding, and loading at manufacturer's premises, payment of GST, Freight, and any other local charges. Octroi is presently not applicable in Delhi and however if applicable shall be reimbursed at actuals.

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

28.1.4. Transit insurance shall be arranged by the Contractor at no additional cost to the Purchaser.

28.1.5. GST is included in the total contract price. GST payments will be processed only upon submission of the Contractor's valid GST registration and a self-declaration on the Contractor's letterhead confirming GST compliance and deposit as per applicable laws. The Contractor must provide their GST registration number.

28.1.6. Income Tax (IT) at applicable rates will be deducted from Contractor invoices as Tax Deduction at Source (TDS).

29. Taxes & Duties

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

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

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

29.4. If the Supplier/Contractor fails to comply and the Recipient/Purchaser cannot avail input tax credit due to non-filing or non-compliance of GSTR-1 and GSTR-3B for the month/quarter of supply, the Recipient/Purchaser reserves the right to withhold 100% of the GST amount from subsequent payments until the default is rectified.

29.5. To release withheld payments under the GST Act, the Supplier/Contractor must submit proof of payment via GST Portal screenshots reflecting the Recipient/Purchaser's name, along with

the relevant GSTR-1 and GSTR-3B filings for the applicable period. Payments will not be released until such proof is provided.

- 29.6. Furthermore, the Recipient/Purchaser reserves the right to recover any financial loss incurred (including tax, interest, penalties, and loss of input credit) due to the Supplier/Contractor's non-compliance or non-filing of GSTR-1 and GSTR-3B.
- 29.7. For goods delivered on FOR site basis, the Supplier/Contractor is responsible for complying with all rules regarding the issuance of E-way bills. Any violation may result in penalties and seizure of goods during transit. All penalties and pre-deposits related to such violations shall be borne by the Supplier/Contractor. The Supplier/Contractor is also responsible for ensuring timely release of seized goods. Any supply delay caused by seizure shall attract liquidated damages as per contract provisions.
- 29.8. For goods not covered under GST, applicable Excise Duty (ED), VAT, or CST shall be payable extra at prevailing rates.
- 29.9. BYPL Tax Details:
29.9.1. GSTIN: 07AABCC8569N1Z0
29.9.2. CST No.: 07740254593
29.9.3. TIN No.: 07740254593
29.9.4. PAN No.: AABCC8569N
- 29.10. The Seller must submit a detailed statement of invoices and amounts to the concerned officer within seven (7) days after the end of each month corresponding to the supply period. Failure to submit shall be taken as no requirement for reconciliation.

30. Variation in Taxes, Duties & Levies

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

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

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

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

- 32.1. The Building and Other Construction Workers (BOCW) Act applies to any establishment employing or having employed ten or more building workers at any time during the preceding twelve months in any building or construction work. The Contractor performing such construction work must register with the Registering Officer under Section 7 of the BOCW

Act, along with applicable state government rules, and submit the Registration Certificate issued by the Registering Officer of the concerned State Government's Labour Department.

- 32.2. Under this Act, the Contractor shall pay a cess at the rate of 1% on the cost of construction work, which shall be deducted from each interim bill. The cost of materials, when billed separately as a distinct schedule item, shall be excluded from the cess calculation. The Contractor is required to comply with all applicable provisions of the BOCW Act.

33. Tax Indemnity Clause

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

34. Invoicing Instructions

- 34.1. Invoices shall be prepared in triplicate — (1) Original for the recipient, (2) Duplicate for the transporter, and (3) Triplicate for the supplier — and delivered to: BSES YAMUNA POWER LIMITED, SHAKTI KIRAN BUILDING, KARKARDOOMA, DELHI - 110032. Material Dispatch Clearance Certificates (MDCC) will be issued separately for Capex and Opex, and suppliers must submit invoices accordingly.

- 34.2. The Contractor shall obtain GST registration in the state from which the supply is made. Suppliers must possess a valid GST registration number and issue GST tax invoices and supporting documents compliant with the SGST Act, CGST Act, IGST Act, UTGST Act, GST Compensation Cess Act and applicable rules. Failure to submit GST-compliant invoices shall render the tax amounts (SGST, CGST, IGST, UTGST, GST Compensation Cess) subject to withholding during payment.
- 34.3. Invoices must be issued in the name of BSES YAMUNA POWER LIMITED, with the store/site address as specified in the MDCC. Invoices should comply with all GST Invoice, Debit Note, and Credit Note requirements, including supplier details, GSTIN, HSN codes, item details, tax rates, etc., as outlined in government regulations and the GST INV-01 invoice template.
- 34.4. The Contractor must charge appropriate CGST, SGST, UGST, IGST, and GST Compensation Cess as applicable.
- 34.5. Timely Issuance of Invoices/Debit/Credit Notes:
- 34.5.1. Contractors shall provide invoices and debit/credit notes promptly to allow the Purchaser to claim input tax credit within prescribed deadlines per GST laws. Adjustments (credit notes, purchase returns, debit notes) must be processed within legally mandated timeframes.
- 34.5.2. In case of advance payments, the Contractor agrees to raise a tax invoice. Upon receipt of advance, the Purchaser will issue a payment voucher as per applicable GST rules. Four copies of invoices are required, including the Electronic Reference Number if mandated by law. Persons in charge of conveyance must carry required documents and devices.
- 34.6. Transit Documents and E Way Bills: Where applicable, the Contractor is responsible for issuing transit documents/E Way Bills for goods movement. Logistic partners or transporters shall not be liable for losses or confiscation due to improper documentation or misdeclaration. The Supplier must comply with all E-way bill regulations. Violations may attract penalties and seizure of goods. The Supplier shall bear all penalties and pre-deposits and is responsible for obtaining release of goods from authorities like CGST/SGST. Delays due to seizure shall attract liquidated damages as per contract.
- 34.7. All Contractors/Service Providers must include the following minimum details in invoices submitted:
- 34.7.1. Invoice/Credit Note number and date
- 34.7.2. Contractor/service provider address and GSTN
- 34.7.3. Customer name and address as per GST registration and GST registration number
- 34.7.4. 'Shipped to' and 'Billed to' addresses
- 34.7.5. Place of supply
- 34.7.6. Description of goods/services with units of measurement
- 34.7.7. HSN/SAC codes
- 34.7.8. Taxable value (gross and discount detailed separately if applicable)
- 34.7.9. Tax rate and amount for CGST, SGST, and IGST separately
- 34.7.10. Contractor's signature (for e-invoices, a physical signature is not required)
- 34.7.11. Indication of reverse charge applicability

35. Bill Submission Procedure

- 35.1. All monitoring, measurement, billing & payment processes shall be on IT enabled platform of BYPL as per Company's guidelines issued from time to time and bidders to ensure adherence. The company may modify the procedure for the submission of bills. The Contractor shall be obliged to submit its bill as per the procedure stipulated by the company from time to time.

- 35.2. All bills must be uploaded to BYPL portal (BTS - Bill Tracking System) for certification by the Engineer In-Charge or Package Engineer.
- 35.3. Further the contractor shall also submit original bill (hard copy) along with supporting documents at Vendor Support Cell of BYPL. The bills shall be made in favour of BSES Yamuna Power Ltd, Shakti Kiran Building, Karkardooma, New Delhi - 110032.
- 35.4. Each bill shall be complete in all respects, including compliance with ESI, HR, Quality, HSE, Stores, and Finance requirements. The site follows an established procedure for bill processing. Incomplete bills or invoices will not be processed for payment.

36. Power to Withhold Payment

- 36.1. The Employer reserves the right to withhold payment of Running Account (RA) bills, in whole or in part, for reasons including but not limited to non-compliance with major contract terms such as quality and progress of work, at the sole discretion of the Engineer In-Charge.
- 36.2. Such withholding of payment does not absolve the Contractor from the obligation to execute work diligently and promptly, nor does it entitle the Contractor to claim interest, anticipated profits, or losses on the withheld amounts.
- 36.3. All pending compliances must be fulfilled by the Contractor before submission of the next RA bill for the withheld amount to be released. If compliances are not completed before the next RA bill, the hold amount will be released once the Contractor meets the Employer's satisfaction.
- 36.4. If work is not performed strictly in accordance with the contract, or if any claim (just or unjust, including claims for wrongful death or property injury) arises against the Employer related to the Contractor's work, the Employer shall have the right to withhold payments, final or otherwise, to an extent deemed adequate to secure against delays, losses, or claims.
- 36.5. In cases where the Employer chooses not to require correction of defective or non-conforming work, an equitable deduction from the contract price shall be mutually agreed upon between the Contractor and Employer. Failing agreement, the deduction shall be determined through the dispute resolution process. Pending such resolution, the Employer may withhold a reasonable sum from payments due to the Contractor.

37. Terms of Payment and Milestones

- 37.1. Payments will be issued upon the achievement of each specified milestone, as outlined below:

37.2. PACKAGE:

37.2.1. FOR SUPPLY OF EQUIPMENT AND MATERIALS:

- i. 70% prorata of supply value item-wise shall be payable against R/A bills for supply of equipments and materials within 30 days against receipt & acceptance of material at site and submission of following documents duly certified by BYPL Project-in-charge, complete in all respects:
 - a) Signed copy of accepted Purchase Order (for first payment)
 - b) LR / RR / BL as applicable
 - c) Challan as applicable
 - d) One (01) copy of Contractor'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.
 - e) One (01) copy of Contractor's transporter invoice duly receipted by BYPL Stores & 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.

- f) One (01) copy Packing List / Detailed Packing List
- g) Approved Test certificates / Quality certificates, if applicable
- h) Certificate of Origin, if applicable
- i) Material Dispatch Clearance Certificate (MDCC)
- j) Insurance Policy / Certificate, if applicable
- k) Warranty / Guarantee Certificate, if applicable
- l) Checklist for bill submission

- ii. 20% prorata on account of supply value of the actual executed value after installation/erection of material duly certified by BYPL Project-in-charge.
- iii. Balance 10% on account of supply value of the actual executed value shall be paid in 30 days after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by BYPL Engineer-in-Charge specified in the tender and on submission of performance Bank Guarantee of 10% amount, in our format valid up to a defect liability period from the date of handing over of the scheme including submission of Electrical Inspector Clearance Certificate, Compliance of final punch point, No Demand Certificate, Letter of Indemnity by the Contractor (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.

37.2.2. FOR LAYING, ERECTION, INSTALLATION AND TESTING & COMMISSIONING:

- i. 90% pro-rata payment of total installation value of the 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 30 days on receipt of such bills at our office.
- ii. Balance 10% on account of total installation value of the actual executed value payable shall be paid in 30 days after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by BYPL Engineer-in-Charge specified in the tender and on submission of performance Bank Guarantee of 10% amount, in our format valid up to a defect liability period from the date of handing over of the scheme including submission of Electrical Inspector Clearance Certificate, Compliance of final punch point, No Demand Certificate, Letter of Indemnity by the Contractor (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.
- iii. Purchaser has the right to recover tax loss, interest and penalty suffered due to any non-compliance of tax laws by the Contractor. In the event, Purchaser is not able to avail any tax credit due to any shortcoming on the part of the Contractor (which otherwise should have been available to Purchaser in the normal course), then the Contractor at his own cost and effort will get the shortcoming rectified. If for any reason the same is not possible, then the Contractor will make 'good' the loss suffered by Purchaser due to the tax credit it lost. In such event, any amount paid to the Contractors 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.
- iv. 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 Contractor.

- v. 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 Contractor's account.
- vi. Where the supply of Goods is liable to GST under reverse charge mechanism, then the Contractor 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".

38. Performance Guarantee

38.1. The Contractor shall submit the following Bank Guarantees within specified timelines:

Type of Bank Guarantee	Submission Timeline	Validity Period
Contract Performance Bank Guarantee (10% of Total Contract Value including GST)	Within 28 days of Issue of LOI/ LOA/ Purchase Order	Valid until 90 days beyond the Project Completion / Handing Over
Bank Guarantee against Advance (For the advance payment made)	Along with invoice for advance amount	Valid until completion of supplies/work under the contract
Equipment Performance Bank Guarantee (10% of Total Contract Value including GST)	At the time of claiming last payment and issuance of final Taking Over certificate by Purchaser/Owner	Valid until completion of Defect Liability Period plus 3 months

38.2. All Bank Guarantees shall be issued in favour of BSES Yamuna Power Ltd. and must conform to the format prescribed by BYPL.

38.3. Performance Guarantee Forfeiture: Each Performance Bond established under Clause 38.1 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 Contractor has failed to comply with any term or condition outlined in the Contract.

38.4. Each Performance BG established under will be automatically and unconditionally forfeited without recourse if BYPL in its sole discretion determines that Contractor has failed to comply with any term or condition outlined in the contract.

38.5. Performance Guarantee Release: All Performance Bonds shall be released without any interest within seven (7) days following the expiry of the validity period specified in Clause 38.1, except in cases outlined under Clause 38.4.

39. Defects Liability Period/ Warranty / Guarantee

39.1. The Defect Liability Period shall be twenty-four (24) months from the date of Final Takeover of Packages by the Purchaser. The Bidder warrants the satisfactory performance of all works, equipment, and materials supplied as per the contract scope for twenty-four (24) months generally for substations or individual packages, and for a period of sixty (60) months for specified equipment such as GIS, PTR, Panels, CRP, Cable & Joints, from the date of Final Takeover.

39.2. The Contractor is liable to rectify all defects arising from works executed or any act or omission during the Warranty/Defect Liability Period.

39.3. The Contractor shall repair or replace any materials/items supplied that exhibit defects or failures due to faulty materials, workmanship, or design throughout the Defect Liability Period.

- 39.4. If during the Defects Liability Period any goods are found defective, the Bidder shall promptly replace or rectify them at its own cost, including dismantling and reinstallation, as directed by the Purchaser. If removed from site, the goods must be returned at the Contractor's cost within the agreed schedule from receipt of intimation.
- 39.5. The Contractor shall dispatch service personnel within 48 hours in emergencies and ensure availability of manpower and spares throughout the warranty period.
- 39.6. However, if the situation, in BYPL's sole discretion warrants an emergency restoration, it reserves the right to take immediate action for identifying the fault and restoring the system with available resources & materials or with help from any other third-party agency under intimation to the Contractor. All costs of replacement, substitution, shipping, labour and other related expenses including taxes and levies incurred in connection with the restoration of fault plus 15% of expenses incurred as administrative overheads shall be for the account of Contractor. BYPL will charge the Contractor for the costs incurred for fault restoration or may set off such costs against any amounts payable by BYPL to the Contractor or deduct from the PBG submitted by the Contractor. Contractor shall pay BYPL the amount within 30 days.
- 39.7. Fault root cause analysis shall be jointly conducted by BYPL's CES, O&M, OEM teams and the Contractor. If faults arise from reasons other than faulty material, design, or workmanship, the Contractor shall be exempt from further liability or cost.

40. Latent Defect Liability Period

- 40.1. Upon completion of the Defect Liability Period, the Contractor's responsibility shall cease except for latent defects.
- 40.2. Latent defects are defined as inherent defects in materials or deficiencies arising from design or design implementation that are not apparent during the Defect Liability Period.
- 40.3. The Contractor's Liability for latent defects warranty shall be for a period of Five (5) years commencing from the date of Taking over of the package and shall be commence along with the Defects Liability Period for all the supply items and the work executed under the contract.
- 40.4. Notwithstanding the completion of the Defects Liability Period, the Contractor shall be responsible for expeditiously making good by repair or replacement at its option and at its cost and expense any Latent Defect which appears before the expiry of the Latent Defects Liability Period.

41. Support beyond the Guarantee Period

- 41.1. The Contractor shall ensure the availability of spare parts and necessary technical support for a minimum period of ten (10) years following the completion of the equipment guarantee period under the contract. The Contractor must notify BYPL at least twelve (12) months in advance of the End of Life Support for the supplied product or technology.

42. Return, Replacement or Substitution

- 42.1. BYPL shall promptly notify the Contractor upon identification of any defective commodity. At its sole discretion, BYPL may return such defective commodities to the Contractor for replacement at no cost to BYPL or reject the commodities and procure the same or similar items from a third party. In the event of such third-party procurement, BYPL shall provide the Contractor with proof of the replacement purchase cost.
- 42.2. All costs associated with replacement, substitution, shipping, labor, and other related expenses incurred in connection with the return and replacement or third-party procurement

of the commodity shall be borne by the Contractor. BYPL reserves the right to deduct such costs from any payments due to the Contractor.

42.3. Should the cost of the substitute commodity exceed the price quoted in the Contractor's bid, the Contractor shall reimburse BYPL for the difference.

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

43. Effective Date of Commencement of Contract

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

44. Time - The Essence of Contract

44.1. The date specified for completion of the "Project" in the Letter of Acceptance or Purchase Order issued to the Contractor shall be deemed to be of the essence of the Contract. The Contractor is required to complete the Project on or before the stipulated schedule and completion date.

45. Project Completion Timelines

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

Package Name	Total Months for Handing over of the Package, From Zero Date	Total No. of Days for Handing over of the Package From Zero Date
Survey, Design, Supply, Laying, Jointing, Testing And Commissioning of Cables With Required Accessories as per the Scope of Work on Turnkey Basis	5 months	150 days

45.2. The Contractor shall submit a detailed PERT chart or L2 Network plan for execution of the awarded package to BYPL for review and approval within fifteen (15) days of issuance of Letter of Intent (LOI) or Letter of Award (LOA). The detailed execution schedule, including intermediate milestones, shall be as follows:

45.2.1. Timeline:

SL NO	ACTIVITY	TIMELINE
1	Zero Date (Letter of Intent/Award)	Zero Date
2	Mobilization of manpower	15 days from Zero Date
3	Submission of Drawings/Documents/calculations for Engineering Approval	15 days from Zero Date
4	Engineering Approvals	30 days from Zero Date
6	Procurement/Supplies	75 days from Zero Date
7	Testing & Commissioning of line	130 days from Zero Date or as per the mutually agreed schedule
8	Handing Over	150 days from Zero Date or as per the mutually agreed schedule

45.3. Delivery shall be at F.O.R BYPL - Delhi stores/sites.

- 45.4. The Contractor shall submit a deployment plan for Tools & Plants (T&P) and manpower required for the project. Failure to deploy required T&P, manpower, or construction materials may result in the Employer arranging these at the Contractor's cost plus a 20% service charge, deductible from payments due.
- 45.5. The Contractor shall mobilize the team at site immediately upon receipt of order and plan round-the-clock parallel working to meet schedule milestones.
- 45.6. Weekly progress meetings shall be held on site between the Contractor and Engineer-in-Charge. The Contractor shall submit a weekly report detailing manpower deployment and major milestones achieved.
- 45.7. Strict adherence to the agreed schedule is mandatory. Failure to maintain quality or timeliness may result in the Employer withdrawing work wholly or partially without notice or liability.
- 45.8. Project schedules shall be periodically reviewed with the Employer, who may direct corrective actions including additional resources or night work at no extra cost. The Employer reserves the right to revise work schedules to meet project requirements without entitlement for extra payment.
- 45.9. The Contractor shall carry out work on Sundays and holidays, except National Holidays, if required to meet the schedule with prior written permission from Engineer-in-Charge.
- 45.10. BYPL Engineer-in-Charge shall certify final completion of work.

46. Extension of Time and Time Overrun

- 46.1. Extension of time may be granted at the Company's discretion if delays are not the Contractor's fault, subject to the Contractor submitting detailed justification within ten (10) days of the delay's occurrence. Such extension does not warrant any increase in contract price and does not prejudice the Company's right to recover liquidated damages.

47. Liquidated Damages

47.1. LD FOR DELAY IN COMPLETION OF WORK

- 47.1.1. Time is the essence of the Contract. Following issuance of the Letter of Intent/Letter of Award, the contractual network (L2 network) shall be finalized and approved by BYPL. The Contractor must adhere strictly to the agreed completion schedule and intermediate milestones.
- 47.1.2. If the Contractor fails to successfully hand over the awarded Packages within the agreed contract completion schedule, the contractor shall pay to the Purchaser, Liquidated damages for the delayed period at the rate of 0.5% of the total contract price per each week of delay or Pro-rata thereof, by which the Completion is delayed.
- 47.1.3. The maximum liquidated damages (LD) for delay shall not exceed 10% of the Contract Value.
- 47.1.4. It is agreed that liquidated damages constitute a genuine pre-estimate of damages and are not a penalty.

47.2. LD ON INTERMEDIATE MILESTONE

- 47.2.1. Liquidated Damages shall be applicable on the delay in achieving Intermediate milestone as agreed in the L2 Network which shall be at the rate of 0.5% of the total contract price per each week of delay of Intermediate milestone or Pro-rata thereof, by which the Milestones are delayed.
- 47.2.2. LD on delayed milestones may be redeemed if delays are subsequently compensated and the package is handed over within the agreed schedule.

47.3. OVERALL LIQUIDATED DAMAGES:

47.3.1. The overall Maximum LD for delay is 10% of the Contract Value.

47.3.2. However, the total Liquidated Damages for delay will be limited as hereinafter provided below.

47.3.3. Notwithstanding the above, in the event the Contractor fails to complete the package as per the schedule; and delays the "Handling Over" of the package up to a period for which the liquidated damage for time delay becomes more than ten percent (10%) of the Contract Price, then the Purchaser at his sole discretion, shall be entitled to treat the failure as an act of default by the Contractor and same shall entitle the Purchaser to terminate the Contract.

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

47.5. 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 Contractor or from the Performance Bond or file a claim against the Contractor.

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

48. Recoveries

48.1. Whenever any sum is recoverable from the Contractor under this contract, the Purchaser shall be entitled to recover such amount by appropriating, in whole or in part, any sums due or that may become due to the Contractor under this contract. If such sums are insufficient to cover the full amount recoverable, the Contractor shall pay the outstanding balance to the Purchaser upon demand.

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

49.1. If the Contractor's establishment falls under the scope of the Micro, Small and Medium Enterprises Development Act, 2006 and its amendments, the Contractor shall declare this status within the bid. Failure to do so will be deemed as confirmation that the Contractor is a non-MSME unit. The Contractor must also submit a copy of the Udyog Aadhaar (UA) and Udyam Registration Number, along with the PAN number.

50. Transfer and Subcontracting

50.1. The Contractor shall not subcontract, transfer, assign, or otherwise part with the Contract or any part thereof, either directly or indirectly, without the prior written approval of the Purchaser.

50.2. Notwithstanding any subcontracting, the Contractor shall remain entirely responsible for the execution, completion, and satisfactory performance of the Work, in full compliance with the Purchase Order, specifications, approved drawings, and data sheets. The Contractor shall also be fully accountable for any acts, omissions, defaults, or negligence of any subcontractor.

51. Intellectual Property Rights and Royalties

51.1. The Contractor shall indemnify the Purchaser and the Purchaser's Representative against all claims and proceedings arising from infringement or alleged infringement of any patent rights, registered designs, copyright, design, trademark, trade name, know-how, or other intellectual property rights (collectively referred to as "Intellectual Property Rights") relating to the Works, Contractor's equipment, machines, methods, plant, materials, or anything required for execution of the Works. In case of infringement, the Contractor shall, at its own cost, either

rectify, modify, or replace the infringing item so that infringement ceases, or procure necessary rights or licenses from the affected third party.

- 51.2. 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 that 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 the 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.
- 51.3. Intellectual Property Rights in any plant, materials, drawings, designs, plans, documents, specifications, data, know-how, charts, or information provided by the Purchaser remain the sole property of the Purchaser. The Contractor has only a limited right to use these for execution of the Works.
- 51.4. 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.
- 51.5. 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 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.
- 51.6. 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.
- 51.7. 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).

52. Contractor Code of Conduct

- 52.1. Contractor acknowledges having reviewed the BYPL policy on legal and ethical code required to be followed by Contractors encapsulated in the "Vendor/Contractor Code of Conduct" displayed on the official website of BYPL (www.bsedelhi.com) also, which shall be treated as a part of the agreement/contract/PO/WO.
- 52.2. Contractor undertakes that he shall adhere to the Contractor Code of Conduct and also agrees that any violation of the Contractor Code of Conduct shall be treated as breach of the agreement/contract/PO/WO.

- 52.3. In event of any such breach, irrespective of whether it causes any loss/damage, company (BYPL) shall have the right to recover loss/damage including liquidated damages from Contractor.
- 52.4. The Contractor hereby indemnifies and agrees to keep indemnified the company (BYPL) against any claim/litigation/liability/penalty including litigation cost arising out of any violation of Contractor Code of Conduct by the Contractor or its officers, agents & representatives etc.

53. Limitation of Liability

- 53.1. Except in cases of willful misconduct, fraud, or gross negligence, neither Party shall be liable to the other for loss of use of any works, loss of profit, loss of contracts, or any other indirect or consequential damages arising out of or in connection with the Contract. The total liability of the Contractor to the Purchaser under this Contract shall not exceed the Contract Value.
- 53.2. Notwithstanding the above, this clause shall not limit the liability of the Contractor in the following cases:
- 53.2.1. Fraud, willful misconduct, or unlawful acts
 - 53.2.2. Acts or omissions that violate the fundamental rules of diligence that a conscientious Contractor would observe under similar circumstances
 - 53.2.3. Intellectual property infringement
 - 53.2.4. Breach of confidentiality or data security obligations
 - 53.2.5. Tax and statutory dues liabilities
 - 53.2.6. Recovery of liquidated damages
 - 53.2.7. Third-party death or personal injury

54. Liability of Suppliers/Contractors

- 54.1. Subject to the due discharge of its obligations under the Contract and except in case of willful misconduct, fraud, or gross negligence 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 that the Contractor may be entitled to receive from any insurance purchased by the Contractor to cover such a liability, whichever is higher.
- 54.2. This limitation of liability shall not affect the Contractor's liability, if any, for damage to third-party property or injury or death of a person due to negligence of the Contractor or any Person or firm acting on behalf of the Contractor in executing the order.
- 54.3. Notwithstanding anything contained in the Contract, the Contractor shall not be liable for any willful misconduct, fraud, or gross negligence on the part of the Purchaser or any of its affiliates, any Contractor, or any party, other than Contractor and/or, its directors, officers, agents or representatives or its affiliates, or SubContractor, or the Contractor or any third party engaged by it.
- 54.4. Notwithstanding anything contained in the Contract, including but not limited to approval by the Purchaser of any drawings, documents, Contractor 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.

55. Indemnification

- 55.1. The Contractor shall indemnify and hold harmless the Company from and against any and all liabilities, claims, damages, losses, or expenses arising out of or resulting from:
- 55.1.1. any breach non-observance or non-performance by contractor or its employees or agents of any of the provisions of this Work Order.
 - 55.1.2. any act or omission of contractor or its employees or agents.
 - 55.1.3. 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.
 - 55.1.4. Any damages or loss related to free-issued materials, for which the Bidder shall submit an Indemnity Bond.
- 55.2. The Contractor shall at all times indemnify the Company against all liabilities to third parties, including employees or agents of the Company or the Contractor, for bodily injury, property damage, or any other loss arising out of or in connection with the execution or completion of the Works. This includes all costs, charges, and expenses incurred by the Company due to claims from such persons.

56. Events of Default

- 56.1. Each of the following events or occurrences shall constitute an event of default under the Contract:
- 56.1.1. The Contractor fails or refuses to pay any amounts due under the Contract;
 - 56.1.2. The Contractor fails or refuses to deliver Commodities conforming to this RFQ/specifications, or fails to deliver Commodities within the period specified in P.O. or any valid extension thereof;
 - 56.1.3. The Contractor 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 Contractor's creditors file any petition relating to bankruptcy of Contractor;
 - 56.1.4. The Contractor fails to complete the works in accordance with the approved schedule of works.
 - 56.1.5. The Contractor fails to comply with any reasonable instructions or directions issued by the Company in connection with the execution of the works.
 - 56.1.6. The Contractor 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 Contractor of notice of such failure from BYPL specifying the failure.

57. Consequences of Default

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

58. Force Majeure

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

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

58.2. Specific Events of Force Majeure

- 58.2.1. Subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements:
 - 58.2.1.1. Natural elements or other acts of God, such as storms, floods, earthquakes, lightning, cyclones, landslides, or other natural disasters.
 - 58.2.1.2. Explosions or fires.
 - 58.2.1.3. Epidemics, pandemics, or plagues.
 - 58.2.1.4. Declared war by the Government of India.
 - 58.2.1.5. Dangers of navigation or perils of the sea.
 - 58.2.1.6. Cyber security incidents impacting grid operations.
 - 58.2.1.7. Pandemic-related lockdowns.
 - 58.2.1.8. Climate change events beyond traditional natural disasters.
 - 58.2.1.9. Embargoes.
 - 58.2.1.10. Supply chain or industrial disturbances beyond reasonable control.

58.2.2. Note: Force Majeure shall not apply to financial inability, labor shortages, power failures, strikes, accidents, or subcontractor defaults.

58.3. Notice of Events of Force Majeure

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

58.4. Mitigation of Events of Force Majeure

- 58.4.1. Each Party shall:
 - 58.4.1.1. Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure including recourse to alternate methods of satisfying its obligations under the Contract;

- 58.4.1.2. Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and
- 58.4.1.3. Keep the other Party informed at regular intervals of the circumstances concerning the event of Force Majeure, with best estimates as to its likely continuation and what measures or contingency planning it is taking to mitigate and or terminate the Event of Force Majeure.

58.5. Burden of Proof

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

58.6. Termination for Certain Events of Force Majeure

- 58.6.1. If any obligation of any Party under the Contract is or is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 3 months, the Parties shall promptly discuss in good faith how to proceed with a view to reaching a solution on mutually agreed basis. If a solution on mutually agreed basis cannot be arrived at within a period of 30 days after the expiry of the period of three months, the Contract shall be terminated after the said period of 30 days and neither Party shall be liable to the other for any consequences arising on account of such termination.
- 58.6.2. The Purchaser may terminate the contract after giving 7 (seven) days' notice if any of the following occurs:
 - 58.6.2.1. Bidder fails to complete the execution of works within the approved schedule of works, terms and conditions.
 - 58.6.2.2. In case the Bidder commits any Act of Insolvency, or is adjudged insolvent
 - 58.6.2.3. Has abandoned the contract
 - 58.6.2.4. Has failed to commence work or has suspended the progress of works
 - 58.6.2.5. Has failed to proceed with the works with due diligence and failed to make such due progress

58.7. Limitation of Force Majeure event

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

58.8. Extension of Contract Period due to Force Majeure event

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

58.9. Effect of Events of Force Majeure

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

59. Suspension or Extension

- 59.1. The Purchaser reserves the right to suspend or reinstate execution of the whole or any part of the Works without affecting the validity of the Contract provisions. Any orders for suspension or reinstatement shall be provided to the Contractor in writing. The completion time for the Works will be extended by a period equivalent to the duration of the suspension.
- 59.2. For any aggregate suspension period less than six (6) months, the Contractor shall not be entitled to claim reimbursement. If the suspension of the Works extends beyond six (6) months, the Purchaser will reimburse the Contractor only for necessary and demonstrable direct costs incurred, subject to satisfactory substantiation. Overheads, incidentals, and profit shall not be considered. The Purchaser's decision regarding such claims will be final and binding. The Purchaser shall bear no liability for suspension or delay arising from any default on the part of the Contractor or its sub-contractors; the Purchaser's decision in this respect shall also be final and binding.

60. Protection of Property

- 60.1. The Contractor shall be fully responsible for any damage caused by its operations. The Contractor shall ensure the protection of all persons, including members of the public, employees of the Purchaser, employees of the Contractor and subcontractors, and safeguard all public and private property, including structures, buildings, plants, equipment, and utilities-whether located above or below ground.
- 60.2. The Contractor shall provide and maintain all necessary safety measures, such as barriers, signboards, warning lights, and alarms, to ensure adequate protection of persons and property. The Contractor shall give reasonable notice to the Purchaser and any affected parties regarding public or private property and utilities that may be subject to damage during the execution of the works, and shall coordinate all necessary arrangements for the removal, replacement, or protection of such property and utilities with the concerned authorities.

61. Severability

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

62. Waiver of Rights

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

63. Cleanliness & Precautions at Site

- 63.1. All debris shall be removed and disposed of at assigned areas on daily basis. Surplus excavated earth shall be disposed of in an approved manner. In short, the contractor shall be fully responsible for keeping the work site clean at all times. In case of non-compliance, company shall get the same done at Contractor's risk and costs.
- 63.2. While carrying out any civil work including road/ pit digging, plinth/ fence making, road restoration etc. contractor shall adhere to below mentioned guidelines:
- 63.2.1. No construction material/ debris shall be stored on metalled road.

- 63.2.2. Windbreakers of appropriate height on all sides of earmarked area using CGI sheets shall be raised to ensure that no construction material dust fly outside earmarked area.
- 63.2.3. The construction material i.e. coarse sand, stone aggregates, excavated earth, cement and any other material to and from the site shall be transported under wet and covered condition to ensure their non-slippage en-route to avoid air contamination.
- 63.2.4. The contractor shall provide mask and helmet to every worker working on the construction site and involved in loading/unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.
- 63.2.5. Overloading of vehicles shall be strictly prohibited.
- 63.2.6. The construction material at site shall be stored under wet and covered conditions.
- 63.2.7. The dumping sites for temporarily storing the excavated earth shall be properly levelled, watered and rehabilitated by plantation to avoid flying of dust.
- 63.2.8. The worker at the site shall be sensitized to adopt/observe the dust-controlled measures in true spirit.
- 63.2.9. If any C&D waste is generated at site the same will be transported to the C&D waste site only and the record for the same will be maintained by the agency.
- 63.2.10. Wet jet in grinding and stone cutting is being permitted at site.
- 63.2.11. The necessary record for dust control is being maintained by the department on day to day basis and being monitored regularly.
- 63.2.12. Bidder shall ensure that no tree shall be harmed and no tree roots shall be destroyed/cut while performing the task under contract.
- 63.2.13. Contractor shall comply the provisions of The Delhi Preservation of Trees Act 1994.
- 63.2.14. The Execution Contractors shall be responsible for all the preventive and protective environmental steps as per guidelines. Any violations from the above guidelines have been viewed very seriously by the authorities. Concerned agency is liable for the penalties / other actions by the authorities, The Agency shall indemnify BYPL from all liabilities on this account.

64. Safety Code

- 64.1. The Contractor shall ensure that all safety precautions required by applicable laws are strictly observed at the work site. The Contractor shall be fully responsible for the safety of its workers, as well as all other personnel present at the site or premises. No worker under the age of eighteen (18) years shall be employed by the Contractor.
- 64.2. The Contractor shall comply with all safety requirements as detailed in the Company's Safety Manual, accessible at <https://www.bsesdelhi.com>, throughout all phases of the Contract.
- 64.3. Where subcontracting is approved in writing by the Company, the main Contractor shall ensure that all safety provisions are enforced by subcontractor personnel.
- 64.4. Contractors employing two hundred (200) or more employees, including contract workers, shall appoint a dedicated Safety Coordinator to oversee compliance with contractual safety obligations. Contractors with fewer employees shall nominate an employee to fulfill this role. The Safety Coordinator shall liaise with the Company's Safety Officer and have their name prominently displayed on a notice board at the work site.
- 64.5. The Contractor shall be fully liable for any non-compliance with safety measures, including consequences such as injuries, fatalities, and associated compensation liabilities.
- 64.6. In the event of any accident, the Contractor shall immediately submit a detailed report to the Owner and Safety Officer outlining the circumstances, injuries or fatalities, extent of property damage, and remedial measures taken to prevent recurrence. Additionally, the Contractor shall provide a monthly summary report of all accidents to the Owner.

65. Statutory Obligations

- 65.1. The Contractor shall comply with all applicable laws, by-laws, regulations, various Acts, Rules, codes, and standards including but not limited to
- 65.1.1. -The Child Labour (Prohibition & Regulation) Act, 1986,
 - 65.1.2. -The Contract Labour (Regulation & Abolition) Act, 1970,
 - 65.1.3. -The Employees Pension scheme, 1995,
 - 65.1.4. -The Employees Provident Funds and Miscellaneous Provisions Act, 1952,
 - 65.1.5. -The Employees State Insurance Act, 1948,
 - 65.1.6. -The Equal Remuneration Act, 1976,
 - 65.1.7. -The Industrial Dispute Act, 1947,
 - 65.1.8. -The Maternity Benefit Act, 1961,
 - 65.1.9. -The Minimum Wages Act, 1948,
 - 65.1.10. -The payment of Bonus Act, 1965,
 - 65.1.11. -The Payment of Gratuity Act, 1972,
 - 65.1.12. -The Payment of Wages Act, 1936,
 - 65.1.13. -The Delhi Shops & Establishment Act, 1954,
 - 65.1.14. -The Company's Liability Act, 1938,
 - 65.1.15. -The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013,
 - 65.1.16. -The Delhi Preservation of Trees Act 1994,
 - 65.1.17. -The Workmen Compensation Act, 1923,
 - 65.1.18. -Building and Other Construction Workers (Employment and Regulations) Act 1996,
 - 65.1.19. -Building and Other Construction Workers (Cess) Act 1996,
 - 65.1.20. -The Employers Liability Act, 1938,
 - 65.1.21. -Indian Electricity Act, 2003 and Indian Electricity Rules,
 - 65.1.22. -GST tax,
 - 65.1.23. -And all other applicable laws, as amended, including any statutory approvals required by Central or State Government authorities, including the Ministry of Labour.
- 65.2. The Contractor shall indemnify the Purchaser fully for any financial liabilities arising out of non-compliance with the above provisions.
- 65.3. The Contractor shall comply all laws of the land and prevailing orders issued by various Govt Departments like Dept. of Power/DERC/NGT/Dept. of Forest/Dept. of Environment/DPCB/CPCB/Court orders etc. Broadly, the compliance shall be as detailed below, but not limited to:
- 65.3.1. An Electrical license.
 - 65.3.2. PF Code No. and all employees to have PF A/c No. under PF every Act, 1952.
 - 65.3.3. All employees to have a temporary or permanent ESI Card as per ESI Act.
 - 65.3.4. ESI Registration No.
 - 65.3.5. Sales Tax registration number, if applicable.
 - 65.3.6. PAN No.
 - 65.3.7. Work Contract Tax Registration Number/ VAT Registration.
 - 65.3.8. Labour License under Contract Labour Act (R & A) Act 1970.
 - 65.3.9. Delhi Building and other Construction Workers (Regulation of Employment and Conditions of Services) Rules, 2002(B.O.C.W.)
 - 65.3.10. Additional obligations include:
 - 65.3.10.1. Procuring a third-party Insurance Policy before starting work
 - 65.3.10.2. Adhering to the Minimum Wages Act applicable in the state
 - 65.3.10.3. Ensuring payment of salaries/wages exclusively via ECS into employees' bank accounts by the 7th of the succeeding month; in exceptional cases, crossed cheques may be issued, with full disclosure to HR (CMC)
 - 65.3.10.4. Maintaining accurate Wage and Attendance Registers
 - 65.3.10.5. Providing and maintaining a First Aid Box at the site

- 65.3.10.6. Submitting latest PF and ESI challans with certificates confirming timely deduction and deposit of contributions for all employees
- 65.3.10.7. Securing a Workman Compensation Policy, if applicable
- 65.3.10.8. Securing Labour License before starting work, if applicable

65.4. Prior to commencement, the Contractor shall provide the Company with permanent PF Code and ESI details of all employees.

66. Staff and Workman

66.1. It shall be the responsibility of the Contractor to:

- 66.1.1. Obtain the necessary Contract Labour License from the relevant authorities and maintain liaison with them. The Company shall provide required forms for obtaining such licenses. However, the Contractor shall bear all associated expenses, including registration with the Provident Fund Department relevant to the scope of work. The Contractor shall ensure monthly PF deposits for all staff and labor and furnish all related documentation to the Company.
- 66.1.2. Obtain and maintain workman insurance coverage for all deployed workers.
- 66.1.3. Maintain proper records for all employed workers in the form of various registers, including but not limited to:
 - 66.1.3.1. Register of workmen
 - 66.1.3.2. Register of muster rolls
 - 66.1.3.3. Register of overtime
 - 66.1.3.4. Register of wages
 - 66.1.3.5. Any other registers required by the latest amendments to labour laws
- 66.1.4. Maintain all records in the prescribed formats.
- 66.1.5. Disburse monthly wages to workers and supervisors promptly and in the presence of Company representatives or as directed by labour authorities.
- 66.1.6. Maintain proper liaison with Project authorities, local police, and all other relevant governmental or local bodies.
- 66.1.7. Pay all workmen no less than the minimum wages prescribed under applicable State or Central labour laws. The Contractor shall ensure full compliance with the Minimum Wages Act, PF Act, ESIC Act, Workmen Compensation Act, Contract Labour Regulation and Abolition Act, and all related rules. In case of statutory non-compliance, the Company reserves the right to act at the risk and cost of the Contractor.
- 66.1.8. Employ the required number of skilled, semi-skilled, and unskilled workers as per site requirements to complete the project on schedule. The Contractor shall provide necessary safety equipment such as safety shoes, helmets, belts, and gloves to all workers and staff during erection and other works.
- 66.1.9. Employ adequate engineering and supervisory staff to ensure timely project completion. The day-to-day management and supervision of site works shall be the responsibility of the Contractor's Engineer-in-Charge, who will report to the Company's Engineer-in-Charge and assist in overall project execution.

67. Insurances

- 67.1. The Contractor shall be responsible for insuring its personnel, materials, and machinery deployed at the site for the awarded package. Copies of such insurance policies shall be furnished to the Purchaser prior to the start of work.
- 67.2. The Contractor, at their own cost, shall procure and maintain a Comprehensive Marine cum Storage cum Erection (MSE) insurance policy covering the entire Project cost.
- 67.3. Such insurance coverage shall be held jointly in the names of the Purchaser and the Contractor. The Contractor shall have the authority to liaise directly with the insurance

company or companies throughout the Contract period and shall be responsible for maintaining all insurance policies in force.

67.4. The Contractor shall bear all risks of loss or damage to equipment during handling, transportation, storage, erection, commissioning, and all activities until the satisfactory completion and handover of Performance Guarantee tests of the plant. The Contractor shall promptly present all claims and shall be responsible for repairing or replacing any damaged or lost equipment.

67.5. For all insurance policies obtained, the Contractor shall handle claim settlements directly with underwriters without imposing any liability on the Purchaser. The Contractor shall arrange for replacement or rectification promptly without awaiting insurance claim settlements, bearing all related costs. Such events shall not entitle the Contractor to any extension of contract time or additional cost claims.

67.6. Marine Transit Risk and Erection All Risk Coverage:

67.6.1. The Contractor shall secure coverage for marine transit risk related to supply materials at 100% of their declared value and erection all-risk coverage for 100% of the Project cost. This coverage shall include, but is not limited to, loss or damage from AOG perils, earthquakes, and acts of terrorism.

67.7. Third Party Insurance:

67.7.1. Prior to commencing work, the Contractor shall obtain third-party insurance at their own cost to cover any loss, damage, or injury to property or persons (including those of the public, employees, and representatives of any outside agency or the Company) arising out of or in connection with performance of the work or temporary works. The Contractor shall be responsible for settling all claims related to third-party insurance without involving the Purchaser/Owner and shall promptly arrange replacement or rectification at their own cost.

67.8. Group Personal Accident Insurance:

67.8.1. The Contractor shall secure accidental insurance coverage for all staff deployed under this Agreement, covering death, permanent total disability, and partial permanent disability due to external accidents, with a minimum coverage of Rs. 15 Lakh (Table C). Permanent total disability coverage shall be 125% of the basic sum assured. The Contractor shall ensure same-day on-the-spot claim settlement with the legal heirs of any victim, without awaiting insurance claim settlements and without any liability on BYPL. The Contractor shall bear the full premium costs of this coverage and provide copies of all relevant policies within fifteen (15) days of commencement of work.

67.9. Workman Compensation:

67.9.1. The Contractor shall obtain and maintain a valid insurance policy under the Workman Compensation Act to cover all workers who are not already covered under Employees' State Insurance (ESI) and Provident Fund (PF), engaged in executing the jobs covered under this Contract. A copy of the insurance policy shall be provided to the Company for reference and record-keeping. If all workers are covered under ESI and PF, the Contractor shall certify this status to the Company.

67.9.2. The Contractor shall indemnify and keep the Company indemnified against all claims for compensation under the provisions of the Workmen Compensation Act, 1923, as amended from time to time, or under any other applicable law related to compensation payable to workers employed by the Contractor, subcontractors, or agents for work under this Contract. This indemnity includes all costs, expenses, and

liabilities incurred by the Company in connection with such claims, without prejudice to the Company's rights to recover amounts.

- 67.9.3. The Company shall be entitled to deduct from any amounts due or to become due to the Contractor all moneys paid or payable in connection with such claims, costs, or expenses. The Contractor agrees to abide by the Company's decision concerning the sums payable under this clause.

68. Human Resource Issues

- 68.1. The Contractor shall execute the works using its own resources and shall bear all costs related to salaries, allowances, perks, travel expenses, advances, insurance, safety measures, security, transportation, and any other miscellaneous expenses for their employees and workmen during the tenure of the Annual Maintenance Contract (AMC). The Contractor shall also be solely responsible for payments related to outpatient care, hospitalization, and compensation in the event of any accident, injury, or death.
- 68.2. The issuance of ID cards for the Contractor's workforce shall be managed exclusively by the BYPL Security ID Card Cell. Contractors must maintain records of identity cards and promptly collect and return cards upon employee separation. Failure to comply will attract penalties. Contractors shall submit a detailed employee list to BYPL Security prior to contract commencement.
- 68.3. The Contractor shall deploy manpower immediately as required to perform the specified work.
- 68.4. The Contractor must ensure that no disputes arise concerning service conditions or payments during the contract period. Employees of the Contractor shall not make claims or demands on the Company for employment, wages, allowances, or related matters at any time.
- 68.5. The Contractor shall not deploy personnel below 18 years of age and shall not deploy female workers between 7 PM and 6 AM.
- 68.6. The Contractor shall be solely responsible for any disputes arising between it and its employees and shall indemnify the Company against all resultant losses, damages, and claims. All legal dues to employees must be paid timely or within eight days post-termination.
- 68.7. The Contractor shall provide and ensure regular use of all necessary safety gear by its workforce, including safety shoes, helmets, gloves, belts, goggles, etc., at its own cost.
- 68.8. The Contractor shall maintain discipline among its workforce and adhere to the Company's disciplinary procedures at the site. The Company reserves the right to object to the presence of any Contractor employee deemed to exhibit misconduct or negligence; such personnel must be replaced immediately upon request.
- 68.9. The Contractor shall ensure compliance with:
- 68.10. Payment of minimum wages as notified by the Government of the National Capital Territory of Delhi
- 68.11. Salary disbursement strictly via ECS
- 68.12. Timely deduction and deposit of ESI and PF contributions, with submission of relevant documentation to the Company
- 68.13. The Company reserves the right to require Contractor services on holidays or beyond normal working hours, with written communication provided by the Engineer In-Charge.

- 68.14. The Contractor shall ensure none of its personnel engage in activities detrimental to the Company's interests. Any violations may lead to actions as per tender terms.
- 68.15. The Contractor is responsible for all applicable taxes and duties payable to central, state, or local authorities.
- 68.16. Contractor employees shall not be considered employees of the Company and are not entitled to Company benefits or facilities. Should the Company incur liabilities due to Contractor employee-related laws or enactments, such costs shall be recoverable from the Contractor, including any sums payable.
- 68.17. The Contractor shall fully comply with all applicable statutory Acts.
- 68.18. The Contractor shall submit compliance documentation as per the format attached as Annexure I.
- 68.19. The Contractor shall adhere to the Vendor/Bidder Code of Conduct as specified in the NIT.

69. Environmental, Health & Safety Plan

- 69.1. 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:
- 69.1.1. Comply with all of the elements of the EHS Plan and any regulations applicable to the work.
 - 69.1.2. Comply with the procedures provided in the interests of Environment, Health and Safety.
 - 69.1.3. Ensure that all of their employees designated to work are properly trained and competent.
 - 69.1.4. 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 Contractors' instructions.
 - 69.1.5. Make arrangements to ensure that all employees designated to work on or visit the site present themselves for site induction before the commencement of work.
 - 69.1.6. Provide details of any hazardous substances to be brought onsite.
 - 69.1.7. Ensure that a responsible person accompanies any of their visitors to site.
 - 69.1.8.
 - 69.1.9. All contractor's staff are accountable for the following:
 - 69.1.10.
 - 69.1.11. 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.
 - 69.1.12. Keep tools in good condition.
 - 69.1.13. Report to the Supervisor any unsafe or unhealthy condition or any defects in plant or equipment.
 - 69.1.14. Develop a concern for safety for themselves and for others.
 - 69.1.15. Prohibit horseplay.
 - 69.1.16. Not to operate any item of plant unless they have been specifically trained and are authorized to do so.

70. Call Before U Dig (CBuD)

- 70.1. General Requirement: For all new or existing works involving trenching, digging, or any form of earthwork, the Contractor shall strictly comply with the Call Before U Dig (CBuD) scheme as notified by the Department of Telecommunications (DoT), Government of India, and as amended from time to time.

70.2. Contractor's Obligations: The Contractor shall be required to:

- 70.2.1. Register or enroll on the CBuD mobile application or web portal (cbud.gov.in) prior to initiating any digging or excavation activity within the project area.
- 70.2.2. Submit detailed project/work information, including exact location coordinates and execution schedule, through the CBuD platform to initiate an enquiry.
- 70.2.3. Provide prior intimation to the concerned utility or asset owners through the CBuD system—at least 48 hours in advance for emergency works and 7 days in advance for normal works—before commencing excavation.
- 70.2.4. Coordinate with all relevant asset owners and obtain their acknowledgment or consent (or deemed consent upon expiry of the prescribed response period) prior to starting any site work.
- 70.2.5. Exercise utmost care to prevent damage to underground utilities or assets; in case of accidental damage or exposure, immediately inform the concerned agency and the contracting authority.
- 70.2.6. Adhere to all terms, conditions, and operational protocols of the CBuD platform, along with any specific instructions issued by the asset owners or the contracting authority.
- 70.2.7. Accept full responsibility for any non-compliance with CBuD requirements and for all liabilities, damages, or service disruptions resulting from such non-compliance or from damage to underground utilities.

70.3. Key Compliance Requirements

- 70.3.1. **Registration Proof:** The Contractor may be required to submit proof of CBuD registration as part of the technical bid submission.
- 70.3.2. **Condition of Contract:** Compliance with the CBuD process is both a general and special condition of the contract. Non-compliance may attract penalties, including debarment or termination of the contract.
- 70.3.3. **Site Awareness:** This clause ensures that the Contractor has inspected the site, is aware of the presence of potential underground utilities, and has adopted mandatory preventive measures to avoid damage.
- 70.3.4. **Risk Mitigation:** Implementation of this clause ensures effective coordination and minimizes economic losses and public inconvenience arising from accidental damage to underground infrastructure.

70.4. Penal Provisions for Non-Compliance

- 70.4.1. The Contractor shall be liable to compensate the concerned infrastructure owner for any damage caused to existing utilities or infrastructure during excavation.
- 70.4.2. The Contractor shall at all times indemnify and hold BYPL harmless from all actions, suits, proceedings, costs, damages, charges, claims, and demands of every nature brought against BYPL, its officers, or employees in connection with loss, damage, or injury resulting from operations conducted by the Contractor.
- 70.4.3. In addition, the Contractor shall reimburse or pay to BYPL, forthwith upon demand and without protest or demur, all losses, charges, expenses, and damages incurred by BYPL in consequence of any such claims or actions arising out of or related to the Contractor's operations.

71. Guidelines Regarding Inspection & Maintenance of Pits/Dugs

71.1. The contractor shall ensure strict compliance of the following directions:

- 71.1.1. The sites of all manholes, pits, holes, tanks or any other opening in the ground of any kind shall be regularly inspected and maintained.
- 71.1.2. Schedule and protocols of inspections and maintenance shall be drawn up and notified to BYPL.
- 71.1.3. These sites shall be cordoned off to render them inaccessible to the public.
- 71.1.4. The existence of these sites shall be clearly & visibly marked by the display of signboards/ signages.
- 71.1.5. If they are required to be covered, it shall be ensured that the covers are in place.

- 71.1.6. If required, as per law, prior permission from authorities shall be secured before the commencement of work.
- 71.1.7. Bidder shall follow all laws of the land and prevailing borders issued by various Govt departments like Dept of Power / DERC /NGT/ Dept of Forest/Dept of Environment/DPCB/Court Orders etc.

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

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

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

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

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

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

72.2. DUST MITIGATION MEASURES FOR CONSTRUCTION & DEMOLITION ACTIVITIES

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

- 72.2.1.1. Dust/wind breaking walls of appropriate height around the periphery of the construction site.
- 72.2.1.2. Installation of Anti Smog Gun(s) (for >20,000 m2 built up area).
- 72.2.1.3. Tarpaulin or green net on scaffolding around the area under-construction and the building.
- 72.2.1.4. All vehicles including carrying construction material and construction debris of any kind should be cleaned and wheels washed.
- 72.2.1.5. All vehicles carrying construction material and construction debris should be fully covered and protected.
- 72.2.1.6. All construction debris and construction material of any kind should be stored on the site and not dumped on public roads or pavements.
- 72.2.1.7. No loose soil or sand or Construction & Demolition Waste or any other construction material which may cause dust, shall not be left uncovered.
- 72.2.1.8. No grinding and cutting of building materials in open area. Wet jet should be used in grinding and stone cutting.
- 72.2.1.9. Unpaved surfaces and areas with loose soil should be adequately sprinkled with water to suppress dust.
- 72.2.1.10. Roads leading to or at construction sites must be paved and blacktopped i.e., metallic roads (for >20,000 m2 built up area).
- 72.2.1.11. Construction and demolition waste should be recycled on-site or transported to authorized recycling facility and due record of the same should be maintained.
- 72.2.1.12. Every worker working on construction site and is involved in loading, unloading and carriage of construction material and construction debris should be provided with dust-mask to prevent inhalation of dust particle.
- 72.2.1.13. Arrangement should be provided for medical help, investigation and treatment to workers involved in the construction of building and carry of construction material and debris relatable to dust emission.
- 72.2.1.14. Dust mitigation measures shall be displayed prominently at the construction site for easy public viewing.
- 72.2.1.15. Ensure the compliance of all dust control measure.

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

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

73. Commissioning & Acceptance Test

- 73.1. Upon completion of the Works, the Contractor shall conduct a trial run or operational test in the presence of the Engineer In Charge. The system shall be operated under the Contractor's supervision during this period. The Contractor shall promptly undertake any necessary rectifications or modifications identified during the trial run.
- 73.2. Upon satisfactory completion of the trial run, the system shall be considered energized and placed into commercial operation. The Engineer In Charge will issue a certificate of acceptance confirming successful commissioning.

74. Work Completion Certification, Handing Over

- 74.1. 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.
- 74.2. Upon the successful completion of all testing and commissioning of the items and works under the package, and subject to the Purchaser's/Owner's satisfaction, the Purchaser shall issue a "Taking Over Certificate" to the Contractor. This certificate shall serve as the final acceptance of the package and shall only be issued after the Purchaser receives the corresponding certificate from the Owner.

75. Punch List and Outstanding Work

- 75.1. The Contractor shall, in coordination with the Purchaser, prepare and update on a continuing basis during the period between completion of structure and final completion, punch lists (based on the preliminary punch list) of outstanding items requiring completion or rectification.
- 75.2. The Contractor shall rectify or complete all outstanding work or plant items to the standards specified in the Contract and according to the schedule set forth in the punch list. If the Contractor fails to commence or diligently proceed with such outstanding work as per the agreed schedule, the Purchaser may arrange for completion of the outstanding work. The reasonable costs incurred for such completion shall be certified by the Purchaser and deducted from the contract price or otherwise paid by the Contractor to the Purchaser.
- 75.3. The parties may mutually agree that any outstanding work items shall be carried out by the Purchaser or deleted from the punch list, subject to an agreement on the appropriate compensation or allowance to be paid or granted by the Contractor to the Purchaser in respect of such outstanding items.

76. Rectification/Correction and Replacement of faulty/defective/damaged work

- 76.1. The Employer may reject defective or unsatisfactory work or materials. The Contractor shall proceed immediately with the correction of rejected, defective, or unsatisfactory workmanship or materials and shall have all objectionable materials and defective work removed from the site (or any place used for storing materials for use on the work) and replaced.

77. Demobilization

- 77.1. Prior to handing over the site, the Contractor shall ensure the removal of all its belongings, materials, equipment, supplies, wastes, and any other property brought or generated at the site or work area.
- 77.2. The Contractor shall, as soon as reasonably practicable and in accordance with all applicable laws and regulations, remove or dispose of all debris, rubbish, and waste, taking all necessary measures to prevent any damage to the site or adjacent property.
- 77.3. Regarding labor and accommodation, the Contractor shall be fully responsible for the removal of all its workmen, laborers, and any temporary structures, hutments, sheds, or dwellings erected for the execution of the works, ensuring complete clearance of the site prior to handover.

78. Contract Closure

- 78.1. Upon completion of all works in accordance with the scope and specifications of the Contract, the process for contract closure shall be initiated. The following key activities, as applicable, shall be undertaken to effect contract closure:
- 78.1.1. Completion of works and issuance of the Work Completion Certificate by the Purchaser.
- 78.1.2. Resolution and closure of all outstanding punch points.
- 78.1.3. Finalization and certification of measurements by the Engineer-in-Charge or the designated Engineering representative.
- 78.1.4. Joint final reconciliation of Free Issue Materials (FIM) between the Contractor and Purchaser.
- 78.1.5. Joint reconciliation and finalization of delay analysis, including Liquidated Damages (LD), if applicable.
- 78.1.6. Submission of No Demand Certificate by the Contractor.
- 78.1.7. Submission of Indemnity Bond by the Contractor.
- 78.1.8. Reconciliation and confirmation of the Contract Payment Register and associated accounts by both Contractor and Purchaser.

79. Patent Rights and Royalty

- 79.1. In the event that the Contractor, during the course of performing its obligations under this GCC, acquires, invents, or develops any proprietary knowledge, information, process, or invention which qualifies, or may qualify, as a trademark, copyright, patent, trade secret, geographical indication, or any other intellectual property right, the Bidder shall promptly disclose such creation to BYPL. All title, interest, and rights to such intellectual property shall vest exclusively in BYPL, and the Contractor shall execute all documents necessary to ensure BYPL's sole ownership without delay.
- 79.2. The Contractor warrants that, in performing its obligations, no intellectual property rights of any third party shall be infringed, whether by violation of statute, passing off, or otherwise. The Contractor shall bear sole responsibility for any infringement claims, and shall fully indemnify and hold BYPL harmless from and against any and all losses, damages, liabilities, costs, or expenses (including reasonable legal fees) incurred as a result of any such infringement. Any compensation, damages, or expenses paid by BYPL to third parties in connection with such infringement shall be recoverable in full from the Contractor.

80. Confidentiality/Secrecy

- 80.1. The Contractor shall not, without the Company's prior written consent, disseminate, publish, or otherwise utilize in any form of advertising, publicity, sales release, or media any

photograph, reproduction, or description of the Works under this Contract, nor disclose the site details, dimensions, quantities, or other related information concerning the Works.

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

80.2.1. Documents: All maps, plans, drawings, specifications, schemes, and other documents or information related to the Contract/Project, including any material supplied to the Bidder by BYPL for contract execution, shall be treated as confidential and remain the property of BYPL. Such documents shall be used solely for purposes of the Contract and shall not be disclosed or used for any other purpose. Disclosure to third parties is permitted solely where such disclosure is necessary for the execution of the Work, and only upon the third party's execution of a confidentiality agreement acceptable to BYPL, explicitly committing to uphold confidentiality obligations equivalent to those set forth herein.

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

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

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

81. Progress Reports of Work Execution and Information

81.1. Throughout the manufacturing and erection stages of critical equipment under this Contract, the Contractor shall, at its own expense, submit periodic progress reports as reasonably required by the Purchaser. These reports shall include relevant supplementary materials such as charts, network diagrams, photographs, and test certificates. The format, size, and number of copies of such reports shall be specified by the Purchaser.

81.2. Quantitative progress reports shall refer to the project schedule in sufficient detail to enable the Purchaser to assess performance, schedule witness dates, and evaluate forecasts, including reports on key subcontracts, where applicable. Within seven (7) days after each report submission—and at other times as reasonably requested by the Purchaser—the Contractor and Purchaser shall meet to discuss progress.

81.3. Weekly progress reports shall include but not limited to:

81.3.1. Executive summary

81.3.2. Description of the work and services performed and goods and materials delivered and erected during the preceding week.

81.3.3. Necessary photographs of work done in the manufacturer's shop and erection site which shall be taken when and where indicated by the Purchaser. Photographs shall be approximately 100 x 125 mm in size including a margin of 5 mm side for fixing. Adequate numbers of photographs shall be submitted indicating various stages of manufacture and erection of critical items. Each photograph shall contain the date, the name of the Contractor and the title of the view taken.

81.3.4. Updated project schedule showing progress to the end of the week (as percentages completed of the Contractor's activities broken down into significant elements of the works), and the current schedule of activities and the targets for the next week.

- 81.3.5. Identification of areas with foreseeable problems which in the opinion of the contractor may affect the project schedule.
- 81.3.6. Such other information and supporting documentation as the Purchaser may require satisfying himself about the timely manufacture, delivery and erection of equipment as per contract.

81.4. The Purchaser shall advise the Contractor about the number of copies of progress reports and, where relevant, photographs he has to submit each week together with the names and addresses of persons (Communication Matrix) to whom they are to be sent. Purchaser will also advise the contractor regarding the format of the Monthly Progress report.

81.5. In addition to the above, the Contractor shall promptly furnish all reports, records, and information as may be requested by the Company, in a form and frequency specified by the Company. The Company retains the right to alter the format and requirements of such submissions, and the Contractor shall be bound to comply with any revised reporting obligations as communicated by the Company

82. Dispute Resolution & Arbitration

82.1. The Parties shall make all reasonable efforts to resolve amicably, through mutual discussions, any disputes or differences arising out of or in connection with this Contract. In the event that such disputes remain unresolved for thirty (30) days from the date either Party notifies the other in writing of the dispute, either Party may refer the matter to arbitration.

82.2. Arbitration shall be conducted by a tribunal comprising two arbitrators - one to be appointed by each Party. The two arbitrators thus appointed shall mutually select a third individual to act as the presiding arbitrator prior to entering upon reference, if and when required. The arbitration proceedings shall be undertaken in accordance with the provisions of the Indian Arbitration and Conciliation Act, 1996 and its 2015 and 2019 amendments. The seat and venue of arbitration shall be New Delhi, India. The language of all proceedings, documents, and communications shall be English. The arbitral process shall be completed within a maximum period of three (3) months from constitution of the arbitral tribunal.

82.3. Reference to negotiation and/or arbitration may proceed regardless of whether the Works have been completed, provided that the contractual obligations of both the Purchaser and the Contractor shall remain unaffected during pendency of arbitration. Under no circumstances shall the Contractor suspend execution of the Works, in whole or in part, on account of ongoing arbitration. Payments due to the Contractor shall continue to be made as per the terms of the Contract.

82.4. All disputes arising out of or in relation to this Contract that require recourse to judicial proceedings shall be subject to the exclusive jurisdiction of the courts at Delhi, India.

83. Termination Due To Contractors Default

83.1. The Purchaser shall have the right to terminate this Contract by providing the Contractor with seven (7) days' prior written notice if any of the following events occurs:

- 83.1.1. The Contractor fails to complete the execution of the Works within the approved schedule, terms, and conditions stipulated herein.
- 83.1.2. The Contractor commits an act of insolvency or is adjudged insolvent by a court of competent jurisdiction.
- 83.1.3. The Contractor abandons the Contract.
- 83.1.4. The Contractor fails to commence the Works or suspends the progress of the Works for an unreasonable period.
- 83.1.5. The Contractor fails to proceed with the Works with due diligence and fails to make satisfactory progress.

84. Remedy for Contractor's Default

- 84.1. If the quality of the Works performed by the Contractor fails to meet the contract requirements, the Purchaser shall have the right to demolish or reject such defective work and have it re-executed at the Contractor's risk and cost.
- 84.2. If the Contractor is unable to perform the Works in accordance with the agreed schedule and other contract provisions, the Purchaser may, after providing seven (7) days' written notice to the Contractor, have the Works rectified, completed, or carried out by an alternative agency at the Contractor's risk and cost.

85. Risk & Cost

- 85.1. If the Contractor fails to execute the Works as per the NIT specifications or as agreed in the Contract within the scheduled period, including any extensions granted, the Contract shall be terminated. BYPL reserves the right to complete the Works through alternative sources at the Contractor's risk and cost. Any additional expenditure incurred shall be debited to and recovered from the Contractor under the Contract.

86. Termination for convenience of Purchaser

- 86.1. The Purchaser may, at its sole discretion, terminate this Contract in whole or in part by providing the Contractor with thirty (30) days' prior written notice, including notice via email. The Purchaser shall pay the Contractor for all supplies and services rendered up to the effective date of termination, subject to submission of an appropriate invoice by the Contractor.
- 86.2. Upon receipt of the termination notice, the Contractor shall, within thirty (30) days or by the date specified in the notice:
- 86.2.1. Cease all further Work, except for such activities as may be necessary to protect and preserve completed portions of the Facilities or to leave the site in a safe and clean condition as directed by the Purchaser.
 - 86.2.2. Terminate all subcontracts, except those which the Purchaser specifies will be assigned to it.
 - 86.2.3. Remove all Contractor's equipment and personnel, including subcontractors' personnel, from the site and clear all debris, rubbish, and wreckage, leaving the site clean and safe.
 - 86.2.4. Deliver to the Purchaser all completed portions of the Facilities as of the termination date.
 - 86.2.5. To the extent permitted by law, assign to the Purchaser all rights, title, and benefits relating to the Facilities, Plant, Equipment, and subcontracts as at the termination date.
 - 86.2.6. Deliver to the Purchaser all non-proprietary drawings, specifications, and other documentation prepared in connection with the Facilities as of the termination date.
- 86.3. In the event of such termination, the Purchaser shall pay the Contractor the following amounts, after deducting any claims the Purchaser may have under the Contract:
- 86.3.1. The contract price attributable to the completed parts of the Facilities as of the termination date.
 - 86.3.2. Reasonable costs incurred by the Contractor for removal of equipment from the site and repatriation of personnel.
 - 86.3.3. Pre-approved and reasonable costs for fulfilling bona fide obligations or commitments with third parties connected to the Contract that are not otherwise covered.

86.4. Payment as described above shall constitute the Contractor's sole and exclusive remedy for termination by the Purchaser under this clause. The Contractor hereby waives all other claims, including loss of profits or any other damages or expenses related to such termination.

86.5. The Contractor agrees that all claims for compensation must be fully substantiated with sufficient detail to allow evaluation by the Purchaser. All subcontracts shall be terminated except those assigned to the Purchaser pursuant to this clause.

87. Entire Agreement & Amendment

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

88. Notice & Communication

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

88.2. Notices and formal communications may also be transmitted via the official email addresses of the authorized representatives of the Contractor or BYPL. Such electronic communications shall be deemed duly delivered upon successful transmission and acknowledgement by the recipient.

88.3. All communications, correspondence, and documentation pertaining to the Purchase Order shall be directed strictly as specified in this Agreement.

89. Acceptance

89.1. The Contractor hereby acknowledges and confirms review of BYPL's Policy on legal and ethical standards for contractors, as set forth in the "Vendor/Contractor Code of Conduct" displayed on BYPL's official website (www.bsesdelhi.com). The Contractor agrees that the Contractor Code of Conduct shall form an integral part of the Contract, Purchase Order (PO), or Work Order (WO). The Contractor undertakes to fully comply with the Vendor/Contractor Code of Conduct, and acknowledges that any violation shall constitute a breach of the Contract/PO/WO. In the event of such breach, whether or not it causes any actual loss or damage, BYPL reserves the right to recover any loss or damage from the Contractor. The Contractor shall indemnify and hold harmless BYPL against any claims, litigation, or other consequences arising out of any breach or violation of the Contractor Code of Conduct by the Contractor, its officers, agents, or representatives.

89.2. Acceptance of the Contract includes acceptance of all terms and conditions referenced therein, including technical specifications, drawings, general conditions, detailed scope of work, and any equipment drawings provided to the Contractor.

89.3. The contractual obligations of BYPL and the Contractor are strictly limited to the terms and conditions set forth in the Contract. No amendment, modification, or alteration to the Contract shall be valid unless made in writing and signed by authorized representatives of both Parties.

89.4. All services and supplies under this Contract are expected to be fully aligned with BYPL's Vision, Mission, and Values. These can be reviewed at <https://www.bsesdelhi.com/web/bypl/about-bses>.

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

1. General Requirements

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

2. QEHS Policy

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

3. Health & Safety Plan

- 3.1 The contractor shall document a detailed and comprehensive Contract specific health & safety plan incorporating HIRA (Hazard Identification & Risk Analysis) to BYPL. This plan shall necessarily include detailed policies, procedures, method statement for each activity to be performed and regulations which, when implemented, will ensure compliance of the contract provisions stated herewith.
- 3.2 The contractor shall provide health & safety plan for such activities required to be carried out under the awarded contract as deemed necessary by BYPL.

4. EHS Organization & Responsibility

- 4.1 The contractor supervisor will play the role of safety supervisor. The safety supervisor shall hold a diploma degree from a recognized institute or university as per CEA Regulations, 2010. Also simultaneously contractor has to ensure their competency in safety or EHS with 40 hours training from reputed agency (like RLI/Allied Boston/ National Safety Council) or trainer, which should be verified earlier by BYPL safety department accordingly.
- 4.2 The training certificate should not be more than one year old.
- 4.3 Apart from above, as an owner of the company the contractor & their other key persons are also responsible for safety compliance and related issues.

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

- 5.1 The contractor shall ensure that all his workers have undergone the safety induction and have been issued with a valid ID card prior to start work at BYPL site.
- 5.2 All contractor workers shall undergo above as per the BYPL site specific procedure issued from time to time.
- 5.3 The contractor shall ensure that no worker is in any O&M activities until the valid ID card is issued and the same is available by each worker at site including that of sub contractor(s).
- 5.4 In case any worker lost the ID card issued to him, the contractor shall ensure that such incidences are promptly reported to BYPL and duplicate or new ID card is issued immediately after completing formalities as deemed necessary by BYPL.

6. Provision of Safe Working Conditions

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

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

6.2 PPE' REQUIREMENT

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

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

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

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

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

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

6.2.4 **Technical Specification of the PPEs**

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

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

Lead MAKE: BATA/HONEYWELL/KARAM

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

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

Lead MAKE: 3M / KARAM / UFS

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

The specification of the Full body harness shall be as given below:

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

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

Lead MAKE: KARAM /LIFEGEAR/UFS/HONEYWELL

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

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

Technical Specification:

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

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

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

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

	For LT work	For HT work
Length	360mm	360mm

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

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

Lead MAKE: Honeywell / ANSELL/CATU

6.2.4.6 Arc Protection Face Shield

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

Lead MAKE: Oberon/Honeywell

6.2.4.7 Certificates required for all PPEs:

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

7. Integrated Management System & Audits

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

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

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

8. Medical Examination

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

8.2 Records of medical examination as described above shall be maintained at the contractor premises

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

9. Working at Height

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

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

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

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

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

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

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

10. Reporting of Near Miss/ Incidents / Dangerous Occurrences

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

11. Suspension of Work

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

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

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

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

12. OHS Appreciation Policy

12.1 If the contractor observes all the safety rules and codes, statutory laws and rules during the period of the contract awarded by the BYPL and no accident occurs then BYPL may consider the performance of the contractor and safety score card will be prepared. The best contractor will be appreciated by suitable "SAFETY AWARD" as per scheme as may be announced separately from time to time.

13 Guidelines for Penalty Policy Implementation

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

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

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

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

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

13.6 Safety Head may impose penalty for serious violations directly.

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

Appendix – 1

Penalty Policy on Safety Violation

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

Notes:

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

Appendix – 2

Penalty Policy on non- submission of EHS related requirements

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

Annexure-1

Format for PPE's Receipt by workers

Name of Site -----

Division-----

Name of Contractor -----

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

Signature of Contractor / Date.....

APPENDIX II

ANNEXURE – 2.01

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

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

1. WHEREAS M/s BSES Yamuna Power Limited, a Company incorporated under the provisions of Companies Act, 2013 having its Registered Office at Shaktikiran Building, Karkardooma, Delhi 110032, India hereinafter referred to as the " Owner ", (which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns).
2. AND WHEREAS the Owner has entered into a contract for _____ (Please specify the nature of contract here) vide Contract No. _____ dated _____ (hereinafter referred to as the "Contract") with M/s. _____, (hereinafter referred to as "the Contractor", 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 Contractors 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 Contractors 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 Contractor 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.

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5. The decision of the Owner to invoke this Guarantee and as to whether the Contractor 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 Contractor 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 Contractor or any dispute raised, invoked, threatened or pending before any court, tribunal, arbitrator or any other authority.
6. The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor without proceeding against the Contractors notwithstanding any other security or other guarantee that the Owner may have in relation to the Contractor's liabilities.
7. The Bank hereby waives the necessity for the Owner first demanding the aforesaid amounts or any part thereof from the Contractors 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 Contractors, 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 Contractors under the terms and conditions of the Contract; or
 - (iii) Extend and/or postpone the time for performance of the obligations of the Contractors 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 Contractors 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 Contractors, and this Guarantee shall not be affected or discharged by the liquidation, winding-up, bankruptcy, reorganization, dissolution or insolvency of the Contractors 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 Contractors under the Contract.
12. NOTWITHSTANDING anything herein above contained, the liability of the BANK under this Guarantee shall be restricted to _____ *(insert an amount equal to ten percent (10%) of the Contract Value)* and this Guarantee shall be valid and enforceable and expire on _____ *(pl. specify date)* or unless a suit or action to enforce a claim under this Guarantee is filed against the Bank on or before the date of expiry.
13. On termination of this Guarantee, all rights under the said Guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities hereunder.
14. The Bank undertakes not to revoke this Guarantee during its validity except with the prior written consent of the Owner and agrees that any change in the constitution of the Bank or the Contractors shall not discharge our liability hereunder.
15. This Guarantee shall be governed by the laws of India. Any suit, action, or other proceeding arising out of, connected with, or related to this Guarantee or the subject matter hereof shall be subject to the exclusive jurisdiction of the courts of **Delhi**, India.

Dated this day of 20XX at

(Signature)

.....
(Name)

.....
(Designation with Bank Stamp)

Attorney as per
Power of Attorney No.....

Date.....

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

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

1. WHEREAS M/s BSES Yamuna Power Limited, a Company incorporated under the provisions of Companies Act, 2013 having its Registered Office at Shaktikiran Building, Karkardooma, Delhi 110032, India hereinafter referred to as the "Owner", (which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns).
2. AND WHEREAS the Owner has entered into a contract for _____ (Please specify the nature of contract here) vide Contract No. _____ dated _____ (hereinafter referred to as the "Contract") with M/s. _____, (hereinafter referred to as "the Contractor", 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 Contractors 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 Contractors 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 Contractor 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 Contractor has not performed its obligations under the Contract shall be binding on the Bank. The Bank

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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 Contractor 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 Contractor or any dispute raised, invoked, threatened or pending before any court, tribunal, arbitrator or any other authority.

6. The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor without proceeding against the Contractors notwithstanding any other security or other guarantee that the Owner may have in relation to the Contractor's liabilities.
7. The Bank hereby waives the necessity for the Owner first demanding the aforesaid amounts or any part thereof from the Contractors 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 Contractors, 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 Contractors under the terms and conditions of the Contract; or
 - (iii) Extend and/or postpone the time for performance of the obligations of the Contractors 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 Contractors 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 Contractors, and this Guarantee shall not be affected

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

Dated this day of 20XX at

(Signature)

.....
(Name)

.....
(Designation with Bank Stamp)

Attorney as per
Power of Attorney No.....

Date.....

BYPL BANK DETAILS WITH IFSC CODE:

1. Name of the Bank: Axis Bank Limited
2. Branch Name & Full Address: C-58, Basement & Ground Floor, Preet Vihar, Main Vikas Marg,
New Delhi 110092
3. Branch Code: 055
4. Bank Account No: 911030003596085
5. IFSC Code: UTIB0000055
6. Swift Code: AXISINBB055

FORMAT OF WARRANTY/GUARANTEE CERTIFICATE

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

Ref. Purchase Order No. :

Dear Sir,

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

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

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

Bidder Name & Signature

GST UNDERTAKING

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

"The tax component as mentioned in the invoice shall be deposited with the GST Department as per law by way of actual payment or by way of legal set off as per law. The turnover billed shall be duly declared in my GST returns a copy of which shall be filed with the Purchaser. Should the input tax credit to the Purchaser be denied by way of any lapse on the part of the Bidder, 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 Bidder"

FORMAT OF WARRANTY / DEFECT LIABILITY PERIOD – SERVICES

Performance requirements of the works completed is as per detailed specifications and standards specified and to be adhered to strictly. In-case of deficiency, the same is to be rectified / redone to meet the specifications by the contractor within stipulated schedule or any extension thereof. The Contractor shall be liable to rectify all defects except those arising out of normal wear and tear, in the works done by the Contractor under this contract, or from any act or omission of the contractors for a period of 24 months will depend on individual contract period package to package from the date of Handing over the works to the Employer / Owner.

Bidders Name & Signature

SUMMARY OF COMMERCIAL TERMS AND CONDITIONS

SL NO	PARTICULARS	CLAUSE AS PER TENDER	BIDDER'S CONFIRMATION
1	Validity of Bid	180 days from the date of submission of the bid	
2	Price Basis	"Firm" , FOR Delhi store(s)/site(s) basis. Prices shall be inclusive of all taxes & duties, freight up to Delhi store(s)/site(s).	
3	Unloading	Unloading at stores/sites shall be in the Contractor's scope	
4	Insurances	Insurances in Bidder's scope	
6	Payment Terms	Supply: i. 70% prorata of supply value item wise shall be payable against R/A bills for supply of equipments and materials within 30 days against receipt & acceptance of material at site and submission ii. 20% prorata on account of supply value of the actual executed value after installation/erection of material duly certified by BYPL Project-in- charge. iii. Balance 10% on account of supply value of the actual executed value shall be paid in 30 days after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by BYPL Engineer-in-Charge Services: i. 90% pro-rata payment of total installation value of the actual executed value shall be paid in 30 days on receipt made progressively on submission of your running invoices on Monthly basis duly certified by our Engineer In charge ii. Balance 10% on account of total installation value of the actual executed value payable shall be paid in 30 days after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by BYPL Engineer-in-Charge.	
7	Project Schedule	Transmittal Approval Documents (GTP/Drawings/QAP/etc.) are to be submitted within 30 days from the date of LOI/LOA/PO or as per the approved Project Schedule to the concerned officials in BYPL for approval. BYPL shall approve/provide comments on the submitted drawings within 7 days of first submission. In case resubmission is required, it shall be completed by the Contractor within next 5 days. The timelines for approval by BYPL shall be 5 days in case of every resubmission. However, repetitive submissions are not desirable. 150 days from the date of LOI/LOA/PO or completion as per the BYPL schedule.	
8	Defect Liability Period	Twenty Four (24) months for substation/Individual package in general and a period of 60 months (Sixty-Months) for the equipment's specified (i.e., GIS, PTR, Panels, CRP, Cable & Joints) in the specific provisions from the date of Final Takeover of Packages by Purchaser	
9	Liquidated Damages	At the rate of 0.5% of the total contract price per each week of delay or pro-rate thereof, by which the completion is delayed. Max LD of delay is 10% of contract value.	
10	Contract Performance Bank Guarantee	10% (Ten percent) of the Total contract price (Incl. GST) shall be submitted within 15 days of award of contract with the validity till completion of the contract period.	

11	Performance Bank Guarantee	10% (Ten percent) of the Total contract price (Incl. GST) valid till completion of defect liability plus 3 months	
12	Reverse Auction	Acceptance for participation in Reverse Auction event	

Seal of the Bidder:

Signature:

Name:

BSES

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, Contractors, 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)

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, Contractors, 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/25-26/RS/SkS/SV/22 [RFx Number: 2200000153]	Page 14 of 14	Bidders seal & Signature

VOLUME – II
FINANCIAL BID (PRICE FORMAT)

GRAND SUMMARY OF THE QUOTED PACKAGE(S)

ALL PRICES IN INR (₹)

Package Description	Sub Packages Description	Supply Amount - Landed (₹) (1)	Services Amount - Landed (₹) (2)	Total Amount (₹) (1+2)
Survey, Design, Supply, Laying, Jointing, Testing And Commissioning of Cables With Required Accessories as per the Scope of Work on Turnkey Basis	66kv 3x300 Sq Mm Cable Infeed Near Mandawali Railway Station upto Gufa Wala Mandir			
Grand Total (In words)				

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

Date:

Bidders Name:

Place:

Bidders Address:

Signature:

Designation:

Printed Name:

Common Seal:

Note:

- 1) Bidder may quote either for Package A or Package B or both Packages. Bidder shall submit a single EMD based on the Packages quoted considering the EMD Value provided in Table 1.
- 2) All prices for the packages quoted are inclusive of taxes and duties, GST and freight etc. Bidder shall include & indicate any others taxes under the applicable law(s) for supply and services to be performed in the purchaser's country.
- 3) Bidder shall include & indicate any others taxes under the applicable law(s) for supply and services to be performed in the purchaser's country.
- 4) The bidder shall, at its own, handle all imported equipment's and handle all formalities for custom clearances, port charges, etc. if any
- 5) All prices for the packages quoted are against the scope of work under the contract shall be executed strictly as per the NIT conditions and the technical specification.
- 6) Quoted prices shall be as per the Bill of quantities (BOQ) as attached. However Any items/material/machinery, not specifically mentioned In BOQ as well as in the technical specifications but required for successful completeness, Erection, Testing and Commissioning of the package awarded shall be deemed to be in the scope of the bidder.
- 7) Insurance as per the clause defined in GCC/SCC and other contract conditions, is included in the quoted prices. However Bidder shall indicate the value of the insurance taken, separately.
- 8) Site visit is advisable prior to submission of quotation.

PRICE BID (SUPPLY & SERVICES)

FINANCIAL BID NIT NO: CMC/BY/25-26/RS/SkS/SV/22 [RFx Number: 2200000153]	Page 3 of 12	Bidders seal & Signature

PRICE FORMAT – SUPPLY (Kindly refer detailed package wise SCOPE attached as Volume III for Indicative Description of Goods/BOM, BOQ)

S. No.	DESCRIPTION OF GOODS	HSN CODE (8 Digit Mandatory)	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
1.	66kV Aluminium 3C X300 SQMM XLPE Armoured Cable		Meter	12000				
2.	Supply of HDPE pipes as per IS 4984,PN 6 class PE 80 - 200mm dia		Meter	3000				
3.	Cable End Termination kit -Outdoor AIS for 66 kV 3Cx300 sq mm		Nos.	8				
4.	Cable straight through joint kit Suitable for 66 kV 3Cx300 sq mm cable		Nos.	48				
5.	OFC cable 48 F Single Mode G652 D (2 Runs with each circuit)		Meter	12800				
6.	Supply of HDPE Duct-40mm		Meter	12000				
7.	Optical fiber loop chamber		Nos.	20				
8.	Fiber Optic Cable LIU		Nos.	8				
9.	Jointing Kit for optical Fiber cable		Nos.	20				
10.	RCC cable cover(2 feet long)		Nos.	10000				
11.	Earthing Pipe having 40 mm dia		Nos.	20				
12.	Earthing Flats (50X10 sqmm)		Lot	1				
13.	Yamuna River Sand		Cum	950				
14.	Cable Joint Marker		Nos.	48				
15.	Cable Route Marker		Nos.	60				
16.	Aluminium Cable identification Tag with Nylon String		Nos.	400				
17.	Receiver Unit for Electronic Cable Route Marker cum Cable Route Tracer		Nos.	1				
18.	Safety Barricading Tape		Meter	2000				
19.	Safety Barricading Cone		Lot	1				
20.	Weather and acid resistant PVC warning tape of 150mm width 300 micron thick Yellow colour with desired Red/Black lettering		Meter	6000				

S. No.	DESCRIPTION OF GOODS	HSN CODE (8 Digit Mandatory)	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
21.	Wire Mesh		SQM	50.0				
22.	Angle and Channel		Lot	1				
23.	Cleat HDPE With GI Hardware		Nos.	48				
24.	Sign,Placard,Circuit Plate (125 mm X100 mm)		Nos.	4				
25.	Anti-Climbing Device		Nos.	4				
26.	ACSR Goat Conductor		Meter	200				
27.	Hardware fittings		Lot	1				
28.	11kV Disc Insulator		Nos.	90				
29.	P.G. Clamp		Nos.	26				
30.	Rail Pole		Nos	8				
31.	Danger Plate		Nos.	4				
32.	Lightning Arrester		Nos.	12				
33.	Line Differential relay		Nos	4				
34.	Patch Cord		Lot	1				
35.	Galvanized Nut & Bolts		Lot	1				
36.	Cable Support Structure		Lot	1				
37.	Blue Stone Aggregate		Cum	12				
38.	Bricks		Lot	1				
39.	Dry Brick Aggregate		Cum	5				
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 – SERVICES (Kindly refer detailed package wise SCOPE attached as Volume III for Indicative Description of Goods/BOM, BOQ)

S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
1.	Surveying of cable Route, Detailed Site Plan & Profile using Ground penetration Radar System, Excavation of trial pits as per field requirement, preparation of route drawing with location of joint chambers position and finalizing the cable route in consultation with BSES Representative		Meter	3000				
2.	Erection Testing and Commissioning of CABLE 66KV AL 3X300 SQMM XLPE		Meter	12000				
3.	Making Trenchless duct for HDPE 200 mm dia		Meter	1500				
4.	Installation of HDPE 200 mm dia duct		Meter	1500				
5.	Erection Testing and Commissioning of Cable End Termination kit - Outdoor AIS for 66 kV 3Cx300 sq mm		Nos.	8				
6.	Erection Testing and Commissioning of Cable straight through joint kit Suitable for 66 kV 3Cx300 sq mm cable		Nos.	48				
7.	Installation of OFC cable 48 F Single Mode G652 D (2 Runs with each circuit)		Meter	12800				
8.	Making of Trenchless duct for HDPE 40 mm dia		Meter	1000				
9.	Installation of HDPE pipes 40 mm dia		Meter	11000				
10.	Installation of Optical fiber loop chamber		Nos.	20				
11.	Installation of Fiber Optic Cable LIU		Nos	8				
12.	Installation of Jointing Kit for optical Fiber cable		Nos.	20				
13.	Installation of RCC cable cover(2 feet long)		Nos	10000				
14.	Installation of Earthing Rods having 40 mm dia		Nos	20				

S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
15.	Installation of Yamuna River Sand		Cum	950				
16.	Installation of Cable Joint Marker		Nos.	48				
17.	Installation of Cable Route Marker		Nos.	60				
18.	Installation of Aluminium Cable identification Tag with Nylon String		Nos.	400				
19.	Installation of Safety Barricading Tape		Meter	2000				
20.	Installation of Safety Barricading Cone		Lot	1				
21.	Installation of Warning Tape		Meter	6000				
22.	Installation of Wire Mesh		Sqm	50				
23.	Installation of Angle and Channel		Lot	1				
24.	Installation of Cleat HDPE With GI Hardware		Nos	48				
25.	Installation of Sign, Placard, Circuit Plate (125 mm X100 mm)		Nos.	4				
26.	Installation of Anti Climbing device		Nos	4				
27.	Erection Testing and Commissioning of ACSR Goat Conductor		Meter	200				
28.	Hardware fittings		Lot	1				
29.	Installation of 11kV Disc Insulator		Nos.	90				
30.	Installation of PG Clamp		Nos.	26				
31.	Installation of Rail Pole		Nos	8				
32.	Installation of Danger Plate		Nos	4				
33.	Erection, testing and commissioning of Lightning Arrester		Nos	12				
34.	Installation of Line Differential relay		Nos	4				
35.	Installation of Patch Cord		Lot	1				
36.	Installation of Galvanized Nut & Bolts		Lot	1				
37.	Installation of Cable Support structure		Lot	1				
38.	Foundation of all Supplied Items		Lot	1				
39.	Digging of cable trench as per specification and drawings. Rate is		Cum	2000				

S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
	inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Ordinary Soil.							
40.	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.		Cum	1500				
41.	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Rocky Soil		Cum	500				
42.	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.		Cum	1200				
43.	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.		EA	4				
44.	Mounting of 66KV, 3x330sq.mm.XLPE cable with cable end box on the steel structure and fixing it with suitable wooden cleats (wooden cleats shall be supplied by contractor) i/c.its jumpering with the isolator as required.		EA	8				
45.	Providing and laying in position specified grade		Cum	15				

S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
	of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work upto plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)							
46.	VLF High voltage test on complete cable length at site before circuit energization as per IEEE 400.2		LOT	1				
47.	Partial discharge test on complete cable length at site before circuit energization as per IEEE 400.2		LOT	1				
48.	Tan Delta test on complete cable length at site before circuit energization as per IEEE 400.2		LOT	1				
49.	Phasing of cables before commissioning. The work includes disconnection/reconnection of cable for matching the phase sequence of cables including providing skilled workmen at both ends.66 kv Cable		Per ckt.	2				
50.	Painting Works		Lot	1				
51.	Charges for providing continuous steel barricade 1.2 mtr high including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance.40% qty for selected portion		M	1200				
52.	Dismantling of Existing overhead line including associated items		Lot	1				
53.	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand) (13.1.1-AR192)		Sqm	120				

S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
54.	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand) (13.2.1-AR193)		Sqm	100				
55.	Distempering with dry distemper of approved brand and manufacture (two or more coats) and of required shade on new work, over and including water thinnable priming coat to give an even shade. (13.40-AR209)		Sqm	250				
56.	Barbed wire over gantry wall		m	50				
57.	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 4 (1 cement : 4 coarse sand) (6.1.1-AR56)		Cum	15				
58.	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand) (6.1.2-AR57)		Cum	8				
59.	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in : Cement mortar 1:4 (1 cement : 4 coarse sand) (6.4.1-AR58)		Cum	30				
60.	Stringing and sagging of main bus and cover bus bar with ACSR Zebra conductor and Jumpering of various electrical equipment by ACSR Zebra conductor in between equipment to equipment of any length		Meters	200				

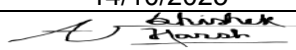
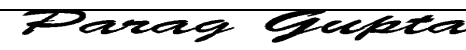
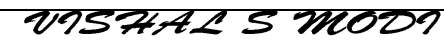
S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY (A)	UNIT BASIC PRICE (₹) (B)	UNIT GST & CESS AS APPLICABLE AMT (₹) (C)	UNIT LANDED COST (₹) (D = B+C)	TOTAL LANDED COST (₹) (E = DXA)
	required and from bus bar to equipment of any length required with the help of PG clamps, T connectors and other clamps. For 66 kV /33KV Yard							
61.	Collecting The Spreaded Stone Grit From Yard, Stacking At Suitable Places & Relaying The Same After Proper Screening / Cleaning Twice On The Specified		Cum	6				
62.	Providing And Laying In Position Cement Concrete Of Specified Grade Excluding The Cost Of Centring And Shuttering- All Work Upto Plinth Level 1 : 4 : 8		Cum	3				
63.	Making termination in the existing line i/sagging and jumpering complete for 6Nos.Conductors with one earth wire.		EA	1				
64.	Dismantling of MS as well as galvanised structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.		Lot	1				
65.	Stringing of Bolted type 'T'/PG Connector suitable for single Zebra conductor		EA	40				
66.	P/F red sand stone slabs 3Dmm		Sqm	40				
67.	Erection of MS as well as galvanised structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry		MT	7				

S. No.	DESCRIPTION OF SERVICES	SAC CODE	UoM	QTY	UNIT BASIC PRICE (₹)	UNIT GST & CESS AS APPLICABLE AMT (₹)	UNIT LANDED COST (₹)	TOTAL LANDED COST (₹)
				(A)	(B)	(C)	(D = B+C)	(E = DXA)
	structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.							
68.	Digging of cable trench with the help of tractor hammer cutting where digging through standard tools like pickaxe and spade is not possible. The work includes demolishing cement concrete manually/ by mechanical means including disposal of material within 50 meters lead as per direction of Engineer - in Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix)		Cum	300				
69.	Installation of Blue Stone Aggregate		Cum	12				
70.	Installation of Bricks		Lot	1				
71.	Installation of Dry Brick Aggregate		Cum	5				
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**

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

**SCOPE FOR TURNKEY EXECUTION
OF 66 kV INFEED NEAR MANDAWALI RAILWAY STATION
UPTO GUFA WALA MANDIR**

Revision			0
Date			14/10/2025
Prepared by	Abhishek Harsh	CES	 3267d7c3-82b5-46cb-b5a6-867ae7820a34
Reviewed by	Srinivas Gopu	CES	 5d32525e-ed3a-4841-b1c7-b8a5e77d1519
	Parag Gupta	P&E	 0be1fe35-66da-497a-9703-29e1dc117e25
	Vishal Modi	P&E	 b0f05ca-ae05-4e43-b3d4-97a3d4b20ff0
Approved by	Amit Tomar	CES	 b2c7e933-0e06-443a-b1ab-d60801a2d452
	Sanjay Kumar	P&E	 2e0cd3df-9097-442a-919c-09da0fa0eaa5

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SCOPE FOR 66 kV INFEEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR**1 INTENT**

- a. This document defines the scope for turnkey execution of projects in BSES Yamuna Power Limited.
- b. This document shall be read in conjunction with all technical documents enclosed in tender.

2 BIDDER'S SCOPE

- a. Bidder's Scope includes design, engineering, manufacture, shop testing, inspection, packing, dispatch, supply, loading, unloading, storage at site, assembly, erection, complete pre-commissioning checks, testing & commissioning at site, obtaining statutory clearance & certification from Electrical Inspector and handing over of complete projects 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 project 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.
- d. Scope of Supply and Work has been provided for each project. It shall be read in conjunction with respective specifications provided in tender document.
- e. In case of any discrepancy in Specification//Scope/CEA Guideline/Indian standards/ IEC, the most stringent one shall govern.

2.1 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

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

2.1.1 CODES AND STANDARDS

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

2.1.2 SERVICE CONDITIONS

2.1.2.1	Average grade atmosphere	Heavily polluted, Dry
2.1.2.2	Maximum altitude above sea level	1000M
2.1.2.3	Ambient air temperature	Highest 50Deg Average 40Deg C
2.1.2.4	Minimum ambient air temperature	0 Deg C
2.1.2.5	Relative Humidity	100%
2.1.2.6	Rainfall	750mm concentrated in four months
2.1.2.7	Seismic Condition	Zone IV
2.1.2.8	Max. Relative Humidity	100%

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR
2.1.3 SYSTEM PARAMETERS

2.1.3.1	Nominal Voltage kV	66
2.1.3.2	Rated voltage kV	72.5
2.1.3.3	Power Frequency (kV rms) with stand voltage	140
2.1.3.4	Basic Insulation Level kVp	325
2.1.3.5	Rated Frequency Hz	50±5%
2.1.3.6	System Neutral Earthing	Solidly Grounded

2.2 INFEED
2.2.1 SCOPE OF SUPPLY

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

S.No	Particulars	Unit	Qty	Remarks
2.2.1.1	66kV Aluminium 3C X300 SQMM XLPE Armoured Cable	Meter	12000	
2.2.1.2	Supply of HDPE pipes as per IS 4984, PN 6 class PE 80 - 200mm dia	Meter	3000	
2.2.1.3	Cable End Termination kit -Outdoor AIS for 66 kV 3Cx300 sq mm	Nos.	8	
2.2.1.4	Cable straight through joint kit Suitable for 66 kV 3Cx300 sq mm cable	Nos.	48	

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty	Remarks
2.2.1.5	OFC cable 48 F Single Mode G652 D (2 Runs with each circuit)	Meter	12800	
2.2.1.6	Supply of HDPE Duct-40mm	Meter	12000	
2.2.1.7	Optical fiber loop chamber	Nos.	20	
2.2.1.8	Fiber Optic Cable LIU	Nos.	8	
2.2.1.9	Jointing Kit for optical Fiber cable	Nos.	20	
2.2.1.10	RCC cable cover(2 feet long)	Nos.	10000	Length shall be 3 meters
2.2.1.11	Earthing Pipe having 40 mm dia	Nos.	20	
2.2.1.12	Earthing Flats (50X10 sqmm)	Lot	1	
2.2.1.13	Yamuna River Sand	Cum	950	
2.2.1.14	Cable Joint Marker	Nos.	48	
2.2.1.15	Cable Route Marker	Nos.	60	
2.2.1.16	Aluminium Cable identification Tag with Nylon String	Nos.	400	
2.2.1.17	Receiver Unit for Electronic Cable Route Marker cum Cable Route Tracer	Nos.	1	
2.2.1.18	Safety Barricading Tape	Meter	2000	
2.2.1.19	Safety Barricading Cone	Lot	1	
2.2.1.20	Weather and acid resistant PVC warning tape of 150mm width 300 micron thick Yellow colour with desired Red/Black lettering	Meter	6000	
2.2.1.21	Wire Mesh	SQM	50.0	For fencing having a) Height - 2.65 meter b) Gate Frame - 3 X 2.5 sqm
2.2.1.22	Angle and Channel	Lot	1	Material shall be GI
2.2.1.23	Cleat HDPE With GI Hardware	Nos.	48	

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty	Remarks
2.2.1.24	Sign,Placard,Circuit Plate (125 mm X100 mm)	Nos.	4	
2.2.1.25	Anti-Climbing Device	Nos.	4	
2.2.1.26	ACSR Goat Conductor	Meter	200	
2.2.1.27	Hardware fittings	Lot	1	
2.2.1.28	11kV Disc Insulator	Nos.	90	
2.2.1.29	P.G. Clamp	Nos.	26	
2.2.1.30	Rail Pole	Nos	8	
2.2.1.31	Danger Plate	Nos.	4	
2.2.1.32	Lightning Arrester	Nos.	12	
2.2.1.33	Line Differential relay	Nos	4	Cabinet shall be provided if required
2.2.1.34	Patch Cord	Lot	1	
2.2.1.35	Galvanized Nut & Bolts	Lot	1	
2.2.1.36	Cable Support Structure	Lot	1	Material shall be Galvanized
2.2.1.37	Blue Stone Aggregate	Cum	12	Size - 20 mm
2.2.1.38	Bricks	Lot	1	For wall
2.2.1.39	Dry Brick Aggregate	Cum	5	Size - 40 mm

2.2.2 SCOPE OF WORK

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

S.No	Particulars	Unit	Qty.	Remarks
2.2.2.1	Surveying of cable Route, Detailed Site Plan & Profile using Ground penetration Radar System, Excavation of trial pits as per field requirement, preparation of route drawing with location of joint chambers position and finalizing the cable	Meter	3000	

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty.	Remarks
	route in consultation with BSES Representative			
2.2.2.2	Erection Testing and Commissioning of CABLE 66KV AL 3X300 SQMM XLPE	Meter	12000	
2.2.2.3	Making Trenchless duct for HDPE 200 mm dia	Meter	1500	
2.2.2.4	Installation of HDPE 200 mm dia duct	Meter	1500	
2.2.2.5	Erection Testing and Commissioning of Cable End Termination kit -Outdoor AIS for 66 kV 3Cx300 sq mm	Nos.	8	
2.2.2.6	Erection Testing and Commissioning of Cable straight through joint kit Suitable for 66 kV 3Cx300 sq mm cable	Nos.	48	
2.2.2.7	Installation of OFC cable 48 F Single Mode G652 D (2 Runs with each circuit)	Meter	12800	
2.2.2.8	Making of Trenchless duct for HDPE 40 mm dia	Meter	1000	
2.2.2.9	Installation of HDPE pipes 40 mm dia	Meter	11000	
2.2.2.10	Installation of Optical fiber loop chamber	Nos.	20	
2.2.2.11	Installation of Fiber Optic Cable LIU	Nos	8	
2.2.2.12	Installation of Jointing Kit for optical Fiber cable	Nos.	20	
2.2.2.13	Installation of RCC cable cover(2 feet long)	Nos	10000	
2.2.2.14	Installation of Earthing Rods having 40 mm dia	Nos	20	
2.2.2.15	Installation of Yamuna River Sand	Cum	950	
2.2.2.16	Installation of Cable Joint Marker	Nos.	48	
2.2.2.17	Installation of Cable Route Marker	Nos.	60	
2.2.2.18	Installation of Aluminium Cable identification Tag with Nylon String	Nos.	400	
2.2.2.19	Installation of Safety Barricading Tape	Meter	2000	
2.2.2.20	Installation of Safety Barricading Cone	Lot	1	
2.2.2.21	Installation of Warning Tape	Meter	6000	
2.2.2.22	Installation of Wire Mesh	Sqm	50	

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty.	Remarks
2.2.2.23	Installation of Angle and Channel	Lot	1	
2.2.2.24	Installation of Cleat HDPE With GI Hardware	Nos	48	
2.2.2.25	Installation of Sign,Placard,Circuit Plate (125 mm X100 mm)	Nos.	4	
2.2.2.26	Installation of Anti Climbing device	Nos	4	
2.2.2.27	Erection Testing and Commissioning of ACSR Goat Conductor	Meter	200	
2.2.2.28	Hardware fittings	Lot	1	
2.2.2.29	Installation of 11kV Disc Insulator	Nos.	90	
2.2.2.30	Installation of PG Clamp	Nos.	26	
2.2.2.31	Installation of Rail Pole	Nos	8	
2.2.2.32	Installation of Danger Plate	Nos	4	
2.2.2.33	Erection, testing and commissioning of Lightning Arrester	Nos	12	
2.2.2.34	Installation of Line Differential relay	Nos	4	
2.2.2.35	Installation of Patch Cord	Lot	1	
2.2.2.36	Installation of Galvanized Nut & Bolts	Lot	1	
2.2.2.37	Installation of Cable Support structure	Lot	1	
2.2.2.38	Foundation of all Supplied Items	Lot	1	RCC Type
2.2.2.39	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Ordinary Soil.	Cum	2000	
2.2.2.40	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	Cum	1500	
2.2.2.41	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Rocky Soil	Cum	500	

SCOPE FOR 66 KV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty.	Remarks
2.2.2.42	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	Cum	1200	
2.2.2.43	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	4	
2.2.2.44	Mounting of 66KV,3x330sq.mm.XLPE cable with cable end box on the steel structure and fixing it with suitable wooden cleats (wooden cleats shall be supplied by contractor) i/c.its jumpering with the isolator as required.	EA	8	
2.2.2.45	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work upto plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	Cum	15	
2.2.2.46	VLF High voltage test on complete cable length at site before circuit energization as per IEEE 400.2	LOT	1	
2.2.2.47	Partial discharge test on complete cable length at site before circuit energization as per IEEE 400.2	LOT	1	
2.2.2.48	Tan Delta test on complete cable length at site before circuit energization as per IEEE 400.2	LOT	1	
2.2.2.49	Phasing of cables before commissioning. The work includes disconnection/reconnection of cable for matching the phase sequence of cables including providing skilled workmen at both ends.66 kv Cable	Per ckt.	2	
2.2.2.50	Painting Works	Lot	1	
2.2.2.51	Charges for providing continuous steel barricade 1.2 mtr high including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance.40% qty for selected portion	M	1200	
2.2.2.52	Dismantling of Existing overhead line including associated items	Lot	1	
2.2.2.53	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand) (13.1.1-AR192)	Sqm	120	

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty.	Remarks
2.2.2.54	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand) (13.2.1-AR193)	Sqm	100	
2.2.2.55	Distempering with dry distemper of approved brand and manufacture (two or more coats) and of required shade on new work, over and including water thinnable priming coat to give an even shade. (13.40-AR209)	Sqm	250	
2.2.2.56	Barbed wire over gantry wall	m	50	
2.2.2.57	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 4 (1 cement : 4 coarse sand) (6.1.1-AR56)	Cum	15	
2.2.2.58	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand) (6.1.2-AR57)	Cum	8	
2.2.2.59	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in : Cement mortar 1:4 (1 cement : 4 coarse sand) (6.4.1-AR58)	Cum	30	
2.2.2.60	Stringing and sagging of main bus and cover bus bar with ACSR Zebra conductor and Jumpering of various electrical equipment by ACSR Zebra conductor in between equipment to equipment of any length required and from bus bar to equipment of any length required with the help of PG clamps, T connectors and other clamps. For 66 kV /33KV Yard	Meters	200	
2.2.2.61	COLLECTING THE SPREADED STONE GRIT FROM YARD, STACKING AT SUITABLE PLACES & RELAYING THE SAME AFTER PROPER SCREENING / CLEANING TWICE ON THE SPECIFIED	Cum	6	
2.2.2.62	PROVIDING AND LAYING IN POSITION CEMENT CONCRETE OF SPECIFIED GRADE EXCLUDING THE COST OF CENTRING AND SHUTTERING- ALL WORK UPTO PLINTH LEVEL 1 : 4 : 8	Cum	3	
2.2.2.63	Making termination in the existing line i/sagging and jumpering complete for 6Nos.Conductors with one earth wire.	EA	1	

SCOPE FOR 66 kV INFEEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S.No	Particulars	Unit	Qty.	Remarks
2.2.2.64	Dismantling of MS as well as galvanised structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	Lot	1	
2.2.2.65	Stringing of Bolted type 'T'/PG Connector suitable for single Zebra conductor	EA	40	
2.2.2.66	P/F red sand stone slabs 3Dmm	Sqm	40	
2.2.2.67	Erection of MS as well as galvanised structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode , tack welding & hacksaw blades etc.	MT	7	
2.2.2.68	Digging of cable trench with the help of tractor hammer cutting where digging through standard tools like pickaxe and spade is not possible. The work includes demolishing cement concrete manually/ by mechanical means including disposal of material within 50 meters lead as per direction of Engineer - in Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix)	Cum	300	
2.2.2.69	Installation of Blue Stone Aggregate	Cum	12	
2.2.2.70	Installation of Bricks	Lot	1	
2.2.2.71	Installation of Dry Brick Aggregate	Cum	5	

2.2.3 SCOPE DEMARCATION

S. No	Head	BYPL	Bidder's Scope	Remarks
2.2.3.1	Tree Cutting/ Branch Cutting	✗	✓	
2.2.3.2	Permissions from Various External and Internal Agencies other than Tree Cutting permission	✗	✓	Statutory fees will be borne by BYPL if applicable

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S. No	Head	BYPL	Bidder's Scope	Remarks
2.2.3.3	Permit to work request to BYPL authority	✗	✓	Permit Should be applied to Engineer Incharge prior to work through proper procedure
2.2.3.4	Permit to work issuance from BYPL authority	✗	✓	
2.2.3.5	Testing Equipment	✗	✓	
2.2.3.6	Lighting Arrangement	✗	✓	
2.2.3.7	Dewatering	✗	✓	
2.2.3.8	Construction Power and Construction Water	✗	✓	For construction power, bidder may take temporary connection from BYPL on chargeable basis.
2.2.3.9	Safety and Security of Manpower(Labor, Engineers, Supervisors etc)	✗	✓	
2.2.3.10	Various Tools and Tackles related to Job	✗	✓	
2.2.3.11	Loading, Unloading and Transportation of Material	✗	✓	It includes transportation of dismantled equipment to BYPL store in stacked manner.
2.2.3.12	Digging, Refilling of Earth	✗	✓	
2.2.3.13	Cleanliness around work premises	✗	✓	
2.2.3.14	Document/Drawing Submission	✗	✓	
2.2.3.15	Document/Drawing Approval	✓	✗	
2.2.3.16	Security and Safety of material until handover	✗	✓	
2.2.3.17	Various Machines e.g. Crane, Hydra, JCB etc to complete the Job	✗	✓	
2.2.3.18	Cable Drum Handling	✗	✓	

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

S. No	Head	BYPL	Bidder's Scope	Remarks
2.2.3.19	Maintenance of Equipment Until Handover to Engineer Incharge and EHV O&M	✗	✓	
2.2.3.20	Electrical Inspector Clearance	✗	✓	Only statutory fees will be borne by BYPL if applicable
2.2.3.21	Permit issuing agency for Works inside BYPL Premises	✓	✗	
2.2.3.22	Permit requesting Agency	✗	✓	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.
2.2.3.23	Temporary office near work premises	✗	✓	After handing over the equipment, contractor has to evacuate the premises within one week otherwise deemed fit action will be taken
2.2.3.24	Temporary store at work premises	✗	✓	
2.2.3.25	Yard aesthetics at work place should be maintained at the time and after the completion of Work	✗	✓	Disposal of Scrap/Debris etc from site and complete cleaning of working area till handover
2.2.3.26	Any damages done to the existing system, shall be repaired/ rectified/ replaced	✗	✓	
2.2.3.27	Clearance certificate	✗	✓	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.
2.2.3.28	External Agency Clearance	✗	✓	Statutory fee shall be borne by BYPL
2.2.3.29	Various compliances pertaining to Job	✗	✓	IE rules, CEA Regulation 2010

SCOPE FOR 66 kV INFEED NEAR MANDAWALI RAILWAY STATION UPTO GUFA WALA MANDIR

2.3 APPROVED MAKE LIST

All bidders have to comply with the approved make list for major equipment given below. For component wise approved make list, please refer respective equipment specification. Any make not specified in the approved list shall be subject to BYPL approval.

S. No	Material / Equipment	Approved Make
2.3.1	66kV Lightning Arrestor	Hitachi
		Oblum
		Raychem
		CG Power
		Electrolyte
		GE Vernova
2.3.2	66 kV Cable	Universal
		KEI
		Polycab
		KEC
2.3.3	ACSR conductor	Apar
		Lumino Industries
		Sterlite power
2.3.4	66kV Joints & Terminations	Raychem
		3M

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S. No	Material / Equipment	Approved Make
2.3.5	Overhead Line Accessories	Raychem
		Rashriya Udhyog
		Klemmen
		Legion
		Burma
2.3.6	Insulators	Aditya Birla
		BHEL
		Morden Insulators
		Sarvana
		Insulators and Electricals Company
2.3.7	Patch Cord	Preston
		D-link
		Belden
2.3.8	LIU	Preston
2.3.9	Numerical Relay	Schneider Micom Relay
		Siemens Siprotec Relay
2.3.10	Steel	SAIL
		Tata
		Jindal Steel and Power Limited (JSPL)

BSES

Technical Specification

For

66kV, 3CX300 sq mm Cable

Specification no – BSES-TS-39-3C66-R0

Rev.		0
No. of Pages		30
Date		25 Apr 2022
Prepared by	Gautam Deka/ Pronab Bairagi	Gautam Deka 25/04/22
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	Amit Tomar	Amit Tomar 25/04/22
Approved by	Gaurav Sharma	Gaurav Sharma
	Gopal Nariya	Gopal Nariya

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General Specification

1.0 Scope

This specification covers technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at stores/site, performance of 66 kV 3Cx300 sq. mm cable complete with all accessories for trouble free and efficient operations.

2.0 Applicable Standard

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest revisions of relevant Indian Standards /IEC and shall conform to the regulations of local statutory authorities.

Indian Standards

IS 7098 (Part-3)-1993	Specification for Cross-linked polyethylene insulated PVC sheathed Cables Part: 3 - For working voltages from 66 kV upto and including 220 kV
IS 8130-2013	Specification for Conductor for insulated electric cables & flexible Cords
IS 5831-1984	Specification for PVC insulation and sheath of electric Cables
IS : 3975 -1999	Mild steel wires, formed wires and tapes for Armouring of Cables
IS: 5216	Guide for Safety procedures and practices in electric works
IS: 10418-1982	Specification for Drums for Electric Cables

IEC Standards

IEC-60228: 2004	Conductor for insulated cables
IEC-60502 (Part-2): 2005	Power cables with extruded insulation and their accessories for rated voltages for rated voltages from 6 kV ($U_m = 7,2$ kV) up to 30 kV ($U_m = 36$ kV)
IEC-60811: 1990	Test methods for insulations and sheaths of electric cables and cords.
IEC 60840: 2004	Power cables with extruded insulation and their accessories. Test methods and requirements.

3.0 Cable Design Features

S.NO	DESCRIPTION	REQUIREMENT
3.1	Manufacturing process	The cable shall be manufactured by "Triple head extrusion process". The conductor screen, Insulation & Insulation screen shall all be extruded in tandem to ensure homogeneity and reduction of voids, in the insulation and the screening system of the cable, whereby enhancing the life of the cable. The cable shall be strictly manufactured by "Dry Cured and Dry-Cooled" process.
3.2	Conductor	Electrolytic grade Aluminum conductor shall H2 grade, class-2 in accordance with IS 8130/IEC 228. The shape of conductor shall

		be compacted, stranded, and circular.
3.3	Longitudinal water sealing of conductor	Shall be achieved by water swelling yarns/tapes in the interstices of the conductor. The fiber/yarn shall turn into jelly/swell, when in contact with water making the conductor water tight as per IEC 60502-2.
3.4	Semi conducting water blocking tape	Semi-conducting water blocking tapes shall be applied over the conductor, suitable for continuous operating conductor temperature of 90 deg C.
3.5	Conductor Screen	The conductor screen shall consist of extruded semi conducting compound which shall be fully compatible with the conductor and extruded insulation. Outer surface of semiconductor screen shall be super smooth, and firmly bonded to the overlaying insulation. The minimum Thickness of conductor screen shall be 0.8 mm
3.6	Insulation	The extruded XLPE insulation shall TREE-RETARDANT and of very high degree of purity with nominal thickness of 11 mm. The minimum thickness at any point shall not be less or more than 10% of the nominal value. Percentage eccentricity of the insulation shall not be more than 10%. The insulation properties shall be stable under Thermal conditions arising out of continuous operation at conductor temperature of 90 deg C rising momentarily to 250 Deg C under short circuit conditions.
3.7	Insulation Screen	The insulation screen shall consist of extruded semi conducting Compound which shall be fully compatible with extruded insulation. Insulation screen shall be firmly bonded to the insulation The minimum Thickness of insulation screen shall be 0.8 mm
3.8	Make of insulation and semi conducting screen	TR-XLPE of Dow/Borealis/Hanwa (any deviation to above shall not be acceptable unless and until it has been specially approved by BSES prior to sourcing of compounds and manufacturing of cable).
3.9	Core	The ovality of the core shall not be more than 5%.
3.10	Inner Longitudinal water sealing bedding	Semi-conducting water swellable tapes shall be applied over the extruded semi-conducting core screening. Nominal Thickness of the Swellable Tape = 0.3 mm The swell speed shall be greater 12mm/minute
3.11	Metallic Screen	The metallic Screen shall consist of a layer of annealed copper tape of minimum 0.1mm thickness and shall be applied over the semi-conducting water-swellable tape with minimum 10% overlap.

3.12	Inner Longitudinal water sealing bedding (2 nd layer)	Semi-conducting water swellable tapes shall be applied over the metallic screen again with a minimum overlap of 10 %. Nominal Thickness of the Swellable Tape = 0.3 mm The swell speed shall be greater 12mm/minute
3.13	Core Identification	Cores shall be identified by coloured strips (Red, Yellow, Blue), applied helically / longitudinally over the copper tape. The coloured strips shall carry the name of manufacturer permanently printed at close intervals; this is to provide additional identification of manufacturer of the cable.
3.14	Optical Fiber Cable (as one of the fillers)	Clause deleted
3.15	Fillers	Fillers used in 3-Core cables shall be of PP Fillers grade along with sufficient water blocking yarn to make it water tight construction.
3.16	Laying up of Cores	All the 3-Core, along with Fillers, water-blocking yarn shall be laid in the suitable right hand lay.
3.17	Inner Sheath	Extruded PE ST7 confirming to requirements of IEC 60502-2 with latest amendments. The minimum thickness of the inner sheath shall be 1.5 mm. A non-conducting water blocking tape with approx. 10% overlap shall be applied over the inner sheath.
3.18	Armour	The armour shall be of galvanized round steel wires of minimum 4 mm dia complying the requirements of IS 3975:1999 with latest

		amendments. The armour wires shall be applied with minimum 90% coverage. The joints in the armour round wires shall be made by brazing or welding and the surface irregularities shall be removed. A joint in the wire shall be at least 300 mm from the nearest joint in any other armour wire in the completed cable. The short circuit capacity of armour shall be 26.3 kA for 3 second.
3.19	Binder Tape	Rubberized cotton tape shall be wrapped with approx. 10% overlap over armour
3.20	Outer Sheath	The outer sheath shall consist of extruded black colored HDPE type ST 7 as per IEC 60502-2 with anti termite protection. The minimum thickness shall be 3 mm at any point. Semi conductive layer either extruded or graphite coating shall be provided over the Outer Sheath.
3.21	Cable Rating	The cable size shall be suitable to carry rated load current on 66 kV continuously without exceeding the maximum conductor temperature of 90 deg. C.
3.22	Drum Length	300m $\pm$ 5 % (short lengths not acceptable except the last length and minimum acceptable short length shall be 100m). The Overall tolerance - 2 % for the total cable length of the entire order Manufacturer shall not be allowed to put two cable pieces of different short length in same cable drum.
3.23	Embossing	The extruded outer sheath shall be embossed with meter marking at interval of 1 metre. The "A" end meter marking and "Z" end meter marking and the drum lengths shall be printed on the drum flange along with other markings. The outer sheath shall also be embossed with (min.) a) Voltage designation b) Type of construction/cable code (i.e. A2XCEW2Y) c) Number of core and nominal cross sectional area. d) Type of cable "Electric Cable". e) Manufacturers name & trade mark f) Name of buyer (e.g. BSES) g) Month & year of manufacturing h) Batch no / Lot no. and Drum no i) Sequential length marking. i) Purchase Order Number and Date Progressive length marking shall start from zero for each drum.
3.24	Joints and Terminations	The 3-Core Joints and Terminations to be used with the cable shall be with proven design and fully type tested as per IS 60840. The Joints and Terminations match or exceed all technical performance parameters of the specified cable.

		The Joints and Terminations would be either Heat Shrink, Cold-Shrink or Pre-moulded type.

4.0 Quality Assurance

4.1	Vendor quality plan	To be submitted for purchaser approval
4.2	Inspection points	To be mutually identified & agreed in quality plan

5.0 Inspection & testing

5.1	Routine test	Each drum length of cable shall be subjected to the following tests
		- Measurement of the electrical resistance of the conductor shall be carried out as per the provisions of Clause 10.5 of IEC 60840/ IS 10810 part 5 The measurement shall be made on the conductors of each cable length. The D.C. resistance of the conductor at 20 deg. C shall not exceed the maximum value specified in IEC 60228 / IS 8130.
		- High voltage test as per clause 9.3 of IEC-60840/ 20.17 of IS 7098(Part-3):1993
		- Partial discharge test shall be carried out as per clause 9.2 of IEC Publication No.60840/20.10 of IS 7098(Part-3):1993
		- Measurement of capacitance as per clause 10.10 of IEC60840/ 20.18 of IS 7098(Part-3):1993
		Impulse voltage test of one drum and Physical dimension of each and every layer along with component.
		- Test on the outer jacket as per Clause 3 of IEC 60229
5.2	Type test	The cable and the associated accessories like Joints and Terminations of same voltage, design and number of cores shall be of Type Tested from CPRI/ERDA as per IEC 60840:2004 /IS7098-III:1993 with latest amendments . Type test report (from CPRI/ERDA only) of not more than five (5) years old shall be submitted for the same type, size and voltage rating of the cable offered, along with the bid. All type tests shall be carried out in accordance with Clause 12 of IEC-60840 / Clause 19.1 of IS 7098-III and in accordance with the sequence prescribed therein.
5.3	Short Circuit Test of Armour	The bidder shall furnish short circuit test report of 26.3 kA for 3 seconds from CPRI/ERDA for the same voltage, size and design

		of cable. This short circuit test shall be preceded and succeeded by high voltage, Partial Discharge, Armour Resistance and Conductor Resistance Test. Test report shall not be more than five (5) years old.
5.3	Acceptance Tests	Shall be conducted as per IEC: 60840: 2004 / IS: 7098-III: 1993 and approved QA plan for each lot of cable.
5.4	Special Tests	The following tests shall be carried out as special tests
		Conductor examination as per Clause 10.4 of IEC-60840 for conformance of IEC 60228/IS 8130.
		Measurement of thickness of insulation as per Clause 10.6 of IEC- 60840 and Clause 8 of IEC-60811-1-1./ IS 10810 part 6
		Measurement of thickness and overall dimensions of sheath as per Clause 8 of IEC-60811-1-1./ IS 10810 part 6
		Measurement of dimensions of Armour as per Clause 10.7 of IEC-60840/IS 10810 part 36
		Measurement of external diameter as per Clause 8.3 of IEC-60811-1-1
		Hot set test for TR-XLPE insulation as per Clause 10.9 of IEC-60840/ IS 10810 Part 30
		Degree of cross-linking as per ASTM D 2768-01, void and contamination as per 20.1 of IS 7098 (Part-3), abrasion resistance as per BS 7835
		Sheath Integrity Test
5.5	Inspection	The buyer reserves the right to witness all tests specified on completed cables
		The buyer reserves the right to inspect cables at the Seller's works at any time prior dispatch, to verify compliance with the specifications.
		In-process and final inspection call intimation shall be given in advance to purchaser.
		In the event of any discrepancy in the test reports i.e test reports not acceptable or any type tests(including special / assitional 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	Three sets of complete test certificates shall be submitted along with the dispatch documents.

6.0 Drawings, Data & manuals

6.1	To be submitted along with bid	The seller has to submit:
		a) Cross sectional drawing of cable.
		b) Completely filled GTP
		c) Type test certificates
		d) Dimensional drawing for pulling eye
		e) Fault level calculation
		f) Complete cable catalogue and manual
		g) Armour Coverage Calculations
6.2		f) Short Circuit Test Certificate
		Within 15 days, the seller has to submit four sets of above mentioned drawings along with one soft copy for buyer's approval.
6.3	Submittals required prior to dispatch	a) Inspection and test reports, carried out in manufacturer's works (R)
		b) Test certificates of all bought out items.
6.4	Drawing and document sizes	Standard size paper A0, A1, A2, A3, A4
6.5	No. of dwgs. / Documents required at different stages	As per Annexure – A

7.0 Shipping, Handling and Site support

7.1	Packing	The cable shall be wound on non-returnable steel drums of suitable size of minimum hub diameter of 15D (where D is the overall diameter of the cable) and packed conforming to international standards. The drum shall be fully enclosed by suitable packing preferably PP sheeting. Cable shall have sea worthy packing in case cables are dispatched by shipping lines.
7.2	Pulling eye & sealing of Cable ends	A cable pulling eye shall be provided at "Z" end of cable on each drum. Suitable fillings/putty shall be used for sealing gap between outer sheath and pulling eye. Heat shrinkable sleeves with the pulling eye shall also be provided. The pulling eye shall be directly connected to the conductor and be capable to withstand a tensile load of 30N / sq mm of conductor area. The "A" end of the cable shall be sealed with heat shrinkable cap. Drawing of the pulling eye shall be submitted along with the bid for review.
7.3	Drum identification label	The following information shall be marked on the drum:
		- Drum identification number.
		- Trade name or trade mark; if any
		- Name of manufacturer and buyer
		- Nominal sectional area of the conductor of the cable
		- Type of cable and voltage for which it is suitable

		- Length of the cable on the drum, with "A" end and "Z" end markings.
		- Purchase order number with SAP item code.
		- Year and month of manufacturing.
		- Direction of rotation of drum (an arrow) and
		- Net weight of cable in drum and gross weight of cable with drum.
		- Batch no or Lot no.
7.4	Shipping	The seller shall give complete shipping information concerning the gross weight, size of each packing.
7.5	Handling & Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet / manual needs to be furnished before commencement of supply.
7.6	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

8.0 Progress reporting

8.1	Outline Document	To be submitted for purchaser approval for outline of production, inspection, testing, packing, dispatch, documentation programmer.
8.2	Detailed Progress report	To be submitted to Purchaser once a month containing a) Progress on material procurement. b) Progress on internal stage inspection c) Reason for any delay in total program d) Details of test failures if any in manufacturing stages e) Progress on final box up. f) Constraints / forward path

9.0 Deviations

9.0	Deviation from the Specification.	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 by the Buyer that the Seller complies fully with this specification.

Type Test Required After Award of PO:

Type test on one cable drum of each type/rating from any lot shall be conducted at CPRI/ERDA on sample basis as per relevant IS/IEC. Sample shall be sealed by BSES during inspection of cable. This type test is applicable subject to BSES requirement and cost shall be borne by BSES

Annexure – A**Scope, Documentation and Delivery schedule**

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

- a. All documents/drawings shall be provided in soft copy only in returnable Pen drives
- b. Language of the documents shall be English only.
- c. Incomplete submission shall be liable for rejection.
- d. Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch, 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 document not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope

S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
1	Guaranteed Technical Particulars (GTP)	Required	Required	Required
2	Deviation Sheet, if any	Required	Required	Required
3	Detailed cross sectional drawing of cable and drum	Required	Required	Required
4	Installation Instructions		Required	Required
5	Manual/Catalogue	Required	Required	Required
6	Cable de-rating factors		Required	Required
7	Type test reports of offered type and rating of cable	Required	Required	Required
8	BIS certificate	Required		
9	Make of Raw Materials	Required	Required	Required
10	Inspection and test reports, carried out in manufacturer's works			Required
11	Routine Test Certificates			Required
12	Test certificates of all the raw materials			Required

Annexure – B: Service Conditions

1.0.0	Delhi Atmospheric conditions	
a)	Average grade atmosphere :	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	Deg C
e)	Relative Humidity	90 % Max
f)	Thermal Resistivity of Soil	150 Deg.C cm/W
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

Annexure – C: Guaranteed Technical Particulars (Data by Supplier)

Sr.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
1	Name of manufacturer			
2	Country of manufacturer			
3	Type of cable			
4	Standard according to which cable is manufactured			
5	Rated voltage	kV	38/66	
6	Highest system voltage	kV	72.5	
7	System frequency	Hz	50	
8	No of phases per circuit	Nos	3	
9	System earthing		Solidly Grounded	
10	Rated short time current of Conductor	kA		
11	Rated short time current of Armour	kA	26.3 for 3 sec	
12	Rated short time current of metal screen	kA		
13	Rated short time current of armour and screen	kA		
14	Duration of short circuit current	Sec	1	
15	Impulse withstand voltage 1.2/50 micro sec wave	kVp	325	
16	Power frequency withstand Voltage	kV(rms)	95 for 30 minutes	
17	Conductor			
a	Nominal cross sectional area	sqmm	300	
b	Type class of conductor.		Compacted Stranded Circular	
C	Material of conductor		Aluminum	
D	Flexibility class of conductor		Class -2	
E	Minimum numbers of strands	Nos		
F	Diameter of strands before compaction. (nominal / Minimum)	Mm / mm		
G	Material of longitudinal water sealing filling of conductor			
18	Details of semi conducting tape over the conductor			
19	Conductor Screen			
a	Material and type			
b	Minimum thickness	mm	0.8	
	Make and grade of semi conducting compound.			
20	Insulation			

	Material of Insulation		TR-XLPE	
	Nominal thickness	Mm	11	
	Minimum thickness		9.9	
	Make and grade of insulation Compound			
	Maximum dielectric stress at the conductor surface	kV/mm		
21	Insulation screen			
a	Material and type			
b	Minimum thickness	mm	0.8	
c	Make and grade of semi conducting compound.			
22	Inner water swellable semi conducting tape			
a	Nominal thickness	mm	0.3	
b	Minimum swell height in one minute.	mm	12 mm in one Minute	
c	Overlap	%	10 min	
23	Min thickness of copper tape	mm	0.1	
a	width of copper tape	mm		
b	Overlap of copper tape	%	10 min	
24	outer water swellable semiconducting tape			
a	Nominal thickness	mm	0.3	
b	Minimum swell height in one minute.	mm	12 mm in one Minute	
c	Overlap	%	10 min	
25	Nominal diameter over Laying up	mm		
26 a	Removed	Yes/No		
		No.		
		No.		
26 b	No. & Material of balance fillers	No./material	/ PE ST 7	
27	No. of water blocking yarns and denier	No./material		
28	Material of the inner sheath		PE ST 7	
29	Method of Extrusion	mm	Sleeve/Tube	
30	Minimum thickness of inner sheath	mm	1.5	
31	Nominal diameter over inner Sheath	mm		
32	Non conducting water blocking tape over inner sheath			

a	Nominal thickness	mm	0.3	
b	Overlap	%	10 min	
33	Armour			
	Nominal Diameter	mm	4	
	No. of wires			
	Armour coverage			
	Area of Armour			
	Short circuit capacity of Armour	kA/3 sec	26.3	
	Binder tape over Armour		RC tape	
34	Outer jacket			
	Material and type		HDPE type ST 7	
	Minimum thickness	mm	3	
	Colour		Black	
35	Semiconducting coating outer jacket	Extruded/Graphite coating		
36	AC test voltage at works for insulation.	kV(rms)	95	
37	DC test voltage for outer jacket	kV(DC)	25	
38	Overall dia of completed single core cable	mm		
39	Weight per metre of complete Cable	kg/m		
40	Short circuit capacities with maximum conductor temperature of 250Deg C : (conductor temperature of 90 Deg C at the commencement of short circuit) 0.5 second duration 1 second duration 2 second duration 3 second duration	kA		
41	Minimum radius of bend round: which cable can be laid a) Direct burial in ground b) In ducts	mm		
42	Maximum D.C .resistance of: conductor per KM at 20 deg. C	Ohm/km	0.100	
43	Maximum AC resistance of: conductor per KM at 90 deg. C	Ohm		
44	Equivalent star reactance per KM: of 3 phase circuit at 50 Hz	Ohm		
	Maximum electrostatic capacitance : Per KM of cable	pf		
45	Maximum continuous current carrying :	Amp		

	Capacity per circuit when laid in ground as per the following parameters -Maximum continuous conductor temperature of 90Deg C -Maximum conductor temperature during short circuit of 250 Deg C -Ground temperature of 30 Deg C -Soil resistivity of 150 DegCcm/Watt -Depth of laying of 150cm			
46	Maximum continuous current carrying : Capacity per cable when laid in air with ambient temperature of 40DegC and other parameters as per SI no 49	Amp		
47	Rating factors for ambient air temperature attached(Yes/No)			
48	Rating factors for ground temperature attached(Yes/No)			
49	Rating factors for phase spacing in flat formation attached(Yes/No)			
50	Rating factors for grouping of cable laid in ground in horizontal formation attached(Yes/No)			
51	Rating factors for grouping of cable laid in ground in tri-foil touching formation attached(Yes/No)			
52	Rating factors for thermal resistivity of soil attached(Yes/No)			
53	Rating factors for depth of laying attached(Yes/No)			
54	Max. power factor of charging KVA of : cable when laid direct in the ground at normal voltage frequency at conductor temperature at 90Deg .C			
55	Max. dielectric power loss of cable per :	Watt/km		

	KM of 3 phase circuit laid direct in ground at normal voltage, frequency and maximum conductor temperature of 90 Deg C			
56	Impedance per KM of 3 phase circuit : at 50 C/s and maximum conductor temperature. a) Positive and negative sequence b) Zero sequence	Ohm		
57	Standard drum length of cable	Metres	300 +/- 5% (short lengths not acceptable except the last length)	
58	The overall quantity tolerance	-2 %		
59	Cable to be wound on non returnable steel drum.	Yes / no	Yes	
60	Normal delivery length	Metres		
61	Cable pulling Eye to be provided at "Z" end			
62	Tensile load withstand capacity for pulling eye		30 N / sqmm	
63	Approximate shipping weight for the normal deliver length with the drum size (flange dia. in mm and width in mm):	kg		
64	Drum size (Flange dia X flange width X hub dia)			
65	Embossing details on outer jacket			
66	Sequential marking at every meter.		Provided	
67	Process of cross linking of polyethylene.			
68	Removed			

Annexure - D
List of Sub-Vendors

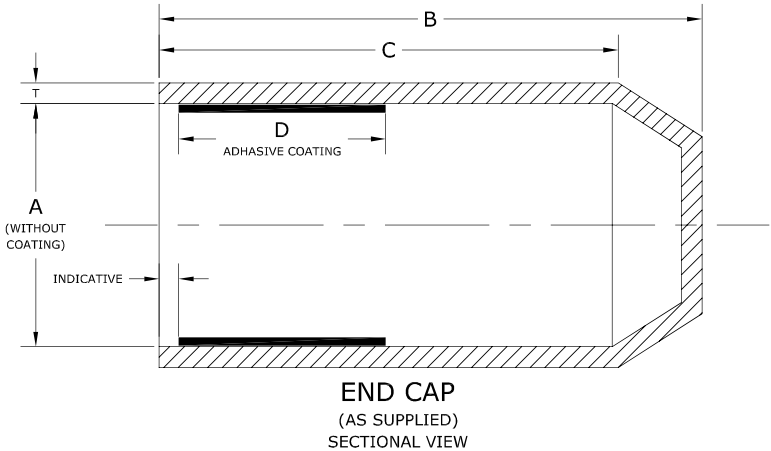
Ser. No.	Raw Materials		Name of the Suppliers
1.	XLPE Compound	1	Dow Chemicals , U.S.A.
		2	Borealis , Sweden
		3	Hanwha , South Korea
2.	Semi-Conducting Compound	1	Dow Chemicals, U.S.A.
		2	Borealis , Sweden
		3	Hanwha , South Korea
3.	Conductor Water-Blocking tapes / yarn / powder	1	Lantor
		2	Geca
		3	Miracle
		4	Scapa
		5	Sneham International
4.	Water-Swellable Tapes (Pre-slitted)	1	Lantor
		2	Geca
		3	Miracle
		4	Scapa
		5	Sneham International
5.	Aluminium Rod	1	Bharat Aluminium Co. Ltd. (BALCO)
		2	Hindustan Aluminium Co. Ltd. (HINDALCO)
		3	National Aluminium Co. Ltd. (NALCO)
		4	Vedanta (Sesa Sterlite)
6.	Copper Tape	1	Aggarwal Metal
		2	Indian Smelting
		3	Luvata Swedan

		4	Outokumpu Copper Strip AB, Sweden
7	Galvanized Steel Wires / Strips	1	Tata
		2	Balaji
		3	Systematic
		4	Mica Wires Pvt Ltd.
		5	Bansal Industries
8	PVC Compound	1	Kalpana
		2	Universal
		3	SCJ Plastic
		4	Sriram Polytech
		5	Shri Ram Vinyl, Kota
9	P. P. Fillers	1	Vijoy Polymers
		2	Yash Polymers
		3	AVSL Industries
10	Core Identification Tape	1	AVSL Industries
		2	Yash Polymer
		3	Vijoy Polymers
11	PE Compound	1	Borealis
		2	Shakun
		3	Kalpana

DIMENSIONS

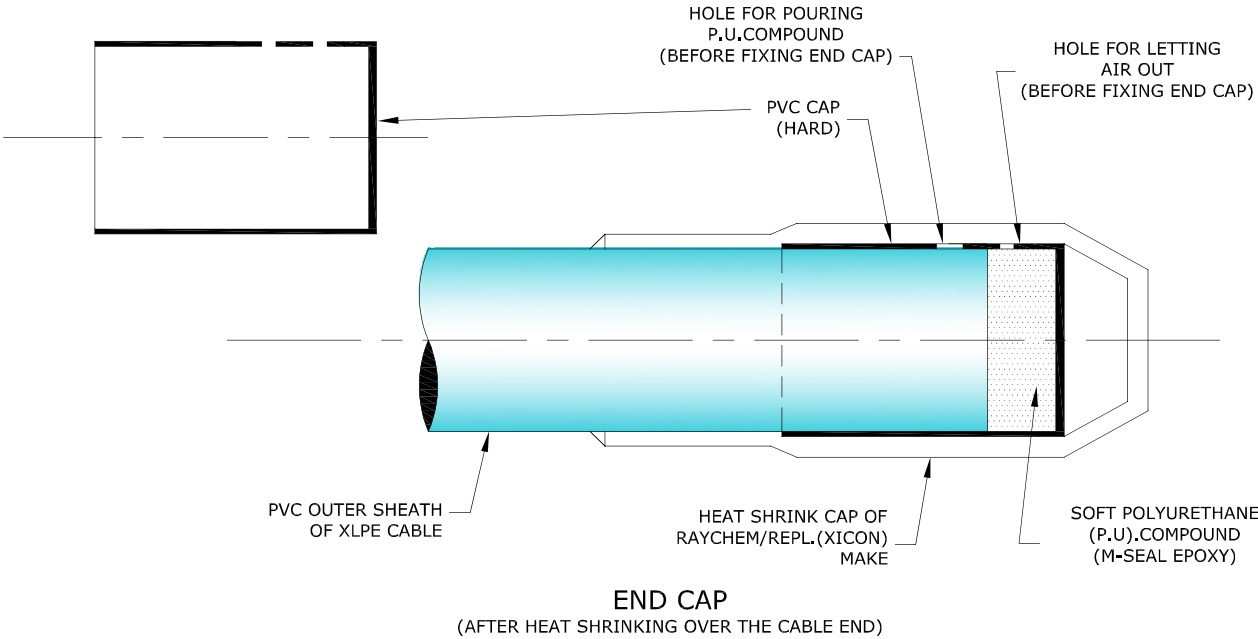
SIZE	A EXP.(Min.)	A REC.(Max)	B EXP.(Min.)	C EXP.(Min.)	D EXP.(Min.)	LC %	T (WALL REC. ± 20 %)
EC 120/150	75	34	120	105	50	± 10	4.2
EC 240/300	100	62	130	110	70	± 10	3.5
EC 400	145	75	155	120	70	± 10	4.6

EXP - Expanded (as supplied), REC - Recovered freely, LC - Longitudinal Change, T - Wall Thickness, EC - End Cap



MATERIAL SPECIFICATIONS

Characteristics	Test Class	Value	Test Method
A Physical Properties			
1 Specific Gravity	Type	1.05 ± 0.2	ASTM D-1505
2 Water Absorption	Type	1 % (max)	ASTM D-570 / ISO 62
3 Tensile Strength	Routine	10 N /sqmm (min)	ASTM D-412 / ISO 37
4 Ultimate Elongation	Routine	300% (min)	ASTM D-412 / ISO 37
5 Hardness	Type	45 shore D ± 3	ASTM D-2240
6 Thermal Test			
B Thermal Ageing (120°C for 500 hrs)			
1 Tensile Strength	Type	8 N/sqmm (min)	ASTM D-412 / ISO 37
2 Ultimate Elongation	Type	200% (min)	ASTM D-412 / ISO 37
C Electrical Properties			
1 Volume Resistivity	Type	10 ¹² ohm-cm. (min)	ASTM D-257 / IEC 93
2 Dielectrical Strength	Type	10 kV/mm. (min)	ASTM D-149 / IEC 243
3 Dielectric Constant	Type	5 (max)	ASTM D-150 / IEC 250



- Note : 1) All dimension in mm
2) Colour Black
3) Size as mentioned in the table shall be stencilled on respective item

BSES

DRAWING No. MISC/E/4-1131/1698

SCALE :NOT TO SCALE

DATE: 09-05-2011

**END SEALING CAP
(FOR XLPE CABLE)**

DRAWN BY:

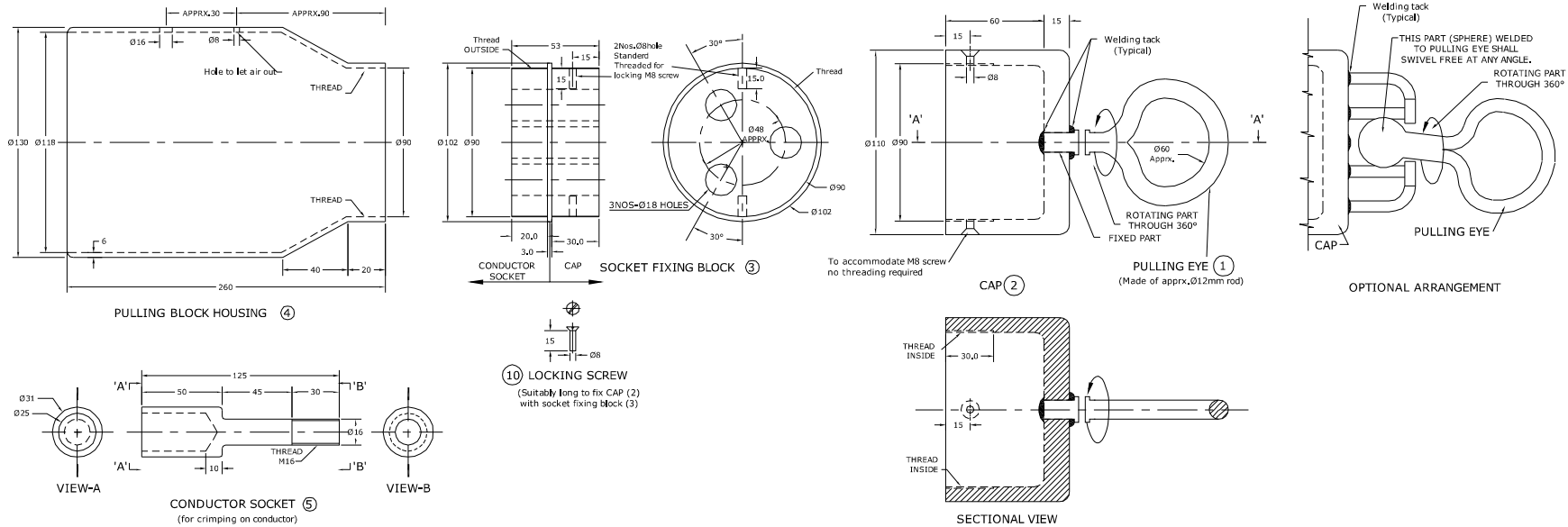
CHECKED BY:

APPROVED BY:

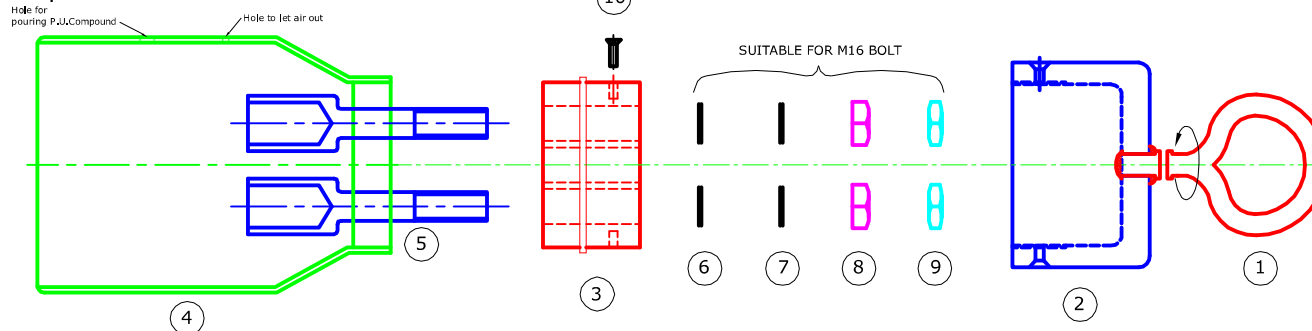
REVISIONS

Addl V.P.

ANNEXURE F



Exploded View



10	LOCKING SCREW	2	M.S.Zinc-Plated
9	LOCK NUT	3	M.S.Zinc-Plated
8	NUT	3	M.S.Zinc-Plated
7	SPRING, WASHER	3	M.S.Zinc-Plated
6	PLAIN WASHER	3	M.S.Zinc-Plated
5	CONDUCTOR SOCKET	3	AL.
4	PULLING BLOCK HOUSING	1	M.S.Zinc-Plated
3	SOCKET FIXING BLOCK	1	M.S.Zinc-Plated
2	CAP	1	M.S.Zinc-Plated
1	PULLING EYE	1	M.S.Zinc-Plated
NO.	DISCRIPTION	QTY.	MATERIAL

BSES

DRAWING No. MISC/E/4-1133/1699

SCALE :NOT TO SCALE

DATE: 09-05-2011

CABLE PULLING EYE ASSEMBLY (TYPICAL)

DRAWN BY:

CHECKED BY:

APPROVED BY:

REVISIONS

Add V.P.

EXAMPLE:

- 1) For cable size 33kV, 3/C X 400sq mm Al XLPE.
 - 2) Diameter over conductor : 23.8mm approx.
- Overall diameter : 108±3mm approx.
Pulling force applicable on the cable : 30 N/sq mm
Pulling eye shall withstand total force of : 36000N+Safety margin

NOTE:

- 1) All Dimensions are in mm, unless otherwise stated.
- 2) This drawing is typical / indicative. Separate dimensioned drawing for cable pulling eye assembly, suitable for required size & rating of cables, shall be submitted for approval, prior to manufacturing.
- 3) After fixing cable pulling eye, P.U. (Poly-Urethane) Compound shall be poured to occupy inner spaces to avoid ingress of Water / Moisture.
- 4) After P.U. Compound oozes/flows out from the cable side, the same edge shall be sealed with suitable sleeve/Tape.

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ANNEXURE-G



QUALITY ASSURANCE PLAN (QAP) FOR 66 kV EHV CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification, P : Perform, W : Witness, V : Verification											
A RAW MATERIAL												
1	Aluminium/Copper Rod	a) Tensile strength	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		b) Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Diameter	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Chemical composition	Major	Chemical	Sample	MPS	MPS	Test certificate	P	V	V	
		e) Surface finish	Major	Visual	Sample			-	P	P	—	
2	PVC Compound	a) Tensile Strength	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		b) Elongation at break	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Thermal stability	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
3	TR-XLPE Compound (Borealis/Dow chemical/ Hanwa)	a) Packing	Minor	Visual	100%	MPS	MPS	-	P	V	-	
		b) Tensile Strength	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Elongation at break	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Hot set test	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		e) Volume Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		f) Cure Curve (Max. Torque)	Major	Physical	Sample	MPS	MPS	Reg./Sheet	-	P	V	
		g) Density	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
4	Semi-conducting Compound (Borealis/Dow chemical/ Hanwa)	a) Packing	Minor	Visual	100%	MPS	MPS	-	P	V	-	
		b) Volume Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Tensile Strength	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Elongation at break	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		e) Cure Curve (Max. Torque)	Major	Physical	Sample	MPS	MPS	Reg./Sheet	-	P	V	
		f) Density	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
5	Copper tape	a) Thickness & width	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		b) Tensile Strength	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Elongation at break	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
6.	Armour wires/strips (Galvanised steel)	a) Dimensions	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		b) Surface condition/finish	Major	Visual	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Tensile Strength	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Elongation at break	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		e) Torsion test for round wire	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		f) Wrapping test	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		g) Mass of zinc coating	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		h) Uniformity of zinc coating	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		i) Adhesion test	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		j) Resistivity test	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
7	Water Swellable	a) Dimensions	Minor	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	



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S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,												
P : Perform, W : Witness, V : Verification												
	tape	b) Swelling height	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Weight	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
8	Steel Drum	a) Dimension	Major	Meas.	1 sample per size	IS 10418 / Purchase order		-	P	P	-	
		b) Finish & workman ship	Minor	Visual	1 sample per size	Compliance to standard Engineering norms & free from surface defects		-	P	P	-	
9	Binder tape	a) Dimensions & material	Minor	Physical	Sample	MPS	MPS	-	P	P	-	
10	Polypropylene filler	a) Size	Minor	Physical	Sample	Purchase order	Purchase order	-	P	P	-	
11	Heat shrinkable end cap	a) Bore diameter	Major	Physical	1 sample per size	--	--	-	-	P	-	
		b) Length of end cap	Minor	Physical	1 sample per size	--	--	-	-	P	-	
B PROCESS INSPECTION												
1	Wire Drawing	a) Diameter	Major	Physical	Sample			Reg./Sheet	-	P	V	
		b) Surface finish	Major	Visual	100 %	Smooth & free from defects		--	-	P	-	
		c) Tensile test (for Al)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	P	V	
		d) Elongation test (for Cu)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	-	V	
		e) Wrapping test (for Al)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	P	V	
2	Stranding	a) No. of wires/strands	Major	Physical	At the time of m/c setting			Reg./Sheet	-	P	V	
		b) Lay length & Lay direction	Major	Physical	-do-			-	-	P	V	
		c) Dia of conductor	Major	Physical	During setting & once in each shift			Reg./Sheet	-	P	V	
		d) Surface finish	Major	Visual	100 %	No surface defects and free from sharp edges, scratches, grease, oil etc.		-	-	P	-	
3	Core extrusion (Conductor screen, Insulation & insulation screen)	a) Compound Make/Grade	Major	Visual	During m/c setting			-	-	P	-	Insulation screen shall be freely strippable, without application of heat.
		b) Thickness of insulation & extruded S.C. layers	Major	Physical	During m/c setting after stabilisation	Tech. Data Sheet / IS 7098/III	Tech. Data Sheet / IS 7098/III	Reg./Sheet	-	P	V	
		c) Surface finish	Minor	Visual	100 %	Smooth & free from defects		-	-	P	-	
		d) Printing on outer semi- conducting layer	Major	Visual	100 %	"DO NOT HEAT, FREELY STRIPPABLE"		-	-	P	-	
		e) Tensile Strength	Major	Physical	Sample	IS 7098/III	IS 7098/III	Reg./Sheet	-	P	V	
		f) Elongation at break	Major	Physical	Sample	IS 7098/III	IS 7098/III	Reg./Sheet	-	P	V	
		g) Hot set test	Major	Physical	Sample	IS 7098/III	IS 7098/III	Reg./Sheet	-	P	V	
		g1) Ovality of core	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	



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									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
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		h) Eccentricity of insulation	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		i) Core diameter	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		j) Void & contamination test for insulation (Silicon Oil test)	Major	Physical	Sample			-	-	P	V	
		k) Wafer boil test for extruded semi-conducting layers	Major	Physical	1 sample/lot	BIS draft Specn	BIS draft Specn	Reg./Sheet	-	P	V	
4	Taping - water Swellable semi-conducting	a) Dimensions	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Tape Application (Overlap)	Minor	Visual	During m/c setting	Suitable overlap	Suitable overlap	-	-	P	-	
5	Taping - Copper tape	a) Width & Thickness of tape	Major	Physical	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		b) Number of tapes	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Tape application (Overlap)	Minor	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
6	Laying up	a) Identification of cores	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	Cores shall be laidup with PP fillers & suitable tape binder shall be provided over laid up assembly
		b) Direction of lay, core Sequence & Lay length	Major	Visual	During m/c setting	IS 7098/III, PIL- W-02	IS 7098/III, PIL- W-02	-	-	P	-	
		c) Application of binder tape	Minor	Visual	During m/c setting	Tech. Data Sheet		-	-	P	-	
		d) Shape of laid up assembly	Minor	Visual	100%	Reasonably circular	Reasonably circular	-	-	P	-	
7	Inner sheath	a) Material & type	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Thickness	Major	Physical	During m/c setting & drum change	Tech. Data Sheet & IS 7098/III	ech. Data Sheet & IS 7098/III	Reg./Sheet	-	P	V	
		c) Surface finish	Minor	Visual	100 %	Surface shall be smooth & free from defects		-	-	P	-	
		d) Colour of inner sheath	Major	Visual	100 %	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
8	Armouring	a) Dimension of armour wires/strips	Major	Physical	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	No negative tol. on strip thickness/wire diameter
		b) No. of armour strip/wire	Major	Counting	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Armour coverage	Minor	Visual	During m/c setting	IS 7098/III	IS 7098/III	-	-	P	-	
		d) Direction of lay	Major	Visual	During m/c setting	IS 7098/III	IS 7098/III	-	-	P	-	
		e) Lay length/Gear setting	Minor	Visual	During m/c setting			-	-	P	-	
		f) Surface finish	Major	Visual	100 %	No cross over/over riding of wire/strip		-	-	P	-	
9	Outer sheath/Rewinding	a) Material & type	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Anti rodent & termite additives	Major	Visual	Each loading			Reg./Sheet	-	P	V	



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									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
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		b) Thickness	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Overall diameter	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		d) Surface finish & colour of sheath	Major	Visual	100 %	Surface smooth & free from defects. Colour as per Tech. Data Sheet		-	-	P	-	
		e) Cable length verification	Major	Visual	Each length	Manufacturing Plan	Manufacturing Plan	-	-	P	-	
		f) Marking	Major	Visual	Each length	As per approved GTP/cross sectiona drawing		Reg./Sheet	-	P	V	
C FINAL INSPECTION												
1	Routine tests	a) High Voltage	Critical	Electrical	100 %	IS 7098/III	IS 7098/III	Test Report	-	P	V	
		b) Conductor Resistance	Critical	Electrical	100 %	IS 8130/84	IS 8130/84	Test Report	-	P	V	
		c) Partial Discharge	Critical	Electrical	100 %	IS 7098/III	IS 7098/III	Test Report	-	P	V	
		d) Impulse	Critical	Electrical	One sample per lot			Test Report		P	V	
		e) Armour Coverage	Critical	Physical	One sample per lot			Test Report		P	V	
		f) Physiacal Dimensions	Critical	Physical	One sample per lot			Test Report		P	V	
		g) Freely Strippable insulation screen (Strippability Test)	Major	Physical	One sample per lot	Factory Standard	Factory Standard	Test Report	-	P	V	
2	Stage Inspection	Wire Drawing	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	Stage Inspection shall be conducted subject to BSES requirement
		Extrusion process	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Raw maerial inspection at factory	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Wrapping of Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Tensile test for Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		a) Annealing test for copper	Major	Physical	Appendix A to IS 7098/III, each lot sample basis	IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records.
		b) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		c) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Tests N/A on finished conductor.
		d) Conductor resistance test	Major	Electrical	Appendix A to IS 7098/III, each lot sample basis	IS 8130/84	IS 8130/84	Test Report	-	P	W	
		e) Test for thickness of insulation & sheath	Major	Physical		IS 7098/III & Tech. Data sheet	IS 7098/III & Tech. Data sheet	Test Report	-	P	W	
		f) Hot set test for insulation	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	



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									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
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3	Acceptance tests	g) Tensile strength & Elongation at break of insulation & outer sheath	Major	Physical	Each Lot Sample Basis	IS 7098/III & IS 5831/84	IS 7098/III & IS 5831/84	Test Report	-	P	W	
		h) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		i) High voltage test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		j) Insulation resistance (Volume resistivity) test	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		k) Tests for dimension of armour wires/strips	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		l) Test for anti termite & anti rodent property of outer sheath	Major	Physical		Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	W	
		m) Rewinding of cable on drum	Major	Visual		To check cable appearance, drum appearance, cable winding, packing, embossing/printing/sequential marking		Reg./Sheet	-	P	W	
		n) Void & contamination test for insulation (Silicon Oil test)	Major	Physical				Reg./Sheet	-	P	W	
		o) Wafer boil test for extruded semi-conducting layers	Major	Physical				Reg./Sheet	-	P	W	
		p) Freely Strippable insulation screen	Major	Physical		Factory Standard	Factory Standard	Test Report	-	P	W	
		q) Water Penetration test (WPT) on core (i.e. Logitudinal Water Blocking Test)	Major	Physical		IEC:60502	IEC:60502	Test Report	-	P	W	Test shall be conducted for leakage of water through conductor.
		r) Armour coverage	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		s) Ovality	Major	Physical		As per data sheet	As per data sheet	Test Report	-	P	W	
		t) Eccentricity	Major	Physical		As per data sheet	As per data sheet	Test Report	-	P	W	
		u) Mass & uniformity & zinc coating on armour	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		v) Resistivity of Strip armour	Major	Electrical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		w) Swelling height of water swellable tape	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		x) Flammability test	Major	Physical		As per IS-78098/II/2011	As per IS-78098/II/2011	Test Report	-	P	W	
		y) Impulse withstand test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	



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									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,											
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		z) Ageing & Water absorption test(Gravimetric) on Insulation & Outer sheath	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		z1) Heating Cycle with Potential	Critical	Electrical	sample basis, once per PO			Test Report	-	P	W	
		z2) Raw Material Verification in all aspects	Major	Physical	Each Lot					P	W	
4	Type tests at vendor's works	a) Tests on conductor			One sample per Tender							
		i) Annealing test for copper	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records. Tests N/A on finished conductor.
		ii) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iii) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iv) Conductor resistance test	Major	Electrical		IS 8130/84	IS 8130/84	Test Report	-	P	V	
		b) Tests for armouring wires/strips										
		i) Dimensions of wire/strip	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		ii) Tensile strength & Elongation at break	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	Only for Steel wires/strips
		iii) Torsion test for wire	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		iv) Winding test for strip	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		v) Uniformity of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vi) Mass of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vii) Resistivity of wire/strip	Major	Electrical		IS 3975	IS 3975	Test Report	-	P	W	
		c) Test for thickness of insulation & sheath	Major	Physical		IS 7098/III & Tech. Data sheet	IS 7098/III & Tech. Data sheet	Test Report	-	P	W	
		d) Physical tests for insulation									W	
		i) Tensile strength & Elongation test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iii) Hot set test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iv) Shrinkage test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		v) Water absorption (gravimetric)	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		e) Physical tests for outer sheath									W	
		i) Tensile strength & Elongation test at break	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		iii) Shrinkage test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	



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1	2	3	4	5	6	7	8	9	10	11	12	13
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	P : Perform, W : Witness, V : Verification											
		iv) Hot deformation test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		v) Loss of mass in air oven	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		v) Heat shock test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		vi) Thermal stability test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		f) Electrical tests in sequence									W	
		i) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ii) Bending test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iii) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iv) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		v) Dielectric power factor as a function of temperature	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		vi) Heating cycle test	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		vii) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		viii) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ix) Impulse withstand test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		x) High voltage test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		g) Insulation resistance (Volume resistivity test)	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		h) Flammability test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
D PACKING & MARKING												
1	Packing & Marking	a) Cable end sealing	Major	Visual	100 %	IS 7098/III/ Agreement	IS 7098/III/ Agreement	-	-	P	W/V	BSES representative may verify these characteristics on randomly selected drums.
		b) Pulling eye at leading end- removed from vendor scope, end cap shall be provided at both the end of cable	Major	Visual	100 %	As per agreement	As per agreement	-	-	P	W/V	
		b) Stencilling/Marking on drum	Minor	Visual	100 %	IS 7098(Part 2):2011/ Agreement	IS 7098(Part 2):2011/ Agreement	-	-	P	V	



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									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,												
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Note		1. Checks specified above for Raw Material, In-Process and Final Inspection shall be as relevant to the specific cable construction. 2. Number of samples shall be selected as per Factory Standard/Agreement wherever 'sample' is indicated for extent of check. 3. Plant standards shall be followed in case Technical Data Sheet does not include requirements for characteristics to be checked. 4. BSES may witness Raw material and in process inspection in addition to Routine/Acceptance tests at any time/stage of manufacturing. 5. BSES's Inspector may randomly select a cable drum for type testing at vendor's works. 6. For each of the offered lot for inspection, BSES may randomly select one cable drum for testing of end cap "Destructive testing" to verify adhesion of sealing cap to cable outer sheath. . 7. All factory Type Tests shall be Witnessed by BSES										

ANNEXURE-H

Testing and manufacturing process requirements w. r. t. TR- XLPE insulation

All cables made with TR-XLPE Insulation should be tested and/or certified to meet the following performance parameters as per ANSI /ICEA S-94-649 after one year AWTT.

Property	Units	Requirements Values
Min. Avg. Electrical Breakdown Strength(qual. test)	Kv/mm	> 25
Impulse Strength	Kv/mm	> 83
Water Tree Length	mm	0.25
Max. Bowtie Tree Density	(Number per 16.4 cu. cm)	Maximum 15 (0.12-0.25 mm range)

Manufacturing processes to produce high-quality cables with the following characteristics:

- Cure consistency with hot set/creep less than 100%
- No voids larger than 75 microns per 16.4 cubic cm
- No ambers larger than 250 microns per 16.4 cubic cm
- No contaminants larger than 125 microns and less than 5 between 50-125 microns per cubic 16.4 cubic cm tested.
- Neutral indent on cable is less than 375 microns
- Cable insulation concentricity greater than 90% tested
- No protrusions greater than 75 microns at the conductor shield and 125 microns at the insulation shield

ANNEXURE-I

Sl. No.	Document Name	Clause No.	Deviation	Reason	Merit to BSES

BSES

BSES-TS-158-RMHC-R0

APPROVED LIST FOR DIFFERENT TYPES OF CABLE RAW MATERIALS & VENDOR NAMES

BSES

APPROVED LIST

FOR

DIFFERENT TYPES OF CABLE RAW MATERIALS &

VENDOR NAMES

Specification No.- BSES-TS-158-RMHC-R0

Rev:	R0	Page:	03
Date:	16.05.2024		
Prepared by	RK Jana/ Pronab Bairagi	<i>R.K. Jana</i> <i>20.05.24</i>	
	Abhishek Vashistha	<i>Abhishek</i>	
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	Puneet Duggal	<i>Puneet Duggal</i>	
Approved by	Gaurav Sharma	<i>Gaurav Sharma</i>	
	Gopal Nariya	<i>Gopal Nariya</i>	

Raw materials Manufacturer details :

SL.NO.	RAW MATERIALS	SL.NO.	NAME OF MAKE
01	Aluminium Rod (For conductor & armour)	A	Bharat Aluminium Co.Ltd. (BALCO)
		B	Hindustan Aluminium Co.Ltd. (HINDALCO)
		C	National Aluminium Co.Ltd.(NALCO)
		D	Vedanta (Sesa Sterlite)
02	Water-Swellable Tapes (Pre-slitted)	A	Lantor
		B	GECA TAPES
		C	Scapa
		D	Sneham International
		E	Indore Tapes
03	Semi-Conducting Compound	A	Dow Chemical, U.S.A.
		B	Borealis, Sweden
		C	Hanwha, South Korea
04	XLPE Compound	A	Dow Chemical, U.S.A.
		B	Borealis, Sweden
		C	Hanwha, South Korea
05	Water-Blocking Tapes / Yarn	A	Lantor
		B	Geca Tapes
		C	Scapa
		D	Sneham International
		E	Indore Tapes
06	Copper Tape	A	Aggarwal Metal
		B	Neosym Industry
		C	Luvata , Swedan
07	Core Identification	A	AVSL Industries
		B	Yash Polymer

APPROVED LIST FOR DIFFERENT TYPES OF CABLE RAW MATERIALS & VENDOR NAMES

	Tape	C	Vijay Polymers
08	P. P. Fillers	A	AVSL Industries
		B	Yash Polymer
		C	Vijay Polymers
09	PVC Compound	A	Ddev Plastiks Industries Ltd.
		B	Universal
		C	SCJ Plastic
		D	Sriram Polytech
		E	Shri Ram Vinyl, Kota
		F	Bansal Polyplast Pvt.Ltd.
		G	KEI Industries Ltd.
		H	KEC International Ltd.
10	Galvanized Steel Wires / Strips	A	TATA
		B	Balaji
		C	Systematic
		D	Mica Wires Pvt.Ltd
		E	Bansal Industries
11	PE Compound	A	Borealis
		B	Shakun
		C	Ddev Plastiks Industries Ltd.

Note:

- A. Listed make in this documents shall be followed by manufacturer strictly.
- B. Deviation shall not be given for raw material make at any stage of manufacturing.



**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

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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

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	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 Metallic Screen: a) 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
3.5.0	Water Swellable Tape	For XLPE: Semi-conducting Water Swellable Tape shall be provided under the copper tape on each core. For PILC : not applicable
3.6.0	Filler	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
3.7.0	Over all three cores	XLPE : Binder tape PILCA : 11 kV : belt paper 33kV: Copper Woven Fabric tape
3.8.0	Inner Sheath	For XLPE: Extruded Inner Sheath of Black PVC type ST-2. For PILC : Lead alloy sheath
3.9.0	Bedding Tape	For XLPE: not applicable For PILC: two layers of paper, followed by compounded (bituminized) cotton tape.
3.10.0	Copper Woven Fabric Tape (CWF tape)	For XLPE : not applicable For PILC : a) 11 kV : absent (Belted cable) b) 33 kV : applicable for screened cable
3.11.0	Armour	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
3.12.0	Binder Tape	For XLPE: Rubberised cotton tape

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:

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

* 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)

		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. b) Top corners of all lugs shall be circular shape not rectangular. Refer Annexure F for details.(Except GIS kit)			
4.2.2	Stress Control System	a) The earthed insulation screen of an XLPE cable is terminated at a suitable distance from the conductor. b) The tube is in electrical contact with insulation screen. 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. 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. e) The physical and electrical properties shall conform to ESI 09: 13. 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.			
4.2.3	Insulation Protection	a) XLPE insulation shall be protected by means of an outer tube, resistant to tracking and weathering. b) One end of the tube shall be coated internally with red sealant mastic for a length of 50 mm. c) Physical and Electrical properties shall conform to ESI 09: 13. 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.			
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

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)	a) Transparent tube is used for restoring the insulation provided by belt paper, which is terminated at the crotch. 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.
4.2.4	Environmental Sealing System	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. 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. 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. 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.

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

4.2.5	Earth Bond System	Minimum Armour Fault Current Carrying capacity of cbles 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 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 Length of the copper braided conductor shall be 750 mm. Each copper braided conductor shall be supplied with copper lug, crimped at one end 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
4.2.6	Suppression of electrical discharges	Following materials are required for use during cable termination : 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.
4.2.7	Installation. Instruction Sheet	It shall be in English and Hindi language and shall be provided inside every kit.
4.2.8	Paper Measuring Tap	Required for use during cable preparation / terminations.
4.2.9	Identification Tag (for traceability)	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

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

		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 a. Manufacturing month and year (MM/YY format) b. Manufacturer name i.e Comp c. Manufacturer own sl no for future tracing
4.3.0	Technical Particulars	Vendor shall submit Guaranteed Technical Particulars (GTP) as per Annexure A.
4.4.0	Type Tests	i. Termination Kit shall be of type-tested quality from CPRI/ERDA/KEMA/CESI as per the BIS/IEC/IEEE within last 5 years. 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. 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
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	1) Buyer reserves the right to witness all tests specified on individual H. S. components, Moulded components or completed Cable Termination Kit. 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. 3) In-process and final inspection call intimation shall be given in 10 days advance to purchaser.
	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.)

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:	Markings / Labels shall be on both sides of every packed box. 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.

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	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.. 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. 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.

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.

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		

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

8	Description of items in the Kit, which are imported /sourced From Principal /Sub-suppliers		
9	Names of items in the Kit and their respective shelf life (months years)		
10	Kit Content Table (KCT) enclosed? (Refer Annexure — B)	Yes / No	
11	Drawing for connector (ferrule) enclosed	Yes / No (If yes, mention the document reference)	
12	Is Annexure - D (Technical Deviation Sheet) duly filled-in?		
13	Packing (Qty) i) Packing of every Kit h) Group Packing	1 no -- No. of Kits per Box -- No. of Boxes	
14	Installation Procedure enclosed?	Yes / No (If yes, mention the document reference)	
15	Quality Assurance Plan (QAP for raw materials, in-process inspection, factory testing) is enclosed?	Yes / No	
16	Whether all heat-shrinkable and moulded components of the kit meet the requirements of and have been tested in accordance with EA TS -09-1 3.(for heat-shrinkable joints)	Yes / No (If yes, details of test report no. /Date /name of test laboratory to be mentioned.)	
17	Type Test Reports (TTR) (Relevant test report no. & date, With type, size, other details of each type of Kit.) a) Prepared Joint: CPRI TTR as per BIS / IEC enclosed? b) Loose Components: CPRI TTR as per EA TS 09-13 enclosed?	Yes/No Yes/No	

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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.)

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

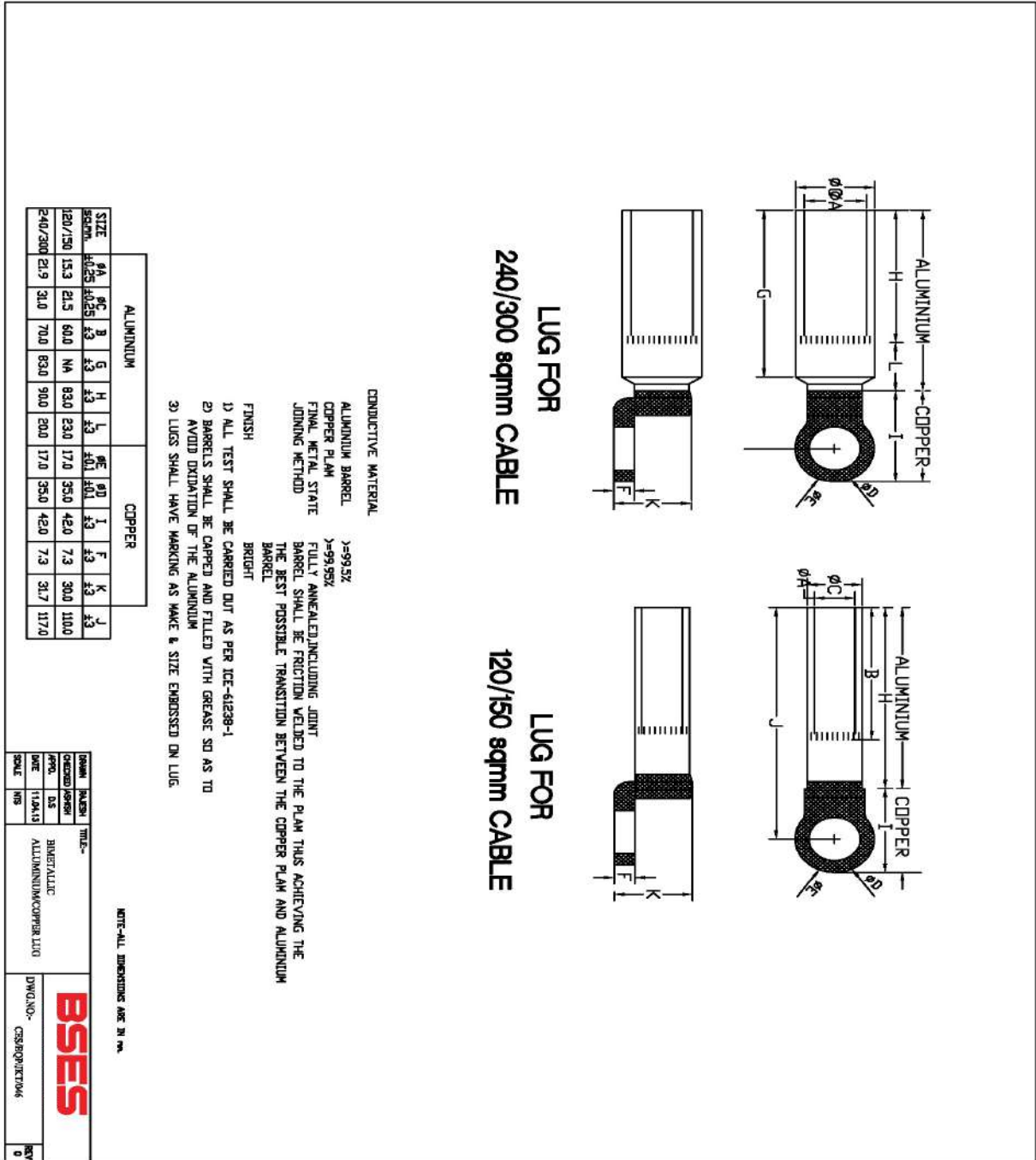
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)**Annexure – E: Service Conditions**

(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

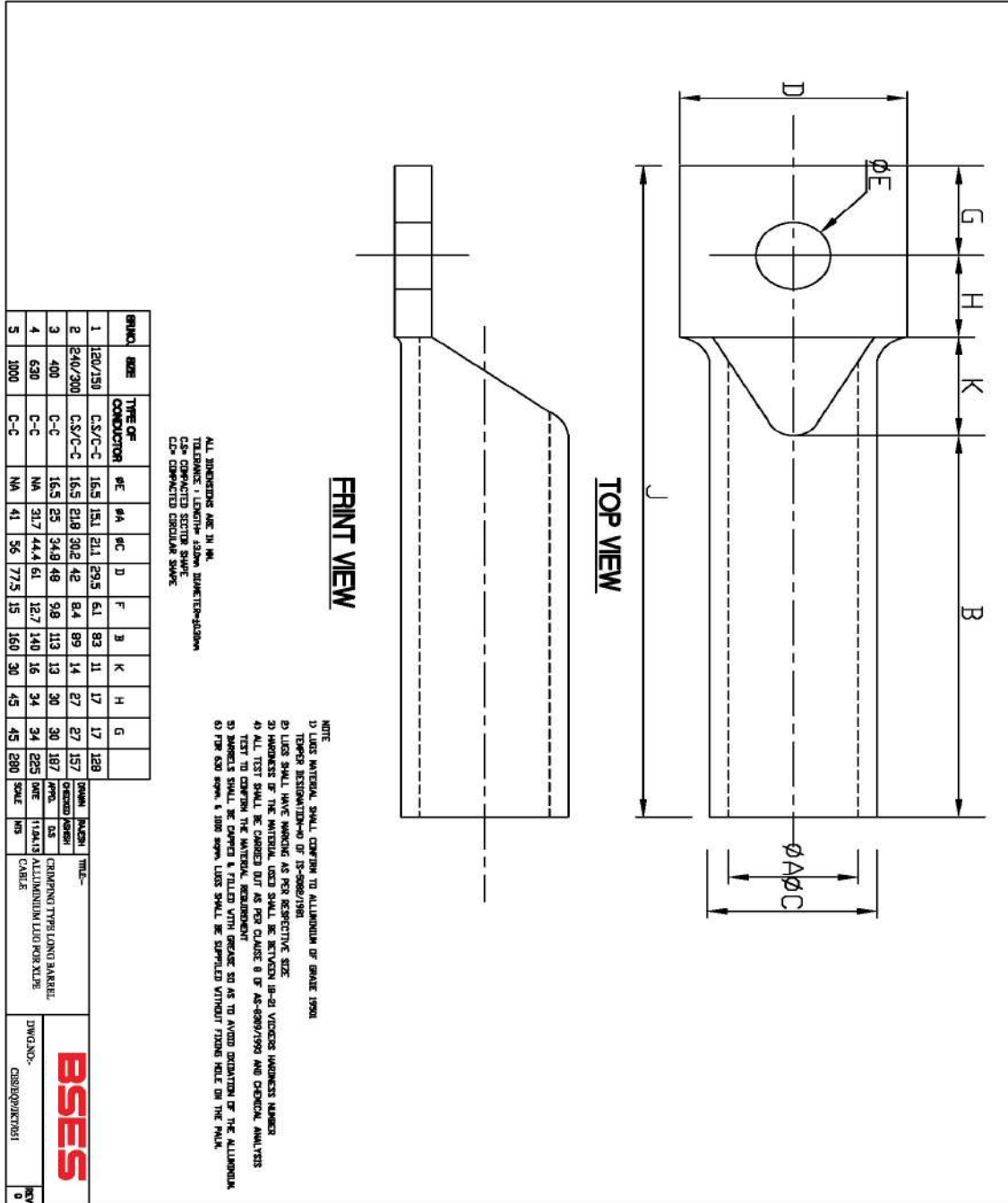
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

Annexure – F: Bimetallic Aluminium / Copper Lug



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



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

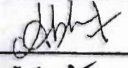
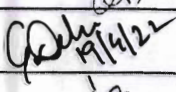
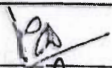
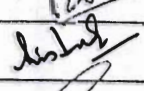
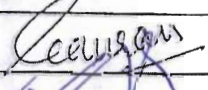
Special Note-

- 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.



Technical Specification
For Heat Shrinkable & Cold Shrinkable
Straight Through Jointing Kit
(11 KV, 33 KV, 66 KV XLPE Insulated Cables)

Specification no – BSES-TS-44-STTH-R0

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Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)**1.0.0 Scope of work**

- A. Heat Shrinkable / Cold shrinkable Straight Joint Kits (hereinafter briefly referred to as “STJ Kits”), suitable for 11 kV, 33 & 66kV XLPE cables, shall be designed, manufactured, tested, packed and delivered by the Vendor, as per Purchaser’s requirements.
- B. Supervision, during installation of joints at site if mentioned in the order.
- C. During post-installation period, if a joint fail at site, the vendor shall depute a technical team to site for a root-cause analysis of the failure of the joint, in the presence of BSES officials. An Analysis Report shall then be submitted for BSES’s review and approval. If this report concludes the cause of failure as due to a design/manufacturing defect in a component, then vendor shall replace all such components in the entire stock available with BSES.

2.0.0 Codes & standards**2.1.0 National Standards:**

S No.	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 2:1985	Cross-linked Polyethylene (XLPE) Insulated PVC sheathed cables: Part 2 - For working voltages from 3.3 kV up to and including 33 kV
	IS- 7098: Part 3:1993	Cross-linked polyethylene insulated thermoplastic sheathed Cables specification: Part 3 - For working voltages from 66 kV up to and including 220 KV
2.1.3	IS- 10810: 1984	Methods of test for cables

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 1kV up to 36 kV
2.2.2	IEC - 60183	Guide to the selection of high voltage cables
2.2.3	IEC - 885 Part 1 to 3	Electric test methods for electric cables
2.2.4	IEC - 60502 - 4	Power Cable Accessories for XLPE Cables above 3kV & up to 30 kV Test methods
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 Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

3.0.0 Cable Construction

Normal sizes of XLPE cables used in BSES system, construction features and corresponding joint requirements of cables are indicated below:

- a. 11kV, 3-core x 150 sq mm AL
- b. 11kV, 3-core x 300 sq mm AL
- c. 11kV, 3-core x 400 sq mm AL (Conventional)
- d. 11kV, 3-core x 300/400 sq mm AL (Single and three core long barrel Repairing Joint)
- e. 11kV, 3-core x 400 sq mm AL (OFC embedded)
- f. 11kV, 1-core x 1000 sq mm AL
- g. 11kV, 1-core x 150 sq mm AL HTAB
- h. 11kV, 1-core x 95 sq mm AL HTAB
- i. 33kV, 3-core x 400 sq mm AL
- j. 33kV, 3-core x 400 sq mm AL (OFC embedded)
- k. 33kV, 3-core x 400 sq mm AL (Single and three core long barrel Repairing Joint)
- l. 66kV, 1-core x 630 sq mm AL
- m. 66kV, 1 core x 1000 sq mm AL
- n. 66kV, 1 core x 1000 sq mm AL (For Single core long barrel Repairing Joint)
- o. 66kV, 3-core x 300 sq mm AL
- p. 66kV, 3-core x 300 sq mm AL (OFC Embedded)

3.1.0	Conductor	a) Electrolytic Grade Stranded Aluminum Conductor b) Grade: H2 / H4 as per IS: 8130 / 1984 (For Al) c) Stranded, compacted and circular in shape d) Class 2 e) Longitudinal "Water-Blocking Arrangement" (or water-tight construction or water barrier protection)
3.1.1	Conductor Screen	Extruded Semi Conducting material
3.1.2	Insulation	Extruded XLPE Insulation for 11 kV and Extruded TR-XLPE Insulation for 33 kV and 66 kV
3.1.3	Insulation Screen	Freely strippable Semi Conducting (without application of heat) for 66kV firmly bonded.
3.1.4	Water Swell able Tape	Semi-conducting Water Swell-able Tape under the copper tape on each core.
3.1.5	Copper Tape	Copper Tape applied helically over the layer formed by application of insulation screen, water swell able tape and identification strip
3.1.6	Filler	All interstices, including center interstices filled by PP filler. In case of OFC embedded cable. 48 no OFC (36 single mode and 12 no multi mode) as a filler in 11kV 3CX400 sqmm cable, 33kV 3CX400 and 66 kV 3CX300 sqmm cable
3.1.7	Over all three cores	Binder tape
3.1.8	Inner Sheath	Extruded Inner Sheath of Black PVC type ST-2.

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

3.1.9	Armour	a) For 11 kV 3-core Cables : Galvanized Steel flat strip armour b) For 1-core Cables : Non-Magnetic, Hard drawn Aluminium wire (flat/round) c) Corrugated aluminium or lead sheathed for 1core 66kV Cable d) For 33kV and 66 kV 3-core cable- Galvanized Steel Round wire
3.1.10	Binder Tape	Rubberized cotton tape
3.1.11	Outer Sheath	Extruded outer sheath of PVC (ST-2) for 11 kV and 33 kV cable. For 66 kV cable, HDPE ST 7 with termite- repellent and anti-rodent properties with extruded semicon/graphite layer over HDPE ST7.
3.1.12	HTAB Cable (1CX150 and 1CX95)	AB cable- conductor-conductor semicon screen- TR XPLE- insulation screen-- Water Swallowable tape -Round wire armour (in the place of copper tape), Water Swallowable tape-outer sheath+massenger wire
3.1.13	OFC	For OFC embedded cable of sizes 11kV 3CX400 sqmm cable, 33kV 3CX400 and 66 kV 3CX300 sqmm cable - Single Mode-36 Nos. Multi Mode- 12 nos. All the OFC cable is placed as filler inside the cable.

4.0.0 Straight-Through Joints (STJ)

General Technical Requirements for Straight-Through Joints (STJ) for XLPE cables are as follows:

Scope: Design, manufacture, testing and supply of Straight-Through Joint Kits for 11 kV, 33 kV & 66kV Power Cables.

Functional requirements for Heat Shrinkable / Cold Shrinkable STJ joints are given below:

4.1.0 Heat Shrinkable / Cold Shrinkable STJ joints		
4.1.1	Cable preparation	Cable preparation shall be as per installation instruction sheet. Manufacturer shall be provide Installation instruction sheet in every kit
Connector		
4.1.2	Conductor Screen	For 11kV a) Conductors to be jointed by crimping connectors b) Annular CSA (cross-sectional area) of the ferrule shall not be less than CSA of the conductor of the cable. Length of the ferrule shall be sufficient to allow adequate number of crimps, to limit temperature rise at the joint. (Vendor to furnish dimensional drawing for ferrule, indicating crimp marks.) c) For aluminium cable, the crimped ferrule shall be of aluminium d) Refer annexure F for GA drawing of crimping ferrule e) For single core repairing joint- long barrel mechanical connector/ferrule shall be provided (middle part of ferrule/connector shall be solid for better connectivity)

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

		For 33kV and 66kV a) Shear bolt type mechanical connector b) Approved make: • Tyco Electronics (BSM-185/400-U) • Pfisterer (332617010) • Nexans • Niled • Or equivalent type tested make (Manufacturer shall take prior approval from CES) d) Maintain smooth surface over connector after cut the shear head bolt e) Vendor to furnish drawing for the mechanical connector Note: In all voltage grade- For single core long barrel repairing joint, one long barrel connector/ferrule and for three core long barrel repairing joint, three long barrel connector/ferrule shall be provided along with all kind of accessories.
4.1.3	Void filling and stress relief over crimped connector and cut point of the insulation screen.	By means of High permittivity mastic tapes / Lubricant.
4.1.4	Metal screen continuity	By means of Tinned copper wire mesh, wrap individual core from cu screen with 50 % overlap and continue on other side cu screen. Bind the copper wire mesh on copper screen with copper binding wire/CFS
Armour / Earthing Continuity		
4.1.5	Armour bond	a) By means of a combination of steel (G.I.) support ring (for 3 - core Cable) or Aluminium support ring (for 1 - core Cable) and two nos. of stainless steel hose clips. b) GI Support Ring shall be 'zinc-sprayed with central bulge / bump'.
4.1.6	Minimum Armour Fault Current Carrying capacity	11 kV Cable – 11 kA for 1 sec 33 kV Cable – 31.5 kA for 1 sec 66 kV Cable – 31.5 kA for 1 sec
4.1.7	Provision of Armour continuity	By means of tinned copper braided conductor as per following 11 kV cables – 11 kV Cable – Three No's of 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

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

Accessories		
4.1.8	Suppression of electrical discharges over XLPE insulation	Cleaning solvent /equivalent, for manual application.
4.1.9	Installation Instruction	Shall be provided in English and Hindi and shall be inside every kit.
4.1.10	Sheet paper Tap	Paper tape, required for measurements during jointing, shall be provided inside every kit.
4.1.11	Identification Tag (for traceability)	1. An aluminum pouch with paper tag & sealing arrangement at one end shall be provided. This tag is required to be tied over the cable at one side of the joint. The paper tag shall give following information 1) Vendor kit designation 2) Cable section/Division 3) Type of joint 4) Size of Joint 5) Make of joint 6) Voltage class 7) Serial no. of kit 8) Vendor lot & batch no 9) Month & year of manufacturing 10) Date of installation 11) Name of jointer 12) Name of vendor supervisor 13) Name of BSES supervisor 14) Remarks 2. In addition to above Stainless Steel Tag shall be provided with following details for straight through joint a. Manufacturing month and year (MM/YY format) b. Manufacturer name i.e Comp c. Manufacturer own sl no for future tracing
4.1.12	Printing on each Heat/cold shrinkable or Moulded component	Month and year of manufacturing, batch no. /lot no., size, make, type etc.
4.1.13	GPS Coordination	Vendor to capture GPS coordinates and shall include in job card of each joint at their own cost.
4.1.14	Hydraulic Crimping	Using of Hydraulic crimping tool is mandatory for crimping purpose
4.1.15	Coffin for completed joint and Joint Marker	After successfully completion of joint, Coffin shall be made by bidder for completed joint. Drawing shall be provided by BSES. Excluding drawing, everything shall be in the scope of bidder. After back filling a joint marker shall be fixed by bidder above ground to mark the joint location. Drawing is enclosed with this

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

		tech spec.
4.1.15	Electronic Ball Marker for 33kV and 66kV Cable Joint.	Passive and Active ball shall be supplied and placed at each and every joint to mark the joint electronically. Data shall be filled by bidder as per BSES requirement.
4.1.16	OFC	11kV 3CX400, 33kV 3CX400 and 66kV, 3CX300 sqmm cables are OFC embedded. OFC joint shall be supplied along with main cable joint. (36 single mode and 12 nos. multi mode OFC inbuilt inside cable). OFC joint shall be made separately from main cable joint.
4.2.0 Only for Heat Shrinkable STJ joints		
4.2.1	Stress Control System	a) The earthed insulation screen of an XLPE cable is terminated at a suitable distance from the connector (Ferrule). b) The stress control tube is in electrical contact with insulation screen. c) Impedance of the tube shall be constant up to an operating temperature and shall be within the range 1×10^8 ohm-cm to 8×10^8 ohm-cm. d) The physical and electrical properties shall conform to EA TS 09-13. d) For single phase repairing joint-stress control tube shall be suitable for long barrel mechanical connector/ferrule
4.2.1.1	Insulation build-up	a) Maximum three layers of insulation tubes shall be used. Total thickness of the insulation being provided in the joint shall not be less than 1.2 times the insulation of the cable being jointed. b) Outer-most tube shall be screened insulating tube (dual wall tube). This tube shall be manufactured by extrusion process. c) Physical and Electrical properties shall conform to EA TS 09-13. d) For single phase repairing joint-insulation build up shall be suitable for long barrel mechanical connector/ferrule
4.2.2	Sealing end of tube	By means of Core end sealing sleeve with red mastic coating
4.2.3	Mechanical Protection	a) For 3-core cable: By means of a rollable steel mat (with required protective coating against corrosion) b) For 1-core cable: i) Copper wire mesh ii) Adhesive coated medium wall tube iii) One more layer of copper wire mesh iv) Medium wall tube
4.2.4	Corrosion Protection	By means of semi-rigid tubes, internally coated with water blocking sealant. Thick wall Insulating tube

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

4.3.0 Only for Cold Shrinkable ST joints

Scope:

The term cold shrink applies to materials, which are capable of shrinking without raising the material above the ambient temperature of its immediate surroundings. The material of the rubber insulator used in the Cold Shrink assembly shall be silicone which is factory expanded and placed on a removable core. The removing of the core causes the cold shrink assembly to shrink. The cold shrink assembly shall maintain a compressive force on the cable continuously throughout the life of the product. This pressure will ensure a complete moisture seal.

4.3.1	Stress Control System	By means of one piece body (splice assembly) providing stress control, insulation and screen continuity.
4.3.2	Mechanical Protection	By application of mastic coated vinyl tape and armor cast structural material. The taped armor cast layer may also be sprayed with water to hasten the curing.

4.4.0	Technical Particulars	Vendor shall submit Guaranteed Technical Particulars (GTP) as per Annexure A.

4.5.0 Testing & Inspection

4.5.1	Type Tests (CPRI/ERDA)	a) Straight-Through Joint shall be of type-tested quality from CPRI/ERDA. Type Test report shall not be more than 5 years old. b) In addition to this, in case of rate contract, vendor will be required to conduct type-testing on heat/cold -shrinkable and moulded components, stress grading mastic, etc., in line with EA TS 09-13 standard, at third party test laboratory once in 6 months on randomly selected sample of each voltage rating without any commercial implication to BSES. Also special test shall be done as per IS 13573.2.2011, Table-7 without any cost implication to BSES. Cable for type test may be provided by buyer at the cost of bidders. C) If product is not type tested or test report is more than 10 years old from CPRI/ERDA (subject to no change in the relevant IS/IEC.IEEE) , same shall be carried out by seller, sample shall be selected randomly by BSES, test cost to be borne by seller. For new vendor, type test is mandatory from CPRI/ERDA of BSES sample at their own cost.
4.5.2	Routine & acceptance Tests	I) All the routine and acceptance tests shall be carried out as per EA TS 09-13 guidelines, refer Annexure C. II) H.V. Test shall be carried out on a randomly selected and installed Straight-Through Joint, in the presence of Purchaser's representative, at manufacturer's works. III) The joint shall withstand a test of 4Uo voltage for 4 hours.

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

4.5.6	Inspection	I) Purchaser reserves the right to inspect /witness all tests on the STJ Kits at Seller's works at any time, prior to dispatch, to verify compliance with the specification. II) In-process and / or final inspection call intimation shall be given in advance to purchaser.
4.5.7	Test Certificates	i) Three sets of complete Test Certificates (Routine & Acceptance tests) shall be submitted along with the delivery of STJ Kits. ii) Bought-out Items: Vendor shall submit Test Certificates, lot/batch number-wise, from their sub- suppliers / principal. TC's should clearly indicate the measured technical parameters, in accordance with sub-supplier's specification. (Also refer Annexure - C)
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.
4.7.0	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 Installation Instructions. e) Any other document.
4.8.0	After Award Contract	Vendor shall submit signed 2 sets (plus 1 set of soft copy) of above-mentioned documents within 15 days, for Purchaser's approval.
4.8.0	"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.

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

4.9.0	Packing, Marking, Shipping, Handling and Storage	a). Every component / kit / box shall be properly sealed/ packed for protection against damage. Stress grading mastic shall be packed in air-tight / air-sealed packing. b). Every kit box shall be wrapped in polythene covers. c). Separate packing (sub-kits) shall be provided, for components (given below) used in crotch area and connector area. These sub-kits, labeled as “CROTCH KIT” and “CONNECTOR KIT”, shall be placed inside every kit box. i) Crotch Kit Components --Conductive cable break-out -- Yellow moulded wedge -- Break-out end sealing tube -- Break-out finger sealing tube -- Stress grading mastic ii) Connector Kit : Components -- Ferrule (connector) -- Void Filling mastic (yellow)
4.9.1	Identification Label	Markings / Labels shall be on both sides of every packed box. 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) Weights (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)
4.9.2	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

5.0.0 Quality Assurance Plan (QAP)

5.1.0	Vendor's Quality Assurance Plan (QAP)	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.

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)**6.0.0 Deviations**

6.1.0	Deviations	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.. 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. 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 be considered as a deviation from this tech spec at any stage of contract.

7.0.0 Delivery

7.1.0	Delivery	Dispatch of Material: Vendor shall dispatch the material, only after the Routine Tests /Final Acceptance Tests (FAT) of the material witnessed/waived by the Purchaser, and after receiving written Material Dispatch Clearance Certificate (MDCC) from the Purchaser.

8.0.0 Inspection Expenses**NA****9.0.0 Failure Analysis and Penalty**

Failure of joint shall be analyzed by BSES and Vendor jointly. Joint failure in regards to poor quality joint, poor work man ship, etc. shall be in the account of vendors. Losses due to failure shall be recovered from vendor in case of warranty.

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)**Annexure - A: Guaranteed Technical Particulars (GTP)**

The Vendor 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)		

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

7.6	Method of conductor continuity a) For crimping connector b) For mechanical connector		
8	Description of items in the Kit, which are imported /sourced From Principal /Sub-suppliers		
9	Names of items in the Kit and their respective shelf life (months / years)		
10	Kit Content Table (KCT) enclosed? (Refer Annexure — B)	Yes / No	
11	Drawing for connector (ferrule) enclosed	Yes / No (If yes, mention the document reference)	
12	Is Annexure - D (Technical Deviation Sheet) duly filled-in?		
13	Packing (Qty) i) Packing of every Kit h) Group Packing	1 no -- No. of Kits per Box -- No. of Boxes	
14	Installation Procedure enclosed?	Yes / No (If yes, mention the document reference)	
15	Quality Assurance Program (QAP for raw materials, in-process inspection, factory testing) is enclosed?	Yes / No	
16	Whether all heat-shrinkable and moulded components of the kit meet the requirements of and have been tested in accordance with EA TS -09-1 3.(for heat-shrinkable joints)	Yes / No (If yes, details of test report no. /Date /name of test laboratory to be mentioned.)	
17	Type Test Reports (TTR) (Relevant test report no. & date, With type, size, other details of each type of Kit.) a) Prepared Joint: CPRI TTR as per BIS / IEC enclosed? b) Loose Components: CPRI TTR as per EA TS 09-13 enclosed?	Yes/No Yes/No	

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Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated 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 of sizes 11kV 3CX400, 33kV 3CX400 and 66kV, 3CX300 sqmm cable)	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
 - a) Minimum supplied (or in expanded form) diameter
 - b) Maximum freely recovered diameter
7. a) Minimum supplied (or in expanded form) thickness
b) Maximum freely recovered thickness

C. Notes on the KCT

Markings, printings and other details for individual/group of components is 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.)

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated 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

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: Deviation Sheet

Sr No.	Clause No.	Deviation

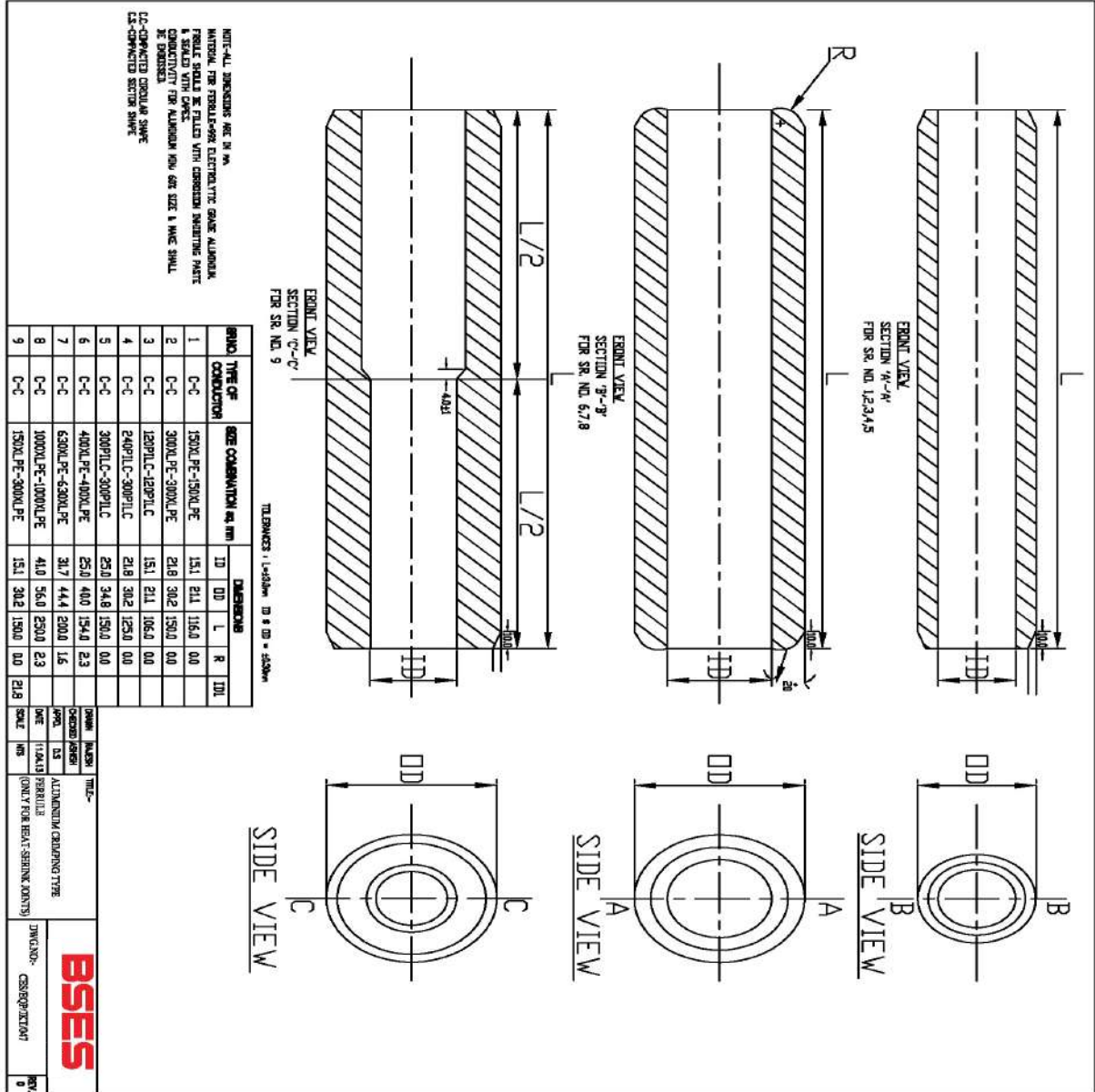
Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)**Annexure - E: Service Conditions**

(Atmospheric conditions in Delhi)

a)	Average grade Soil Condition	
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	100 % Max
f)	Thermal Resistivity of Soil	150 Deg C cm/W
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

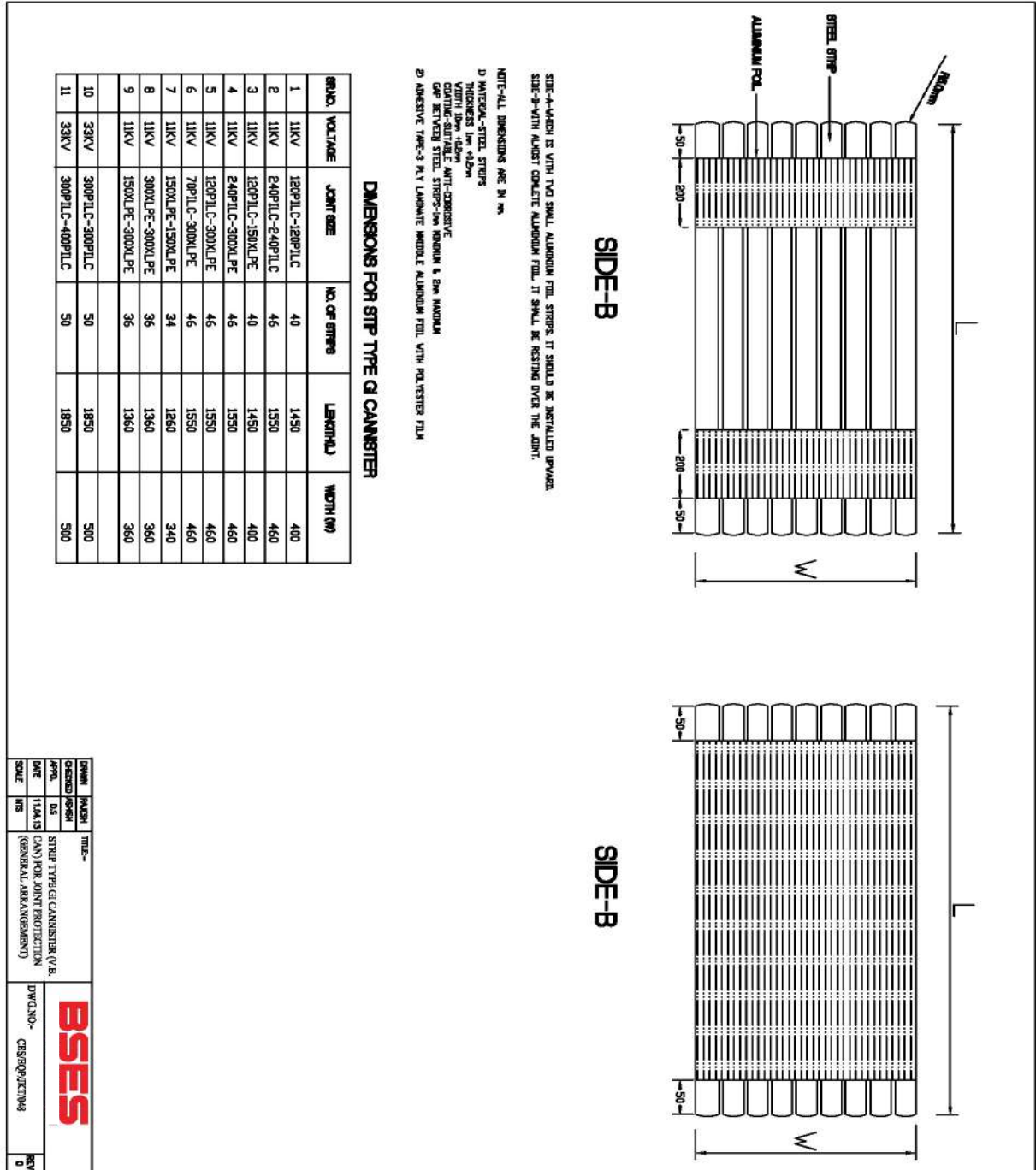
Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

Annexure - F: Aluminium crimping-type Ferrule for compacted circular conductor only for Heat Shrink joints



Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

Annexure – G: Strip type GI canister (V.B. Can) for joint protection only for Heat Shrink Joint





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Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

Annexure – H : Job card Details

BSES Annexure-H

Job Card For Cable Jointing Work

Job Card No: Date: Fault ID:

Division: Purpose: Project / Scheme: O&M:

Contractor:

Voltage Grade: 11kv 33kv 66kv 1.1 KV/ET

No. of cores: 1 3 3.5/4

Cable Size: 1000 / 800 / 630 / 500 / 400 / 300 / 240 / 225 / 185 / 120 / 95 / 70 / 50 / 25 sqmm

Type of Joints	No. of Joints		Docate No.	IR Ref.
	Single	Double		
XLPE/XLPE (or PVC/PVC) Straight Through Joints				
XLPE/PILCA Transition Joint				
PILCA/PILCA Straight Through Joints				
XLPE Indoor Termination				
XLPE Outdoor Termination				
PILC Indoor Termination				
PILC Outdoor Termination				

Feeder Details: From: To:

Location: From: To:

GPS Co-ordinate: Landmark: GIS Uploading: Yes No

Fault Occurance Date:

Job Allocated By: PWT Ref:

Date and Time of Spiking: Date Time Work Completed On: Date Time

Digging Details (In Meter): Length: Width: Depth:

Details of cable laid: Size: Length (In Meter): Docate Ref.:

Contractor Supervisor: Signature: Date:

Jointer Details:

Stage/Work Verification	Name & Signature	Date & Time
ie: Digging / Jointing etc.		

Scrap Details including Qty:

New Kit Details:

Old Kit Details:

Type of Fault:

Remark If any:

Job Certified By:

Shift Incharge: Name: Signature: Date:

1* COPY - BILLING COPY

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)**Annexure – I : SOP for jointing work**

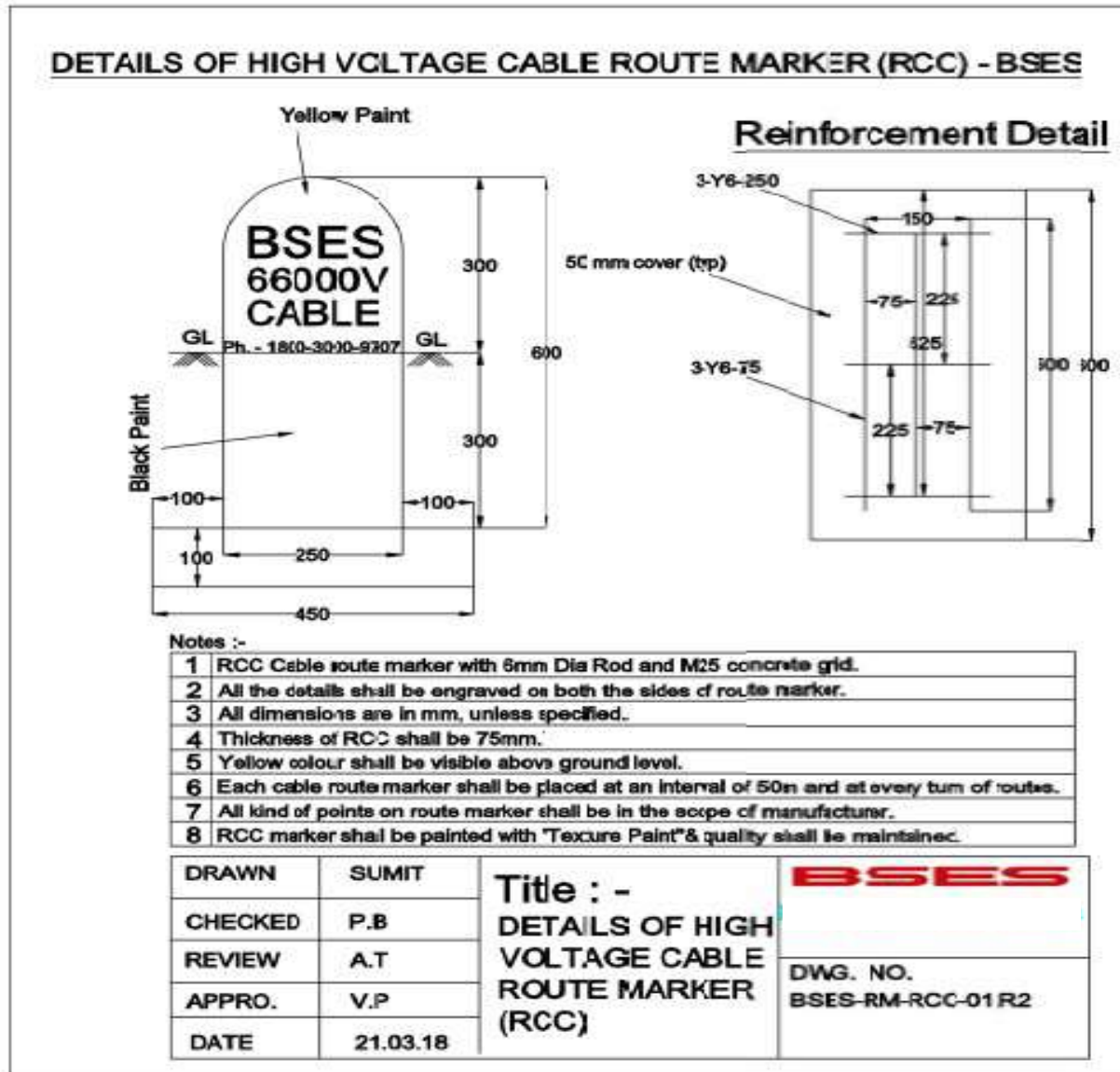
SOP FOR REPAIRING OF CABLE FAULT (Shall be part of PO)		
Sl. No.	Activity	Responsibility
Initiation		
1	Identify and isolate fault and inform GNIIT in case of cable fault	Break down team
2	Updation of the details in OMS against respective feeder tripping event.	GNIIT
Fault Location		
1	Information sent 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

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

4	Backfilling, compaction of excavated soil and removing of excess earth from the site	Cable jointing contractor
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

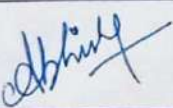
Special Note-

- 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.

Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)**Annexure – J Joint Marker**

Technical Specification of Fiber optical cable & Joint with 48 strands for Line Differential Relay and
suitable Permanently Lubricated HDPE Pipe

**Technical Specification of Fiber optical cable &
Joint with 48 strands for Line Differential Relay
and
suitable Permanently Lubricated HDPE Pipe
Specification No. – SP-FO48-96-R1**

Prepared by	Reviewed by	Approved by	Rev	00
			Date	7 th May 2019
AV	GS	AA	Page	1 of 9

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RECORD OF REVISION	3
1.0 SCOPE	4
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4.0 CONSTRUCTIONAL FEATURES OF JOINT FOR OPTICAL FIBER CABLE	7
5.0 CONSTRUCTIONAL FEATURES OF HDPE PIPE FOR OPTICAL FIBER CABLE	9

**Technical Specification of Fiber optical cable & Joint with 48 strands for Line
Differential Relay and suitable PLB HDPE Pipe****1.0. SCOPE**

This specification covers manufacturing and supply of Fiber optical cable with 48 strands, its joint and suitable PLB HDPE Pipe.

2.0. SERVICE CONDITIONS

Optical Fiber cable to be supplied against this specification shall be suitable for satisfactory operation under the following conditions-

2.1	Average grade atmosphere	Heavily polluted, Dry
2.2	Maximum altitude above sea level	1000M
2.3	Relative Humidity	100%
2.4	Ambient air temperature	Highest 50 Deg C Average 40 Deg C Minimum 0 Deg C
2.5	Operating temperature	0 Deg C - 50 Deg C
2.6	Rainfall	750mm concentrated in four months

3.0. CONSTRUCTIONAL FEATURES OF OPTICAL FIBER CABLE

S No	Parameter	Units	Guaranteed Value
3.1	No. of fibers in the cable		48
3.2	Type of fibers		Single mode,G652D
3.3	Cable diameter - Nominal - Tolerance	mm mm	
3.4	Cable weight	Kg/ km	
3.5	Max Tensile Strength	KN	3500
3.6	Max pulling tension - During installation - During Service	KN KN	6000 3500
3.7	Minimum bending radius - During installation - During service	mm mm	
3.8	Continuous length	Km	2000+/-10%

Technical Specification of Fiber optical cable & Joint with 48 strands for Line Differential Relay and suitable PLB HDPE Pipe

3.9	Temperature range for Operation, Installation, Shipping, Storage	°C	-20deg to +70deg
3.10	Crush strength	KN/M2	
3.11	Impact resistance	Nm	
3.12	Torsion resistance		180 deg
3.13	Outer jacket thickness - Nominal - Tolerance	mm mm	1.6mm +/-0.2
3.14	Outer jacket material		HDPE
3.15	Description of outer jacket coatings/ additives		Anti Termite & Anti Rodent
3.16	Inner jacket material		HDPE Black
3.17	Inner jacket thickness		1.2mm
3.18	Description of Inner jacket coatings/ additives		Anti Termite
3.19	Cable core binding arrangement - Lay length - Lay Direction	mm S/Z	
3.20	Central strength members - Material - Diameter - Shape	mm	FRP 2.0mm Round
3.21	Peripheral strength member		Glass Yarns
3.22	Central Fiber optic unit:	Y/N	N
3.23	Loose tube dia & material		1.9mm +/- 0.1 with PBTP
3.24	Loose tube lay direction		
3.25	No of fibers per tube		4

Technical Specification of Fiber optical cable & Joint with 48 strands for Line Differential Relay and suitable PLB HDPE Pipe

3.26	Total no. of tubes and number of empty tubes		
3.27	Identification / numbering of individual tubes		
3.28	Filling compound within tube		Thixotropic Tube Filling Jelly
3.29	Filling compound in cable core interstices		Thixotropic Flooding Jelly
3.30	Rip cord (s) provided ?	Y/N	Y
3.31	Cable design life	Years	Min 25Years
3.32	Describe cable termite proofing measures		Anti Termite additives
3.33	Describe cable anti-rodent measures		Equally distributed Glass Yarns over Inner Sheath

4.0. CONSTRUCTIONAL FEATURES OF JOINT FOR OPTICAL FIBER CABLE

Construction of the optical fiber cable joint Box shall be as following:

4.1 Main Box:

The main box shall be sturdy & durable having a base and dome shaped body. The domed shaped body shall cover the entire junction while the base shall enable the entries of the optical fiber cable. The base and dome shall be made of Thermoplastic /High density polypropylene material. The Joint Box should be suitable for opening and reentry frequently without impairing its properties. The body may have ribs as strength member if required.

4.2 Cable organizer (Strength member and cable termination)

Cable organizer shall be suitable to secure extra length of fiber tubes with safe bending radius. It should not cause any strain or tension on the fiber. It shall be possible to fix the strength member(s) and the optical fiber cable firmly so that the cable arrangement will not shift or move laterally inside the Joint box. The Internal structure shall be metallic (made of stainless steel) to support and hold the cables and strength members etc. The metallic parts for making connections shall be made of Brass or Nickle Chromium plated steel and the total assembly shall be corrosion proof.

4.3 Fiber organizer/ Fiber Splice trays

Fiber organiser shall be non-metallic made of ABS material having following characteristic.

i.	Specific Gravity	1.01-1.21 gm/cc	ASTM-D-792
ii.	Tensile Strength	0.002 kg/sqmm – 0.005 kg/sqmm	ASTM-D-638
iii.	Elongation	<50%	ASTM-D-638
iv.	Water absorption	0.3-0.4	ASTM-D-57-59
v.	Rock well hardness	R81-R111	ASTM-D785A

Test certificates in conformity to the above parameters of the ABS Material shall be furnished. Fiber organizer cassettes shall be provided on which the fiber splice and service loops of fibers may be placed by making fiber coils. Slots on the splice tray for fixing splice protection sleeve shall be in such a way that they will not cause any stress or strain on sleeve or fiber and shall not shift, loose or move inside the tray or come into conflict with the fiber coils once fixed. It shall be possible to fix a minimum of 4 secondary tubes at the entry port of each tray. No PVC or any other type of adhesive tape is permitted to hold fibers and loose tube inside the tray. All fibers of a tube shall be spliced in a single tray for better tube identity and fiber looping. The fiber organiser shall be fixed inside the Joint box in such a way that this shall not loosen once fixed or to shift or move in any way.

4.4 Holding Arrangements

The box shall provide the following:

- i. Holding arrangement and framework for properly securing cable organizers with splice trays.
- ii. Securing arrangement for holding fibers.
- iii. Holding device to hold strength member of fiber optic cable securely.
- iv. Any other extra component required for providing strength and reliability to the Joint Box.

4.4 Compatibility

All the component and parts used shall be compatible with the optical fiber cable, fiber splices and cable components. Their use for long should not result in increase in transmission loss or deterioration in other properties.

4.5 Marking on body of the Joint box

Following information by marking indelibly on Joint box shall be provided:

- i. Manufacturer's name & date
- ii. Type of Joint box
- iii. Number of Splice organizer cassettes
- iv. Number of splices per cassette
- v. Batch number and serial number.
- vi. Name of Purchaser i.e. BSES Yamuna Power Ltd
- vii. Purchase order number & Date

Technical Specification of Fiber optical cable & Joint with 48 strands for Line Differential Relay and suitable PLB HDPE Pipe

5.0. CONSTRUCTIONAL FEATURES OF HDPE PIPE FOR OPTICAL FIBER CABLE

S No	Parameter	Units	Guaranteed Value
PLB HDPE Pipe Parameters			
5.1	Manufacturer's Name		
5.2	Pipe diameter - Nominal - Tolerance	mm %	40 +1% & -0%
5.3	Wall Thickness - Nominal - Tolerance	mm %	3.5 +1% & -0%
5.4	Standard Length - Nominal - Tolerance	meter &	500 +/- 5%
5.5	Weight	Kg/meter	
5.6	Pipe construction type		Two concentric layers
5.7	Thickness of permanent lubricant	mm	3.85 mm
5.8	Construction material of outer layer		HDPE
5.8	Construction material of inner layer		HDPE with silicon
5.9	Base HDPE Resin - Density at 27 deg C - Melt flow rate at 190 deg C & 5 kg load	Kg/m ³ g/10 minutes	940 to 958 0.2 to 1.1
5.10	Service life span	years	>25
5.11	Maximum outside diameter of fiber optic cable that can be installed by blowing technique		16 mm
5.12	Suitable for underground cable installation by- - Blowing - Pulling		Yes Yes

Technical Specification of Fiber optical cable & Joint with 48 strands for Line Differential Relay and suitable PLB HDPE Pipe

5.13	Tensile Strength	N/mm ²	Min. 20
5.14	Elongation at break	%	Min 350
5.15	Internal coefficient of friction		>0.06
5.16	Description of coatings/ additives		Anti Termite & Anti Rodent
PLB HDPE Pipe Accessories			
5.17	Coupler Type		Push Fit
2.18	Coupler Material		PP
5.19	Coupler strength		15 Kgf/cm ²
5.20	End cap material		PP

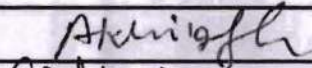
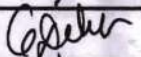
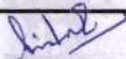
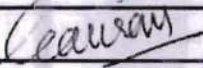
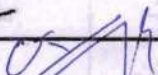


Technical Specification

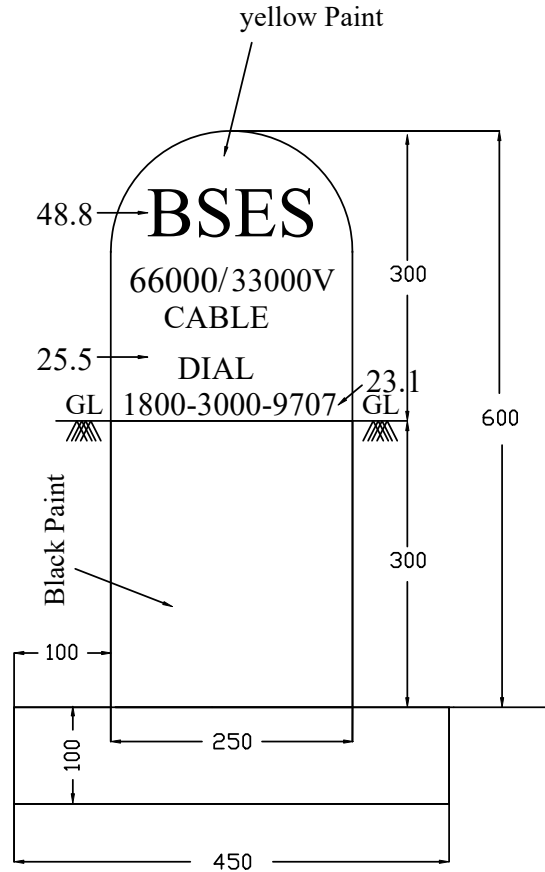
for

Drawings of Miscellaneous RCC Hardware Items

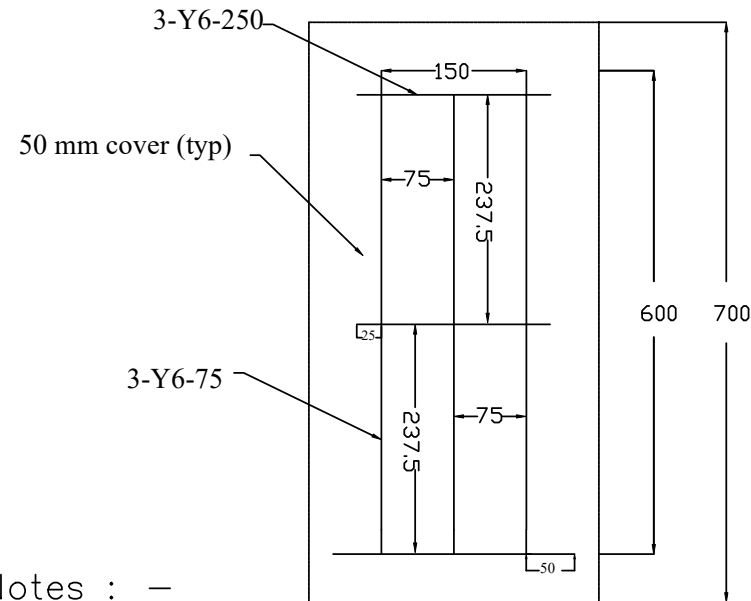
Specification no – BSES-TS-59-RCCH-R0

Rev:		0
Date:		17 May 2022
Pages:		6
Prepared by	Akhilesh Chaudhary	
	Gautam Deka	
Reviewed by	Srinivas Gopu	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	

DETAIL OF HIGH VOLTAGE CABLE ROUTE MARKER (RCC) -BSES



Reinforcement Detail



Notes : —

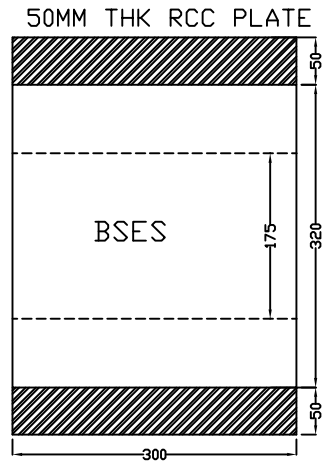
1	RCC cable route marker with 6mm Dia Rod and M25 concrete grade.
2	All the details shall be emgraved on both the sides of route maker
3	All dimentions are in mm, unless specified.
4	Thickness of RCC shall be 75mm.
5	Yellow colour shall be visible about ground level.
6	Eachcable joint marker to be placed at cable joints.
7	All kind of point on route marker shall be in the scope of manufacturer.
8	RCC Marker shall be painted with "Texture Paint" & quality shall be maintained.

Title : —

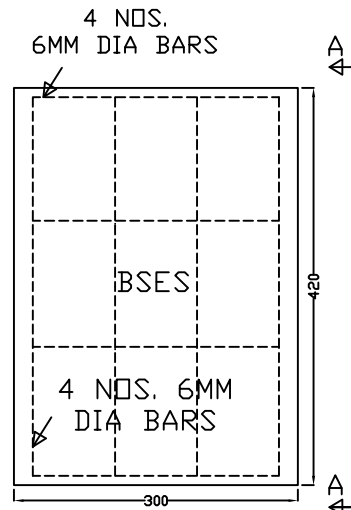
DETAIL OF HIGH
VOLTAGE CABLE
ROUTE MARKER
(RCC)

BSES

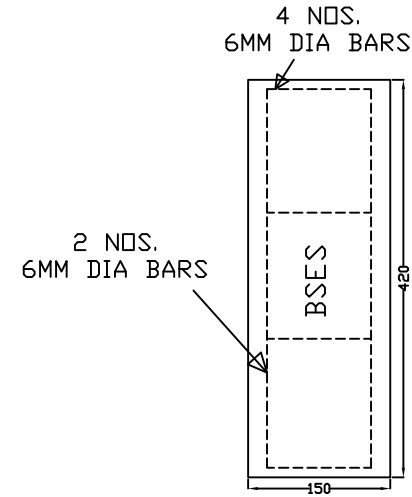
DWG. NO.
BSES—RM—RCC—01,R0



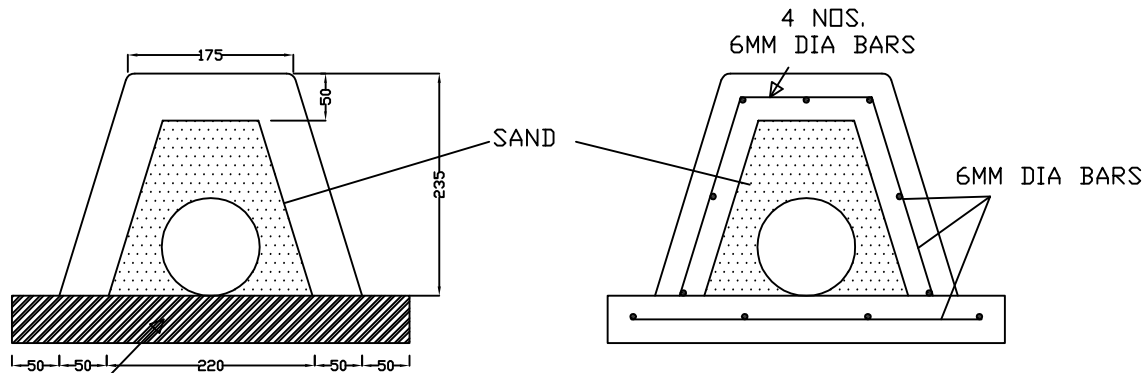
A. PLAN



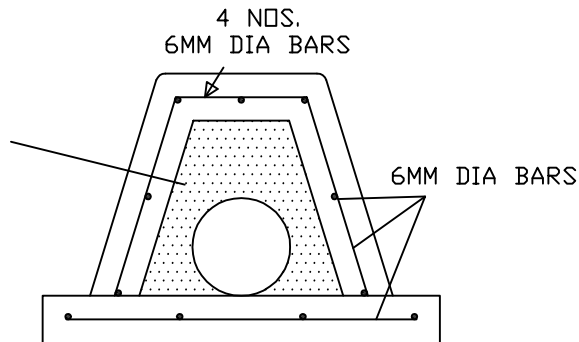
B. REINFORCEMENT DETAILS
300MM LENGTH RCC PLATE



C. REINFORCEMENT DETAILS
150MM LENGTH RCC PLATE



D. ELEVATION



E. REINFORCEMENT DETAILS

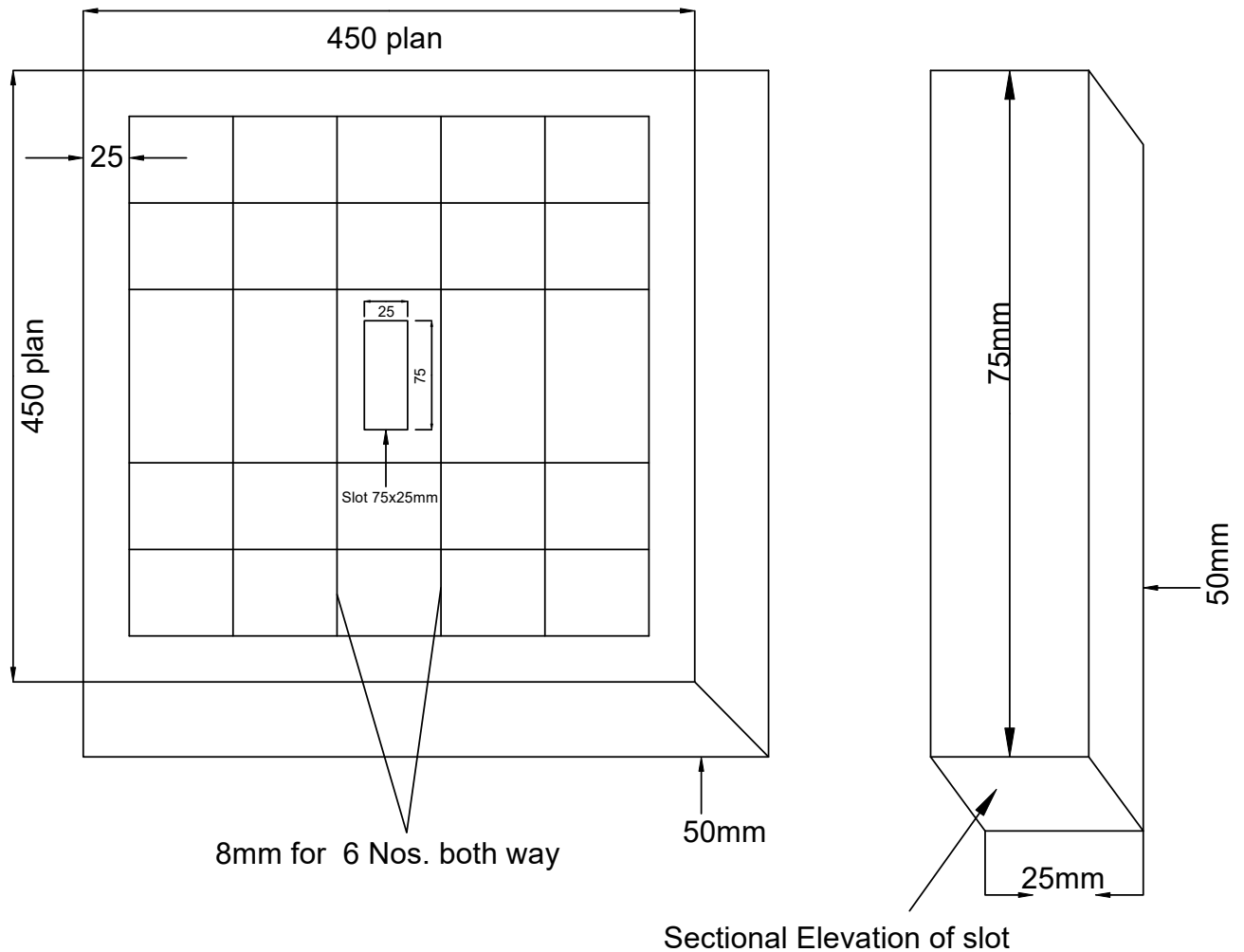
NOTE-

1. ALL DIMENSIONS ARE IN MM
2. CONCRETE MIX 1: 1.5: 3
3. STEEL TMT/RIB BAR 6MM DIA AS PER IS 432/1139
4. CONCRETE MIX SHALL BE NOT LESS THAN M20 /1: 1.5: 3 GRADE AS PER IS 456
5. MOULDING SHALL BE WITH COMPACTION NOT LESS THAN 7N/MMSQ (70 KGF/SQCM)
6. REINFORCEMENT DETAIL AS PER IS 5820/IS 456
7. COVER- 20MM

DRAWING OF CABLE COVER AT CABLE JOINTS

DRAWN	RAJESH	 BSES BSES Yamuna Power Limited
CHECKED	S.G	
APPD.	G.S	
DATE	12.04.22	TITLE:- DRAWING OF CABLE COVER AT CABLE JOINTS
SCALE	NTS	

RCC BASE PLATE SIZE 450X450X50mm



NOTES :-

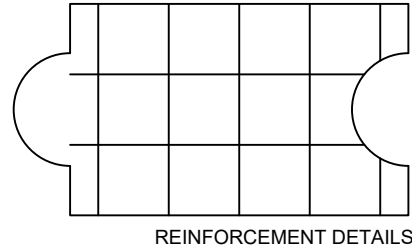
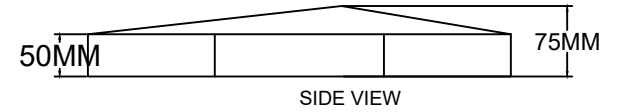
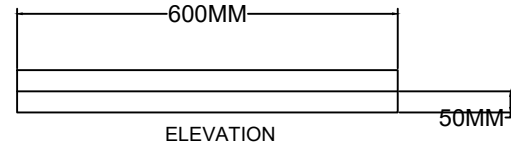
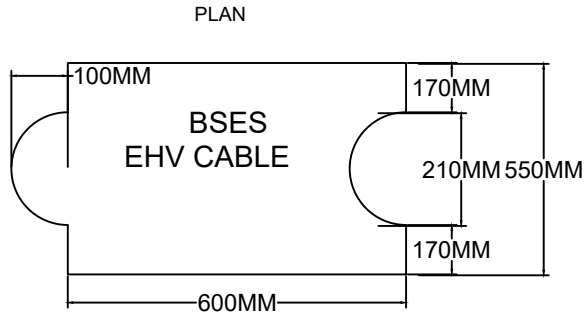
1. Nominal Mix of concrete 1:2:4:M:20
2. Reinforcement shall be welded / Binded at Junctions.
3. Reinforcement :- 8mm dia for 6 nos. each side.
4. IS AND ITS LATEST AMMENDMENTS SHALL BE APPLICABLE.

TITLE :-

**RCC BASE
PLATE**

BSES

DRAWING NO.



NOTES:-

- 1.ALL DIMENSIONS ARE IN MM
- 2.CONCRETE MIX 1:2:4
- 3.MS ROD -6MM $\varnothing$
- 4.STEEL ROD -AS PER IS 423/1139

OWNER- BSES

TITLE-CABLE COVER (SLAB)

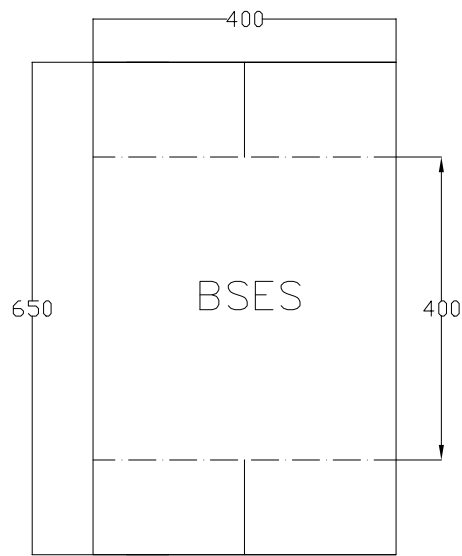
DATE-13.04.2022

DRAWN BY

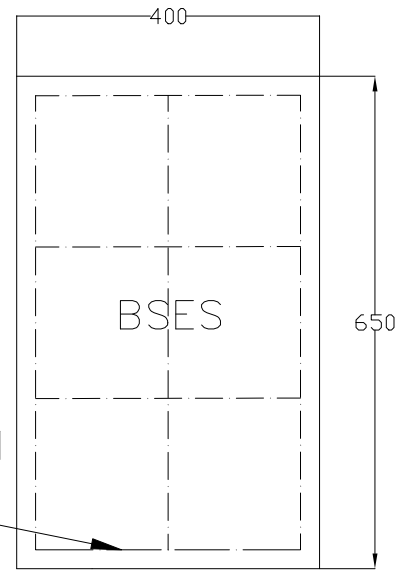
CHECKED BY

APPROVED BY

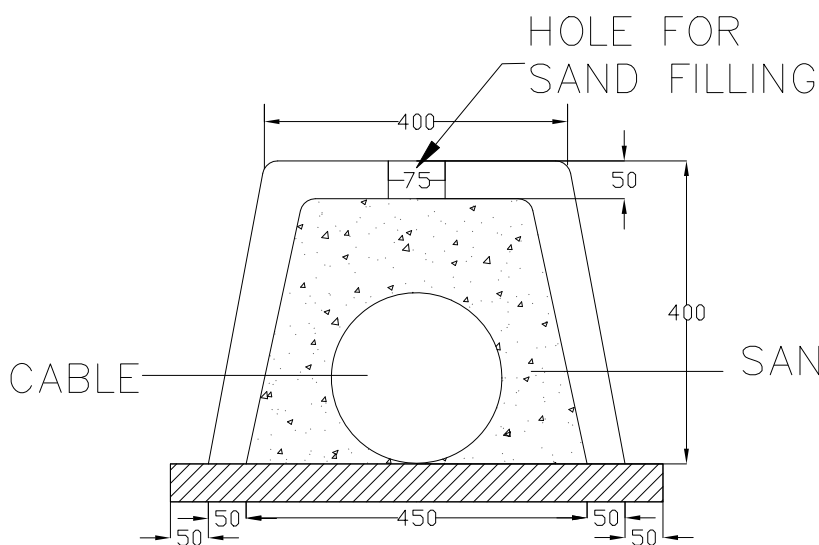
DRAWING OF COFFIN FOR JOINTS



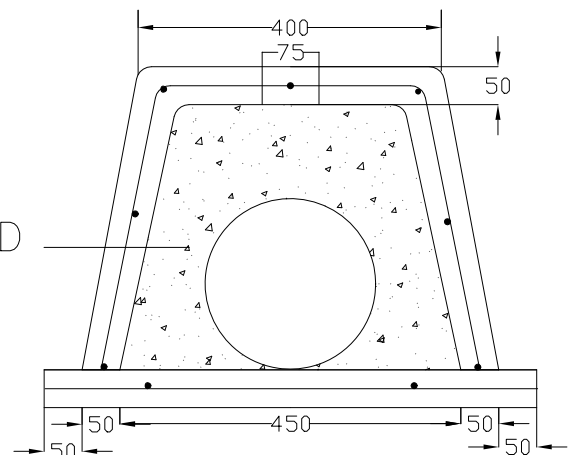
A. PLAN



B. REINFORCEMENT
DETAILS 300 MM
LENGTH RCC PLATE



D. ELEVATION



E. REINFORCEMENT
DETAILS

NOTES :-

1. ALL DIMENSIONS ARE IN MM
2. CONCRETE MIX 1:1.5:3

TITLE :-

DRAWING OF COFFIN
COVER AT CABLE
JOINTS

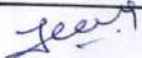
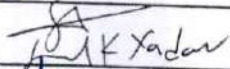
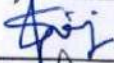
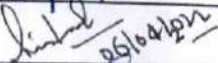
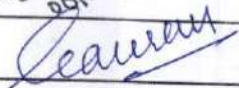
BSES

DRAWING NO.



Technical Specification of
Earthing Strip & GI Earthing Pipe

Specification no – BSES-TS-23-ESEP-R0

Rev:	0	
Pages	7	
Date:	06 April 2022	
Prepared by	Jeena Borana	
	Sunil Yadav	
Reviewed by	Srinivas Gopu	
	Amit Tomar	
Approved by	Gaurav Sharma	
	K. Sheshadri	

TECHNICAL SPECIFICATION OF GI EARTHING PIPE & EARTHING STRIPS**INDEX**

1.0	SCOPE OF SUPPLY	3
2.0	CLIMATIC CONDITION	3
3.0	CODES & STANDARDS	3
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TECHNICAL SPECIFICATION OF GI EARTHING PIPE & EARTHING STRIPS**1.0 SCOPE OF SUPPLY**

The specification covers the manufacturing, testing and inspection of Earthing Pipe and Earthing strips at manufacturers works before dispatch.

2.0 CLIMATIC CONDITION

The material to be supplied against this specification shall be suitable for satisfactory operation under following climatic condition

Location : At various location in the Delhi	
Maximum ambient temperature (°C)	50
Minimum ambient temperature (°C)	0
Maximum altitude above mean sea level (m)	1000
Relative Humidity (%)	100
Rainy month	June to October
Maximum Rainfall (mm)	1450
Wind Pressure (Kg/Sq.m)	195
Seismic Zone	Zone IV as per IS : 1893

3.0 CODES & STANDARDS

Earthing Pipe and Earthing Strip shall be designed, manufactured and tested in Accordance with the following Indian standards.

IS 1239: Part (1)	Steel Tubes, Tubular And Other Wrought Steel Fittings
IS 6745/72	For galvanising testing
IS 4759	Hot-dip zinc coatings on structural steel and other allied products
IS 1161: 1998	Steel Tubes for Structural Purposes
IS 1387: 1993	General requirements for the supply of metallurgical Materials
IS 228 :1987	Methods of chemical analysis of steels
IS 2633: 1986	Methods for testing uniformity of coating of zinc coated articles
IS 2629: 1985	Recommended Practice for Hot-Dip Galvanizing of Iron and Steel
IS 2500: 2000	Sampling of lot by lot
IS 2062	Hot Rolled Medium and High Tensile Structural Steel
IS 808	Dimension for Hot Rolled Steel Beam, Column, Channel and Angle Section
IS 3043: 1987	Code of Practice for Earthing
IS 5561: 1970	Specification for electric power connection
IEC	

TECHNICAL SPECIFICATION OF GI EARTHING PIPE & EARTHING STRIPS**4.0 DESIGN PARAMETERS****4.1 EARTHING STRIPS**

S. No.	Parameter	Requirement
4.1.1	Size	a) 25X3 mm; galvanized b) 50X3 mm; galvanized c) 50X6 mm; galvanized
4.1.2	Material	Material shall be mild steel, grade 'A', Designation E-250 as per IS 2062.
4.1.3	Make	TATA/SAIL/ESSAR/RINL/JSPL/JSW/BSES approved
4.1.4	Galvanization	Mass of zinc coating shall be min 610 gsm in accordance with IS 4759

4.2 GI EARTHING PIPE

S. No.	Parameter	Requirement
4.2.1	Type (Light, Medium, Heavy)	Medium
4.2.2	Size	Dia- 40mm NB
4.2.3	Thickness	Required
4.2.4	Max & Min outside diameter of tube	48.8 mm (max) & 47.9 (min)
4.2.5	Length of Pipe	2500 MM (+ 6 mm & - NOT ACCEPTABLE)
4.2.6	Make	TATA/SAIL/ESSAR/RINL/JSPL/JSW/BSES approved
4.2.7	Mass of Tube	3.56 Kg/m
4.2.8	Tolerance on thickness	(+) Not limited, (-) 8%
4.2.9	Tolerance on Mass	(+/-)10%
4.2.10	Galvanising thickness	80 Microns (min)
4.2.11	Tensile strength	320 N/mm ² (Mpa) (min)
4.2.12	Elongation percent	20%
4.2.13	Color of band	Blue Color
4.2.14	General	
a)	Supply of 6 Nos of M10*30mm elctrogalvanised Nuts+bolts+Plain& Spring Washer	Shall be provided

TECHNICAL SPECIFICATION OF GI EARTHING PIPE & EARTHING STRIPS

S. No.	Parameter	Requirement
b)	GI Strip Size	50 X 6 mm
4.2.15	Marking	a) Manufacture's name or trade mark b) ISI mark with CML No. c) Purchase no. shall be stencilled indelible link d) The manufacturer's identification symbol e) Hot marking at every running meter Name/logo of manufacturer, ISI, class of tube i.e. L for Light colour of Band

5.0 TESTING & INSPECTION

All the tests shall be carried out in accordance with IEC / IS standards.

5.1	Type Test	Type test report of Short time current test to be provided for Earthing Pipe in accordance with IEC 6 approved by CPRI/ERDA Lab.
5.2	Visual Check	Material shall be visually checked and shall free from external defects.
5.3	Dimensional Check	The dimensional requirements shall be checked for material as per the drawing and requirement.
5.4	Acceptance Test	Following tests need to be conducted by the vendor during inspection (value shall be followed as per IS1239-part 1 and IS 4759) a) Chemical composition and galvanization test to be carried out from NABL approved lab on one sample sealed by BSES representative. b) Leak tightness test (Hydrostatic test) c) Bend test

6.0 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, requirements of the Specification shall be met without exception.

BSES	BSES-TS-23-ESEP-R0
TECHNICAL SPECIFICATION OF GI EARTHING PIPE & EARTHING STRIPS	

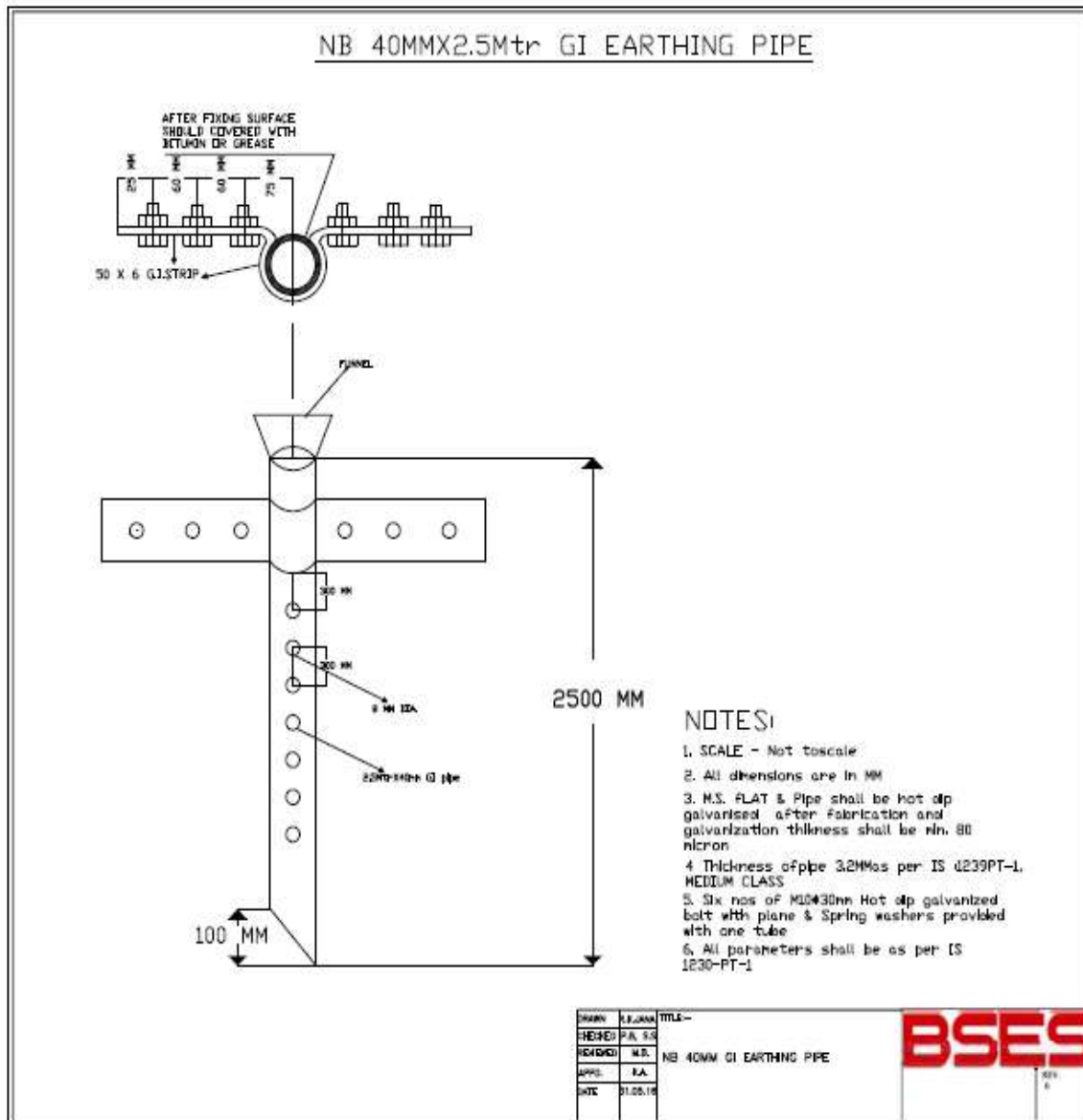
7.0 DOCUMENTS SUBMISSION

Document submission shall be as per the matrix given below. All documents/drawing shall be provided in soft copy for each section. Language of the documents shall be English only. Deficient/improper drawing submission may liable for rejection.

S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
7.1	Guaranteed Technical Particulars (GTP)	Required	Required	Required
7.2	Deviation Sheet, if any	Required	Required	Required
7.3	GA and Dimensional Drawing	Required	Required	Required
7.4	Manufacturer's quality assurance plan and certification for quality standards		Required	Required
7.5	Make of Raw Materials	Required	Required	Required
7.6	Type Test Report	Required		
7.7	Inspection and test reports, carried out in manufacturer's works			Required
7.8	Routine Test Certificates			Required
7.9	Test certificates of all the raw materials			Required

TECHNICAL SPECIFICATION OF GI EARTHING PIPE & EARTHING STRIPS

8.0 Drawing of G.I. Earthing Pipe





Technical Specification of Various Types of Structural Steel Items

Specification no – BSES-TS-17-SSI-R0

Rev:	0
Date:	05 Apr 2022
Pages:	07
Prepared by	Jeena Borana
	Vani Sood/ Pronab Bairagi
Reviewed by	Srinivas Gopu
	Amit Tomar
Approved by	Gaurav Sharma
	K. Sheshadri

Technical Specification of Various Types Of Structural Steel Items**INDEX**

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2.0 SERVICE CONDITION	3
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5.0 DESIGN PARAMETERS	4
6.0 MATERIAL	5
7.0 TESTING & INSPECTION	5
8.0 MARKING	6
9.0 DEVIATION	6
10.0 GUARANTEE CERTIFICATE	6
11.0 DOCUMENTS SUBMISSION	6

Technical Specification of Various Types Of Structural Steel Items**1.0 SCOPE OF SUPPLY**

The specification covers design, manufacturing, testing of structural steel items at manufacturers works before dispatch. Packing, delivery of material and submission of documents/test reports to purchaser.

2.0 SERVICE CONDITION

Structural Steel items to be supplied against this specification shall be suitable for satisfactory continuous operation under outdoor environment. Following are the climatic condition:

S. No.	Parameters	Requirements
2.1	Peak ambient temp.	55°C
2.2	Min ambient temp. in shade	45°C
2.3	Max.average ambient temp in 24 hours period in shade	40°C
2.4	Min ambient temp.	(-)5°C
2.5	Max. temp. attainable by an object exposed to sun	70°C
2.6	Max. relative humidity	95%
2.7	Average number of thunder storm days per annum	40
2.8	Average number of rainy storm days per annum	120
2.9	Average annual rainfall	1250mm
2.10	No of months of tropical monsoon condition	4 months
2.11	Max. wind pressure	150kg/m ²
2.12	Altitudes	Not exceeding 1000mtrs

3.0 CODES & STANDARDS

S. No.	Code	Description
3.1	2629.1985	Important guidelines for general for general hot-dip galvanizing of iron and steel
3.2	IS 2062	Hot Rolled Medium and High Tensile Structural Steel
3.3	IS 808	Dimension for Hot Rolled Steel Beam, Column, Channel and Angle Section
3.4	IS : 5561-1970	Specification for electric power connection

Technical Specification of Various Types Of Structural Steel Items**4.0 ELECTRICAL DATA**

S.No.	Parameters	Details
4.1	LT Supply System	3 phase AC, 4 Wire
4.2	Rated Voltage	415+/-10%
4.3	Rated Frequency	50Hz $\pm$ 5%
4.4	Fault level	35MVA – 50kA

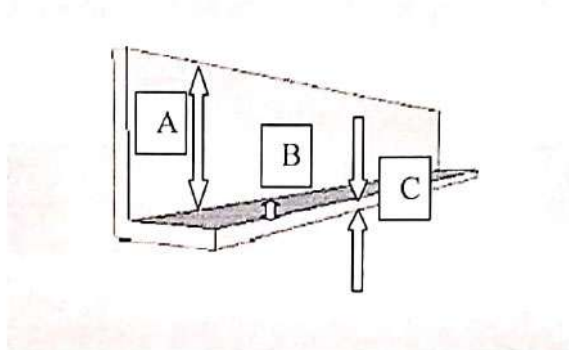
5.0 DESIGN PARAMETERS

S. No.	Description
5.1	MS Angle, Strctl, 50mm , 50mm , 6mm
5.2	MS Angle, Strctl, 65mm , 65mm , 6mm
5.3	MS Angle, Strctl, 75mm , 75mm , 6mm
5.4	CHNL, Strctl, ISMC;150MM;75MM;16.8KG/M
5.5	CHNL, Strctl, ISMC100; 100MM; 50mm; 7.7mm
5.6	Flat, Strctl, 8mm;50mm;6000mm
5.7	Flat, Strctl, 6mm; 50mm;6000mm
5.8	Flat, Strctl, 6mm;50mm;5500mm

5.1 MS Angle (50MM:50MM:6MM): Dimension shall be A =50mm, B=50mm, C=6mm

5.2 MS Angle (65MM:65MM:6MM): Dimension shall be A =65mm, B=65mm, C=6mm

5.3 MS Angle (75MM:75MM:6MM): Dimension shall be A =75mm, B=75mm, C=6mm

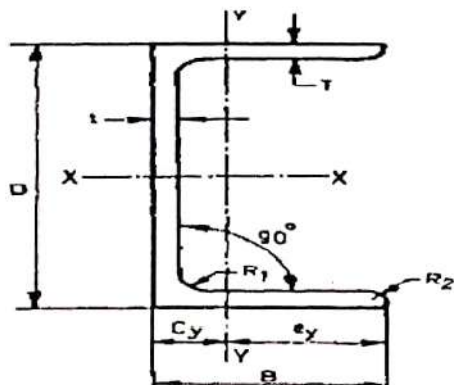


For MS Angle reference drawing (a, b & c)

Technical Specification of Various Types Of Structural Steel Items

5.4 Channel Structural (150MM;75MM;16.8KG/M): Dimension shall be 150MM;75MM;16.8KG/M

5.5 MS Channel (100MM;100MM;5MMX7.7MM): Dimension shall be D=100, B=100,t=5,T=7.7mm



For MS Channel reference drawing (g & h)

5.6 Flat Structural (8MM;50MM;6000MM) : Dimension shall be 8MM;50MM;6000MM

5.7 Flat Structural (6MM;50MM;6000MM) : Dimension shall be 6MM;50MM;6000MM

5.8 Flat Structural (6MM;50MM;5500MM) : Dimension shall be 6MM;50MM;5500MM

6.0 MATERIAL

6.1	Material	Material shall be mild steel, grade 'A', Designation E-250 as per IS 2062.
6.2	Make	Steel shall be of TATA/SAIL/ESSAR/RINL/JSPL/JSW/Other BSES approved make

7.0 TESTING & INSPECTION

All the tests shall be carried out in accordance with IEC / IS standards.

7.1	Visual Check	Material shall be visually checked and shall free from external defects.
7.2	Dimensional Check	The dimensional requirements shall be checked as per the drawing.

Technical Specification of Various Types Of Structural Steel Items

7.3	Acceptance Test	Following tests needs to be conducted by the vendor during inspection (value shall be followed as per relevant IS/IEC) a) Tensile Strength b) Yield Stress c) Elongation d) Chemical Composition as per IS 2062 from NABL accredited LAB.

8.0 MARKING

8.1	The material shall be embossed with the details mentioned	a) Name/Model of the material b) Identification of the source of manufacture c) ISI mark

9.0 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, requirements of the Specification shall be met without exception.

10.0 GUARANTEE CERTIFICATE

Guarantee Certificate to be given for any manufacturing defects along with its consignment from the date of receipts at stores for free replacement within one year.

11.0 DOCUMENTS SUBMISSION

Document submission shall be as per the matrix given below. All documents/drawing shall be provided in soft copy for each section. Language of the documents shall be English only. Deficient/improper drawing submission may liable for rejection.

S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
11.1	Deviation Sheet, if any	Required	Required	Required
11.2	GA and Dimensional Drawing	Required	Required	Required
11.3	Manufacturer's quality		Required	Required



BSES-TS-17-SSI-R0

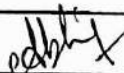
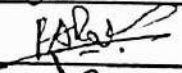
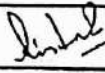
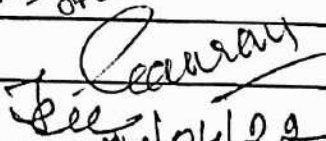
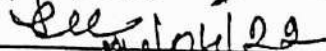
Technical Specification of Various Types Of Structural Steel Items

S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
	assurance plan and certification for quality standards			
11.4	Make of Raw Materials	Required	Required	Required
11.5	Inspection and test reports, carried out in manufacturer's works			Required
11.6	Routine Test Certificates			Required
11.7	Test certificates of all the raw materials			Required



Technical Specification of
ACSR CONDUCTORS
(Insulated & Bare)

Specification no – BSES-TS-05-ACSR-R0

Rev:		0
Date:		04 Apr 2022
Prepared by	Abhishek Vashistha	
	Rohit Patil	
Reviewed by	Puneet Duggal	
	Amit Tomar	 04-04-2022
Approved by	Gaurav Sharma	
	K. Sheshadri	 04/04/22

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TECHNICAL SPECIFICATION OF ACSR CONDUCTOR**1. SCOPE**

- 1.1 This specification covers the design, manufacture, testing at manufacturer's works, packing and delivery at site of the ACSR conductor along with necessary accessories.
- 1.2 The conductor and its accessories shall be complete with all fittings and components necessary for the effective working and efficient performance and satisfactory maintenance under the various operating conditions specified. All such parts shall be deemed to be included within the scope of supply where specifically included or not in this specification in the tender schedule. The successful bidder shall not be eligible for any extra charge for such accessories.
- 1.3 The specification includes both insulated & un-insulated ACSR conductor. Following table suggests requirement of conductors under insulated & un-insulated type as per tender enquiry

Conductor name	Zebra	Goat	Panther	Wolf	Dog	Rabbit	Squirrel
Insulated	X	X	X	X	√	√	√
Un-Insulated	√	√	√	√	√	√	√

2. CODES AND STANDARDS

- 2.1 All equipment and material shall be designed, manufactured and tested in accordance with the latest applicable Indian Standard, IEC standard and CBIP manuals enlisted in the appendix 1, except where modified and / or supplemented by this specification.
- 2.2 Equipment and material conforming to any other standard, which ensures equal or better quality, may be accepted. In such case copies of English version of the standard adopted shall be submitted by the vendor with the offer
- 2.3 The electrical installation shall meet the requirement of Indian Electricity Rules as amended up to date; relevant IS code of practice and Indian electricity act. In addition other rules & regulations applicable to the work shall be followed. In case of any discrepancy the most stringent & restrictive one shall be binding.
- 2.4 The equipment offered shall in general comply with the latest issues including amendments of the standards enlisted in the appendix 1 but not restricted to it.

3. DESIGN**3.1 General**

- All steel strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die marks, scratches, abrasions and kinks after drawing and also after stranding.
- The finished material shall have minimum brittleness, as it will be subjected to appreciate vibration while in use.
- The steel strands shall be hot dip galvanized and shall have a maximum zinc coating of 240gms/sq.mm after stranding. The zinc coating shall be smooth, continuous of uniform thickness, free from imperfections and shall withstand three and a half dips after stranding in standard Price test.
- The steel wire rod shall be of such quality and purity that, when drawn to the size of the strands specified and coated with zinc, the finished strands shall be of uniform quality and have the same properties and characteristic as prescribed in relevant ASTM/IS/IEC standards.
- To avoid susceptibility towards wet storage stains (while rust), the finished material shall be provided with a protective coating of boiled linseed oil.
- The finished conductor shall have a smooth surface without any surface cuts, abrasions, scuff

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

marks and shall be free from dirt, grit etc.

- The Steel wire shall be made from materials produced either by the acid or basic Open Hearth process or by electric process. No steel wire drawn from 'Bessemer processes shall be used. The steel wire shall not contain sulphur or phosphorous exceeding 0.5% and the total of sulphur and phosphorous shall not exceed 0.085%.
- The steel strands shall be performed and post formed in order to prevent spreading of strands in the event of cutting of composite core wire. Care shall be taken to avoid damages to galvanization during performing and post forming operations.

3.2 MATERIALS

- The aluminium strands shall be hard drawn from electrolytic aluminum rods having a purity of not less than 99.5% and a copper content not exceeding 0.04%.
- The steel wire strands shall be drawn from high carbon steel wire rods produced by either the acid or basic open hearth process, the electric furnace process, or the basic oxygen process and shall conform to the following requirements as to the chemical composition:

Element	% composition
Carbon	0.50 to 0.85
Manganese	0.50 to 1.10
Phosphorus	Not more than 0.035
Sulphur	Not more than 0.045
Silicon	0.10 to 0.35

- The zinc used in galvanizing shall be electrolytic high grade zinc of 99.95% purity. It shall conform to and satisfy all the requirements of IS/IEC.

3.3 STANDARD LENGTH

- The standard length of the conductor shall be 3000 meters. A tolerance of +/-5% on the standard length offered by the Bidder shall be permitted. All lengths outside this limit of tolerance shall be treated as random lengths.
- Random lengths will be accepted provided no length is less than 70% of the standard length and the total quantity of such random length shall not be more than 10% of the total quantity ordered. When one number random length has been manufactured at any time, five (5) more individual lengths, each equivalent to the above random length with a tolerance of +/-5% shall also be manufactured and all the above six random lengths shall be dispatched in the same shipment. At any point, the cumulative quantity supplied including such random lengths shall not be more than 12.5% of the total cumulative quantity supplied including such random lengths. However, the last 20% of the quantity ordered shall be supplied only in standard lengths as specified.
- Bidder shall also indicate the maximum single length, above the standard length, he can manufacture in the guaranteed technical particulars of offer. This is required for special stretches like river crossing etc. The employer reserves the right to place orders for the above lengths on the same terms and conditions applicable for the standard lengths during the pendency of the Contract.

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR**3.4 JOINT IN WIRES**

- **Aluminium wires**

No joints shall be permitted in the individual wires in the outer most layer of the finished conductor. However, joints in the 12 wire and 18 wire inner layer of the conductor shall be allowed but these joints shall be made by cold pressure butt welding and shall be such that no such way joints are within 15 meters of each other in the complete stranded conductor. The joints shall withstand a stress of not less than the breaking strength of individual strand guaranteed.

- **Steel Wires**

There shall be no joint of any kind in the finished wire entering into manufacture of the non strand joint or strand splices in any length of the complete stranded steel core of the conductor.

3.5 INSULATON

S. No.	Particular	Data
1	Voltage Grade	1.1 kV
2	Insulation Material	XLPE
3	Nominal Thickness of Insulation	As per table 3 of IS 7098 P-1

4. QUALITY ASSURANCE

- 4.1 Vendor shall follow his standard procedures for quality assurance and control. These standard procedures including quality assurance plan shall be submitted to the purchaser for approval.
- 4.2 The procedures shall be in such a form as to clearly indicate the manufacturing sequence and major inspection points and to reference Bidder's test in inspection procedures.
- 4.3 Manufacturing and quality control procedures shall be available for audit to the Purchaser and / or its representatives at the place of manufacture.
- 4.4 The Purchaser and/or its representative reserves the right to inspect the equipment at the point of manufacture and witness factory and other such tests as may be necessary to ensure conformance to the specification.
- 4.5 The Purchaser and / or its representative shall inspect the Vendor facilities prior to award of contract.
- 4.6 The Purchaser and/or its representative may conduct surveillance of the Vendor facilities for compliance to his standard procedures of quality assurance and quality control while work is in progress.

5. INSPECTION AND TESTING**5.1 INSPECTION**

- The purchaser's representative shall at all times be entitled to have access to the works and all places where conductor shall be manufactured and shall have full facilities for unrestricted inspection of the manufacturer works, raw materials and process of manufacture for conducting necessary tests as detailed herein.
- The manufacturer shall keep the Employer informed in advance of the time of starting and of the progress of manufacture of conductor in its various stages so that arrangements can be made for inspection.
- No material shall be dispatched from its point of manufacture before it has been satisfactory inspected and tested, unless the inspection is waived off by the purchaser in writing. In the latter

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

case also the conductor shall be dispatched only after satisfactory testing for all tests specified herein have been completed.

- The acceptance of any quantity of material shall in no way relieve the manufacturer of any of his responsibilities for meeting all requirements of the Specification and shall not prevent subsequent rejection if such material is later found to be defective.

5.2 TESTS

The following acceptance and routine tests and tests during manufacture shall be carried out on the conductor. For the purpose of this clause, the following shall apply

- Acceptance tests shall mean those tests which are to be carried out on samples taken from each lot offered for pre-dispatch inspection, for the purpose of acceptance of that lot.
- Routine tests shall mean those tests, which are to be carried out on each strand/spool/length of the conductor to check requirements which are likely to vary during production.
- Tests during manufacture shall mean those tests, which are to be carried out during the process of manufacture to ensure the desired quality of the end product.
- For all acceptance tests, the acceptance values shall be the values shall be the values guaranteed by the Bidder in the guaranteed technical particulars of his proposal or the acceptance value specified in this Specification, whichever is more stringent for that particular test.

5.3 TYPE TESTS

Supplier shall submit all Type test report with validity of 5 years, along with the bid. The entire test certificate as per relevant IS/IEC shall be submitted for purchaser review. In case type tests have not been conducted earlier the same has to be carried out without any cost implication to purchaser. Purchaser has the right of witnessing any of the tests for which the supplier has to give prior notice before the date of conducting such tests. The unit rates for each type of the tests to be carried out shall be indicated in the offer. Requirement of type test shall be as listed below. Type test charges shall not be included as part of main price to be indicated in the offer.

The following tests shall be performed on a typical length of conductor. The cost of these tests shall be quoted separately.

- a) Surface condition test
- b) Test for ultimate breaking load on stranded conductor
- c) Stress strain test
- d) Measurement of diameter of individual aluminium and steel wires.
- e) Measurement of lay ratio.
- f) Breaking load of individual wires
- g) Ductility test
- h) Wrapping test
- i) Resistance test and
- j) Galvanizing test

5.4 ACCEPTANCE TESTS

- a) Visual and dimensional check by drum
- b) Visual check for joints scratches etc and lengths of conductor by rewinding
- c) Dimensional check on steel and Aluminium strands

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

- d) Galvanizing test on steel strands
- e) Torsion and elongation test on steel strands
- f) Check for lay ratio of various layers
- g) Breaking load test on steel and aluminium strands
- h) Wrap test on steel and aluminum strands
- i) DC resistance test on aluminium strands
- j) UTS Test on welded joint of strands
- k) Tensile test (For Aluminium)
- l) Test for thickness of insulation
- m) Tensile strength & elongation at break test for insulation
- n) High voltage test
- o) Insulation resistance (Volume resistivity) test

All above tests except (j-o) shall be carried out on aluminium and steel strands after stranding only.

5.5 ROUTINE TESTS

- a) Check to ensure that the joints are as per Specification.
- b) Check that there are no cuts, fins etc on the strands.
- c) Check that drums as per Specification.
- d) All acceptance test as mentioned above to be carried out on each coil

6. EMBOSSING & PRINTING

Following text shall be embossed on insulated conductor only

- a) BSES, PO No. & Date, Manufacturing month & year, Type of Conductor- one each meter length
- b) Printing of running meter No.- on each meter length- White colour

7. APPROVED VENDORS & SUPPLIERS OF RAW MATERIAL

S. No	Material	Approved Suppliers
1	Steel	TATA /SAIL
2	Aluminium	NALCO/BALCO/HINDALCO
3	Insulation	KLJ/KALPENA/DOW/HANWHA/BOREALIS

8. DOCUMENT SUBMISSION MATRIX

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

- a. All documents/drawings shall be provided in soft copy only via mail or in returnable Pen drives
- b. Language of the documents shall be English only.
- c. Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch, Pre closure
- d. No submission is acceptable without check list compliance.
- e. Deficient/ improper or incomplete document/ drawing submission shall be liable for rejection.
- f. Order of documents shall be strictly as per the check list.

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

- g. Any document not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope

S No.	Detail of Document	Bid	Approval	Pre Dispatch
1	Guaranteed Technical Particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Detailed cross sectional drawing of ACSR Conductor	Required	Required	
4	Dimensional drawing of drum	Required	Required	
5	Type test reports of offered type and rating of ACSR conductor	Required	Required	
6	BIS certificate	Required		
7	Complete cable catalogue	Required		
8	Make of Raw Materials	Required	Required	
09	Inspection test reports and Routine Test Certificates carried out in manufacturer's works			Required
10	Test certificates of all raw materials			Required
11	Calibration test reports of instruments			Required

9. ANNEXURE - I**CONDUCTOR DATA SHEET**

S.N.	Particulars	Conductor Details						
1	Conductor Name	Zebra	Goat	Panther	Wolf	Dog	Rabbit	Squirrel
2	Stranding and wire diameter	54/3.18 mm Al. + 7/3.18 mm Steel	30/3.71 mm Al. + 7/3.71 mm Steel	30/3.0 mm Al. + 7/3.0 mm Steel	30/2.59 mm Al. + 7/2.59 mm Steel	6/4.72 mm Al. + 7/1.57 mm Steel	6/3.35 mm Al. + 1/3.35 mm Steel	6/2.11 mm Al + 1/2.11 mm Steel
3	Number of strands							
3a	Core	1	1	1	1	1	1	1
3b	1 st layer	6	6	6	6	6	6	6
3c	2 nd Layer	12	12	12	12	6	--	--
3d	3 rd layer	18	18	18	18	--	--	--
3e	4 th Layer	24	--	--	--	--	--	--
4	Sectional	428.9 Sq.	324.30	212.10	158.10	105.00	52.88 Sq.	20.98 Sq.

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

	Area of Aluminum	mm	Sq. mm	Sq. mm	Sq. mm	Sq. mm	mm	mm
5	Total Sectional Area	484.5 Sq. mm.	400.00 Sq. mm	261.50 Sq. mm	194.90 Sq. mm	118.50 Sq. mm	61.70 Sq. mm	24.48 Sq. mm
6	Overall Diameter	28.62 mm	25.97 mm	21.00 mm	18.13 mm	14.15 mm	10.05 mm	6.33 mm
7	Approx. Weight							
7a	Aluminum	1186 kg/Km	878 kg/Km	587 kg/Km	428 kg/Km	287 kg/Km	145 kg/Km	58 kg/Km
7b	Steel	435 kg/Km	610 kg/Km	387 kg/Km	298 kg/Km	107 kg/Km	69 kg/Km	27 kg/Km
7c	Total	1621 kg/Km	1488 kg/Km	974 kg/Km	726 kg/Km	394 kg/Km	214 kg/Km	85 kg/Km
8	Calculated DC resistance at 20°C	0.06868 Ohm/Km	0.09106 Ohm/Km	0.13900 Ohm/Km	0.18710 Ohm/Km	0.27920 Ohm/Km	0.55240 Ohm/Km	1.39400 Ohm/Km
9	Minimum UTS	130.32 KN	137.00 KN	89.67 KN	67.34 KN	32.41 KN	18.25 KN	7.61 KN

Lay Ratio of Aluminum Conductors, Steel Reinforced

S. No.	Conductor	No. of wire		Ratio of Aluminum Wire Diameter to Steel wire Diameter	Lay ratio to Steel core (6 wire ratio)		Lay ratio for Aluminum wire					
							Outermost Layer		Layer immediately beneath Outermost Layer		Innermost Layer of conductors with 3 Aluminum wire Layers	
1	Zebra	Aluminum	Steel		Min	Max	Min	Max	Min	Max	Min	Max
		6	1		-	-	10	14	-	-	-	-
		6	7		13	28	10	14	-	-	-	-
		30	7		13	28	10	14	10	16	-	-
		42	7		13	28	10	14	10	16	10	17
		54	7		13	28	10	14	10	16	10	17

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

Diameter of Aluminum & Steel Strands

S. No.	Conductor Name	Aluminum			Steel		
		Nominal	Maximum	Minimum	Nominal	Maximum	Minimum
1	Zebra	3.18	3.21	3.15	3.18	3.24	3.12
2	Goat	3.71	3.74	3.68	3.71	3.76	3.65
3	Panther	3.00	3.03	2.97	3.00	2.94	2.06
4	Wolf	2.59	2.62	2.56	2.59	2.64	2.54
5	Dog	4.72			1.57		
6	Rabbit	3.35	3.32	3.38	3.35	3.42	3.28
7	Squirrel	2.11	2.13	2.9	2.11	2.15	2.07

10. ANNEXURE - II

VENDOR DATA (GURANTEED TECHNICAL PARTICULARS)(SEPARATE DATA SHEET SHALL BE SUBMITTED FOR EACH TYPE OF CONDUCTOR)

SI.NO.	DESCRIPTION	BSES Requirement	PARTICULARS
1	Name of the material offered	XLPE Insulated ACSR Conductor	
2	Maker's Name	Required	
3	Address and Phone No.		
4	Reference Standards	IS-398Pt-1, IS 1778 , IS 7098	
5	No.of strands/diameter of Galvanised steel wire/Al strand	Required	
6	Apporx.Dia over covered conductor		
7	Minimum Ultimate Tensile Strength of Conductor	18.25	
8	Direction Of Lay	Successive layers shall have opposite directions of lay outermost layer being Right Handed	
9	Lay ratio of Aluminum wire		
10	Continuous max. current rating of ACSR	Required	
	Conductor in still air at an ambient temperature at 45 Deg C		
11	Temperature rise for the above current	Required	
12	Short Circuit current rating of ACSR	Required	
	Conductor for 1sec		
13	Module of elasticity of complete	79	

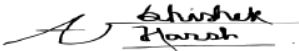
TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

	Conductor		
14	Coefficient of linear expansion of complete conductor	19.1×10^{-6}	
15	Cross sectional area	Required	
16	Nominal aluminium area	Required	
16.1	Conductivity and Grade of Al	61% EC Grade	
16.2	% Composition of steel wire	As Per spec	
17	Chemical composition certificate from NABL approved lab	Required	
18	Minimum breaking load		
18.1	Aluminum strand (After Stranding)	Required	
18.2	Galvanised steel wire (After Stranding)	Required	
19	Total Conductor	Required	
20	Max.Working tension of conductor	75% of UTS	
21	Resistance of Al conductor at 20Deg C(Max)	Required	
22	Weight		
22.1	Aluminium strand	Required	
22.2	Steel Strand	Required	
22.3	Conductor without insulation	Required	
22.4	Conductor with insulation	Required	
23	Purity of AL.rod in %age	Required	
24	Zinc coating on steel wire		
24.1	Grade of Zinc	Electrolytic High Grade Zinc not less Than 99.95% purity as per IS209-1992	
24.2	Min wt of Zinc Coating	Required	
24.3	No.& duration of dips of Zinc coating (Before Stranding)	Required	
25	Type of Insulation	XLPE Type as per IS 7098	
25.1	Nominal thickness of XLPE insulation	1.6	
25.2	Min thickness of XLPE insulation	1.5	
25.3	Color of XLPE insulation	Black	
25.4	Tensile strength of Insulation (Min)	12.5	
25.5	Percentage elongation at break of Insulation(Min)	200	
25.6	Insulation resistance test (Volume resistivity) Min	1×10^{14} at 27deg C 1×10^{12} at 90deg C	

TECHNICAL SPECIFICATION OF ACSR CONDUCTOR

26	Chemical composition test certificate of XLPE insulation material	Required, shall be weather proof and have property of protection against ultraviolet light having 2.5% black carbon content	
27	Drum	Required	
27.1	Ref IS	IS-1778-1980	
27.2	Gross weight of drum including weight of Conductor	Required	
27.3	Standard length of each piece of Conductor	3Km	
27.4	Non standard length	length	
28	Order quantity tolerance	(+/-)2%	Yes/No
29	Embossing	Name of manufacturer, Manufacture year, Manufacturing month, Type of conductor, BSES, P.o no & date	

TECHNICAL SPECIFICATION OF HARDWARE FITTINGS FOR ACSR CONDUCTOR

Rev:	01	
Date:	03.09.2025	
Pages	17	
Prepared by	Vijender Goyal	 91cf8d56-0007-4c84-86df-d3b606c70535
Reviewed by	Abhishek Harsh	 3267d7c3-82b5-46cb-b5a6-867ee7820a34
	Srinivas Gopu	 5d32525e-ed3a-4f41-b1c7-b8a5e77d1519
Approved by	Gaurav Sharma	 23dc2de2-95de-4472-99a7-dea873f472b6

Technical Specification of Hardware Fittings for ACSR Conductor**INDEX**

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Technical Specification of Hardware Fittings for ACSR Conductor**Record of Revision**

SI No.	Revision No	Item/Clause No.	Nature of change	Approved by
	R1	4.1	The following drawing details added a) T Clamp for ACSR Zebra to ACSR Zebra conductor b) Bimetallic Isolator clamp for ACSR Zebra conductor c) Bimetallic Isolator clamp for ACSR Goat conductor d) Bimetallic Isolator clamp for double ACSR Zebra conductor e) Single Tension Hardware Fittings suitable for ACSR Zebra conductor	GS
	R1	Annexure – C	T Clamp for ACSR Zebra to ACSR Zebra conductor drawing added	GS
	R1	Annexure – D	Bimetallic Isolator clamp for ACSR Zebra conductor drawing added	GS
	R1	Annexure – E	Bimetallic Isolator clamp for ACSR Goat conductor drawing added	GS
	R1	Annexure – F	Bimetallic Isolator clamp for Double ACSR Zebra conductor drawing added	GS
	R1	Annexure – H	Single Tension Hardware Fittings suitable for ACSR Zebra conductor	GS

Technical Specification of Hardware Fittings for ACSR Conductor**1.0 SCOPE OF SUPPLY**

1.1 The specification of Hardware Fittings for ACSR Conductor covers the Design, Manufacturing, Assembly, Inspection, testing at manufacturer works, Packing, delivery of material to BYPL stores and submission of documents to purchaser.

2.0 SERVICE CONDITION

All hardware fittings supplied under this technical specification shall be suitable for continuous and satisfactory operation in outdoor environments. Following are the climatic condition:

S.No.	Parameters	Requirements
2.1	Supply Voltage	33kV/ 66kV
2.2	Supply Frequency	50 Hz $\pm$ 5%
2.3	Pollution	Heavily Polluted
2.4	Maximum ambient temperature	50°C
2.5	Minimum ambient temperature	0°C
2.6	Max. relative humidity	90%
2.7	Average annual rainfall	1000mm
2.8	Maximum wind pressure	150kg/sqm
2.9	Maximum altitude above mean sea level	1000 m
2.10	Seismic Zone	Zone IV as per IS : 1893

3.0 CODES & STANDARDS

The Hardware fittings shall conform to this specification & latest revision of following codes with all amendments:

S.no	Title	Indian Standard
3.1	IEC 61284	Overhead Lines- Requirements and tests for fittings
3.2	IS 5561	Electrical Power Connector Specification
3.3	IS 10162	Spacers and Spacer dampers for twin horizontal bundle conductors
3.4	IS 2633	Method for testing uniformity of coating on zinc coated articles
3.5	IS 2121	Conductors and earth wire accessories for Overhead Power lines
3.6	IS 2486	Metal fittings of insulators for Overhead Power lines
3.7	IS 1573	Electroplated coatings of zinc on iron and steel
3.8	IS 617	Aluminium and Aluminium Alloys Ingots for Remelting and Castings for General Engineering Purposes

Technical Specification of Hardware Fittings for ACSR Conductor**4.0 TECHNICAL REQUIREMENTS**

S.No.	Parameters	Requirement
4.1	Clamp and Connector	a) Clamp and connector shall conform to IS 5561. b) The material of clamps and connectors shall be Aluminium alloy casting conforming to designation 4600 of IS:617 for connecting to equipment terminals and conductors of Aluminium. In case the terminals are of copper, the same clamps/connectors shall be used with 2mm thick bimetallic sleeve. c) All castings shall be free from blow holes, surface blisters, cracks and cavities. d) All sharp edges and corners shall be rounded off. e) Short circuit capacity for clamp and connector shall be minimum 40 kA for 1 sec. f) Current rating for Clamp and connector used for Single ACSR conductor shall be 1250A. g) Current rating for Clamp and connector used for Double ACSR conductor shall be 2000A. h) Maximum temperature rise of clamp and connector shall not exceed 45°C when tested at an ambient temperature of 50°C. i) The minimum pull out strength of clamp and connectors shall be 1100 N. a) Bimetallic T-Clamp for ACSR ZEBRA conductor, kindly refer Annexure-A Drawing. b) PG Clamp for ACSR conductor, kindly refer Annexure-B Drawing. c) T Clamp ACSR Zebra to ACSR Zebra conductor, kindly refer Annexure-C Drawing. d) Bimetallic Isolator Clamp for ACSR Zebra conductor, kindly refer Annexure-D Drawing. e) Bimetallic Isolator Clamp for ACSR Goat conductor, kindly refer Annexure-E Drawing. f) Bimetallic Isolator Clamp for Double ACSR Zebra conductor, kindly refer Annexure-F Drawing.
4.2	Bus bar Spacer	a) Bus bar spacer shall conform to IS 10162. b) The material of Bus bar spacer shall be Aluminium alloy casting conforming to designation 4600 of IS:617 for connecting to

Technical Specification of Hardware Fittings for ACSR Conductor

S.No.	Parameters	Requirement
		equipment terminals and conductors of Aluminium. c) All castings shall be free from blow holes, surface blisters, cracks and cavities. d) All sharp edges and corners shall be rounded off. e) Short circuit capacity for bus bar spacer shall be minimum 40 kA for 1 sec. f) Bus Bar Spacer for ACSR twin Zebra conductor, kindly refer Annexure-G Drawing
4.3	Metal Fittings of Insulators for overhead power lines	a) Fittings shall conform to IS 2486 (Part-1). b) The material of tension clamp shall be Aluminium alloy casting conforming to designation 4600 of IS:617 for connecting to equipment terminals and conductors of Aluminium. c) All castings shall be free from blow holes, surface blisters, cracks and cavities. d) All sharp edges and corners shall be rounded off. e) Single Tension Hardware fittings suitable for ACSR Zebra conductor, kindly refer Annexure-H Drawing

5.0 MARKING

5.1	Identification	The following details are to be embossed on material: a) Name of manufacturer b) Customer Name c) Detail of Connector/clamp/bus bar spacer d) Month & Year of manufacturing e) PO number

Technical Specification of Hardware Fittings for ACSR Conductor**6.0 QUALITY ASSURANCE PLAN, INSPECTION AND TESTING**

S.No.	Parameters	Technical Requirements
6.1	Hardware fittings sample	One (1) no. sample of each type of material as per specifications shall be submitted to BSES along with the bid.
6.2	Quality Assurance Plan	QAP Shall be submitted by vendor for approval. Inspection and testing of the material shall be carried out accordingly.
6.3	Type test	
6.3.1	Clamp and Connector	The Clamp and connector must be of type tested from CPRI/ERDA/NABL accredited laboratory in accordance with IS 5561.
6.3.2	Bus bar Spacer	Bus bar spacer must be of type tested from CPRI/ERDA/NABL accredited laboratory in accordance with IS 10162
6.3.3	Metal Fittings of Insulators for overhead power lines	Metal Fittings of insulators must be of type tested from CPRI/ERDA/NABL accredited laboratory in accordance with IS 2486 (Part-1)
6.4	Acceptance test	
6.4.1	Clamp and Connector	The acceptance tests shall be conducted in house/any NABL accredited labs per IS 5561.
6.4.2	Bus bar Spacer	The acceptance tests shall be conducted in house/any NABL accredited labs per IS 10162
6.4.3	Metal Fittings of Insulators for overhead power lines	The acceptance tests shall be conducted in house/any NABL accredited labs per IS 2486 (Part-1)
6.5	Inspection	a) The buyer reserves the right to inspect material at the Seller's works at any time prior dispatch, to verify compliance with the specifications. b) Final inspection call intimation shall be given 15 days in advance to BYPL. 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 BYPL before dispatch of equipment.

7.0 PACKING, SHIPPING, HANDLING & SITE SUPPORT

7.1	Packing	The Hardware fittings shall be suitably packed in order to avoid damage in transit, handling, storage and further transportation from store to field.



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Technical Specification of Hardware Fittings for ACSR Conductor

7.2	Shipping	The seller shall give complete shipping information concerning the gross weight, size of each packing.
7.3	Handling & Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet/manual needs to be furnished before commencement of supply.
7.4	Transit damage	The seller shall be responsible for any transit damage due to improper packing.
7.5	Packing Identification Label	On each packing case, following details are required:
7.5.1	Purchaser's name	
7.5.2	PO number and date	
7.5.3	SAP item code	
7.5.4	Destination	
7.5.5	Manufacturer/Supplier's name	
7.5.6	Address of Manufacturer/Supplier/it's agent	
7.5.7	Description	
7.5.8	Country of origin	
7.5.9	Month & year of Manufacturing	
7.5.10	Warranty period	
7.5.11	Gross and net weight	
7.5.12	All necessary slinging and stacking instructions	

8.0 DEVIATION

8.1	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.

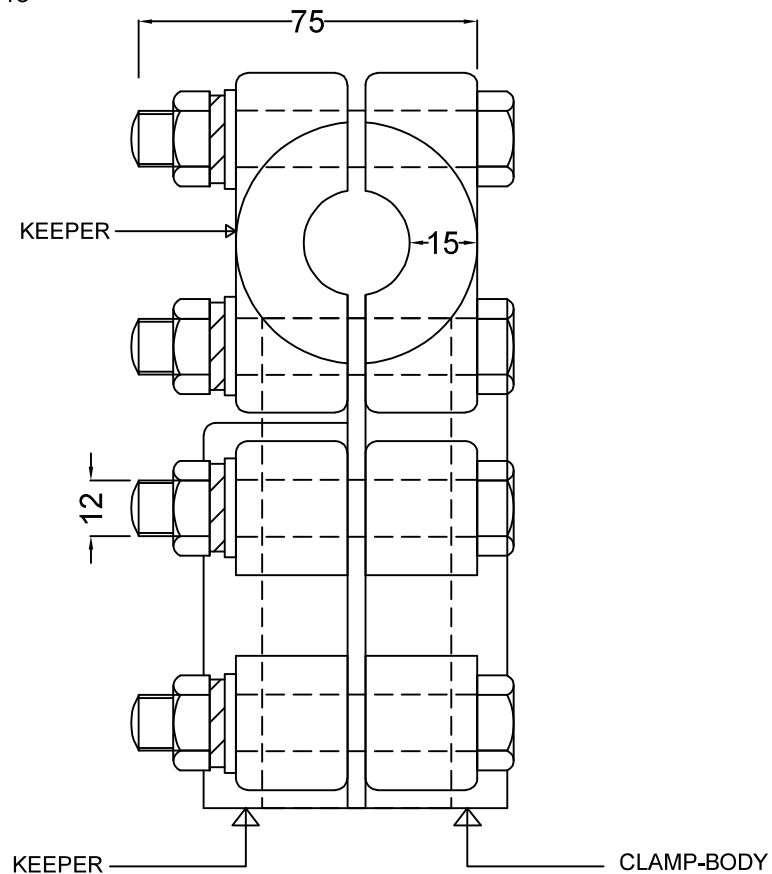
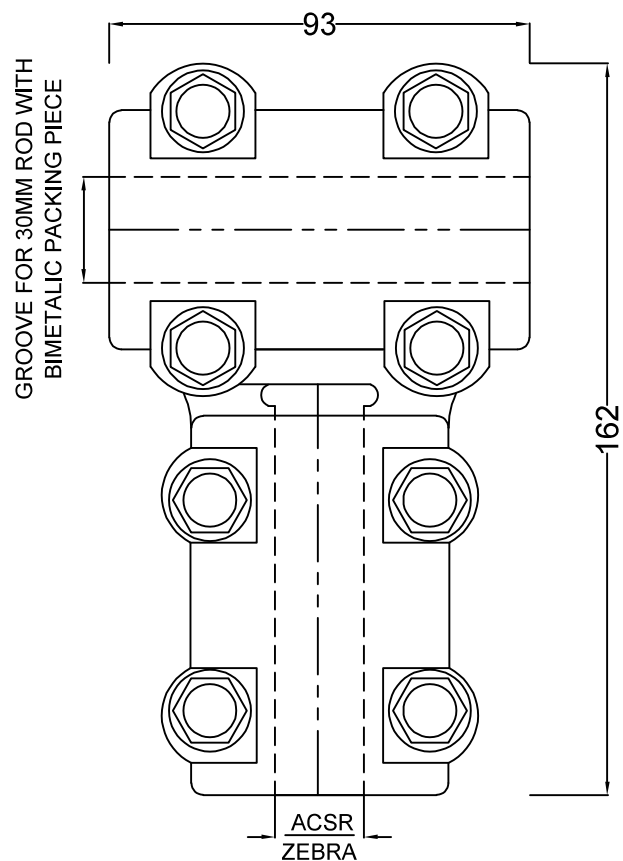
Technical Specification of Hardware Fittings for ACSR Conductor**9.0 DOCUMENT SUBMISSION MATRIX**

Document/Drawing submission shall be as per the matrix given below. All documents/drawings shall be provided in soft copy only. Language of the documents shall be English only. Incomplete submission shall be liable for rejection.

S.No.	Description	Bid	Approval	Pre Dispatch
9.1	Detailed supply list (clearly specifying PO No. with date, PO Quantity & Year of supply) of Hardware fittings supplied to Power utilities/ SEBs/PSUs/Government Organizations in last five years	Required		
9.2	Hardware fittings sample	1 no of each type		
9.3	Performance certificates	Required		
9.4	Relevant type test report/certificate from CPRI/ERDA/NABL	Required	Required	
9.5	Guaranteed Technical Particulars (GTP)	Required	Required	
9.6	Deviation Sheet, if any	Required	Required	
9.7	Dimensional drawing	Required	Required	
9.8	As built drawing			Required
9.9	Installation Instruction		Required	Required
9.10	Manufacturer's quality assurance plan and certification for quality standards		Required	
9.11	Routine Test / Acceptance test reports			Required
9.12	Raw material test certificate			Required

ANNEXURE A- BIMETALLIC T-CLAMP FOR ACSR ZEBRA CONDUCTOR

SAP CODE - 2100190018



NOTES:-

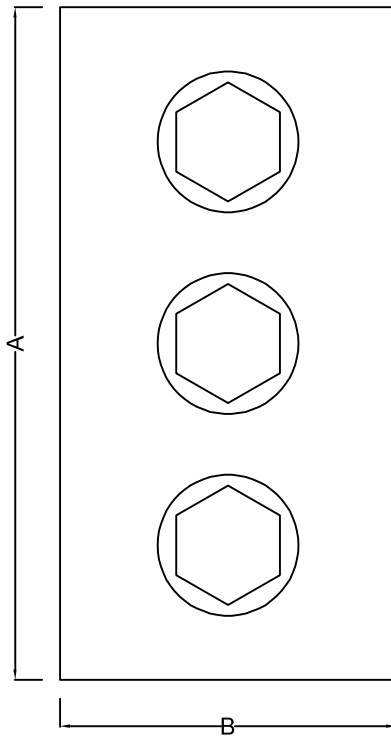
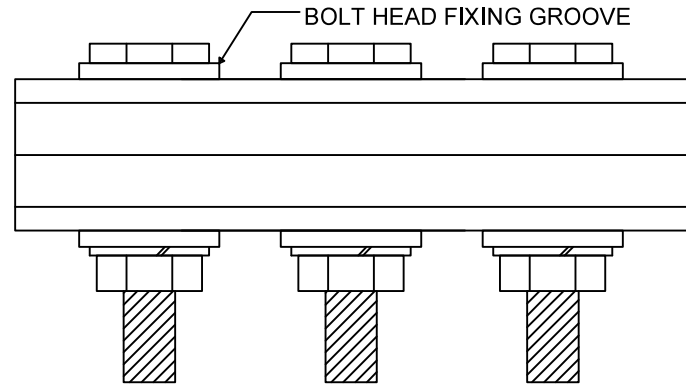
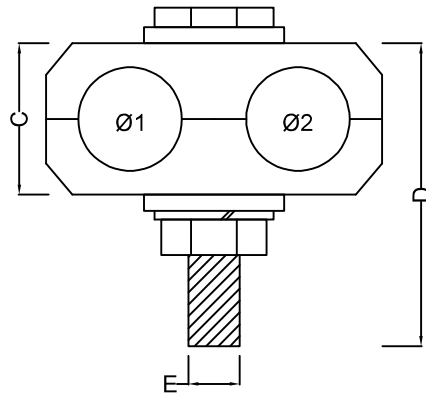
1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. T CLAMP CONFIRMS TO AS PER IS:5561
4. CLAMP - BODY AND KEEPER :- ALUMINIUM ALLOY
5. MINIMUM THICKNESS OF CLAMP BODY & KEEPER : 15mm.
6. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573
7. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

TITLE:- BIMETALLIC T-CLAMP SUITABLE FOR 30MM CU ROD AND OTHER (DROPPING) FOR ACSR ZEBRA CONDUCTOR

BSES

DRG.No:-
BYPL/DRG/25-26/023

ANNEXURE B- PG CLAMP FOR ACSR CONDUCTOR



S.No.	SAP CODE	ACSR CONDUCTOR	CONDUCTOR DIAMETER		A	B	C	D	E	NO. OF BOLTS
			Ø1	Ø2						
1.	2100017979	ZEBRA TO ZEBRA	28.62	28.62	200	100	45	90	15.3	3
2.	2100017978	GOAT TO GOAT	25.97	25.97	200	100	45	90	15.3	3

NOTES:-

1. ALL DIMENSIONS ARE IN mm
2. TOLERANCE :- $\pm 2\%$.
3. PG CLAMP CONFIRMS TO AS PER IS:5561.
4. CLAMP - BODY :- ALUMINIUM ALLOY
5. MINIMUM THICKNESS OF CLAMP BODY -12mm.
6. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573.
7. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

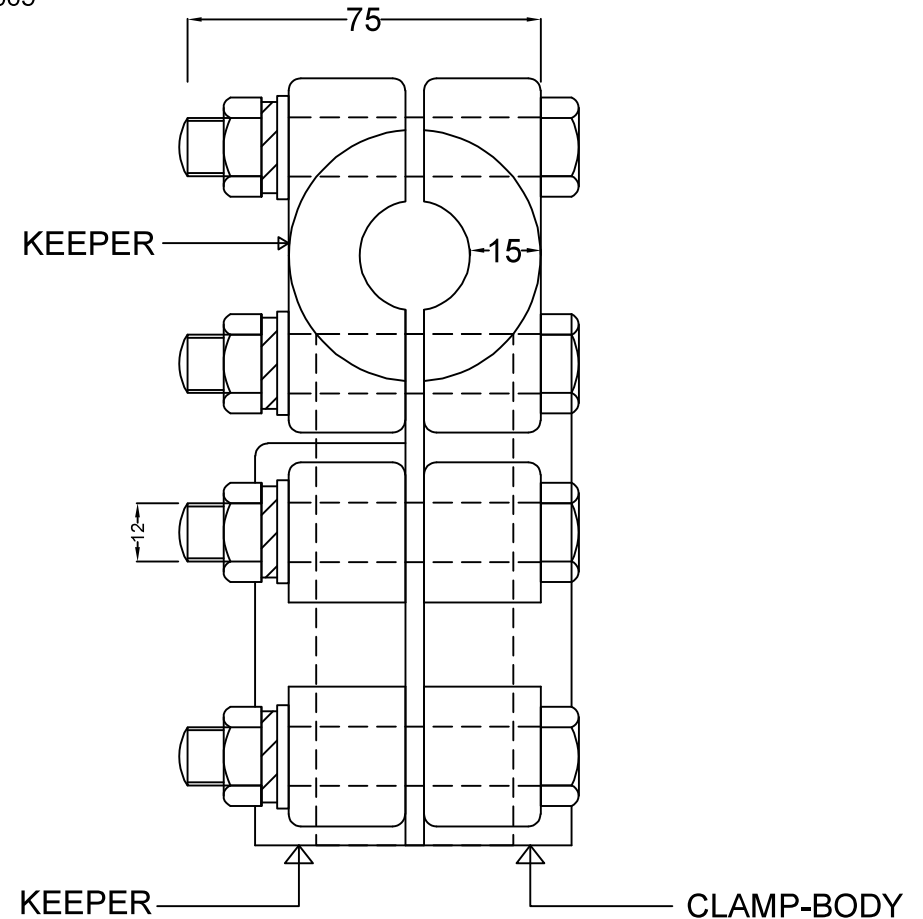
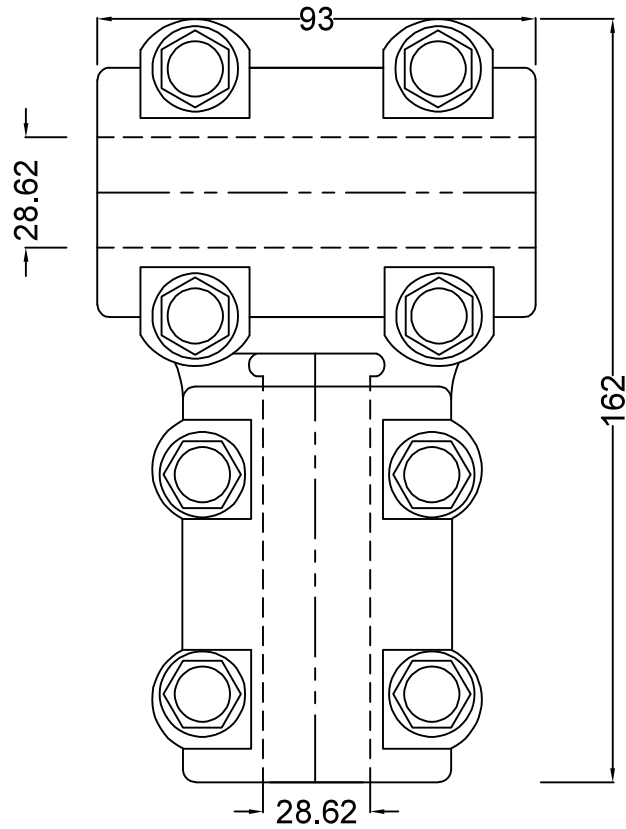
TITLE:- PG CLAMP FOR ACSR CONDUCTOR

BSES

DRG.No:-
BYPL/DRG/25-26/023-1

ANNEXURE C- T CLAMP FOR ACSR ZEBRA TO ACSR ZEBRA CONDUCTOR

SAP CODE - 2100116665



NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. T CLAMP CONFIRMS TO AS PER IS:5561
4. CLAMP - BODY AND KEEPER :- ALUMINIUM ALLOY
5. MINIMUM THICKNESS OF CLAMP BODY & KEEPER : 15mm.
6. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573
7. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

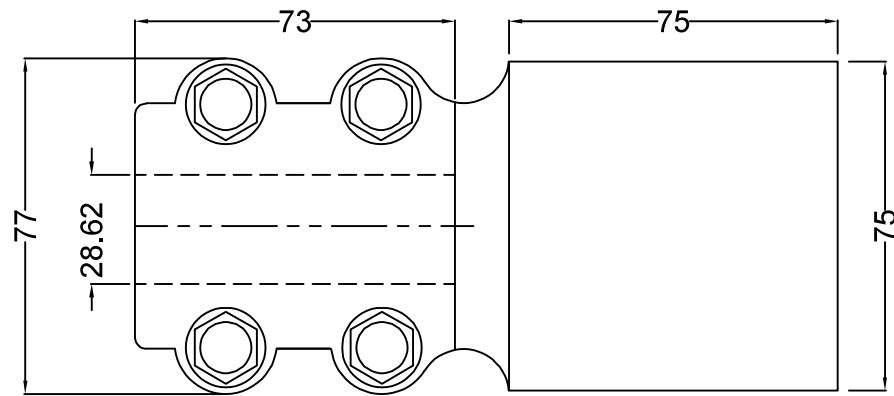
TITLE:- T- CLAMP SUITABLE FOR ACSR ZEBRA
TO ACSR ZEBRA CONDUCTOR

BSES

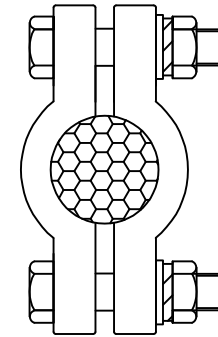
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BYPL/DRG/25-26/023-3

ANNEXURE D- BIMETALLIC ISOLATOR CLAMP FOR ACSR ZEBRA CONDUCTOR

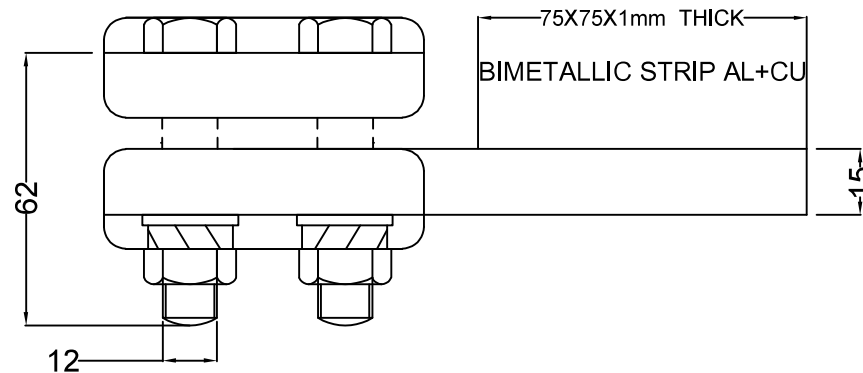
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ELEVATION



SIDE VIEW



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. ISOLATOR CLAMP CONFIRMS TO AS PER IS:5561
4. CLAMP - BODY AND KEEPER :- ALUMINIUM ALLOY
5. MINIMUM THICKNESS OF CLAMP BODY & KEEPER : 15mm.
6. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573
7. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

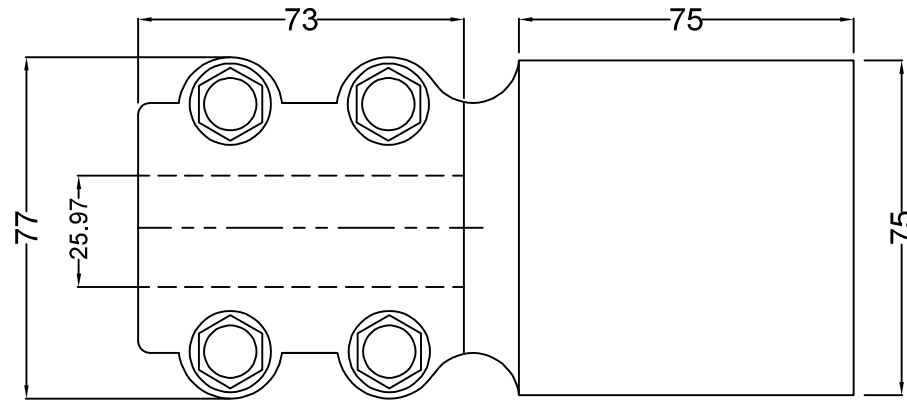
TITLE:- BIMETALLIC ISOLATOR
CLAMP FOR ACSR ZEBRA

BSES

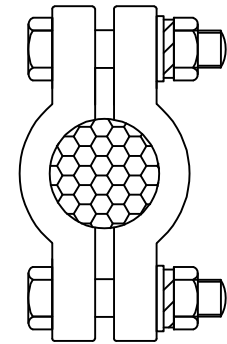
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BYPL/DRG/25-26/023-5

ANNEXURE E- BIMETALLIC ISOLATOR CLAMP FOR ACSR GOAT CONDUCTOR

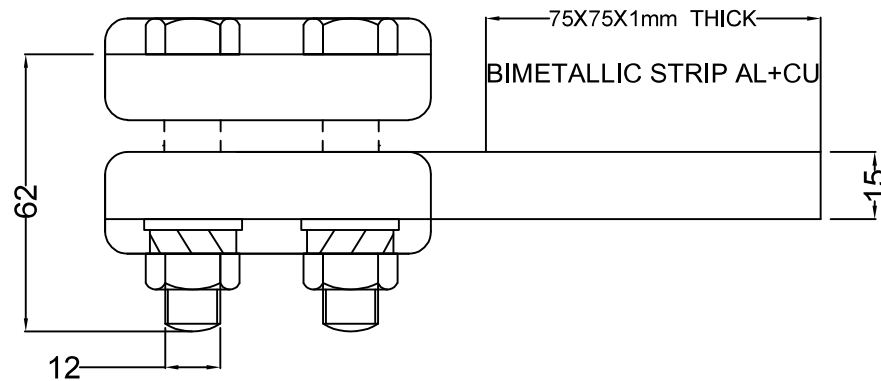
SAP CODE - 2100117828



ELEVATION



SIDE VIEW



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. ISOLATOR CLAMP CONFIRMS TO AS PER IS:5561
4. CLAMP - BODY AND KEEPER :- ALUMINIUM ALLOY
5. MINIMUM THICKNESS OF CLAMP BODY & KEEPER : 15mm.
6. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573
7. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

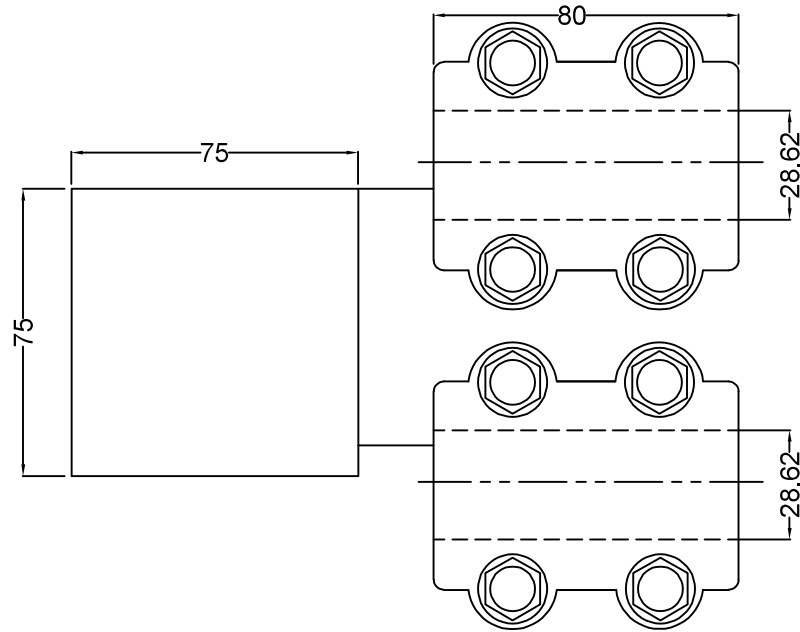
TITLE:- BIMETALLIC ISOLATOR CLAMP
FOR ACSR GOAT

BSES

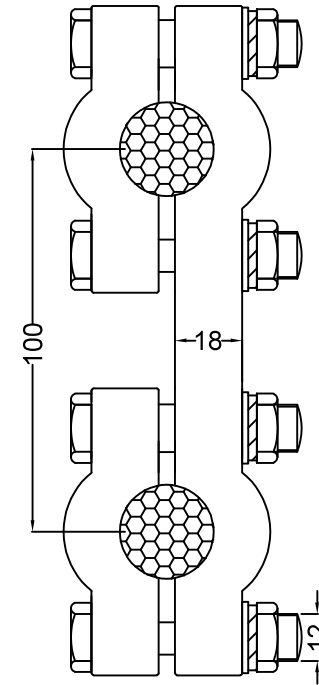
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BYPL/DRG/25-26/023-6

ANNEXURE F- BIMETALLIC ISOLATOR CLAMP FOR DOUBLE ACSR ZEBRA CONDUCTOR

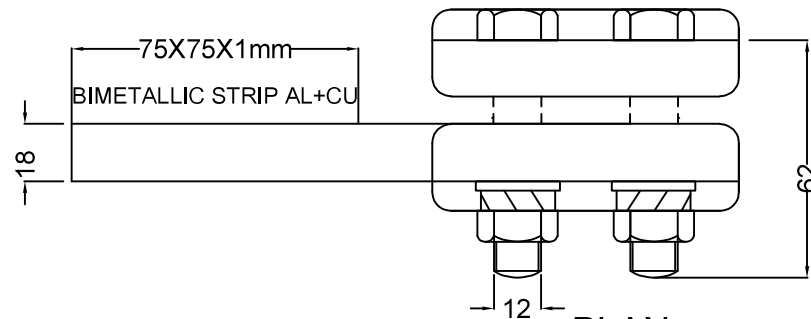
SAP CODE - 2100117827



ELEVATION



SIDE VIEW



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. ISOLATOR CLAMP CONFIRMS TO AS PER IS:5561
4. CLAMP - BODY AND KEEPER :- ALUMINIUM ALLOY
5. MINIMUM THICKNESS OF CLAMP BODY & KEEPER : 18mm.
6. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573
7. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

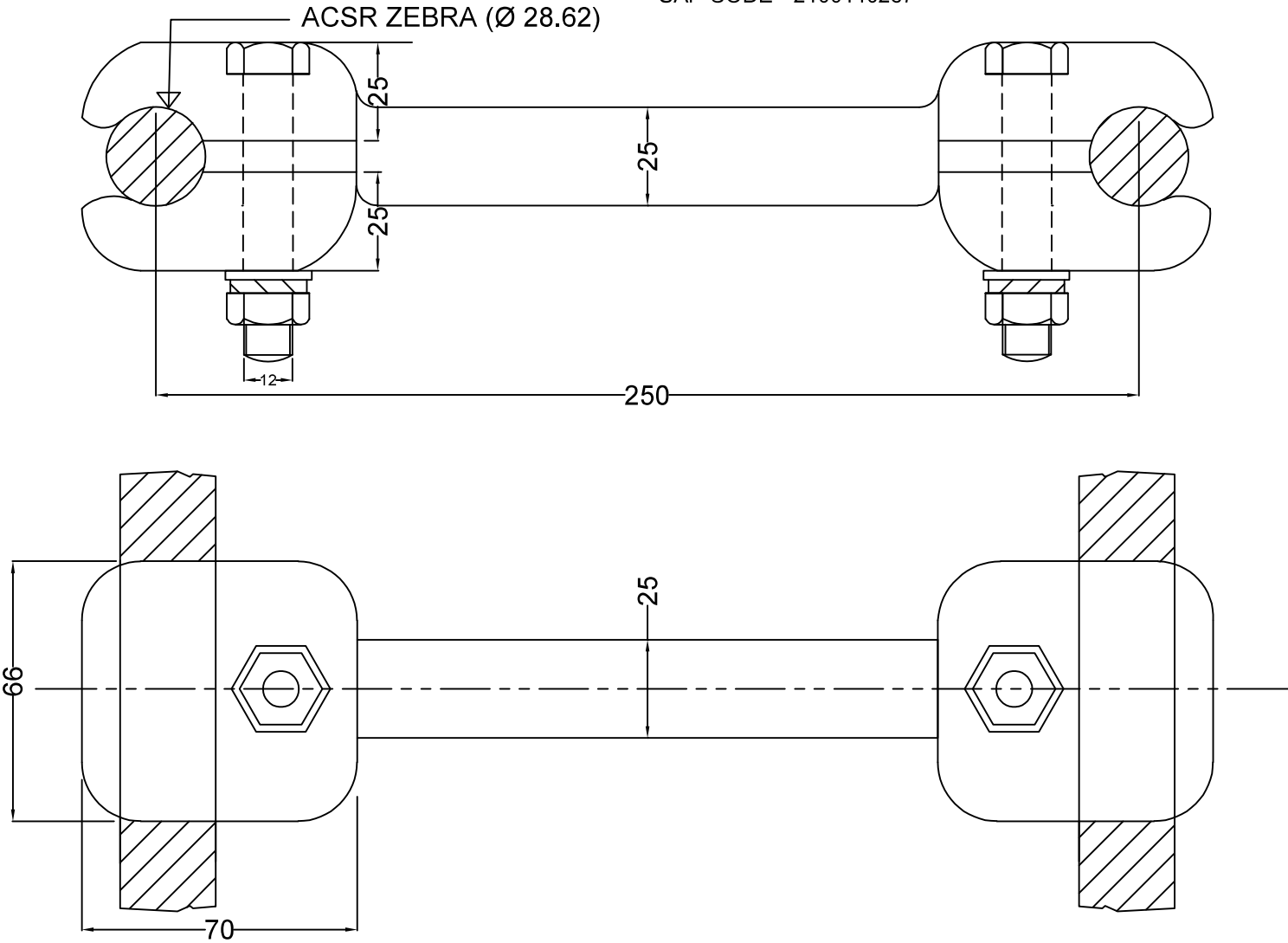
TITLE:- BIMETALLIC ISOLATOR CLAMP FOR
DOUBLE ACSR ZEBRA CONDUCTOR

BSES

DRG.No:-
BYPL/DRG/25-26/023-4

ANNEXURE G- BUS BAR SPACER FOR ACSR TWIN ZEBRA CONDUCTOR

SAP CODE - 2100140267



NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. BUS BAR SPACER CONFORMS TO AS PER IS:10162.
4. CLAMP - BODY AND KEEPER :- ALUMINIUM ALLOY
5. SPRING WASHERS ARE ELECTRO GALVANISED, AS PER IS:1573
6. BOLT S, NUTS & PLAIN WASHERS ARE H.D.G. AS PER IS 2633.

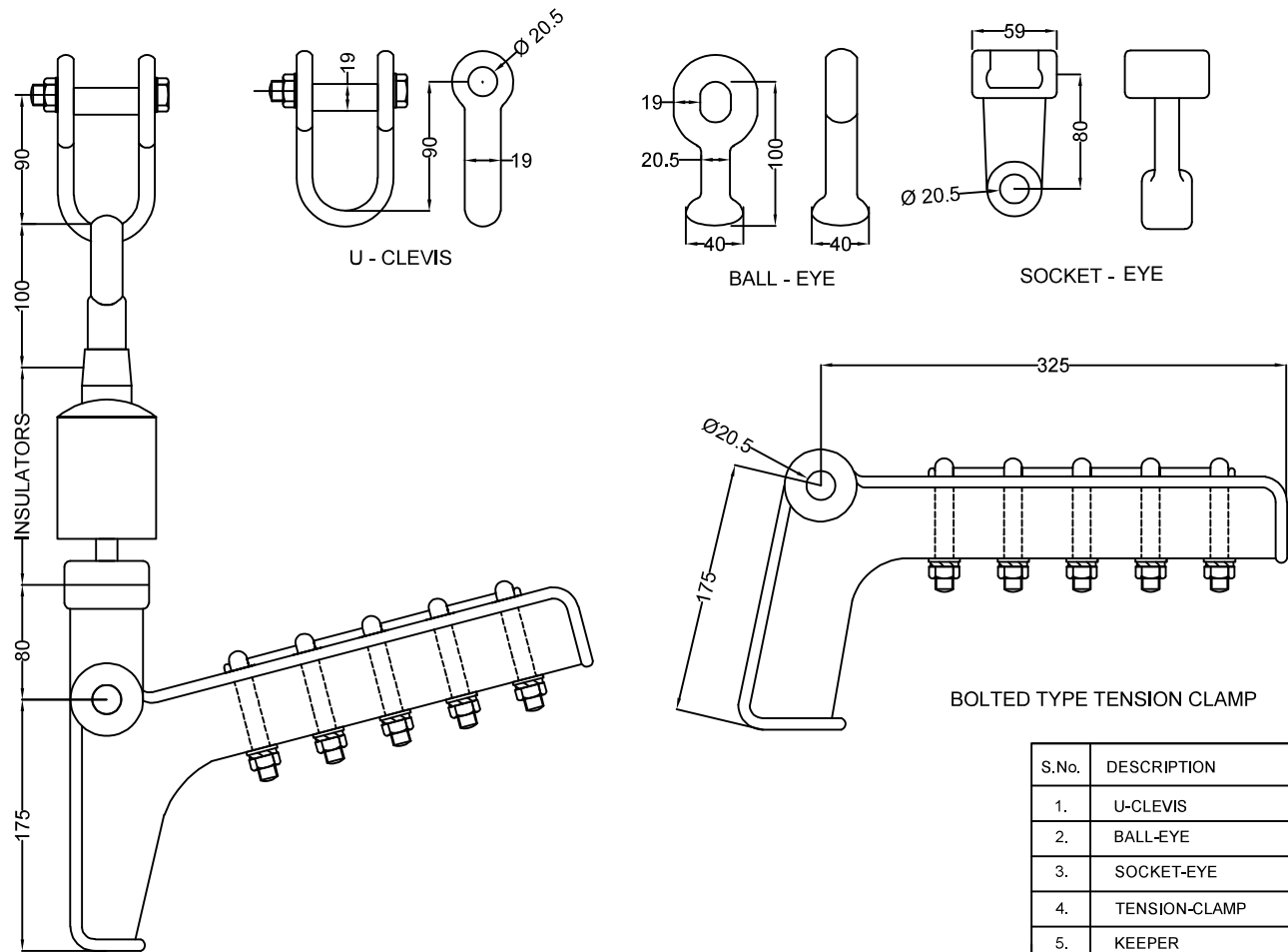
TITLE:- BUS BAR SPACER FOR ACSR
TWIN ZEBRA CONDUCTOR

BSES

DRG.No:-
BYPL/DRG/25-26/023-2

ANNEXURE H- SINGLE TENSION HARDWARE FITTINGS SUITABLE FOR ACSR ZEBRA CONDUCTOR

SAP CODE - 2100134297



NOTE :-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE :- $\pm 2\%$.
3. FITTING CONFORMS TO AS PER IS:2486, (Pt-I)
4. BALL & SOCKET SIZE :-20MM AS PER IS:2486/Pt-II.
5. SLIP STRENGTH:-95%, OF UTS OF CONDUCTOR.
6. BREAKING STRENGTH:- 120 KN.
7. ALL FERROUS PARTS ARE H.D.G. AS PER IS:2633
8. WASHER ARE ELECTROGAL, AS PER IS:1573.
9. ALL SHARP CORNERS SHALL BE ROUND OFF,,
10. MIN.TIGHTENING TORQUE :-3kg m.
11. MIN. GALVANIZIG THICKNESS ON FERROUS PARTS SHALL BE 610 GM/M2.

S.No.	DESCRIPTION	MATERIAL
1.	U-CLEVIS	FORGED STEEL
2.	BALL-EYE	FORGED STEEL
3.	SOCKET-EYE	FORGED STEEL
4.	TENSION-CLAMP	AL ALLOY-LM6
5.	KEEPER	AL ALLOY-LM6
6.	U-BOLT,NUT & P.WASHER	MS HDG
7.	SECURITY CLIP	STAINLESS STEEL
8.	BOLT,NUT & P.WASHER	MS HDG
9.	SPRING WASHER	SPRING STEEL
10.	SPLIT PIN	STAINLESS STEEL

TITLE:-

SINGLE TENSION HARDWARE
SUITABLE FOR ACSR
ZEBRA CONDUCTOR

BSES

DRG.No:-
BYPL/DRG/25-26/023-7



**TECHNICAL SPECIFICATION
OF
PIN AND DISC INSULATOR**

SPECIFICATION NO.- BSES-TS-130-PDI-R0

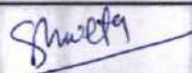
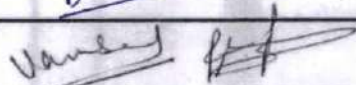
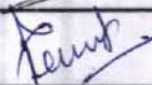
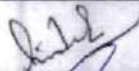
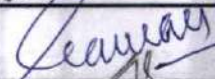
Rev:	0	
Date:	20 Sep 2022	
Pages:	8	
Prepared by	Shweta Dixit	
	Vani Sood/Rohit Patil	
Reviewed by	Puneet Duggal	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	

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TECHNICAL SPECIFICATION OF PIN & DISC INSULATOR**1. Scope of supply**

The subject document is intended to specify technical as well various other requirements of (11kV/33kV) Pin Insulators and Disc Insulator. The Insulator shall be porcelain type pin insulator.

The supplier shall provide items to conforming to the subject specification. The materials offered shall be complete with all component and accessories which are necessary or usual for their efficient performance and satisfactory maintenance.

2. Codes & standards

All Material against this specification shall conform in all respect to the relevant Indian standard specification /International Standard Specification, with latest amendments from time to time, thereof, some of which are listed below:

Sr. No.	Standard	Title of the Standard
2.1	IS - 731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V
2.2	IS 2486	Metal fittings of insulators for overhead power lines with nominal voltage greater than 1000 V
2.3	IS 2629	Recommended Practice for hot dip galvanizing of iron and steel
2.4	IS: 2071	Methods of High Voltage Testing
2.5	IS: 2486-1989	Dimensional Requirements for Insulators fittings
2.6	IEC - 60815	Selection and dimensioning of High voltage insulators for use in polluted conditions

3. Service Conditions

3.1	Average grade atmosphere :	Heavily polluted, dry
3.2	Maximum altitude above sea level	1000 M
3.3	Design ambient temperature	50 deg C
3.4	Relative Humidity	90 % Max
3.5	Seismic Zone	4
3.6	Rainfall	750 mm concentrated in four months
3.7	Wind Pressure	195 Kg/m ² up to 90m elevation as per IS 875-1975

4. Major Design Criteria

S.No.	Description	Requirement / Rating
4.1	Nominal system Voltage	11 kV , 33 kV
4.2	Corresponding highest system Voltage	12 kV , 36 kV
4.3	Frequency	50HZ $\pm$ 5%

TECHNICAL SPECIFICATION OF PIN & DISC INSULATOR

4.4	No. of Phase	3
4.5	Fault level	31.5 kA for 3 Seconds

5. Insulator Features

5.1	General Requirement	i. The porcelain shall be free from defects, thoroughly vitrified and smoothly glazed. ii. The design of Insulator should be such that, stresses due to expansion or contraction in any part of the insulator shall not lead to its deterioration. The porcelain shall not engage directly with hard metal. iii. The glaze shall be Brown in colour –except for the screw threads and the top portion on which the conductor is supported during firing which may be left unglazed, all other surfaces of the insulator shall be effectively glazed. iv. The insulator shall be in one piece. v. The design of the fittings and the insulators shall be such that there is no local corona formation or discharges likely to cause the interference to either sound or vision transmission. vi. Cement used in construction of insulators shall not cause fraction by expansion or loosening by construction and propose care must be taken in “Curing”. The cement used shall not give rise to Chemical Reaction with the metal Fittings and its thickness shall be uniform as possible.
5.2	Pin Insulator	i. The Pin Insulators shall be so designed that the porcelain part should not directly come in contact with any hard material. ii. For this purpose the pin insulators shall be fitted with a Zinc/Lead thimble designed to fit with the small / large steel head of the pin

TECHNICAL SPECIFICATION OF PIN & DISC INSULATOR

5.3	Disc Insulator	i. The Insulator discs shall be Cap and Ball Pin type with Ball and Socket coupling suitable for use in suspension or tension strings. ii. The disc insulators shall be of Ball & Socket type. iii. The cap of disc insulators shall be of Malleable Cast Iron whereas the ball pins shall be of Forged steel. iv. All metal parts shall be of Hot dip galvanized as per IS: 2633.

S.No.	Type of Insulator	Minimum Creepage Distance	Mechanical Failing Load
5.4	11 kV Pin Insulator	320 mm	10 KN
5.5	33 kV Pin Insulator	840 mm	10 KN
5.6	11kV Disc Insulator	380 mm	90KN
5.7	11kV Disc Insulator	380 mm	120 KN
5.8	11kV Disc Insulator	380 mm	160 KN

6. Marking

	Marking	The material shall be marked with the following description with indelible ink:
6.1		I. Manufacture's name or trade mark II. ISI mark with Certificate of Manufacturing License no.(CM/L) III. Purchase Order Number and date IV. The manufacturer's identification symbol V. BSES logo VI. Month and year of manufacturing VII. Minimum failing load in Newtons

7. Inspection & Testing

S.No.	Type Test	Type test of each rating of Pin/disc insulator shall be conducted from CPRI / ERDA lab. The Type test report

TECHNICAL SPECIFICATION OF PIN & DISC INSULATOR

		shall not be more than 5 years old. Tests are as below – i. Visual examination. ii. Verification of dimensions. iii. Visible discharge test. iv. Impulse voltage withstand test (+ve wave & -ve wave) v. Impulse voltage flashover test (+ve wave & -ve wave) vi. Dry and wet power frequency voltage withstands test. vii. Dry and wet power frequency flashover voltage test. viii. Temperature Cycle test. ix. Mechanical failing load test. x. Puncture test. xi. Porosity test. xii. Galvanizing test.
7.1	Acceptance and Routine Tests:	I. Verification of dimensions and Visual examination. II. Temperature cycle test. III. Mechanical failing load test IV. Puncture test. V. Porosity test. VI. Galvanizing test. VII. Electromechanical failing load test. (for Disc. Insulator String only).

8. Packing & Delivery

8.0.0	Packing	
8.1.1	Packing protection	Against corrosion , dampness, heavy rains, breakage and vibration
8.1.2	Packing for accessories and spares	Robust wooden nonreturnable packing case with all the above protection and identification labels.
8.1.3	Packing identification label	In each packing case, following details are required: i) Individual serial number ii) Purchaser's name iii) PO number (along with SAP item code , if any)

TECHNICAL SPECIFICATION OF PIN & DISC INSULATOR

		& date iv) Equipment Tag no. (if any) v) Destination vi) Manufacturer / Supplier's name vii) Address of manufacturer's / supplier's its agent viii) Description and quantity ix) Country of origin x) Month and year of manufacturing xi) Case measurement xii) Minimum failing load in kg xiii) Gross and net weight in kilograms xiv) All necessary slinging and stacking instructions.
8.1.4	Shipping	i) 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, and furnish to the purchaser confirmation that the proposed packages can be safely transported, as normal or oversize packages, upto the plant site. Any modification required in the infrastructure and cost thereof in this connection shall be brought to the notice of the Purchaser. ii) The seller shall be responsible for all transit damage due to improper packing.
8.1.5	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet / manual need to be furnished before commencement of supply.

9. Deviation

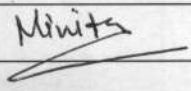
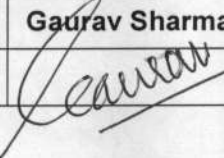
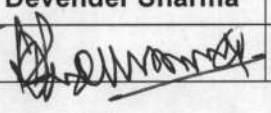
Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP. In absence of such a statement, requirements of the specification shall be met without exception.

Annexure A Guaranteed Technical Particulars of Insulator:

Bidder to submit hard copy duly filled & signed along with techno commercial offer.

S No.	Characteristics	Vendor Data
1	Manufacture Name and Address	
2	Type of Insulator offered	
3	Minimum failing Load (kN)	
4	Standards according to which the material shall confirm	
5	Type of Glaze	
6	Dimension (mm)	
a.	Over all height	
b.	Max. Dia of Insulator	
c.	Top	
d.	Neck	
7	Minimum Creepage Distance (mm)	
8	Working Voltage	
9	Dry Power Frequency 1 Min. Withstand Voltage	
10	Wet Power Frequency 1 Min. Withstand Voltage	
11	Dry Power Frequency Flashover Voltage	
12	Wet Power Frequency Flashover Voltage	
13	Power Frequency puncher withstand Voltage	
14	Impulse flash over Voltage	
a.	positive KV	
b.	negative KV	
	Impulse withstand	
15	Visible discharge test Voltage	
16	No of threads per mm	
17	Type of threads	
18	Thimble	
a.	Type of material	
b.	Type	
19	Net weight of insulator	
20	Packing details	
	Marking details Min. failing load	
a.	Type of packing	
b.	No. of insulator/ Crate	
c.	Weight of each packing approx in Kg	
21	Marking details	
22	Furnished drawing No./relevant information if any	

**TECHNICAL SPECIFICATION
FOR
LIGHTNING/SURGE ARRESTER
Specification No. SP-LA-64-R0**

PREPARED BY	REVIEWED BY	APPROVED BY	REV	0
Minita Kumari	Gaurav Sharma	Devender Sharma	DATE	18/11/2015
			PAGE	Page 1 of 20

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER**CONTENTS**

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TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER**1.0 SCOPE**

This specification covers the design, manufacture, assembly, testing at manufacturer's works, packing and delivery of 66kV, 33kV, and 11kV Metal Oxide (gapless) Lightning/Surge arresters with polymeric housing. Scope of supply is given in Annexure A.

2.0 CODES & STANDARDS

The Lightning/Surge arresters shall be designed, manufactured and tested in accordance with the latest applicable Indian Standard, IEC standard, ASTM standard and CBIP manuals as listed below:

S. No.	Standard Code	Standard Description
2.1		Indian Electricity Rules
2.2		Indian electricity act
2.3		CBIP manual
2.4		ASTMD 2303 standard
2.5	IS : 3070 – Part 3	Lightning Arresters for Alternating Current Systems
2.6	IS : 2071 - Part I	Method of high voltage testing
2.7	IS : 2629 - 1985	Recommended Practice for Hot-Dip Galvanizing of Iron and Steel
2.8	IS : 5621 - 1980	Hollow insulators for use in electrical equipment
2.9	IS : 6639 - 1972	Specification for Hexagon Bolts for Steel Structures
2.10	IEC 60099-4-2001	Metal-Oxide Surge Arresters without gaps for AC Systems
2.11	IEC 60815-3	Polymer Insulators for AC system

3.0 SERVICE CONDITIONS

3.1	Average grade atmosphere	Heavily polluted, dry
3.2	Maximum altitude above sea level	1000
3.3	Ambient air temperature	Highest 50Deg C Average 40Deg C
3.4	Minimum ambient air temperature	0 Deg C

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

3.5	Relative Humidity	100%
3.6	Seismic Zone	4
3.7	Rainfall	750 mm concentrated in four months

4.0 DESIGN FEATURES

4.1	System	66kV	33kV	11kV
4.1.1	Voltage	66kV $\pm$ 10%	33kV $\pm$ 10%	11kV $\pm$ 10%
4.1.2	Frequency	50Hz $\pm$ 5%		
4.1.3	Short circuit rating	31.5kA for 3 sec	26.3kA for 3 sec	26.3kA for 3 sec
4.1.4	Earthing	Solidly grounded		
4.2	Application	To be used for protection of transformers, circuit breakers and other sub-station equipment against lightning and switching surges.		
4.3	Installation	Outdoor for 66kV system, Outdoor/Indoor for 33kV system based on site requirement, and Indoor for 11kV System.		
4.4	Arrestor Type	a. Gap-less metal oxide type (ZnO Type) with absolutely no air volume inside b. Arresters shall be of cage design so that arrester does not explode during the short circuit test condition. The housing should be directly molded on stack of MOV blocks without any intermediate interface.		
4.5	Arrester housing	a. Silicon rubber housing b. The housing material shall be highly hydrophobic in nature. c. Polymer housing shall be free from lamination cavities or other flaws affecting the mechanical and electrical strengths. d. The surge arrester shall not fail due to housing contamination. e. Housing shall be so coordinated that external		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

		flashover will not occur due to application of any impulse or switching surge voltage up to maximum design value of surge arrester. The polymer housing should comply with the requirement of IEC 60815-3. f. The housing shall be of Grey colour.
4.6	Connecting lead	Insulated copper cable or copper strip of minimum cross section area 50sq mm with minimum 1.5m length shall be used for connecting LA and surge counter (for outdoor type only)
4.7	Mounting	a. Vertical on steel structures with insulating bases. b. Surge counters shall be suitable for mounting on structure of lightning arrester.
4.8	Line side Terminal Connectors	a. Aluminium alloy terminal clamps Suitable for ACSR Zebra (dia 28.62mm) / Goat conductor (25.97mm) for 66kV/33kV outdoor LA b. 25X3 mm Copper flat for 33kV/11kV Indoor LA
4.9	Ground Terminal Connectors	Suitable for 50x6 mm GI flat
4.10	End fittings	The end fittings used in polymer arrester shall be made out of aluminum through machining process/pressure die-casting process. Sand casted and gravity casted end fittings are not acceptable due to poor microstructure and porosity issues.
4.11	Surge Counter and Leakage current meters	a. The surge counters and leakage current meters shall be provided with 66kV and 33kV outdoor LAs. b. The surge counter shall be Non-resettable type and shall be enclosed in weather proof enclosures. c. Suitable leakage current meters shall be supplied in the surge counter enclosure. d. The reading of milli-ammeter and counter shall be visible through an inspection glass panel to a man standing on ground. e. Paint shade of the enclosure shall be Polyurethane, 692 of IS-5. f. Ingress protection of the enclosure shall be IP-67

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

4.12	Atmospheric protection for clamp and fitting of iron and steel	All the metal parts including nuts, bolts, and washers shall be Hot dip galvanized as per IS 2633. The minimum thickness of galvanization should be 610g/sqmm.

5.0 NAME PLATE & MARKINGS

5.1	Material	Anodized aluminum 16SWG
5.1.1	Background	SATIN SILVER
5.1.2	Letters, diagram & border	Black
5.1.3	Process	Etching
5.2	Rating plate details	a. Name of the manufacturer b. Type and serial No. c. Rated voltage d. Max. continuous Operating Voltage e. Nominal discharge current f. Pressure Relief Class g. Identification mark on each separately housed unit to enable it to be replaced in correct position after the multiunit arrester has been dismantled. h. Month and year of manufacturer i. BSES PO No. and Date j. Warranty Period

6.0 QUALITY ASSUARANCE PLAN, INSPECTION AND TESTING

S. No.	Description	Requirement / Rating
6.1	Quality Assurance Plan	To be submitted for purchaser approval
6.2	Type test	a. The product must be type tested. Type test reports not older than 5 years carried out from Government recognized / internationally accredited test Labs shall be submitted for the type, size & rating of equipment offered along with bid.

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

		b. Type test reports of TERT (Tracking & Erosion resistance test) of the housing not older than 5 years carried out from Government recognized/ Internationally accredited test labs as per ASTM D 2303 shall be submitted with the bid.
6.3	Routine test	As per QAP and relevant IS / IEC.
6.4	Acceptance test	As per QAP and relevant IS / IEC.
6.5	Tests on fitting and Accessories	As per Manufacturer's Standards and relevant IS / IEC.
6.6	Inspection and Testing	a. The Buyer reserves the right to inspect the product at the Seller's works at any time prior to dispatch, to verify compliance with the specifications. Inspection hold points shall be as per QAP. b. In-process and final inspection call intimation shall be given in advance to purchaser at least 15 days in advance.

7.0 DOCUMENTS SUBMISSION

7.1	To be submitted along with bid	The seller has to submit : a. Tentative GA / cross sectional drawing of product showing all the views / sections. b. Assembly drawings and weight of main component parts c. LA mounting arrangement d. Rating Plate diagram e. Terminal clamps detail f. Detailed reference list of customers already using the offered product during the last 5 years with similar design and rating. g. Completely filled GTP h. Detailed calculation of 'energy discharge capability'. i. Deviations from this specification. Only deviations

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

		approved in writing before award of contract shall be accepted. j. Details of manufacturer's quality assurance standards and programme and ISO 9000 series or equivalent national certification. k. Type test reports shall be submitted for the type, size & rating of product / equipment offered along with bid. They shall be considered valid for 5 years from date of test performed on product / equipment. l. Complete product Manual along with the bid. m. Recommended spare parts and consumable items for five years of operation with prices and spare parts catalogue with price list for future requirements n. Bill of material with make, model & quantity of items.
7.2	To be submitted after award of contract	a. Program for production and testing b. Guaranteed Technical Particulars c. Calculations to substantiate choice of electrical, structural, mechanical component size / ratings d. Detailed dimension drawing for all components, general arrangement drawing showing detailed component layout e. Rating and diagram plate f. Detailed loading drawing to enable the buyer to design and construct foundations (as applicable) g. Transport / Shipping dimensions with weights h. Detailed Bill of Materials for all fittings and accessories with their make, model & tag no. etc i. Detailed installation and commissioning instructions j. Quality plan
7.3	Submittals required prior to dispatch	a. Inspection and test reports, carried out in manufacturer's works (R) b. Test certificates of all bought out items c. Operation and maintenance Instruction as well as trouble shooting charts/ manuals

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

7.4	Drawing and document sizes	Standard size paper A0, A1, A2, A3, A4

8.0 PROGRESS REPORTING

8.1	Outline Document	To be submitted for purchase approval for outline of production, inspection, testing, inspection, packing, dispatch, documentation programme.
8.2	Detailed Progress Report	To be submitted to purchaser once a month containing a. Progress on material procurement b. Progress on fabrication (As applicable) c. Progress on assemble (As applicable) d. Progress on internal stage inspection e. Reason for any delay in total programme f. Details of test failures if any in manufacturing stages g. Progress on final box up constraints / forward path

9.0 PACKING, SHIPPING, HANDLING & SITE SUPPORT

9.1	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.
9.2	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.
9.3	Packing Identification Label	On each packing case, following details are required:
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	Manufacturer / Supplier's name	

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

9.3.7	Address of Manufacturer / Supplier / it's agent	
9.3.8	Description	
9.3.9	Country of origin	
9.3.10	Month & year of Manufacturing	
9.3.11	Case measurements	
9.3.12	Gross and net weight	
9.3.13	All necessary slinging and stacking instructions	
9.4	Shipping	The seller shall be responsible for all transit damage due to improper packing.
9.5	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet / manual to be furnished before commencement of supply.

10.0 DEVIATIONS

10.1	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 LIGHTNING/SURGE ARRESTER
ANNEXURE A : SCOPE OF SUPPLY

S. No.	Description	Descriptive requirement
1	Main Equipment	Polymeric type Lightning/Surge Arresters of 66/33/11 kV
2	Accessories	a. Line terminal connectors b. Surge counter with leakage current ammeter (For outdoor only) c. Grounding terminal bracket d. Necessary flanges along with all hot dip galvanized hardware such as nut bolts/ washers etc. for mounting of LA & surge Counter e. Suitably sized Cu flat or insulated copper cable for connection between LA and surge counter f. Any other item necessary or usual for efficient performance and satisfactory maintenance under the various operating and atmospheric conditions
3	Documentation	Submission of all drawings & documents pertaining to the equipment.

ANNEXURE B: Guaranteed Tech. Particulars for 66KV Lightning Arrester

Sr. No.	Description	BSES Requirement	Data by Supplier
1	Name of manufacturer		
2	Type	Gapless, ZnO type, single pole, heavy duty, station class, pedestal mounted	
3	Model		
4	No. of units.		
5	Installation	Outdoor	
6	Application	Protection of Transformers, circuit breakers, lines and other outdoor S/S equipment.	

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

7	LA connection to system	Phase to earth	
8	Type of Conductor	ACSR Zebra / Goat	
9	Construction	Single Phase	
10	Rated voltage of arrester (KVrms)	60 KV	
11	Nominal discharge current (Amps) (8/20 micro sec. wave) peak value	10KA	
12	System Particulars		
i)	Highest System Voltage	72.5 KV	
ii)	Frequency	50HZ $\pm$ 5%	
iii)	System neutral	Solidly earthed	
iv)	Max. value of temporary over voltage & its max. duration		
	- Insulation level of equipment to be protected	325 KVp	
	- System short circuit level	31.5KA for 3 seconds.	
13	Maximum continuous operating voltage (MCOV)	52KV	
14	Impulse withstand current	100KAp	
15	Long Duration discharge class	3	
16	Minimum single impulse energy capability	Min 6kJ/kV	
17	Maximum residual voltage at switching impulse current of 1KAp (30/60 micro sec. wave)	136 KVp	
18	Max. residual voltage for discharge current (8/20 micro sec)		
i)	At 05 KAp		
ii)	At 10 KAp		
iii)	At 20 KAp		
19	Minimum creepage distance	25 mm/KV	
20	Pressure relief class	40KA	
21	Leakage current at COV (mA)		
i)	Resistive		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

ii)	Capacitive		
22	Dry and wet power frequency withstand voltage of arrester insulation (KVrms)		
23	Virtual steepness for front of wave for above (KV/micro sec.)		
24	Ratio of system voltage withstand level to protection level of surge arrester		
25	High current impulse withstand 4/10 micro second peak value (KA)		
26	Long duration current Impulse		
i)	Current peak. (Amps)		
ii)	Virtual duration (micro sec)		
27	Temporary Over Voltage Capacity (KVp)		
i)	At 0.1 Sec.		
ii)	At 1.0 Sec.		
iii)	At 10.0 Sec.		
iv)	At 100.0 Sec.		
28	Weight of complete unit (Kg)		
29	Height of complete unit from base to the line side (mm)		
30	Minimum recommended spacing between arresters Centre to Centre (mm)		
31	Clearance required from ground equipment at various heights of arresters unit (mm)		
32	Earthing arrangement provided for earthing side of arresters.		
33	Mounting flanges dimensional details.		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

34	Type and specifications of the surge connectors.	As per specs	
35	Surge Counter		
i)	Make		
ii)	Model no.		
iii)	Type	Non resettable type	
iv)	Surge counter min. current for recording a lightning stroke	200 Amp	
v)	Surge counter max. disch. Current withstand	100KA peak for 4/10 wave shape.	
vi)	Counter operation	One count per surge	
vii)	Paint shade of surge counter housing	Polyurethane, 692 of IS-5	
viii)	Degree of protection of the surge counter	IP-67	
36	Mili-ampere meter	To be provided	
i)	Type and range of milli-ampere meter.		
ii)	Range of continuous leakage current at rated voltage with variation due to change in temperature & frequency		
iii)	Safe leakage current (mA) , and its indication		
iv)	Indication of deterioration of surge arrester		
37	Size and length of flexible Cu cable for connection between LA & surge counter	Min 50sqmm size, min 1.5m length	
38	Voltage time curve for thermal stability of LA after a stroke	To be provided	
39	Housing of LA	Silicon rubber	
i)	Type	Silicon rubber	
ii)	Colour	Grey	
40	Supporting Insulators	FRP rods	
41	Life expectancy of LA		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

ANNEXURE C: Guaranteed Tech. Particulars for 33KV Lightning Arrester

Sr. No.	Description	Data By Purchaser	Data by Supplier
1	Name of manufacturer		
2	Type	Gapless, ZnO type, single pole, heavy duty, station class, pedestal mounted	
3	Model		
4	No. of units.		
5	Installation	Outdoor / Indoor	
6	Application	Protection of Transformers, circuit breakers, lines and other outdoor S/S equipment.	
7	LA connection to system	Phase to earth	
8	Type of Conductor	ACSR Zebra / Goat	
9	Construction	Single Phase	
10	Rated voltage of arrester (KVrms)	30 KV	
11	Nominal discharge current (Amps) (8/20 micro sec. wave) peak value)	10KA	
12	System Particulars		
i)	Highest System Voltage	36 KV	
ii)	Frequency	50HZ $\pm$ 5%	
iii)	System neutral	Solidly earthed	
iv)	Max. value of temporary over voltage & its max. duration		
	- Insulation level of equipment to be protected	170 KVp	
	- System short circuit level	26.3KA for 3 seconds.	
13	Maximum continuous operating voltage (MCOV)	25KV	
14	Impulse withstand current	100KA _p	
15	Long Duration discharge class	3	
16	Minimum single impulse energy capability	Min 6kJ/kV	

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

17	Maximum residual voltage at switching impulse current of 1KAp (30/60 micro sec. wave)	70KVp	
18	Max. residual voltage for discharge current (8/20 micro sec)		
i)	At 05 KAp		
ii)	At 10 KAp		
iii)	At 20 KAp		
19	Minimum creepage distance	25 mm/KV	
20	Pressure relief class	40KA	
21	Leakage current at COV (mA)		
i)	Resistive		
ii)	Capacitive		
22	Dry and wet power frequency withstand voltage of arrester insulation (KVrms)		
23	Virtual steepness for front of wave for above (KV/micro sec.)		
24	Ratio of system voltage withstand level to protection level of surge arrester		
25	High current impulse withstand 4/10 micro second peak value (KA)		
26	Long duration current Impulse		
i)	Current peak. (Amps)		
ii)	Virtual duration (micro sec)		
27	Temporary Over Voltage Capacity (KVp)		
i)	At 0.1 Sec.		
ii)	At 1.0 Sec.		
iii)	At 10.0 Sec.		
iv)	At 100.0 Sec.		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

28	Weight of complete unit (Kg)		
29	Height of complete unit from base to the line side (mm)		
30	Minimum recommended spacing between arresters Centre to Centre (mm)		
31	Clearance required from ground equipment at various heights of arresters unit (mm)		
32	Earthing arrangement provided for earthing side of arresters.		
33	Mounting flanges dimensional details.		
34	Type and specifications of the surge connectors.	As per specs	
35	Surge Counter for outdoor type		
i)	Make		
ii)	Model no.		
iii)	Type	Non resettable type	
iv)	Surge counter min. current for recording a lightning stroke	200 Amp	
v)	Surge counter max. disch. Current withstand	100KA peak for 4/10 wave shape.	
vi)	Counter operation	One count per surge	
vii)	Paint shade of surge counter housing	Polyurethane, 692 of IS-5	
viii)	Degree of protection of the surge counter	IP-67	
36	Mili-ampere meter for outdoor type		
i)	Type and range of milli-ampere meter.		
ii)	Range of continuous leakage current at rated voltage with variation due to change in temperature & frequency		
iii)	Safe leakage current (mA) , and its indication		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

iv)	Indication of deterioration of surge arrester		
37	Size and length of flexible Cu cable for connection between LA & surge counter	Min 50sqmm size, min 1.5m length	
38	Voltage time curve for thermal stability of LA after a stroke	To be provided	
39	Housing of LA		
i)	Type	Silicon rubber	
ii)	Colour	Grey	
40	Supporting Insulators	FRP rods	
41	Life expectancy of LA		

ANNEXURE D: Guaranteed Technical Particulars for 11KV Surge Arrester

Sr. No.	Description	Data By Purchaser	Data by Supplier
1	Name of manufacturer		
2	Type	Gapless, ZnO type, single pole, heavy duty, station class, pedestal mounted	
3	Model		
4	No. of units.		
5	Installation	Indoor	
6	Application	Protection of Transformers, circuit breakers, lines and other outdoor S/S equipment.	
7	LA connection to system	Phase to earth	
8	Type of Conductor	Copper flat	
9	Construction	Single Phase	
10	Rated voltage of arrester (KVrms)	9 KV	
11	Nominal discharge current (Amps)	10KA	
12	System Particulars		
i)	Highest System Voltage	12 KV	
ii)	Frequency	50HZ $\pm$ 5%	
iii)	System neutral	Solidly earthed	

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

iv)	Max. value of temporary over voltage & its max. duration		
	- Insulation level of equipment to be protected	75 KVp	
	- System short circuit level	26.3kA for 3 seconds.	
13	Maximum continuous operating voltage (MCOV)	7.65 KV	
14	Impulse withstand current	100KAp	
15	Long Duration discharge class	2	
16	Minimum single impulse energy capability	Min 2.5kJ/kV	
17	Maximum residual voltage at switching impulse current of 1KAp (30/60 micro sec. wave)		
18	Max. residual voltage for discharge current (8/20 micro sec)		
i)	At 05 KAp		
ii)	At 10 KAp		
iii)	At 20 KAp		
19	Minimum creepage distance	25 mm/KV	
20	Pressure relief class	40KA	
21	Leakage current at COV (mA)		
i)	Resistive		
ii)	Capacitive		
22	Dry and wet power frequency withstand voltage of arrester insulation (KV rms)		
23	Virtual steepness for front of wave for above (KV/micro sec.)		
24	Ratio of system voltage withstand level to protection level of surge arrester		

TECHNICAL SPECIFICATION FOR LIGHTNING/SURGE ARRESTER

25	High current impulse withstand 4/10 micro second peak value (KA)		
26	Long duration current Impulse		
i)	Current peak. (Amps)		
ii)	Virtual duration (micro sec)		
27	Temporary Over Voltage Capacity (KVp)		
i)	At 0.1 Sec.		
ii)	At 1.0 Sec.		
iii)	At 10.0 Sec.		
iv)	At 100.0 Sec.		
28	Weight of complete unit (Kg)		
29	Height of complete unit from base to the line side (mm)		
30	Minimum recommended spacing between arresters Centre to Centre (mm)		
31	Clearance required from ground equipment at various heights of arresters unit (mm)		
32	Earthing arrangement provided for earthing side of arresters.		
33	Mounting flanges dimensional details.		
34	Voltage time curve for thermal stability of SA after a stroke	To be provided	
35	Housing of SA		
i)	Type	Silicon rubber	
ii)	Colour	Grey	
36	Supporting Insulators	FRP rods	
37	Life expectancy of SA		

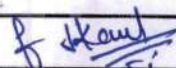
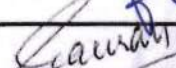
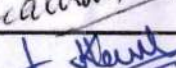


Technical Specification

Of

66/33 kV Control and Relay Panel

Specification no – BSES-TS-86-CRP-R0

Rev:	0	
Date:	03 Jun 2022	
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1.0 SCOPE

- This specification covers design, manufacture, testing at manufacturer's works, packing and delivery of control and relay panel (CRP) for 66kV and 33kV substations.
- The control and relay panel shall be complete with all components and accessories, which are necessary or usual for their efficient performance and trouble free operation under the various operating and atmospheric conditions. Such parts that may have not been specifically included, but otherwise form part of the CRP as per standard trade and/or professional practice and/or are necessary for proper operation of control and relay panel, will be deemed to be included in this specification.
- Scope also Includes-Licensed programming software and communication cord for offered numerical relays, one set of special tools and tackles (if any) required for maintenance of CRP and its components, Spares as per Annexure C, All relevant drawings, data and instruction manuals.

2.0 CODES AND STANDARDS

Control and Relay panel should be designed and manufactured in accordance with the following standards.

2.1	IS-1248, Part 1- 1993	Direct acting indicating analogue electrical measuring instruments and their accessories.
2.2	IS-3231, Part 1- 1986 Part 2 &3 -1987	Electrical relays for power system protection
2.3	IS-9000 Part 1 -1988	Basic environmental testing procedures for electronics & electrical items
2.4	IS-13703 1993	Low voltage fuses for Voltages not exceeding 1000V AC or 1500 V DC
2.5	IS-13947 Part 1 - 1993	Low voltage switchgear & control gear
2.6	IEC-60255 - 1989	Specification for electrical relays
2.7	IEC 60688 1997	Electrical measuring transducers

3.0 PANEL CONSTRUCTION

3.1	Panel Type	Simplex panels with Width - 1000mm/1250 mm and Depth – 800 to 1000mm. Equipment shall be mounted on the front of the panel and doors for wiring access shall be at the back of panels.

TECHNICAL SPECIFICATION FOR 66/33KV CONTROL AND RELAY PANEL

3.2	Enclosure type	Completely metal enclosed and dust, moisture and vermin proof. Degree of protection not less than IP4X in accordance with IS 13947
3.3	Enclosure material	Pre-galvanized, cold-rolled sheet steel of thickness not less than 2.0 mm. Stiffeners shall be provided wherever necessary.
3.4	Doors	Double leaf doors shall be provided at the rear. Doors shall have handles with built-in locking facility. Locks of the door shall be lever type.
3.5	Gland Plate	At least two separate gland plates of removable type with gasket shall be provided for each panel. They shall be of sheet steel of thickness not less than 3.0 mm.
3.6	Cable Entry	Shall be from the bottom
3.7	Cable clamping	Cable glands shall not be used to support control cables. Vendor must provide clamping arrangement of control cable.
3.8	Gaskets	All doors, removable covers and panels shall be Gasketed all around with neoprene gaskets.
3.9	Ventilating louvers	Ventilating louvers, if required, shall have screens and filters. The screens shall be made of either brass or GI wires mesh.
3.10	Foundation	The panels shall be fixed on the embedded foundation channels with intervening layers anti vibration strips made of shock absorbing materials.
3.11	Base Frame	Base frames shall be supplied along with panels. 100mm channel painted black.
3.12	Mounting	Equipment on front of panel shall be flush mounted. No equipment shall be mounted on the doors.
3.13	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. Height of relays, meters and recorders shall not be less than 450 mm from the bottom of the panel.
3.14	Appearance	The center lines of switches, push buttons and indicating lamps shall be matched to give a neat and uniform appearance. Likewise the top lines of all meters, relays and recorders etc, shall be matched.
3.15	Make	To be provided by Vendor

4.0 WIRING

4.1	Internal wiring	1100V grade, FRLS type, single core, stranded copper conductor wires with PVC insulation.
4.2	Size	2.5 sqmm for CT circuits, 2.5 sqmm for PT and control circuits.
4.3	Color Code	
4.3.1	CT & PT	R Ph – Red Y Ph – Yellow B Ph – Blue Neutral – Black
4.3.2	Others	DC– grey, AC-black, Earth – green
4.4	Ferrules	Ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wire. Wires directly connected to trip circuit shall be distinguished by the addition of red colored unlettered ferrule.
4.5	Termination	Fork type, pin type and ring type (as applicable) tinned copper lugs to be used. Only ring type lugs should be used in CT circuits. Insulated sleeves shall be provided at all the wire terminations.
4.6	Wiring Enclosure	Plastic channels to be used as enclosures. PVC sleeves to be used for interpanel wiring.
4.7	Spare Contacts	Spare contacts of relays and contactors etc. should be wired up to the terminal block.
4.8	Inter-panel wiring	When panels are arranged to be located adjacent to each other inter panel wiring of common bus wires between the panels should be supplied with one end terminated and the other end bunched and coiled. Inter panel wiring shall be clearly indicated in the wiring tables.
4.9	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.

5.0 TERMINAL BLOCKS

5.1	Rating and Type	1100 V grade, molded piece, stud type screw driver operated terminals complete with insulated barriers, washers, nuts and lock nuts.
5.2	Suitability	Unless otherwise specified, terminal blocks shall be suitable for connecting the following conductors of cable on each side- a. All circuits including current / voltage transformer circuits: 6mm ² flexible copper. b. AC / DC power supply circuits: one no of 10 mm ² Al./ 6 mm ² flexible Cu.
5.3	Marking and covers	White fibre markings strip with clear plastic, slip-on / clip-on terminal covers to be provided.
5.4	Disconnecting Facility	To be provided in CT and PT terminals
5.5	Shorting & Earthing Facility	To be provided in CT Terminals
5.6	Spare Terminals	20% in each TB row
5.7	Segregation	TBs shall be segregated by application i.e separate terminal blocks shall be provided for each application as follows (a) CT (b) PT (c) Circuit Breaker (d) Bus Isolator (e) Line Isolator-1 (f) Line Isolator-2 (g) Earth Switch-1 (h) Earth Switch-2 (i) Interpanel Bus wiring etc.
5.8	Vertical clearance with gland plate	Minimum 250mm
5.9	Clearance between two rows of TBs	Minimum 150mm
5.10	Test Terminal Blocks	Screw driver operated stud type for metering circuits.
5.11	Arrangement	Arrangement of the terminal block assemblies and the wiring channel within the enclosure shall be such that a row of terminal block runs in parallel and close proximity to each side of the wiring duct. The side of the terminal block opposite the wiring duct shall be reserved for the external cable connection.

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5.12	Categorization	For ease of external connections, terminal blocks shall be categorized based on their usage i.e all terminals for wiring of particular equipment like circuit breaker should form one terminal block.

6.0 PAINT

6.1	Paint Type	Powder coated. Pure Polyester base grade-A, structure finish.
6.2	Paint Shade	RAL7032 'Siemens Grey'
6.3	Paint Thickness	Minimum 50 microns

7.0 MIMIC DIAGRAM

7.1	System Representation	Colored mimic diagram and symbols showing the exact representation of the system shall be provided in the front of control panels
7.2	Material	Mimic diagram shall be made preferably of painted aluminum or plastic (approved material), which shall be screwed on to the panel and can be easily cleaned. Painted overlaid mimic is also acceptable. The mimic bus shall be 2-3 mm thick. The width of the mimic bus shall be 12mm for bus bars and 10 mm for other connections.
7.3	Mimic Indications	LED indications are to be used for breaker and isolator position and semaphore indicators shall be used for earth switch position.

8.0 NAMEPLATES AND MARKINGS

8.1	Nameplates	To be provided as per the following description
8.1.1	Equipment Nameplates	a. All equipment mounted on front side as well as equipment mounted inside the panels shall be provided with individual name plates with equipment designation engraved. b. All front mounted equipment shall be also provided at the rear with individual name plates engraved with tag numbers corresponding to the one shown in the panel internal wiring to facilitate easy tracing of the wiring.
8.1.2	Feeder Nameplates	(a) Large and bold name plate carrying the feeder identification numbers shall be provided for circuit / feeder designation on the top of each panel on front as well as rear side. (b) Rear bottom of each panel shall have a nameplate

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		clearly indicating the following: (i) Customer Name (ii) BSES, PO No. & date (iii) Drawing Reference No (iv) Year of Manufacture (v) Control Voltage (vi) Customer care No
8.1.3	Material	Non-rusting metal or 3 ply lamicaid. Nameplates shall be black with white engraving lettering. Stickers are not allowed.
8.1.4	Fixing	All nameplates/rating plates shall be riveted to the panels at all four corners. Bolting/screwing is not acceptable.
8.2	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.

9.0 EARTHING

9.1	Panel Earthing	All panels shall be equipped with an earth bus securely fixed.
9.2	Location of earthing earthing bus	Earthing bus shall be at rear side of CRP(Door Side)
9.3	Material	The material and the sizes of the bus bar shall be 25 x 6 mm copper flat unless specified otherwise.
9.4	Earth Bus joints	All bolted joints in the bus should be effected by connection of two bolts.
9.5	Hinged Doors	Earthed through flexible copper braid.
9.6	Instrument and Relay Earthing	All metallic cases of relays, instruments and other panel mounted equipment including gland plate, shall be connected to the earth bus by copper wires of size not less than 2.5 mm ² . The color code of earthing wires shall be green.
9.7	CT and PT circuit earthing	PT and CT secondary neutral shall be earthed at one place only at the terminal blocks through links.

10.0 INSTRUMENTS

10.1	Mounting	Flush mounted

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10.2	Voltmeter	Digital type with programmable ratio
10.2.1	Size	96x96 mm
10.2.2	Panels where to be provided	Incomer and Buscoupler
10.2.3	Voltmeter selector switch	Required
10.2.4	Accuracy Class	1.0
10.2.5	Auxiliary Supply	48 – 240VDC and AC i.e universal type.
10.2.6	Make	To be Provided by Vendor
10.2.7	Type/Model	To be Provided by Vendor
10.2.8	VA Burden	To be Provided by Vendor
10.3	Multifunction Meter	Digital type with programmable ratio
10.3.1	Model	Rish Delta Energy,
10.3.2	Make	Rishabh
10.3.3	SCADA Interfacing	RS485 rear port suitable for integration on Modbus Protocol
10.3.4	Size	96x96 mm
10.3.5	Panels where to be provided	All panels
10.3.6	Accuracy Class	1.0
10.3.7	Auxiliary Supply	48 – 240VDC and AC i.e universal type.
10.4	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 shall be 350 mm (H)x200 mm (W)

11.0 RELAYS

11.1	General features of Protection Relays	
11.1.1	Technology and Functionality	Numerical, microprocessor based with provision for multifunction protection, control, metering and monitoring
11.1.2	Mounting	Flush Mounting, IP5X
11.1.3	Architecture	Hardware and software architecture shall be modular and dis-connectable to adapt the protection and control unit to the required level of complexity as per the application.
11.1.4	Programming and configuration	Relay shall utilize a user friendly setting and operating multi-lingual software in windows environment with menus and

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		icons for fast access to the data required. Programming software and communication cord for offered relays should be included in scope of supply.
11.1.5	SCADA Interface port	(a) RS485 for IEC 103 communication. (b) LC Type Dual fibre optic port for interfacing with SCADA on IEC 61850 with PRP compatibility. Through this port relays shall be connected to Ethernet switches.
11.1.6	Communication Protocol	IEC103(Data Type 9) and Dual fibre optic port for interfacing with SCADA on IEC 61850 with PRP compatibility. Through these ports relays shall be connected to switches. Communication protocol shall be selectable at site.
11.1.7	Processing Indications	SCADA functions in monitoring direction 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.
11.1.8	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.
11.1.9	PC Interface port	Front port (preferably serial) for configuration/data download using PC.
11.1.10	GOOSE messaging	Relays shall communicate all status signals, commands and events on GOOSE messaging. Interlocks if any shall also be on GOOSE Messaging and wiring for that shall be in vendor's scope.
11.1.11	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.
11.1.12	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 minimum of two setting groups.
11.1.13	Event and Fault records	(c) 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. (d) Relay shall store records for last 100 events (minimum) (e) Relay shall store records for last 10 faults (minimum). (f) It should be possible to download records locally to PC and to remote SCADA.
11.1.14	Measurement	Relays shall communicate all measured and monitored parameters like current, voltage, active power, reactive power, apparent power, power factor, phase angle, event

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		record, fault record, DIs , DOs etc to SCADA SCADA Integration Relays shall communicate all measured and monitored parameters like current, voltage, power, event record, fault record, DIs , DOs etc to SCADA
11.1.15	Self-diagnosis	Relay shall be able to detect internal failures and same shall be transmitted to SCADA as a soft signal. A watchdog relay with changeover contact shall provide information about the failure for annunciation.
11.1.16	Time synchronization	All relays shall be capable of being synchronized with the system clock through SCADA, PC and GPS.
11.1.17	Operation Indicators	(a) LEDs with push button for resetting. (b) Resetting of LEDs shall be possible from SCADA
11.1.18	Test Facility	Inbuilt
11.1.19	Coating	Conformal Type
11.2	Protection Relay Requirement for Line CRP (66kV/33kV)	
11.2.1	Relay 1	Combined Line differential (Dual channel, ST Port Compatible for Single Mode Fibre having wavelength 1310 nm) and distance protection
		Power Swing Blocking
		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.
11.2.2	Relay 2	Bay Control unit having MIMIC with 3-phase Directional Overcurrent and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
		Under and Over voltage
		Sync check function
		Trip Circuit Supervision- 1&2
		Reverse Blocking Function
		Under Frequency, Over Frequency and Rate of change of frequency
		PT supervision
11.2.3	User Configurable DIs and DOs	Circuit Breaker failure protection (CBFP)
		(a) Relay-1 should have DIs and DOs as per scheme requirement. Same shall be finalized during detailed engineering. 2 DIs and 2 DO shall be spare for future use. (b) Relay-2 should have minimum of 32 DIs and 16 DOs Exclusively for SCADA interfacing. DIs and DOs for tripping and interlocking shall be additional as per scheme

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		requirement. If DIs and DOs for tripping and interlocking are integrated with DIs and DOs meant for SCADA (may be done to optimize DI/DO configuration), atleast 4 DIs and 4 DOs should be available as spare in each panel for future use.
11.2.4	Note	Combining functions of Relay-1 and Relay-2 in single relay is not acceptable.
11.2.5	SLD	Refer annexure D1 and D5 for SLD of 66kV and 33kV line bays respectively
11.3	Protection Relay Requirement for Transformer CRP (66kV/33kV)	
11.3.1	Relay-1	Biased Differential Protection
		High Impedance REF protection
		Software based ratio and vector correction feature (without ICT)
		H2 and H5 harmonic restraint
11.3.2	Relay-2	Bay Control unit having MIMIC with 3-phase Directional Overcurrent and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
		Under and Over voltage
		Sync check function
		Trip Circuit Supervision- 1&2
		Reverse Blocking Function
		Under Frequency, Over Frequency and Rate of change of frequency
		PT supervision
11.3.3	User Configurable DIs and DOs	Circuit Breaker failure protection (CBFP)
		(a) Relay-1 should have DIs and DOs as per scheme requirement. Same shall be finalized during detailed engineering. 2 DIs and 2 DO shall be spare for future use. (b) Relay-2 should have minimum of 32 DIs and 16 DOs Exclusively for SCADA interfacing. DIs and DOs for tripping and interlocking shall be additional as per scheme requirement. If DIs and DOs for tripping and interlocking are integrated with DIs and DOs meant for SCADA (may be done to optimize DI/DO configuration), atleast 4 DIs and 4 DOs should be available as spare in each panel for future use.
11.3.4	Note	Combining the functions of Relay-1 and Relay-2 in a single relay is not acceptable.
11.3.5	SLD	Refer annexure D2 and D6 for SLD of 66kV and 33kV transformer bays respectively

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11.4	Protection Relay Requirement for Bus Coupler CRP (66kV/33kV)	
11.4.1	Relay-1	Bay Control unit having MIMIC with 3-phase Directional Overcurrent and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
		Under and Over voltage
		Sync check function
		Trip Circuit Supervision- 1&2
		Reverse Blocking Function
		Under Frequency, Over Frequency and Rate of change of frequency
		PT supervision for Bus PT-1 and Bus PT-2
		Circuit Breaker failure protection (CBFP)
11.4.2	Relay-2	PT supervision (fuse failure monitoring) for Bus PT-2 if not provided as part of relay-1
		Reverse Blocking Function
11.4.3	User Configurable DIs and DOs	(a) Relay-1 should have DIs and DOs as per scheme requirement. Same shall be finalized during detailed engineering. 2 DIs and 2 DO shall be spare for future use. (b) Relay-2 should have minimum of 32 DIs and 16 DOs Exclusively for SCADA interfacing. DIs and DOs for tripping and interlocking shall be additional as per scheme requirement. If DIs and DOs for tripping and interlocking are integrated with DIs and DOs meant for SCADA (may be done to optimize DI/DO configuration), atleast 4 DIs and 4 DOs should be available as spare in each panel for future use.
11.4.4	SLD	Refer annexure D3 and D7 for SLD of 66kV and 33kV bus coupler bays respectively
11.5	Protection Relay Requirement for Capacitor CRP (66kV/33kV)	
11.5.1	Relay-1	Neutral unbalance relay (current based)
		Timer for ON time delay (600 seconds minimum)
11.5.2	Relay-2	Bay Control unit having MIMIC with 3-phase Directional Overcurrent and Earth fault protection with IDMT, Definite time and instantaneous characteristics.
		Overvoltage and Under voltage protection
		Sync check function
		Trip Circuit Supervision- 1&2

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		Reverse Blocking Function
		Under Frequency, Over Frequency and Rate of change of frequency
		PT supervision
		Circuit Breaker failure protection (CBFP)
11.5.3	User Configurable DIs and DOs	(a) Relay-1 should have DIs and DOs as per scheme requirement. Same shall be finalized during detailed engineering. 2 DIs and 2 DO shall be spare for future use. (b) Relay-2 should have minimum of 32 DIs and 16 DOs Exclusively for SCADA interfacing. DIs and DOs for tripping and interlocking shall be additional as per scheme requirement. If DIs and DOs for tripping and interlocking are integrated with DIs and DOs meant for SCADA (may be done to optimize DI/DO configuration), atleast 4 DIs and 4 DOs should be available as spare in each panel for future use.
11.5.4	Note	Combining the functions of Relay-1 and Relay-2 in a single relay is not acceptable
11.5.5	SLD	Refer annexure D4 and D8 for SLD of 66kV and 33kV capacitor bays respectively
11.6	SCADA Interfacing of Protection Relays	
11.6.1	Configuration and wiring of DIs of protection relays for routing status signals to SCADA	DI-1 – CB Open DI-2 – CB Close DI-3 – Earth switch 1 close DI-4 – Earth switch 2 close DI-5 – Line Isolator Open (For Bus Coupler Panel - Earth switch 3 close) DI-6 – Line Isolator Close (For Bus coupler panel - Earth switch 4 close) DI-7 – Bus 1 Isolator Open DI-8 – Bus 1 Isolator Close DI-9 – Bus 2 Isolator Open DI-10 – Bus 2 Isolator Close DI-11 – TC Healthy DI-12 – CB Spring Charged DI-13 – SF6 Low/ SF6 Lockout DI-14 – Local/Remote switch in Remote DI-15 – CB Autotrip DI-16 – Protection/Trip relay faulty DI-17 – DC fail/DC MCB trip from adjacent panel (DC -1/2 fail for bus coupler panel) DI-18 – PT MCB trip (wherever relevant) Sequence of DIs should be strictly as mentioned above. Change in sequence of DIs will not be acceptable.
11.6.2	Configuration and	DO-1 – CB Open

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	wiring of DOs of protection relays for executing SCADA commands through SCADA interface port (refer clause 12.1.5).	DO-2 – CB Close DO-3 – Line Isolator Open DO-4 – Line Isolator Close DO-5 – Bus 1 Isolator Open DO-6 – Bus 1 Isolator Close DO-7 – Bus 2 Isolator Open DO-8 – Bus 2 Isolator Close Sequence of DOs should be strictly as mentioned above. Change in sequence of DOs will not be acceptable.
11.6.3	Looping	All relays should be looped to form a common bus for interfacing with SCADA.
11.7	Transformer Monitoring Cum AVR Relay	
11.7.1	Functions	As per annexure –A
11.7.2	Requirement	To be provided in Transformer CRP (Take off price to be mentioned in price bid)
11.8	General Features of Auxiliary Relays	
11.8.1	Type	Static or electromechanical.
11.8.2	Reset Characteristic	Self reset contacts except for lockout relays.
11.8.3	Operation Indicators	(a) Hand reset operation indicators or LEDs with pushbutton for resetting. (b) Resetting of LEDs shall be possible from SCADA
11.8.4	Lockout relay	Manual and Electrical reset type
11.8.5	Operational Data	Bidder shall provide the reference list of the type of relays offered
11.8.6	Spare Contacts	Minimum 1NO and 1NC. To be wired upto the terminal block.
11.9	Auxiliary relays – Panel wise requirement	
11.9.1	Lockout relay	To be provided in all panels
11.9.2	DC fail relay	
11.9.3	AC fail relay	
11.9.4	Trip circuit supervision relay	To be provided in all panels for supervision of two trip coils.
11.9.5	Bistable Relays	To be provided in all panels for multiplication of auxiliary contact of breakers, isolators and earth switches. Multiplied contacts to be used for interlocks, indications and numerical relay input. 2NO + 2NC contacts shall be spare after multiplication in each case.
11.9.6	PT selection relays	To be provided in all panels as per scheme requirement.
11.9.7	Contact Multiplication relay	a. To be provided in all panels b. SCADA Close and Open Command shall be wired

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		up through CMR to Closing and Tripping circuit
11.9.8	Transformer Trouble Relays	Auxiliary relays with indicating flags (contactors will not be accepted) should be provided in transformer panel for the following trip and alarm commands – (a) Buchholz trip (b) OSR trip (c) PRV trip (d) SPR trip (e) WTI Trip (f) OTI Trip (g) OLTC PRV Trip (h) Buchholz Alarm (i) Low oil level alarm (j) OTI Alarm (k) WTI Alarm.
11.9.9	Transformer Trouble Relay Contact Multiplication	(a) Contact multiplication of Transformer trouble relays shall be provided with 2 NO and 2 NC contact as spare. (b) 1 NO contact of Buchholz, Differential, OSR, PRV, SPR, REF contact multiplication relay for NIFPS (Nitrogen Injection fire protection system) shall be provided.
11.9.10	SF6 low and SF6 lockout relay	To be provided in all 66kV control and relay panels
11.9.11	DC selection scheme	Fed by two DC incoming sources in Bus coupler panel with auto changeover facility
11.10	General Requirements for all relays/contactors	
11.10.1	Auxiliary supply	(a) 48-250 VDC. All relays/contactors shall be suitable for continuous operation at 15% overvoltage and 15% under voltage. (b) No external resistor shall be provided in relays /contactor to achieve desired voltage.
11.10.2	Spare contacts	Shall be wired upto the terminal block
11.10.3	Signal Integration	All signal integration shall only be through NO Contact

12.0 SYNCH CHECK PHILOSPHY

12.1	Dead Bus – Live Line	(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.
12.2	Dead Line – Live Bus	(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 charged from bus. Hence Sync check relay will allow the line breaker to close in this condition.
12.3	Live Bus – Live Line	(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.
12.4	Live Bus – Dead Bus	(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.
12.5	Live Bus – Live Bus	(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.

13.0 MANAGED ETHERNET SWITCH

13.1	Ethernet Switch	
13.1.1	Numbers	Two at each site
13.1.2	FO Port	Minimum 16 Nos
13.1.3	RJ 45 Port	4 Nos
13.1.4	Communication Protocol	IEC 61850
13.1.5	Network Protocol	PRP
13.1.6	Downlink Rate	100 MBPS

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13.1.7	Uplink Rate	1 GBPS
13.1.8	Coating	Conformal
13.1.9	Power Supply Voltage	220 / 50 VDC as per site condition
13.1.10	Grade	Industrial
13.1.11	Certification required	KEMA,CE & FCC for IEC 61850 compliance
13.1.12	Operating Temperature	
13.1.13	Mounting	In Switchgear Panel
13.1.14	Blinking LED Indicators	On each RJ45 ports
13.1.15	Separate Maintenance/console Part	Required
13.1.16	Latency	Less than or equal to 10 ms
13.1.17	Fibre Optic Compatibility	Multimode, 1310 nm
13.1.18	Placement	Din Rail Arrangement Inside Switchgear
13.2	Fibre Optics (Patch Cord) and Ethernet cable	
13.2.1	Connection	From Relays, Meters to Ethernet Switch
13.2.2	Mode of Fibre Optics	Multimode
13.2.3	Wavelength	1310 nm
13.2.4	Ethernet Cable Type	CAT VI
13.2.5	Associated Connectors and Accessories	Required

14.0 ANNUNCIATION

14.1	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.
14.2	Mounting	Flush mounted
14.3	Fascia	16 window
14.4	Signals to provided on Fascia	Window 1 – Main Protection Operated (Distance /Differential) Window 2 – Backup O/C & E/F Protection Operated Window 3 – CBFP operated Window 4 – CB Autotrip Window 5 – SF6 Low/SF6 Lockout (For 66kV CRP only) Window 6 – Trip Circuit Unhealthy Window 7 – DC Fail Window 8 – AC Fail Window 9 – VT Fuse Fail Window 10 – Protection Relay/Trip relay Faulty Window 11 – Tarfo Trouble trip (For trafo panel only)

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		Window 12 – Trafo Trouble alarm (For trafo panel only)
14.5	Push Buttons	For test, accept and reset
14.6	Potential Free Contacts	To be provided for event logger
14.7	Alarm	For all signals wired to the annunciator
14.8	Overall Dimension of Group	To be Provided by Vendor

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

15.0 INDICATIONS

15.1	Indicating Lamps	Flush mounted Clustered LED type with rear terminal connections. Lamp Cover to be screwed type and moulded from heat resistant material
15.1.1	Breaker On	Red
15.1.2	Breaker Off	Green
15.1.3	Isolator Close	Red
15.1.4	Isolator Open	Green
15.1.5	Spring Charged	Blue
15.1.6	DC control supply healthy	Amber
15.1.7	Heater circuit healthy	Yellow
15.1.8	Trip circuit healthy	White
15.1.9	PT supply	R, Y, B
15.1.10	Voltage	220VDC/50 VDC
15.1.11	Rating	To be Provided by Vendor
15.1.12	Wattage	To be Provided by Vendor

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15.1.13	Series Resistance	To be Provided by Vendor
15.1.14	10% extra Lamp Furnished?	To be Provided by Vendor
15.1.15	Size of lens	To be Provided by Vendor
15.1.16	Make	To be Provided by Vendor
15.1.17	Type	To be Provided by Vendor
15.2	Semaphores	To be provided for all earth switches.
15.2.1	Make	To be Provided by Vendor
15.2.2	Type	To be Provided by Vendor
15.2.3	Diameter of the Disc	To be Provided by Vendor
15.2.4	Operating voltage	220VDC/50 VDC
15.2.5	Burden (Watt DC)	To be Provided by Vendor
15.2.6	Whether latch in type or supply Failure type	To be Provided by Vendor

16.0 SELECTOR SWITCHES AND PUSH BUTTONS

16.1	Switches	Flush Mounted with shrouded terminals
16.1.1	TNC Switch	Lockable Pistol Grip type with spring return to normal position
16.1.2	Local/SCADA selector switch	2 pole
16.1.3	Rotary On/Off Switches	For heater/illumination circuit
16.1.4	Rating of switches	16 A
16.2	Push buttons	Flush Mounted with shrouded terminals
16.2.1	Accept Push Button	Black Color- Trip alarm/DC fail alarm
16.2.2	Reset Push Button	Yellow Color- Trip alarm/DC fail alarm
16.2.3	Test Push Button	Blue Color
16.2.4	Rating	10A

17.0 ACCESSORIES

17.1	Space heaters	Thermostat controlled with switch for isolation
17.1.1	Voltage	240 V AC

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17.1.2	Wattage	To be provided by Vendor
17.1.3	Thermostat Range	To be provided by Vendor
17.1.4	Provided with Individual fuse unit	To be provided by Vendor
17.2	Socket and switch	240V, 5/15A universal type socket to be provided in each panel with on-off switch
17.3	MCBs and Fuses	Provision for receiving, distribution, isolation and fusing of DC and AC supplies to various control circuits should be made using MCBs and Fuses of appropriate ratings
17.4	Panel illumination	240V AC illumination lamp controlled by panel door switch to be provided in each panel

18.0 APPROVED MAKES OF COMPONENTS

18.1	Numerical Relays	(a) R Series of ABB (b) Siprotec series of Siemens (c) Micom series(PX40) of Schneider (d) Micom Series of GE (e) All numerical relays in a panel should be of same make. Use of two different makes of relays in a panel is not acceptable.
18.2	Trafo Monitoring Cum AVR relay	A-Eberle/Easun MR
18.3	Auxiliary Relays & Contact Multiplication Relays	Alstom/Schneider/ABB/Siemens/ER
18.4	Miniature Relays	ABB/ OMRAN
18.5	Contactors	ABB/Siemens/Schneider
18.6	MCBs	Siemens/Schneider/Legrand/ABB
18.7	Control switches	Switron/Kaycee
18.8	Annunciator	Minilec/Alan
18.9	Test terminal block	IMP/DAV
18.10	Terminal blocks	Elmex/Connectwell
18.11	Indicating lamps	Siemens/ Teknic/ Binay
18.12	Meters	Rishabh/Conzerv
18.13	Multi Function Meter	Rishabh (Rish Delta Energy)
18.14	Managed Ethernet Switch	Ruggedcom/ Hirschman/ GarrettCom

19.0 QUALITY ASSURANCE, INSPECTION & TESTING

19.1	Vendor quality plan	To be submitted for purchaser approval
19.2	Type tests	Product must be type tested as per Indian Standards or IEC
19.3	Type test report validity	Last five years from the date of bid submission
19.4	Acceptance and Routine tests	As per specifications and relevant standards. Charges of these tests shall be deemed to be included in the equipment price. Purchaser reserves the right to witness all the tests.
19.5	Notice to Purchaser for conducting tests	Atleast three weeks in advance
19.6	Test reports of acceptance and routine test before dispatch	Six copies to be submitted.

20.0 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.

21.0 DRAWINGS AND DATA SUBMISSION MATRIX

- Document checklist for each stage is given in table below. (Refer equipment specification for details)
- Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch, Pre closure.
- No submission is acceptable without check list compliance.
- Deficient/ improper document/ drawing submission shall be liable for rejection.
- Order of documents shall be strictly as per the check list with in Soft copy with separate folder in proper nomenclature.
- Any drawing not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope.

TECHNICAL SPECIFICATION FOR 66/33KV CONTROL AND RELAY PANEL

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
21.1	Contact Person Name, Email ID and Mobile Number	Required			
21.2	Consolidated Deviation Sheet	Required	Required		
21.3	GTP	Required	Required		
21.4	Relevant Type Test as per IS/IEC	Required			
21.5	Manufacturer's quality assurance plan and certification for quality standards		Required		
21.6	Sizing Calculation of Associated Equipment		Required		
21.7	Recommended Spares Apart from spares stated in Spec(for five years of operation)		Required		
21.8	Schematic		Required		
21.9	CRP				
21.9.1	General Arrangement	Required	Required		
21.9.2	Sectional Layout		Required		
21.9.3	Door Layout		Required		
21.9.4	Panel wise BOQ		Required		
21.9.5	Index Sheet		Required		
21.9.6	Symbols		Required		
21.9.7	SLD	Required	Required		
21.9.8	Trip Logic		Required		
21.9.9	AC Distribution Circuit		Required		
21.9.10	DC Distribution Circuit		Required		
21.9.11	CT Distribution Circuit		Required		
21.9.12	VT Distribution Circuit		Required		
21.9.13	Voltage Selection Circuit		Required		
21.9.14	Metering Circuit		Required		
21.9.15	Indication Circuit		Required		

TECHNICAL SPECIFICATION FOR 66/33KV CONTROL AND RELAY PANEL

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
21.9.16	Isolator Control Circuit		Required		
21.9.17	Protection Circuit		Required		
21.9.18	Relay Circuit with DI and DOs		Required		
21.9.19	DI and DO Sheet of each relay		Required		
21.9.20	Schematic Circuit diagram and Scheme of Each type of Panel		Required		
21.9.21	Logic Operation Diagram		Required		
21.9.22	Communication Architecture		Required		
21.9.23	Trafo Monitoring Relay Circuit in case of Transformer Panel		Required		
21.9.24	CB Closing interlock circuit		Required		
21.9.25	Tripping Circuit		Required		
21.9.26	CB status & CB trouble cont. mult. circuit		Required		
21.9.27	Isolator , E/S and trafo trouble contact multiplication circuit		Required		
21.9.28	Annunciation circuit		Required		
21.9.29	TB Reference page		Required		
21.9.30	Synch Logic Diagram		Required		
21.9.31	QAP		Required		
21.10	Inspection Reports			Required	
21.11	As manufacturing Drawings			Required	
21.12	Operation and Maintenance Manual			Required	Required
21.13	Trouble shooting manual			Required	Required
21.14	As built Drawings				Required
21.15	Test Report				Required
21.16	Soft Copy				
21.16.1	In Pen drive	Required			

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
21.16.2	Through Mail		Required	Required	Required

22.0 PACKING

22.1	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.
22.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label
22.3	Packing Identification Label to be provided on each packing case with the following details	
22.3.1	Individual serial number	
22.3.2	Purchaser's name	
22.3.3	PO number (along with SAP item code, if any) & date	
22.3.4	Equipment Tag no. (if any)	
22.3.5	Destination	
22.3.6	Project Details	
22.3.7	Manufacturer / Supplier's name	
22.3.8	Address of Manufacturer / Supplier / it's agent	
22.3.9	Description and Quantity	
22.3.10	Country of origin	
22.3.11	Month & year of Manufacturing	
22.3.12	Case measurements	
22.3.13	Gross and net weights in kilograms	
22.3.14	All necessary slinging and stacking instructions	

23.0 SHIPPING

23.1	Shipping	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.
		The seller shall be responsible for all transit damage due to improper packing.

24.0 HANDLING AND STORAGE

24.1	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet / manual needs to be furnished before commencement of supply.

25.0 ANNEXURE – A – TRANSFORMER MONITORING CUM AVR RELAY

25.1	General features	
25.1.1	Technology and Functionality	Microprocessor based with provision for multifunction control and monitoring.
25.1.2	Mounting	Rack Mounting

TECHNICAL SPECIFICATION FOR 66/33KV CONTROL AND RELAY PANEL

25.1.3	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.
25.1.4	Programming and configuration	AVR 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.
25.1.5	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.
25.1.6	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.
25.1.7	SCADA Interface port	LC Type Dual fibre optic port for interfacing with SCADA on PRP protocol. Through this port relays shall be connected to Ethernet switches.
25.1.8	Communication protocol	Relays shall be compatible for interfacing with SCADA on both IEC61850 and IEC103 (Data Type-9) protocol. Communication protocol shall be selectable at site. Relay shall be capable of transmitting all parameters including measured values, DI, DO, AI, Events and fault records to SCADA.
25.1.9	Self diagnosis	Relay shall be able to detect internal failures and same shall be transmitted to SCADA as a soft signal. A watchdog relay with changeover contact shall provide information about the failure.
25.1.10	Cable Termination	Termination of cable shall be at rear side.
25.1.11	Time Synchronization	Relay shall be capable of being synchronized with the system clock through SCADA , PC and GPS.
25.1.12	Auxiliary supply	220VDC or 48VDC
25.2	Inputs and Outputs	
25.2.1	CT Input	1/5A selectable through programming
25.2.2	PT Input	110VAC
25.2.3	Binary Inputs	Sixteen programmable binary inputs should be provided
25.2.4	Analog Inputs (4-20mA)	One input to be provided
25.2.5	PT-100 direct input	One input to be provided
25.2.6	Direct Resistance Input	For tap position indication (18 steps)

TECHNICAL SPECIFICATION FOR 66/33KV CONTROL AND RELAY PANEL

25.2.7	Binary Outputs	Ten programmable binary outputs should be provided
25.3	Control	
25.3.1	Control Tasks	Ability to implement control functions through programmable logics
25.3.2	Voltage setting	Programmable Voltage set point
25.3.3	Voltage Regulation	Raise/Lower tap position to maintain the preset value of voltage.
25.3.4	Voltage Regulation modes	Automatic and Manual
25.3.5	Operation Modes	Local and Remote
25.3.6	Fan and Pump control	To be provided
25.3.7	Transformer Paralleling	Capability to parallel transformers whose AVR's are interconnected via a communication network.
25.4	SCADA Interfacing	
25.4.1	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.
25.4.2	Configuration of DOs for executing commands from SCADA through interface port/CRP	DO-1 – Tap raise DO-2 – Tap lower DO-3 – Fan group 1 control DO-4 – Fan group 2 control
25.4.3	Analog Inputs	All analog inputs shall be SCADA Compatible
25.5	Measurement, Event Recording and Monitoring	
25.5.1	Measured Quantities (optional)	Voltage, Current, Active Power, Reactive Power, Apparent Power, Power factor, frequency
25.5.2	Event Recording	Facility for recording parameters during various events such as tap change, change in binary input status etc.

TECHNICAL SPECIFICATION FOR 66/33KV CONTROL AND RELAY PANEL

25.5.3	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.

26.0 ANNEXURE- B – GUARANTEED TECHNICAL PARTICULARS

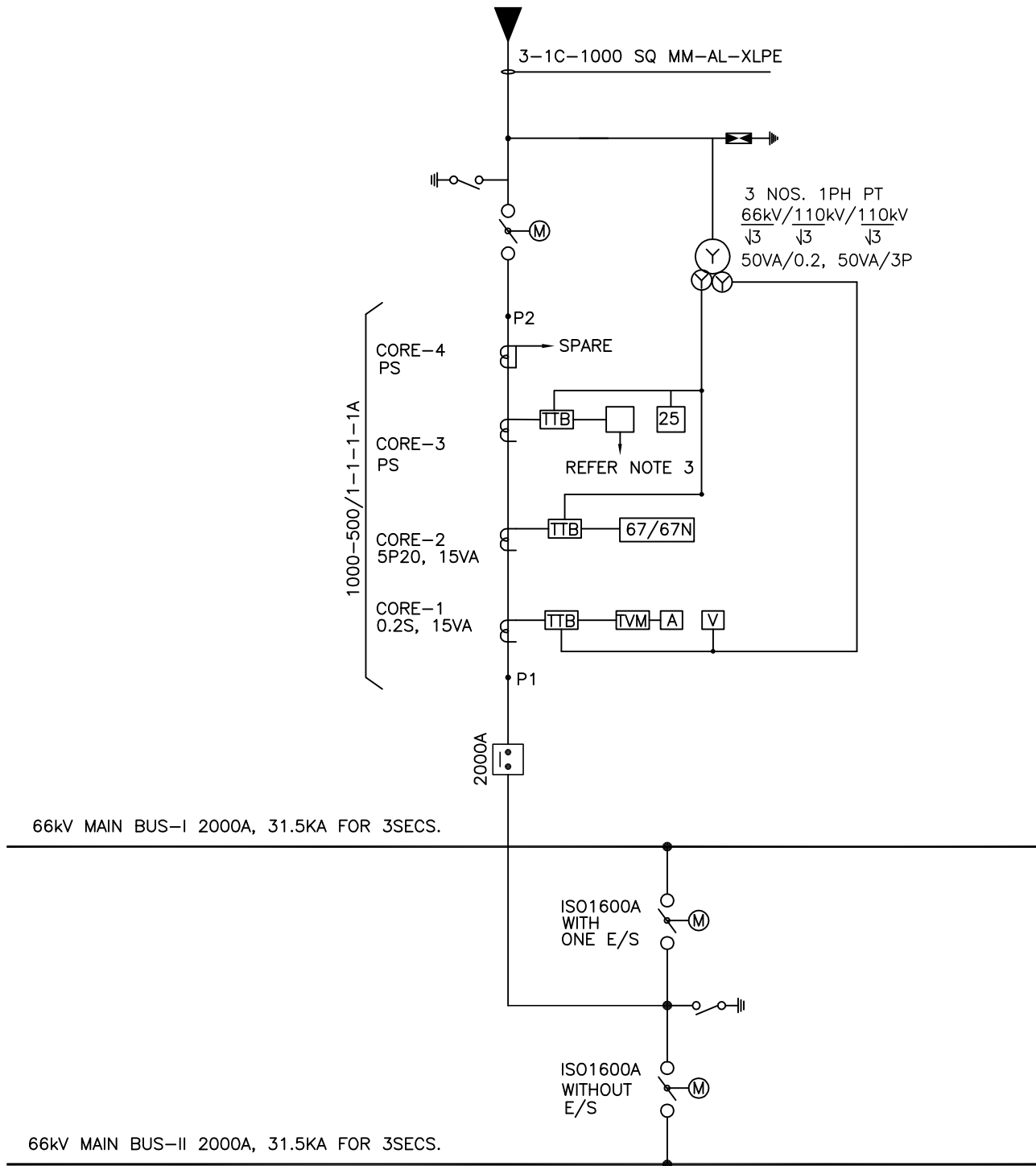
Vendor must submit clause wise compliance against specification at the time of drawing approval clearly highlighting the deviations from specification against each clause.

27.0 ANNEXURE- C – SPARES REQUIREMENT

S No.	Description	Unit Rate
27.1	Numerical relay of each type	1 nos.
27.2	Auxiliary relay of each type	1 nos.
27.3	Contact multiplication relays (Bistable type for CB, isolator and earth switch auxiliary contact multiplication)	6 nos.
27.4	Contactor of each rating	2 nos.
27.5	Voltmeter	1 nos.
27.6	Local/Remote Selector switch	1 nos.
27.7	TNC switch for CB	2 nos.
27.8	TNC switch for Isolators	3 nos.
27.9	Semaphore indicators	4 nos.
27.10	MCB of each rating	1 nos.

28.0 ANNEXURE-D-SLDs

ANNEXURE – D1



LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

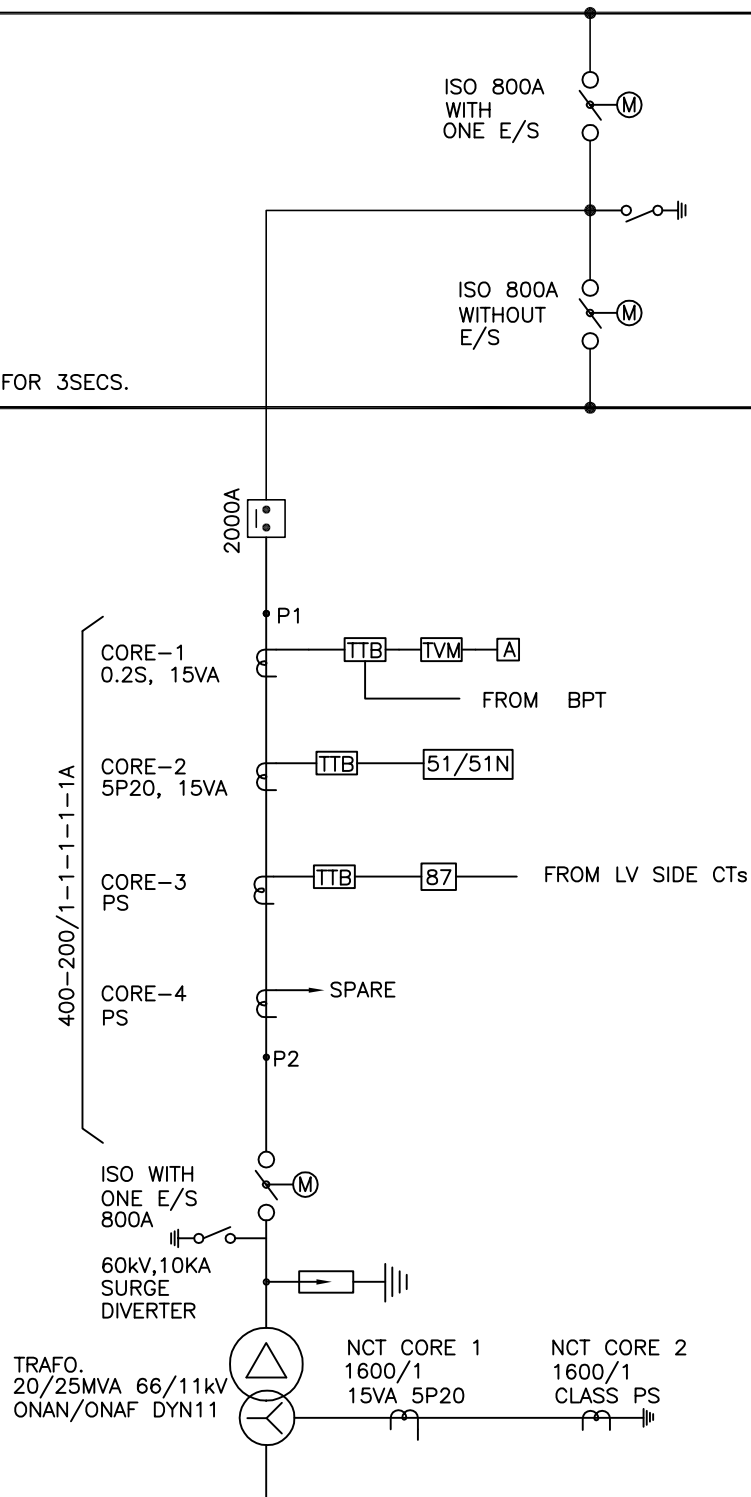
NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.
3. LINE DIFFERENTIAL OR DISTANCE RELAY AS PER CLAUSE 11.2.1 OF SPECIFICATION

DRAWN	AH/AM	TITLE:-- TYPICAL 66KV LINE SLD	
CHECKED	SG/AS		
APPD.	GS/GN		SPEC No - BSES-TS-86-CRP-R0
DATE	03.06.22		DWG No.:- SLD-CRP-66KV-01
SCALE	NTS		

ANNEXURE-D2

66kV MAIN BUS-I 2000A, 31.5KA FOR 3SECS.

66kV MAIN BUS-II 2000A, 31.5KA FOR 3SECS.



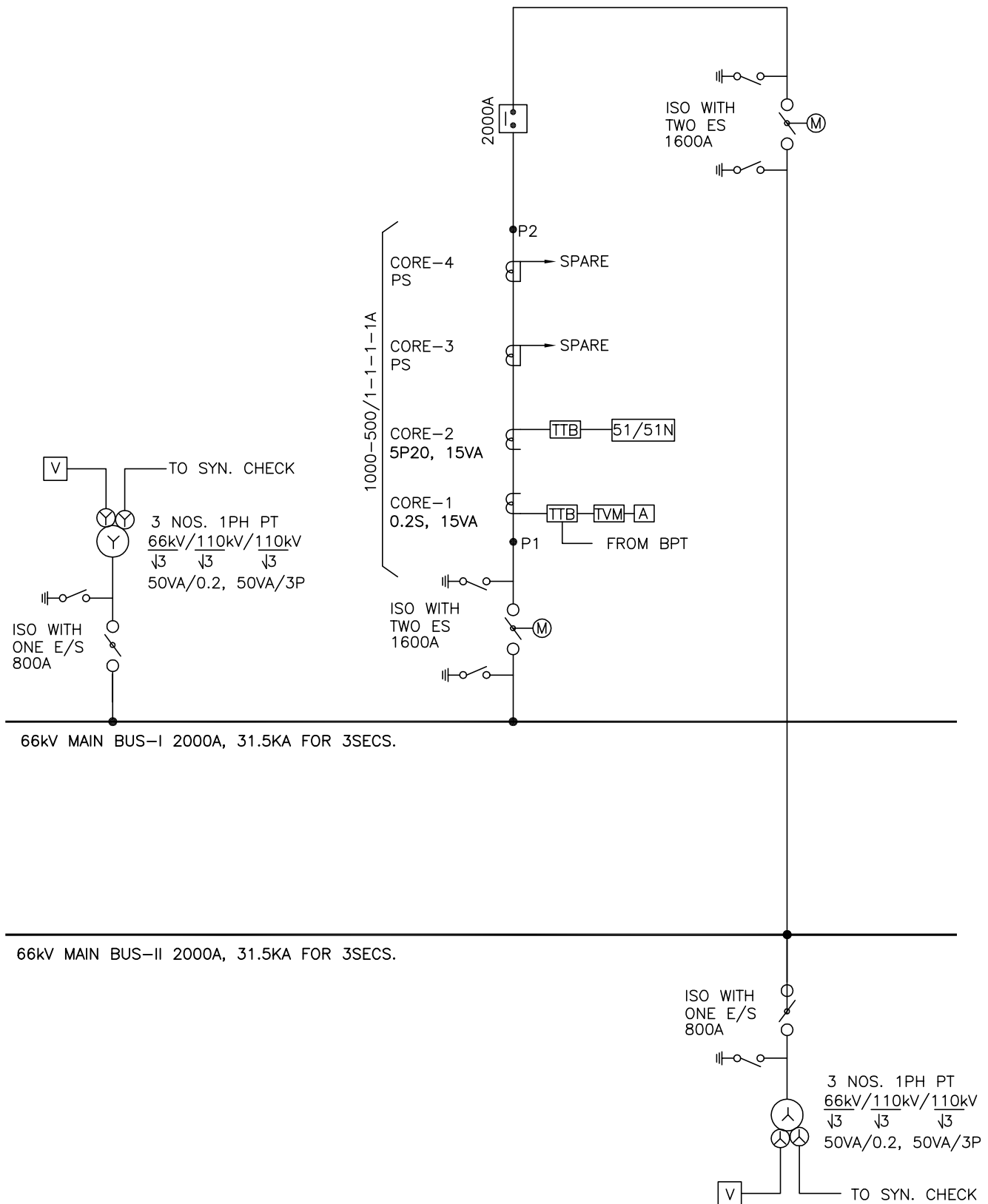
LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.

DRAWN	AH/AM	TITLE:- TYPICAL 66/11KV TRANSFORMER FEEDER SLD	
CHECKED	SG/AS		
APPD.	GS/GN		
DATE	03.06.22		
SCALE	NTS		
			SPEC No - BSES-TS-86-CRP-RO
			DWG No.:- SLD-CRP-66KV-02

ANNEXURE-D3



LEGEND

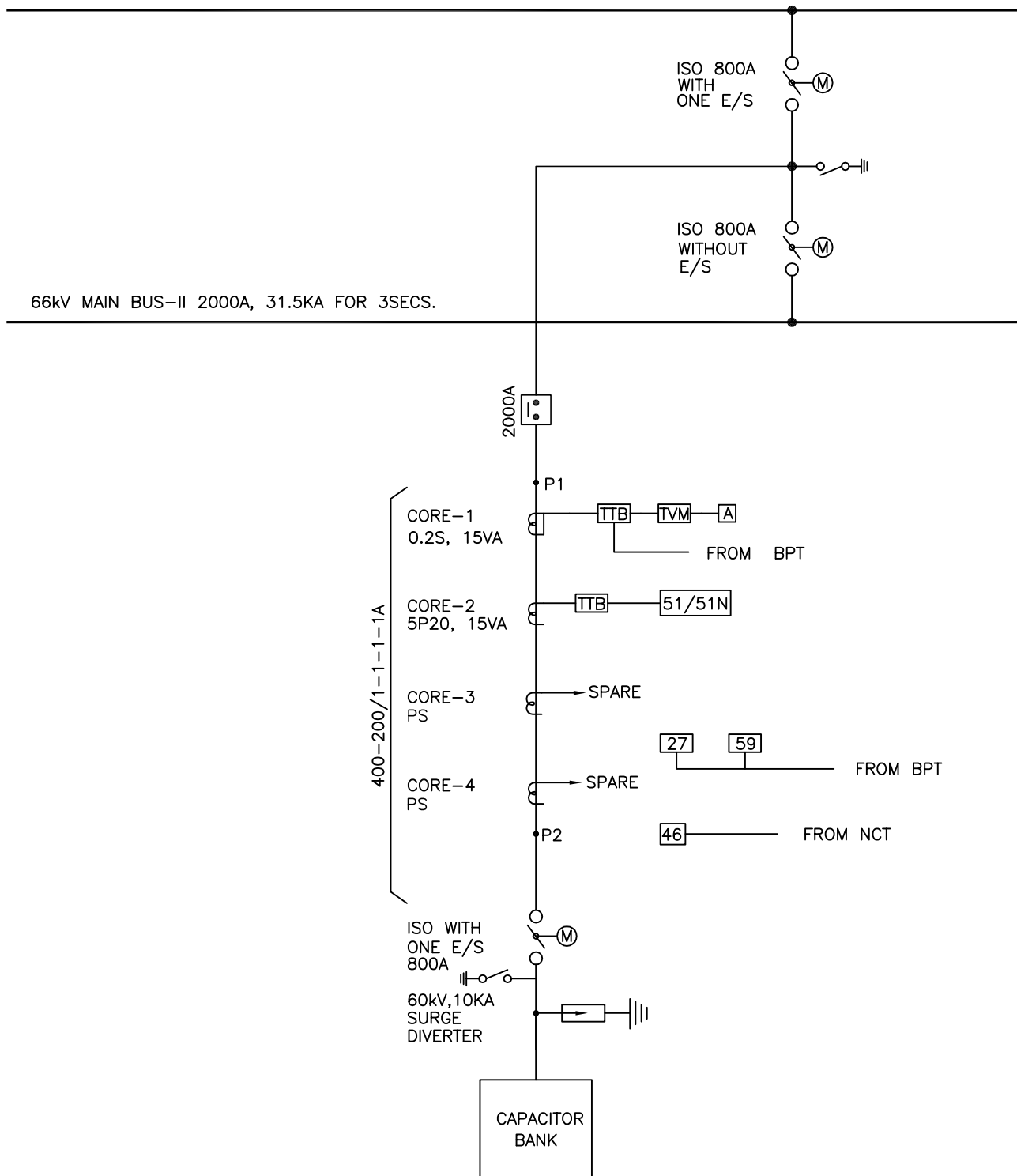
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.

DRAWN	AH/AM	TITLE:-- TYPICAL 66KV BUSCOUPLER SLD	
CHECKED	SG/AS		
APPD.	GS/GN		SPEC No - BSES-TS-86-CRP-RO
DATE	03.06.22		DWG No.:-- SLD-CRP-66KV-03
SCALE	NTS		

ANNEXURE-D4

66kV MAIN BUS-I 2000A, 31.5KA FOR 3SECS.



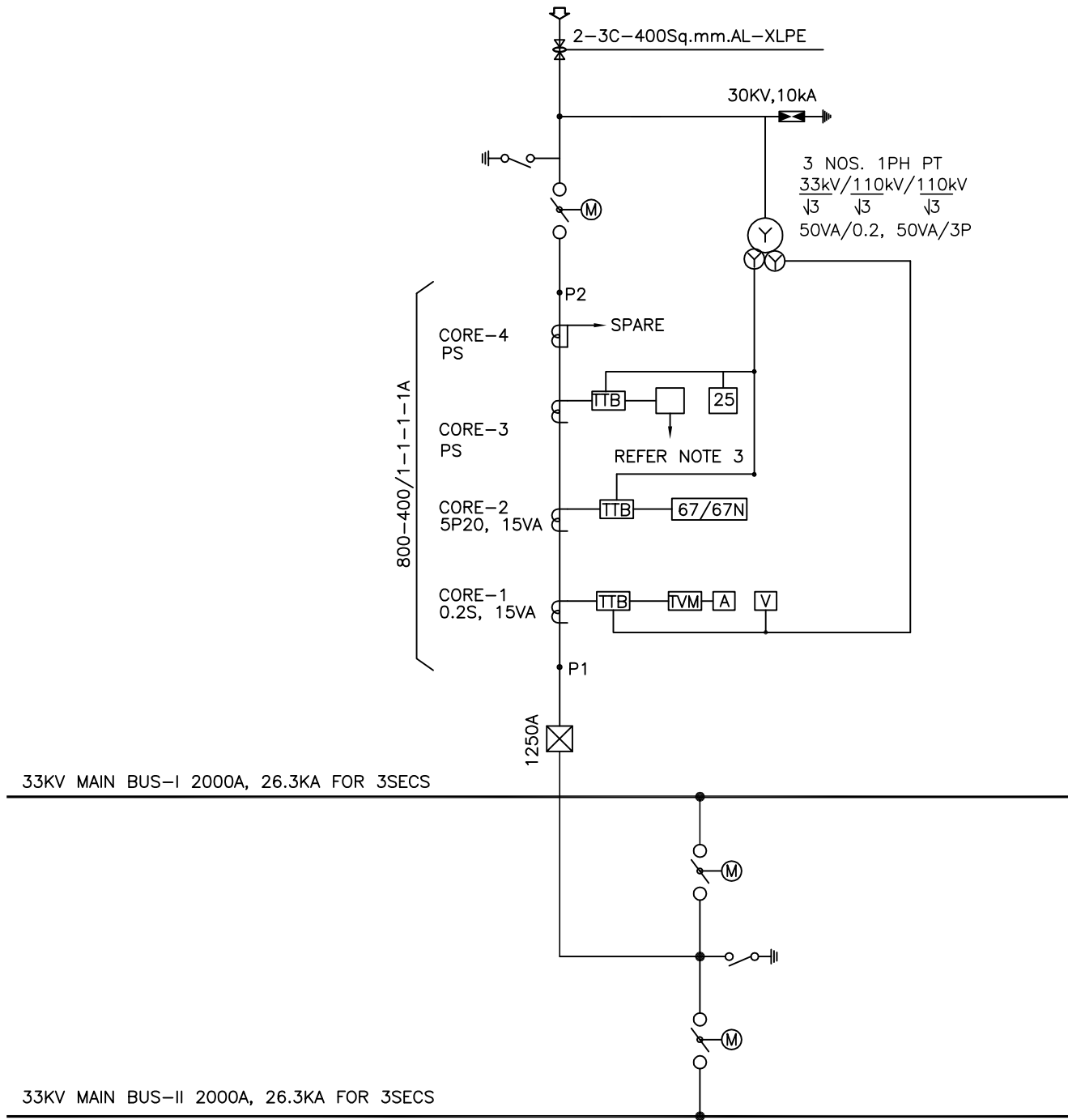
LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR
FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.

DRAWN	AH/AM	TITLE:-- TYPICAL 66KV CAPACITOR BANK FEEDER SLD	
CHECKED	SG/AS		
APPD.	GS/GN		
DATE	03.06.22		
SCALE	NTS		
			SPEC No - BSES-TS-86-CRP-RO
			DWG No.: -SLD-CRP-66KV-04

ANNEXURE-D5



LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

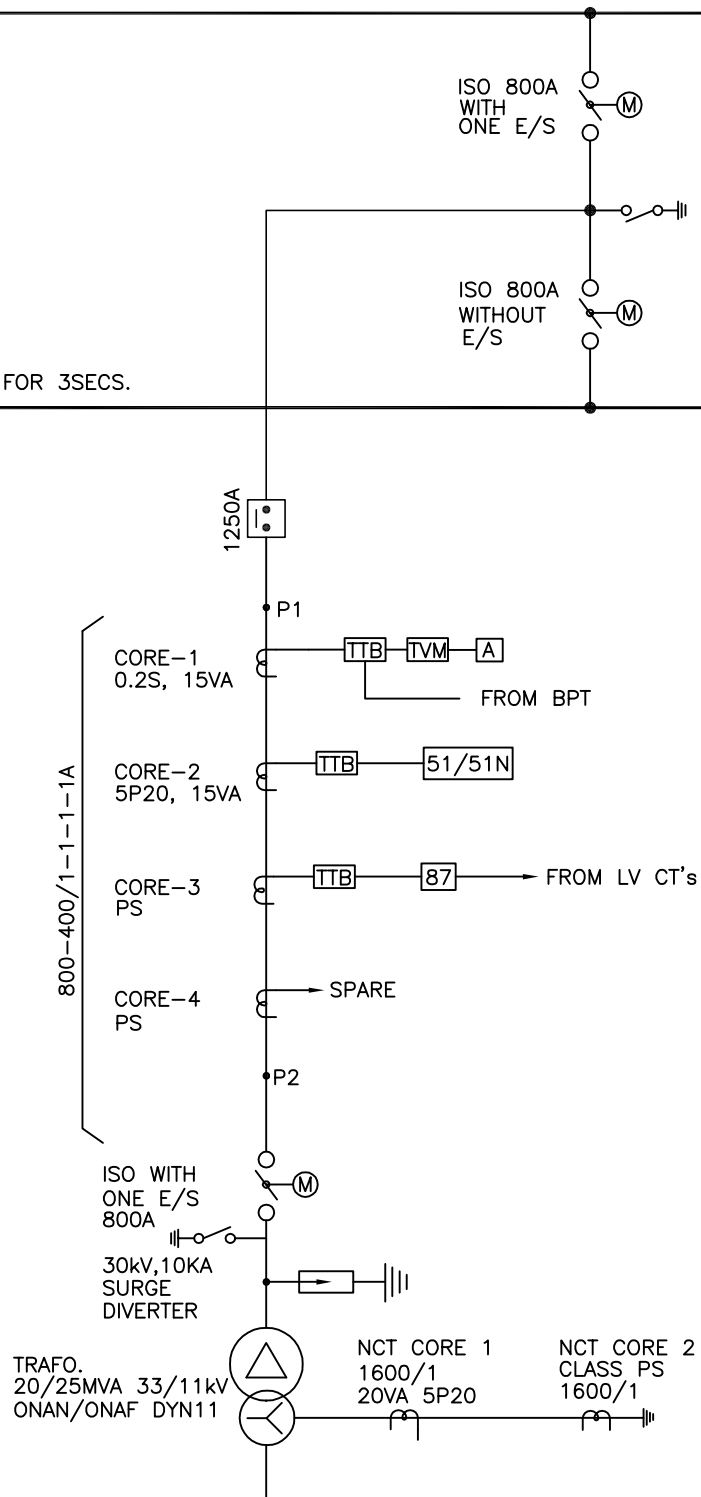
NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.
3. LINE DIFFERENTIAL OR DISTANCE RELAY AS PER CLAUSE 11.2.1 OF SPECIFICATION.

DRAWN	AH/AM	TITLE:- TYPICAL SLD FOR 33KV INCOMER/OUTGOING	
CHECKED	SG/AS		
APPD.	GS/GN		
DATE	03.06.22		
SCALE	NTS		
			SPEC No - BSES-TS-86-CRP-RO
			DWG No.:-SLD-CRP-33KV-01

ANNEXURE-D6

33kV MAIN BUS-I 2000A, 26.3KA FOR 3SECS.

33kV MAIN BUS-II 2000A, 26.3KA FOR 3SECS.



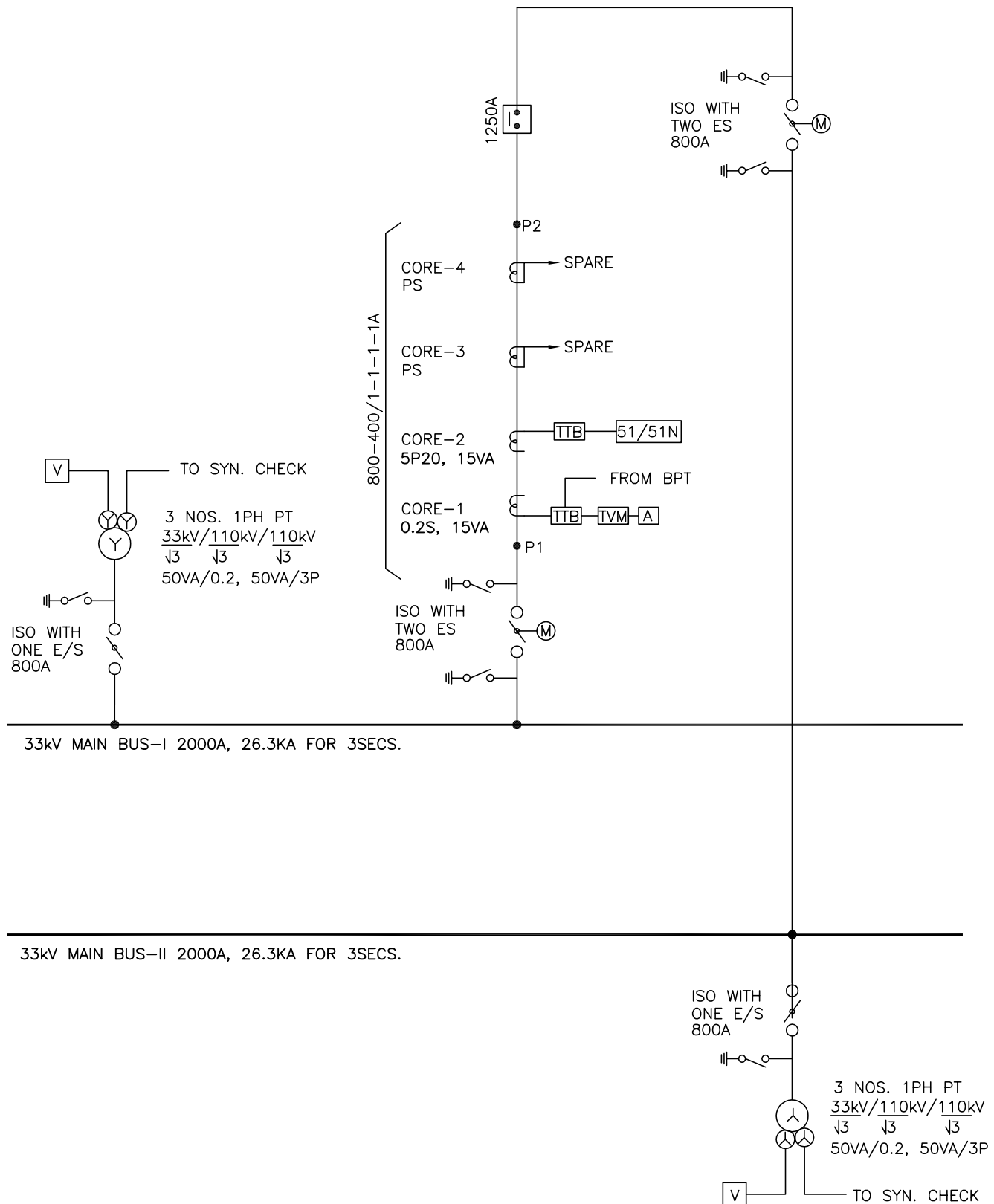
LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.

DRAWN	AH/AM	TITLE:-- TYPICAL 33/11KV TRANSFORMER FEEDER SLD	
CHECKED	SG/AS		
APPD.	GS/GN		
DATE	03.06.22		
SCALE	NTS		
			SPEC No - BSES-TS-86-CRP-RO
			DWG No.:--SLD-CRP-33KV-02

ANNEXURE-D7



LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

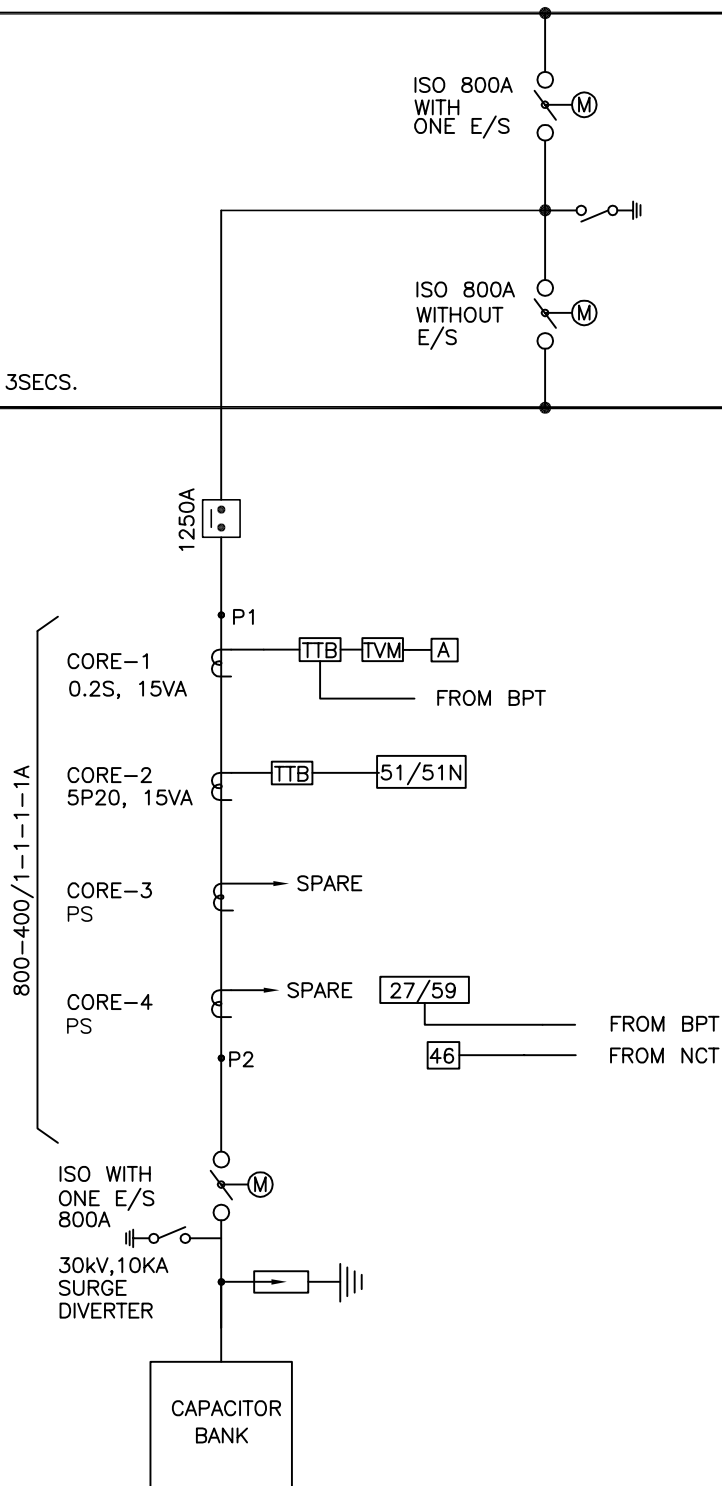
NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.

DRAWN	AH/AM	TITLE:- TYPICAL 33KV BUSCOUPLER SLD	
CHECKED	SG/AS		
APPD.	GS/GN		SPEC No - BSES-TS-86-CRP-RO
DATE	03.06.22		DWG No.:- SLD-CRP-33KV-03
SCALE	NTS		

ANNEXURE – D8

33kV MAIN BUS-I 2000A, 26.3KA FOR 3SECS.

33kV MAIN BUS-II 2000A, 26.3KA FOR 3SECS.



LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOTORISED ISOLATOR WITH ONE E/S		TEST TERMINAL BLOCK
	MOTORISED ISOLATOR WITH DOUBLE E/S		O/C & E/F RELAY
	SURGE DIVERTER		DISTANCE RELAY
	CURRENT TRANSFORMER		U/V & O/V RELAY
	POTENTIAL TRANSFORMER		DIRECTIONAL O/C & E/F RELAY
	CIRCUIT BREAKER		DIFFERENTIAL RELAY
	VOLTMETER		NEUTRAL UNBALANCE RELAY
	AMMETER		SYNC CHECK
	TRIVECTOR METER		

NOTE; 1. REFER SPECIFICATION CLAUSE 11.0 FOR FUNCTIONAL DETAILS OF PROTECTION RELAYS.
2. TVM IS NOT IN SUPPLIER'S SCOPE.

DRAWN	AH/AM	TITLE:-	
CHECKED	SG/AS	TYPICAL 33/11KV	
APPD.	GS/GN	CAPACITOR BANK FEEDER	
DATE	03.06.22	SLD	
SCALE	NTS		
SPEC No - BSES-TS-86-CRP-RO			DWG No.:- SLD-CRP-33KV-04

**Technical Specification
of
Threaded Steel Fasteners of size M8 to M16
With Spring & Plain Washers
Specification No. – SP-TSF-206-R1**

Rev:		1
Date:		08 Mar 2022
Prepared by	Abhishek Vashistha	<i>Abhishek Vashistha</i> 7a74fd4f-a398-49df-bd05-e398d5a949f0
Reviewed by	Puneet Duggal	<i>Puneet Duggal</i> 404db803-a91f-4234-85f0-0b2b5098ec32
Approved by	Gaurav Sharma	<i>Gaurav Sharma</i> 23dc2de2-95de-4472-99a7-dea873f472b6

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

INDEX

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3.0	SERVICE CONDITIONS	3
4.0	GENERAL TECHNICAL PARTICULARS	4
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7.0	DOCUMENT SUBMISSION	7

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

1.0. SCOPE

This specification covers the design, engineering, manufacturing, testing, packing and supply of Threaded steel fasteners with spring and Plain washers.

2.0. STANDARDS & CODES

Materials, equipment and method used in the manufacturing and testing of threaded steel fasteners shall conform to the latest edition of following standards-

S No.	STANDARD	TITLE OF THE STANDARD
2.1	IS 1363 (Part 1)	Hexagon Head Bolts, Screws and Nuts of Product Grade 'C' Part 1 Hexagon Head Bolts (Size Range M 5 to M 64)
2.2	IS 1363 (Part 2)	Hexagon Head Bolts, Screws and Nuts of Product Grade 'C' Part 2 Hexagon Head Screws (Size Range M 5 to M 64)
2.3	IS 1363 (Part 3)	Hexagon Head Bolts, Screws and Nuts of Product Grade 'C' Part 3 (Style 1) Hexagon Nuts (Size Range M 5 to M 64)
2.4	IS 1367 (Part 2)	Technical supply conditions for threaded steel fasteners Part 2 tolerances for fasteners — bolts, screws, studs and nuts — product Grades A, B and c
2.5	IS 1367 (Part 3)	Technical Supply Conditions for Threaded Steel Fasteners Part 3 Mechanical Properties of Fasteners Made of Carbon Steel and Bolts, Screws and Studs
2.6	IS 1367 (Part 6)	Technical Supply Conditions for Threaded Steel Fasteners Part 6 Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel — Nuts with Specified Property Classes — Coarse Thread and Fine Pitch Thread
2.7	IS 4172	General purpose Bolts and Screws - Metric series Radii under the head
2.8	IS 2016	Specification of Plain Washers
2.9	IS 3063	Fasteners - single coil rectangular section Spring Lock Washers – Specification
2.10	IS 1367 (Part13)	Technical Supply Conditions for Threaded Steel Fasteners Part 13 Hot Dip Galvanized Coatings on Threaded Fasteners

3.0. SERVICE CONDITIONS

Fasteners 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%

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

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. GENERAL TECHNICAL PARTICULARS

S No.	Parameters	Technical Requirements	Offered by Vendor
4.1	Fastener Configuration	Each nut-bolt fastener shall be supplied with two no's flat washers and one no's spring washer	
4.2	Hexagonal Bolt (reference standard IS 1363 Part 2)		
4.2.1	Material	Carbon Steel as per IS 1367 Part 3	
4.2.2	Product Grade	Grade C as per IS 1363 Part 2	
4.2.3	Property class	5.6 as per IS 1367 Part 3	
4.2.4	Dimension - Tread Diameter	M8, M10, M12, M16	
4.2.5	Dimension – Length	As per requirement	
4.2.6	Overall dimensions	As per IS 1363 Part 2	
4.2.7	Chemical composition (% max)	Carbon – 0.13 to 0.55 Phosphorous – 0.05 Sulphur – 0.06	
4.2.8	Tensile strength	N/mm sq. 400 (min)	
4.2.9	Stress under proof load	N/mm sq. 225 (nom.)	
4.2.10	Brinell Hardness	HB 114(min) to 238 max.	
4.2.11	Rockwell hardness	HRB-Max. 67(min.) to 99.5 max.	
4.2.12	Vickers harness	HV 120 (min) to 250 max.	
4.2.13	Elongation after fracture	Min 22%	
4.2.14	Head Soundness	No Fracture	
4.2.15	Galvanization	As per IS 1367 Part 13	
4.2.16	Minimum zinc coating thickness	50 micron	
4.3	Hexagonal Nut (reference standard IS 1363 Part 3)		
4.3.1	Material	Carbon Steel as per IS 1367 Part 6	
4.3.2	Grade	Grade C as per IS 1363 Part 3	
4.3.3	Property class	5 as per IS 1367 Part 6	
4.3.4	Dimension - Tread Diameter	M8, M10, M12, M16	

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

4.3.5	Overall Dimension	As per IS 1363 Part 3	
4.3.6	Chemical composition (% max)	Carbon – 0.58 Phosphorous – 0.06 Sulphur – 0.15	
4.3.7	Proof Load	As per Table 4 of IS 1367 Part 6	
4.3.8	Vicker Hardness	HV-Min. 130 HV-Max. 302	
4.3.9	Galvanization	As per IS 1367 Part 13	
4.3.10	Minimum zinc coating thickness	50 micron	
4.4	Plain Washer (reference standard IS 2016)		
4.4.1	Material	Galvanized Steel	
4.4.2	Type	Punched, Type A	
4.4.3	Dimensions	As per table 2 of IS 2016: 1967	
4.5	Spring Washer (reference standard IS 3063)		
4.5.1	Material	Electro Galvanized steel	
4.5.2	Type	Type B - Spring lock washers with flat (square) ends.	
4.5.3	Heat Treatment of Spring washers	Spring washers after coiling shall be suitably heat treated to a hardness of HV 430 to 530	
4.5.4	Dimensions	As per table 1A of IS 3063: 1994	

5.0. QUALITY ASSURANCE PLAN, INSPECTION AND TESTING

S No.	Particular	Requirements	Offered by Vendor
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	BIS Certification	i. The supplier must hold valid BIS license for manufacturing of offered sizes fasteners as per relevant Indian standards at the time of submission of bid. ii. Offers from the bidders not having valid BIS certificate shall not be accepted.	

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

S No.	Particular	Requirements	Offered by Vendor
5.3	Type test	i. The bidder must possess valid type test certificates from a NABL Accredited third party laboratory or equivalent International accredited laboratory for offered size hardware fittings. ii. Submitted Type test report; conducted as per IS:1367 Part-III for Bolts and IS:1367 Part-VI for Nuts must include following tests: A. Mechanical test for Hexagonal Bolts: a. Tensile strength b. Yield stress c. Stress under proof load d. Brinell Hardness e. Rockwell Hardness f. Vickers Hardness g. Elongation after Fracture h. Strength under wedge loading i. Head soundness B. Mechanical Tests for Hexagonal Nuts: a. Vickers Hardness b. Proof stress	
5.4	Routine test	Visual examination	
5.5	Acceptance Tests	i. Following acceptance tests shall be conducted in vendor's in-house testing laboratory, on sample randomly selected from lot offered to BYPL before dispatch. Testing shall be conducted as per IS:1367 Part-III for Bolts and IS:1367 Part-VI for Nuts A. Mechanical test for Hexagonal Bolts: a. Tensile strength b. Yield stress c. Stress under proof load d. Brinell Hardness e. Rockwell Hardness f. Vickers Hardness g. Elongation after Fracture h. Strength under wedge loading i. Head soundness B. Mechanical test for Hexagonal Nuts: a. Vickers Hardness b. Proof stress ii. One sample of each size of fasteners shall be randomly sealed and sealed	

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

S No.	Particular	Requirements	Offered by Vendor
		per purchase order to conduct all acceptance tests mentioned above at NABL accredited third party laboratory without price implication to BYPL. iii. Galvanization test as per IS 1367 Part 13 shall be conducted on one sample of each size of offered nut and bolt per purchase order; test to be conducted at NABL accredited third party laboratory without price implication to BYPL a. Zinc coating Thickness b. Adhesion of Zinc coating iv. Chemical Composition test shall be conducted on one sample of each size of offered nut and bolt per purchase order; test to be conducted at NABL accredited third party laboratory without price implication to BYPL.	

6.0. DEVIATIONS

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

7.0. DOCUMENT SUBMISSION MATRIX

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

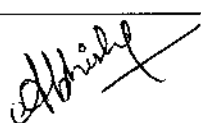
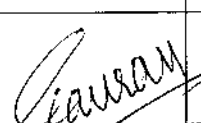
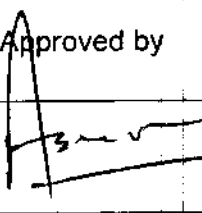
- All documents/drawings shall be provided in soft copy only in returnable Pen drives
- Language of the documents shall be English only.
- Incomplete submission shall be liable for rejection.
- Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing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

TECHNICAL SPECIFICATION OF THREADED STEEL FASTENERS WITH SPRING & PLAIN WASHERS

S. No	Head	Bid	Drawing Approval	Pre Dispatch	Pre Closure
7.1	Contact Person Name, Email ID and Mobile Number	Required			
7.2	Consolidated Deviation Sheet with reference to the Specification clause.	Required	Required		
7.3	Completely filled GTP as per clause 4.0 of this specification (separate sheet for each size and type of fastener)	Required	Required		
7.4	Complete filled acceptance to the QAP, Inspection and testing requirements as per clause 5.0 of this specification (separate sheet for each size and type of fastener)	Required	Required		
7.5	Vendor's BIS Certificate	Required			
7.6	Relevant Type Test as per IS/IEC	Required			
7.7	Detailed reference list of customers using the offered product during the last 3 years	Required			
7.8	Manufacturer's quality assurance plan and certification for quality standards	Required	Required		
7.9	General Arrangement Drawing	Required	Required		
7.10	Inspection Reports			Required	
7.11	Test Report				Required

TECHNICAL SPECIFICATION FOR CABLE LAYING

**TECHNICAL SPECIFICATION
FOR
LAYING OF
11 KV, 33KV AND 66 KV CABLE**

Prepared by	Reviewed by	Approved by	Rev	02
			Date	18 th March 2019
AV	GS	AA	Page	1 of 42

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TECHNICAL SPECIFICATION FOR CABLE LAYING

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1. REFERENCE STANDARDS

- i) IS 1255: Code of practice for installation and maintenance of power cable up to and including 33kV rating.
- ii) IS 1554: PVC Insulated Electrical Cables upto 11KV
- iii) IS 2274: Code of Practice for electrical wiring installation – system voltage exceeding 650V
- iv) IS 7098 Part II: Cross linked Polyethylene Insulated PVC sheathed cables for working voltages from 3.3KV up to and including 33KV
- v) IS 7098 Part III: Cross linked Polyethylene Insulated PVC sheathed cables for working voltages from 66KV up to and including 220KV
- vi) IS 5820: Specification of precast concrete Cable cover.
- vii) Indian Electricity Rules 1956.

TECHNICAL SPECIFICATION FOR CABLE LAYING**2. CABLE LAYING****2.1. SELECTION OF THE ROUTE**

The cable route selection shall be done by the concerned supervising engineer by first conducting route survey and selecting a route along with contractor keeping followings in mind-

- i) The side of road, which presents the least obstacles and the fewest roadways crossings.
- ii) The future consumers and existing cables in the route may influence the cable route.
- iii) Railway, road crossings, MCD and other government agencies may also influence in selection of cable route.
- iv) Plans for future building projects should be considered.

The route shall be as far as possible away from parallel running gas, water pipes and telephone/telecommunication cables.

2.2. CLEARANCES

The desired minimum clearances are as follows –

- i) Power cable to power cable – A minimum clearance equal to diameter shall be maintained. Trench drawings shall be referred for guidance.
- ii) Power Cable to control cables – 0.2 M
- iii) Power cable to communication cable – 0.3M

TECHNICAL SPECIFICATION FOR CABLE LAYING

- iv) Power cable to gas/water main – 0.3 M

2.3. DEPTH OF CABLE LAYING

The desired minimum depth of laying from ground surface to the top of cable shall be

i)	650 / 1100V grade XLPE Cable	-	75 cm
ii)	Low voltage and Control Cable	-	75 cm
iii)	6.35 / 11KV grade XLPE Cable	-	90 cm
iv)	19 / 33KV grade XLPE Cable	-	1.05 M
v)	38 / 66KV grade XLPE Cable	-	1.20 M
vi)	Cables at Road crossing	-	1.0 M (min)
vii)	Cables at railways level crossings (measured from bottom of sleepers to the top of Pipe)	-	1.0 M (min)

Whenever there is any obstacle at the laying depth, the cable should be lowered/ raised to cross the obstacle. However variation in the depth is to be approved by BSES. The Contractor shall provide the same in deviation report.

2.4. WIDTH OF CABLE TRENCHES

The width and depth of Cable Trenches shall depend upon number of circuits and Voltage Grade. Drawings of this specification are shown in the document itself.

2.5. BENDING RADIUS OF CABLES

TECHNICAL SPECIFICATION FOR CABLE LAYING

While pulling of the Cable from the drum or during laying following minimum bending radius shall be maintained so that the cable, in particular the insulation does not get damaged.

i) Single Core Cables (PVC & XLPE)

- a) Up to 11KV grade – 15 X D
- b) Above 11KV grade - 20 X D

ii) Multi Core Cables (PVC & XLPE)

- a) Up to 1.1KV grade - 12 X D
- b) Above 1.1KV grade – 15 X D

Where 'D' is overall diameter of the cable

2.6. MAXIMUM PERMISSIBLE TENSILE STRENGTH FOR CABLES**i) For cables pulled with Stocking**

- a) PVC and XLPE SWA Armoured cables $P = 30 \times D$
- b) PVC and XLPE AWA Armoured cables $P = 20 \times D$

Where P= pulling force in Kgm, D= Diameter of Cable in mm

ii) For Cables pulled by Cable eyes

- a) Aluminium conductor – $30 \text{ N/mm}^2 = 3 \text{ Kg/sq. mm}$

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b) Copper conductors - $50\text{N/mm}^2 = 5\text{ Kg/sq. mm}$

Permissible force is calculated by multiplying the above values by cross sectional area (CSA) of conductor of each core and then number of cores.

2.7. METHODS OF LAYING

- i) Cables shall be laid in direct in ground, in trenches excavated therein and shall be protected with covers as given in the drawing. Cables shall also be drawn into pipes of ducts or laid in the formed trenches or troughs or on racks or supported in trays or cleats as required by the site exigencies. Where the cables are laid in the formed trenches, the installation shall include removal and replacement of the trench covers and the provision of temporary protective covers on the trenches where they cross the access ways.
- ii) HDPE (200 mm) pipes shall be used where cable cross roads and railways tracks. Spare ducts for future extensions should be provided. Spare duct should be sealed off. Buried ducts or ducting blocks shall project into footpath or up to the edge of road, where there is no footpath, to permit smooth entry of cable without un-due bending. The diameter of the cable conduit or pipe or duct should be at least 1.5 times the outer diameter of the cable. Angular alignment of the duct across road crossings shall be predetermined to maintain safe bending radius when direction of cable trench changes before or after the road.
- iii) The contractor shall lay cable by horizontal direct drilling (HDD) in main roads and highway with heavy traffic, passage to public

TECHNICAL SPECIFICATION FOR CABLE LAYING

property where excavation is not possible. Contractor shall take approval for laying of cable by means of HDD wherever required from the supervising engineer. The cable laid by HDD shall be minimized so that it doesn't exceed by 12% of total route length. This is to avoid De-rating of Cables.

- iv) Unless approved by BSES, the contractor shall lay the cables, direct in ground, in single layer. The cables shall be laid with the pre-determined and approved cable route.
- v) Spacing shall be maintained uniformly between the cables all along the length including the bends, as approved by BSES. To maintain the spacing, suitable non-metallic formers shall be placed uniformly with spacing not exceeding 5 meters. Every bend shall have at least one spacer.
- vi) 75 mm of the sand bed shall be placed at the bottom of cable trench.
- vii) After the cables have been laid the trench shall be filled with the sand and shall be well rammed to a level not less than 75 mm above the top of the cables all throughout the route.
- viii) To protect the cables against external mechanical damage, which may be caused by other agencies, the cable shall be protected by suitable cover.(for dimensions of RCC cable cover refer cable laying drawing)

The type of the covers shall be as under

TECHNICAL SPECIFICATION FOR CABLE LAYING

- a) 1.1KV Cables – Single layer of brick thickness not less than 75 mm (3 inch)
- b) 11KV Cables – sand stone of thickness not less than 75mm (3 inch).
- c) 33KV Cables shall be protected by reinforced concrete cover of width 300 mm as per attached drawing with thickness not less than 50mm.
- d) 66KV Cables shall be protected by reinforced concrete cover as per attached drawing with thickness not less than 50mm.

The RCC cable cover shall be embossed as “BYPL 66/33/11 KV CABLE” whichever is applicable.

- ix) Back fill to be filled up to 75mm and the warning tape shall be installed continuously. The tape shall be yellow in colour with Black / Red lettering of minimum 20mm height. The approved warning message shall be written in English and Hindi/ local language. The minimum thickness and width of the tape should be 300 microns and 150 mm respectively.
- x) The trench shall be filled-up by soft soil (300mm) and Excavated soil as indicated in drawings.

TECHNICAL SPECIFICATION FOR CABLE LAYING

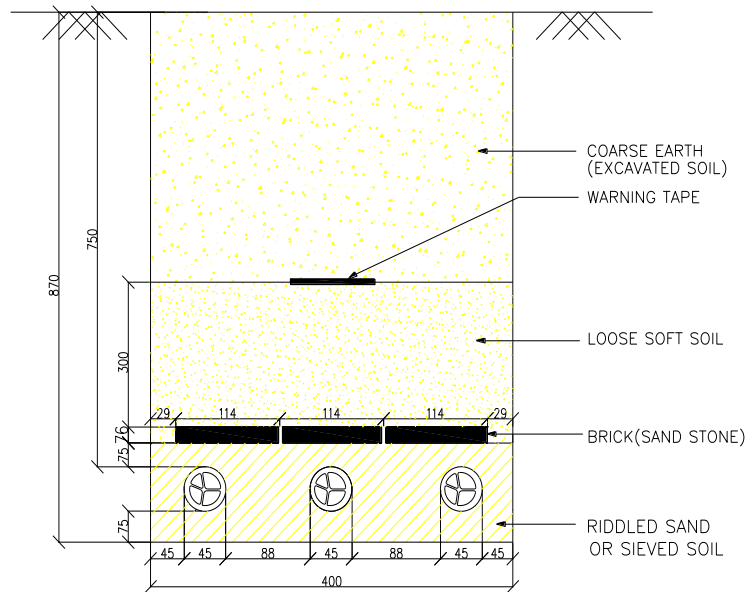


Figure 1.1 – 1.1kV, 150sqmm Buried Cable

TECHNICAL SPECIFICATION FOR CABLE LAYING

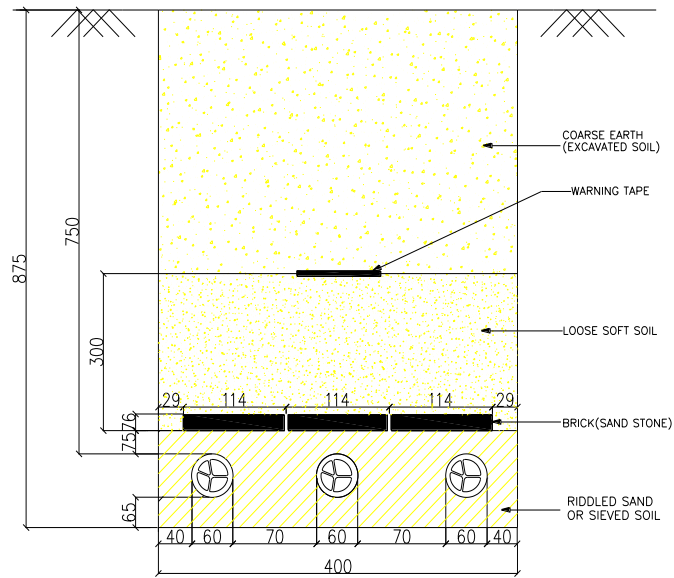


Figure 1.2 – 1.1kV, 300sqmm Buried Cable

TECHNICAL SPECIFICATION FOR CABLE LAYING

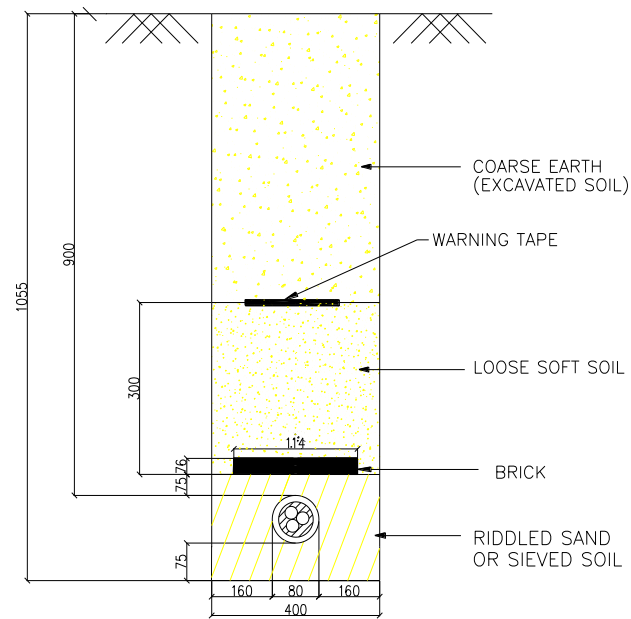


Figure 1.3 – 11kV Buried Cable for Single Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

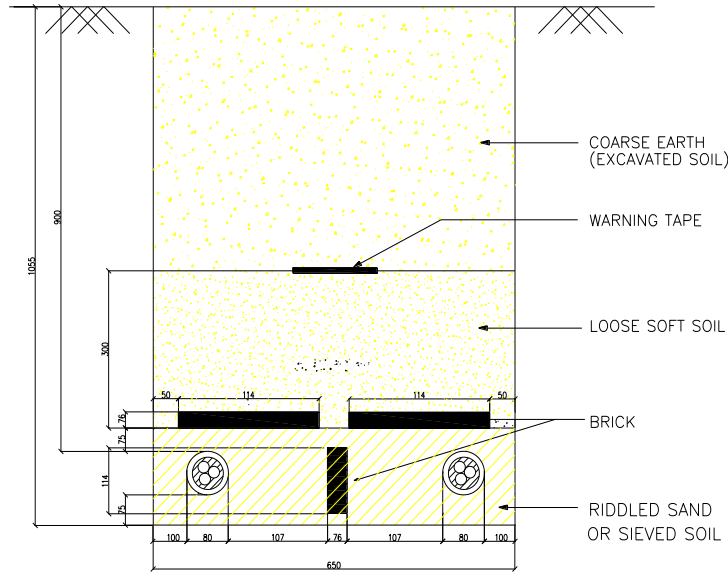


Figure 1.4 – 11kV Buried Cable for Double Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

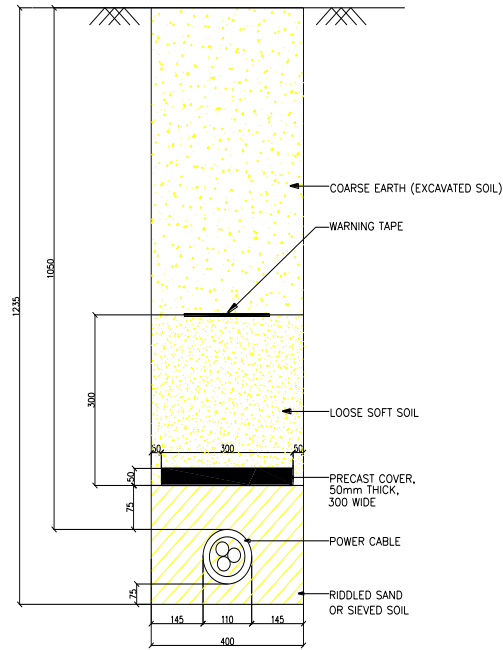


Figure 1.5 – 33kV Buried Cable for Single Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

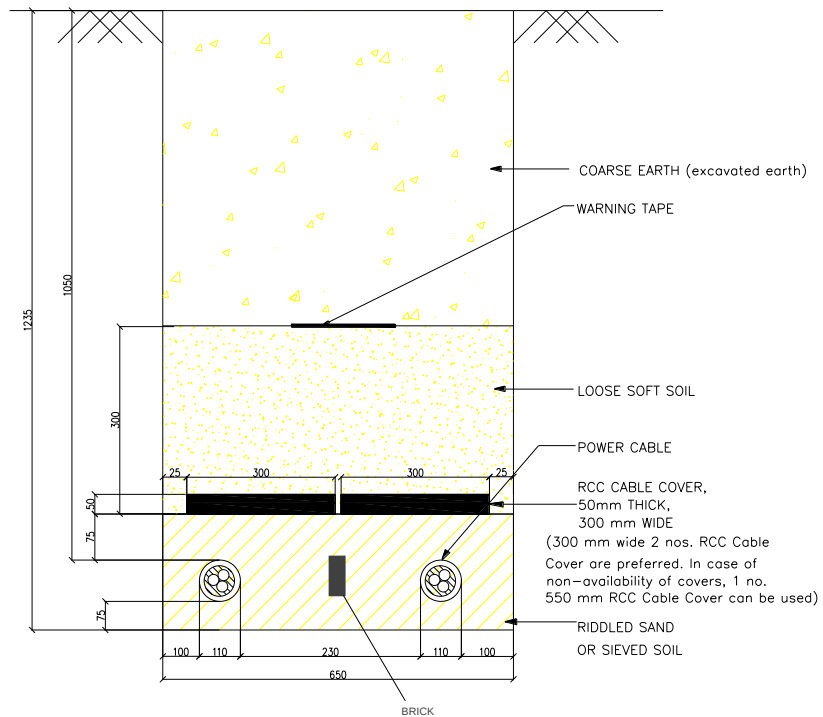


Figure 1.6 – 33kV Buried Cable for Double Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

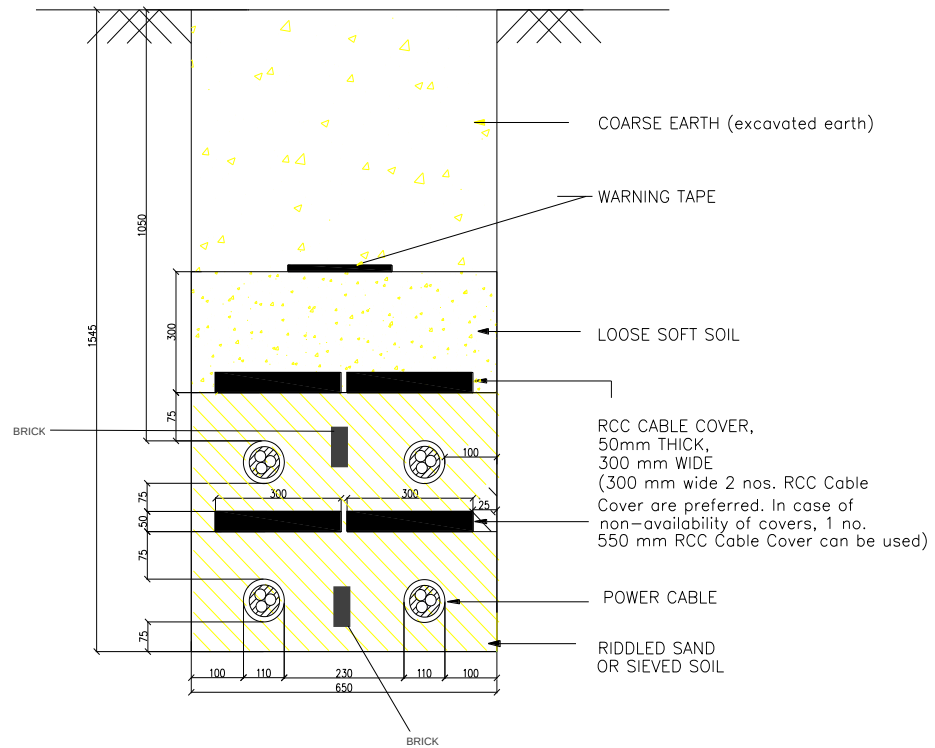


Figure 1.7 – 33kV Buried Cable Option-1 for Four Circuits

TECHNICAL SPECIFICATION FOR CABLE LAYING

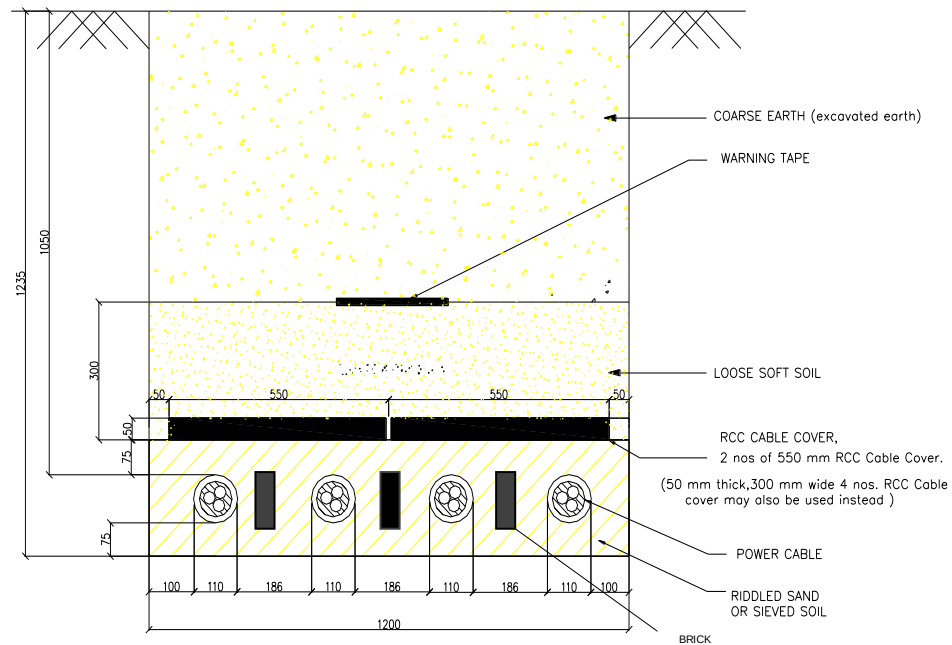


Figure 1.8 – 33kV Buried Cable Option-2 for Four Circuits

TECHNICAL SPECIFICATION FOR CABLE LAYING

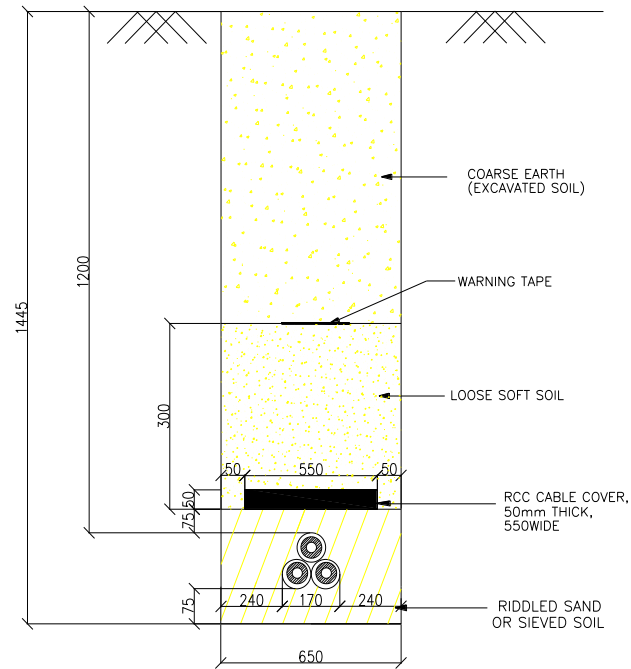


Figure 1.9 – 66kV Buried Cable for Single Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

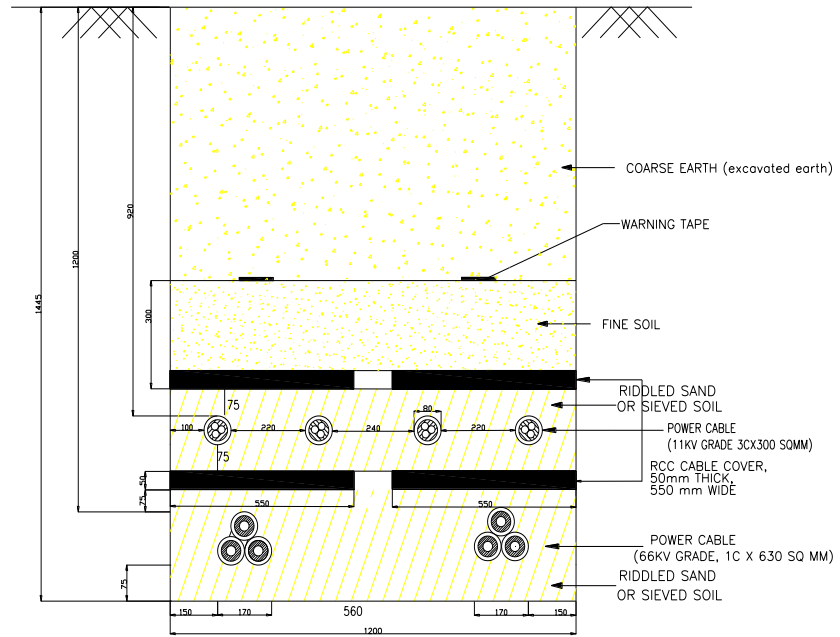


Figure 1.10 – 66kV Double Circuit and 11kV Circuits

TECHNICAL SPECIFICATION FOR CABLE LAYING

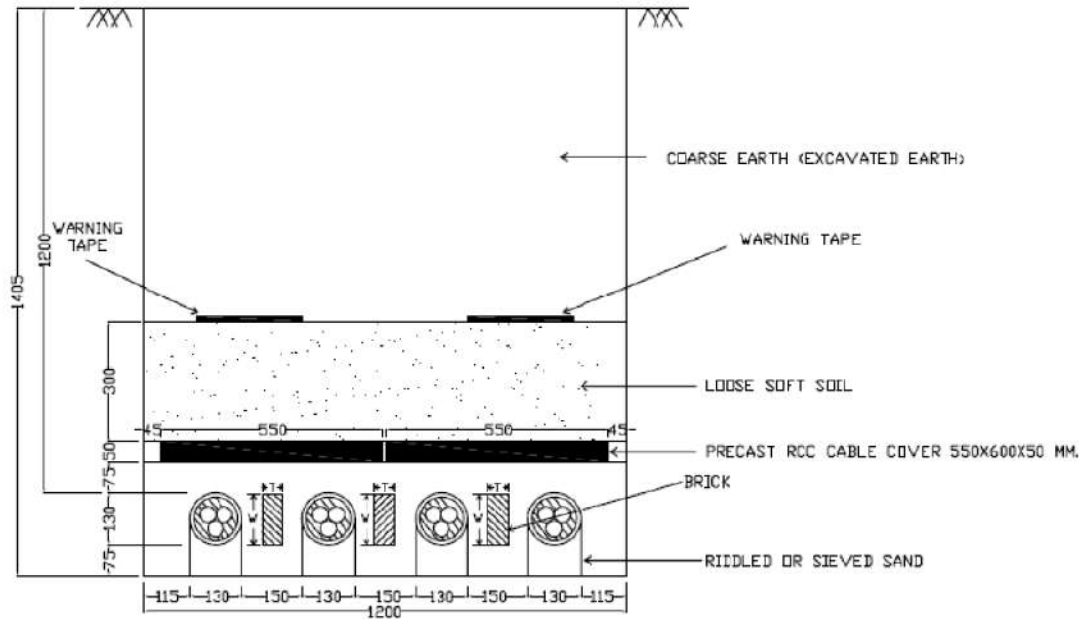


Figure 1.11 – 66kV 3Cx300 sq mm Four No's Cable Runs

TECHNICAL SPECIFICATION FOR CABLE LAYING**2.8 CABLE OVER BRIDGES**

On Bridges the cables are generally supported on HDPE cleats and clamped on steel supports at regular intervals. Approval from appropriate authorities (PWD/railways) as applicable shall be taken by contractor.

2.9 LAYING OF SINGLE CORE CABLES

- a) The single core cables shall be laid in trefoil formation. Single core cables can be laid individually in 200mm HDPE pipe in case of HDD only.
- b) For single core cables laid in trefoil formation, plastic cable ties shall be used at interval of 1.0 (one) meter throughout the cable length to maintain the trefoil arrangement.
- c) To prevent magnetic losses (eddy current and hysteresis losses), the base plate of the panels or the terminal box of the equipments, shall have aluminum plate. Incase the entry into the building is through GI pipe; a “slit” in the GI pipe shall be necessary. Alternatively GI pipes may altogether be avoided and non-metallic pipes such as PVC or HDPE pipe shall be used. Concrete pipes having steel reinforcement (RCC pipe) are not to be used.

TECHNICAL SPECIFICATION FOR CABLE LAYING**2.10 EARTHING OF SINGLE CORE CABLES**

- i) Single point bonded earthing shall be employed to prevent flow of induced circulating current in the armour and screen and consequential de-rating of cables for feeder less than 2.0 KM.
- ii) For feeder length more than 2 KM, cross bonding shall be provided.

2.11 GENERAL GUIDELINES FOR LAYING CABLES

- i) Laying of the cables and handling of the same shall be undertaken, at all times, by adequate staff suitably trained and supplied with all the necessary plant, equipment and tools.
- ii) The contractor shall be responsible for all the route survey, establishment of the position of the joints as per the site requirement and the drum lengths of cables to be laid. While carrying out the route survey the contractor shall take into account the obstacles on the route whether above or below ground. The cable shall be planned to be laid in an orderly formation, free from unnecessary bends and crossings
- iii) The contractor shall submit a drawing for the complete scheme showing the entire route, road crossings, location of joints and also the arrangement of cables to be laid. In case due to site exigencies, cables have to cross over within the trench, the same shall be shown in the drawing. For each and every job, this drawing shall be approved by BSES, prior to commencement of work.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- iv) Contractor shall arrange for all the material and manpower required for jointing and end termination. The Contractor shall provide pit, carry out excavation for creation of working space required for jointing by the jointer. The contractor shall carry out all civil works, structural work, clamping and earthing, so that the cables and accessories perform satisfactorily during the entire lifetime.
- v) The entry and exit of the cables into the building shall be through RCC or GI pipe except for single core cables, which shall be properly sealed and shall be duly supported as per the method and technique approved by BSES, so that the outer sheath of the cable does not get damaged at the entry and exit points. The sealing should be of adequate length so that it minimizes the risk of spreading of fire or ingress of water.

2.12 HANDLING AND STORAGE OF CABLE DRUMS

- i) The cable drums shall be transported upright, so that the weight is distributed on both the flanges. Under no circumstances the cable drum may be laid on its side. During transportation the drums must be properly secured. The cable drums should never be dropped from Lorry or a trailer, so as to prevent damage to the cable drum and also to the cable. Ramp may be used for unloading. The drums may be rolled over short distance, provided the correct direction of rolling as provided on the drum is observed. Alternatively, a mobile crane should be used for lifting and lowering the drum. A chain-pulley arrangement may also be used to lift the drums and deposit the same on ground if required.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- ii) In case the drums are to be stored prior to cable laying, they should be arranged in such a way to leave some space between them for air circulation. It is desirable that the drums stand on battens placed directly under the flanges. Overhead covering is not essential except in heavy rainfall areas or during monsoon. Cable should however be protected from direct rays of sun by leaving the battens on or by providing some form of sunshade. In no case the drums shall be stored in a flat position with flanges horizontal.
- iii) For transportation of the cable drums from storage site to work site, the drum should be mounted on a trailer or an open lorry and unloaded by mobile cranes.

2.13 PROCEDURE OF LAYING

- i) The ground over which the drum is positioned at site should be properly consolidated and jacks placed on both sides of the drum to make the pay-off arrangement stable. Suitable arrangement be made to stop the drum rotation, during cable laying preferably by square wooden poles kept temporarily pivoted over cable roller under the flanges which when required can be applied on the flange as a brake by personnel manning the drum.
- ii) The cable should always be paid off from the top of the drum. The drum must be positioned in such a way that the arrow on the drum points opposite to the direction of rotation marked on the drum.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- iii) It must be ensured that the cable is not dragged over sharp object or on the road surface, so as to avoid damage to the outer sheath of the cable.
- iv) The pulling method to be used shall be approved by BSES. Cable supplier's recommended maximum pulling tension shall not be exceeded.
- v) Rollers shall be placed at intervals and the cable shall be pulled over the rollers. The rollers shall be kept lubricated so that they rotate freely, minimize friction to the cable in motion. Rollers shall be positioned at the bends to minimize sidewall friction. The contractor shall ensure that PVC/HDPE sheath of cable is free from damage due to abrasion.
- vi) The cable should not be pulled out from the drum by lifting of the coil while the drum is lying flat on the flange. This leads to twisting of the armour and cores resulting in permanent damage to the cable.
- vii) To avoid ingress of moisture, it must be observed that the end capping of the cables is not damaged. Cut pieces of the cables must be capped immediately, before laying of the same is taken-up.

2.14 EXCAVATION OF THE TRENCHES

- i) The excavation of the trenches shall be commenced, with proper approvals from various authorities well in time.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- ii) Before opening of the section of the trench, the contractor shall satisfy himself that the line of the trench is clear of underground obstructions, by taking out trial pits on the line of the trench.
- iii) The exact location of each trench shall be approved on site by BSES. The trenches shall be kept as straight as possible and each trench shall be excavated to approved formation and dimensions. If necessary, the trenches shall be adequate shored by wooden planks and bracing to avoid trench cave-ins which would cause injury to the persons and also damage the cables laid.
- iv) The bottom of each trench shall be firm and of smooth contour. The contractor shall take reasonable precautions to prevent damage to the highway or ground surface from a slip or breaking away of the sides of the trench.
- v) The trench excavation and filling in shall be so executed that all walls, roads, sewers, drains, pipes, cables, structures, places and things shall be reasonably secured against risk of subsidence or injury and shall be carried out to the satisfaction of the authorities concerned. Should, however, a damage to an existing or other services be made, the Contractor will arrange and pay for any necessary repair, to make good the damages.
- vi) Where trenches pass from a footway to a roadway or at other positions where a change of level is necessary, the bottom of the trench shall rise or fall gradually. The rate of rise or fall shall be approved by BSES.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- vii) Contractor shall ensure that during excavation and until restoration has been completed, for reasonable access of persons and vehicles to property or places adjacent to the route.
- viii) When the excavation of the trenches has been accurately executed, the contractor shall inform BSES for approval. Laying of cables or building of structure shall not be started until the contractor has been advised by BSES to proceed with the work.

2.15 EXCAVATED MATERIAL

- i) The materials excavated from each trench shall be placed so as to prevent nuisance or damage to adjacent ditches, drains fences, gateways and other property or things. Excavated material shall be stacked so as to avoid undue interference with traffic.
- ii) Where, owing to traffic or for reasons of safety or other considerations, this is not permissible, the excavated material shall be removed from the site and returned for refilling the trench on completion of laying; surplus material shall be disposed off by the contractor at his own cost.

2.16 PIPES AND DUCTS

- i) Care shall be taken to make the bend of the pipes or duct lines as easy as practicable and in no case of radius less than 3 meters. Where approved, split pipes may be used on bends, the pipes being fitted round the cable after laying.

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- ii) All road crossings shall be ducted. This applies to present and future roads as indicated on the route plans. The pipes and the ducts shall be laid in an approved manner and shall be surrounded by 150 mm of PCC (1:2:4)
- iii) Ducts under the road shall be provided by the contractor, by non-disruptive method, if road cutting is not permitted by the concerned authorities Cable laying shall be done by Horizontal Direct drilling method (HDD).
- iv) The cables shall be suitably protected at entry and exit from the pipes, so that the outer sheath does not come in contact with the edges of the pipes / ducts. The pipes and ducts shall have slope so that the seepage water can drain through the small opening provided on the lower side of the pipe sealing.
- v) The pipes and ducts shall be secured to the base at both ends and at regular interval, throughout the length, so that at no point the ducts or pipes get suspended over the threaded cable, and damage the same, thus defeating the very purpose of providing the pipe / duct.
- vi) At all road crossings at least one spare duct / pipe shall be provided for future use. The pipe shall be thoroughly cleaned of obstructions. A draw wire or rope shall be left in each pipe to facilitate the drawing in of the cables. The duct end shall be sealed temporarily to prevent the entry of foreign matter. End caps and permanent markers shall be placed flush with footpath / roadways at both the ends. The pipes

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and ducts shall be cleaned again immediately before the cables are drawn in.

- vii) The internal diameter of the pipe / duct should be such that the cables occupy only 40% of the area of the pipe / duct to avoid de-rating.

3. JOINTING OF CABLES

3.1 TYPES OF ACCESSORIES

- i) Straight Through / Transition Joints - These Joints are used for connecting two cables in the run.
- ii) Termination or sealing end – This is generally used to connect a cable to switchgear terminals, H.T. pillars, transformer boxes and OH lines etc. GIS End termination should be used wherever required.

3.2 REQUIREMENTS OF CABLE JOINTS

- i) Resistance of the jointed conductor should be equal to or less than resistance of the conductor of the same length.

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- ii) Connector & lug should have a mechanical strength should be comparable to that of the conductor.
- iii) Thickness of built up insulation should be equal to or more than thickness of insulation of cable.
- iv) The Joint should provide proper mechanical protection to the insulated cores against damage by impact.
- v) The joints should ensure the continuity of metallic sheath or armour.
- vi) Proper stress control shall be provided to eliminate occurrences of high electrical stresses at screen cut points and over crimped connector.
- vii) The Joints shall be provided with an outermost layer resistant to corrosion by chemical effect

For joints of screened cables, following additional features must be considered

- i) Electric stress relief at termination of screen
- ii) Ionization and corona discharge

Besides the above requirement, cable joints should be simple and compact. It should require minimum time for jointing. It should be mechanically strong to

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withstand dynamic stresses due to short circuit current and impacts. The joints should further be resistant to corrosion and other chemical effects.

3.3 PREPARATION BEFORE JOINTING

A proper joint position should be selected for jointing. The joint pit should be of sufficient dimensions as to allow jointers to work. Sides of the pit should be well covered with tarpaulin sheets to prevent loose earth from falling. When jointing cables in water logged ground or under monsoon conditions, sump hole should be excavated at one end of the joint pit in such a position so that the accumulating water can be pumped out or baled out without causing interference to the jointing operation. The jointing as far as possible is to be carried out inside a tent. Before proceeding for jointing, on the existing cable, it is very essential to identify the cable to be jointed. For jointing of high tension cables, the cable should be made dead and earthed before commencement of the jointing. This should be confirmed by spiking method.

Cleanliness is the most important factor in all jointing work. All tools should be clean and dry at the time of the jointing process. Cleanliness while handling the insulation is very important. Any contamination of the insulation by dust or moisture is detrimental to the joint. In case of paper cables, the cable seals should be examined for any damage or puncture. The paper insulation should then be tested for the presence of moisture. This is done by dipping the insulation paper in hot G-38 compound (110 Deg - 120 deg.C). Care should be taken not to touch the paper with hand. Paper should be held with a plier which

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should be slightly warm. If moisture is present in the sample, it will be detected easily by a bubbling or crackling sound. In case of faulty cable, if on test moisture is detected, then further test would have to be carried out to arrest moisture. The cables to be jointed should then be meggered to check the condition of the insulation and a further check of further continuity of cables and tracing out cables to be jointed is necessary. Number on cores represents the phases. But these should never be taken for granted. Crossing of the core should be avoided in a joint.

3.4 PROCESS OF JOINTING

The process of jointing mainly consist of

- i) Connecting conductors together
- ii) Replacing the machine applied insulation
- iii) Providing earth continuity
- iv) Providing mechanical protection

Conductor joints should satisfy the following basic requirements.

- i) Ensure conductivity of the conductor by proper crimping.

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- ii) Leave a reasonably smooth finish and profile on the conductor joint so as to avoid under stress concentration.

4. BACK FILLING TRENCHES AND TEMPORARY REINSTATEMENT

- i) Filling in of trenches shall not be commenced until BSES has inspected and approved the cables and accessories at site. The inspection should be done on daily basis so that the trenches do not remain open unnecessarily, to avoid inconvenience to public.
- ii) Where cables routes are in public highways, footpaths, gardens etc., the method of reinstatement will be subject to approval by MCD. All costs incurred will be at the contractor's expenses.
- iii) The contractor shall be responsible for proper permanent reinstatement of the upper levels, which shall be carried out to the satisfaction of BSES and the MCD authorities concerned.
- iv) Before finally leaving site, permanent reinstatement shall be executed by the contractor to the approval of MCD and the property owners and all costs incurred shall be to the contractor's account.

TECHNICAL SPECIFICATION FOR CABLE LAYING**5. PERMANENT REINSTATEMENT OF PUBLIC ROAD, FOOT PATH ETC**

- i) In public roads and footways the surfaces and foundations shall be temporarily reinstated by the contractor. After settlement, temporary reinstatement material shall be removed as necessary and the permanent reinstatement shall be carried out to the approval of the appropriate highway authority / MCD. Stone and pre-cast concrete paving kerbs and channels shall also be finally reinstated by the contractor.
- ii) Temporary reinstatement shall be maintained by the contractor until commencement of final reinstatement to ensure that the surface is always safe for the passage of pedestrians and vehicular traffic.

6. IDENTIFICATION

All cables shall be identified below the gland at each end, at joint position and at approved positions by means of bands engraved or punched with cable no. feeder name, size of cable, number of cores, phase colour etc. The bands shall be secured fastened in a permanent manner, and shall be made of material able to resist corrosion, dampness and mechanical damage.

TECHNICAL SPECIFICATION FOR CABLE LAYING**7. CABLE ROUTE MARKERS**

All cables routes shall have markers at suitable location with a gap not exceeding 30 meters. The route markers shall be approved design. Additional markers shall be provided at joint locations with approved markings.

8. CABLE SUPPORTS / CLAMPS

- i) The contractor shall supply and install all the supports, racks, trays, cleats, saddles, clips and other parts required to carry and secure the cables, without risk so that there is no undue mechanical load or stress due to weight of the cable at each end. Cleats, saddles and clips shall be of the design as approved by BSES. No cable shall be laid on the trench floor. They shall be run in a neat and orderly manner and the crossing of cables within the trench shall be avoided as far as possible. Where cable runs unavoidably cross, a suitable supporting arrangement shall be provided to maintain an adequate gap between the cables.
- ii) Every cable shall be supported at a point not more than 500 mm from its termination.

TECHNICAL SPECIFICATION FOR CABLE LAYING**9. INSTALLATION OF CABLES IN TUNNELS / BASEMENT / BELOW THE PANELS**

- i) The design of cable support for cables installed in air in cable tunnels, basements etc. shall consist of vertical steel members spaced at approved interval and secured to the walls, floors and ceilings as necessary by means of bolts either cemented in position or expanded into cored holes. Each vertical support shall have bolted to it a number of steel brackets spaced at the intervals and designed to support and retain trays constructed of galvanized sheet steel of adequate section to carry the weight of the cables, plus space for an additional quantity of future cables at least 25% by weight and dimensions in excess of the cables installed under the contract and an additional load of 100 kg at the extremity without distortion. The trays shall be designed with raised edges to retain the cables and shall incorporate an interlocking feature so as to prevent movement between supports.
- ii) The design and construction of all cable cleating and supporting arrangements shall suit the cable system design. The spacing of cable supports shall be approved by BSES.
- iii) Cable run on trays shall be neatly dressed and where not provided with cleats shall be secured by heavy gauge, type approved metal reinforced, clips or saddles. Not more than six cables shall be embraced by one clip.

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- iv) Mild steel of appropriate sections, duly painted in an approved manner, shall be used for fabrication of cable supports. The steel shall be free from blisters, scales, laminations or other defects. Before final painting, the steel sections shall be provided with double coat of red primer.

10. CABLE PROTECTION AT OVERHEAD TOWERS OR POLES

Where the cables terminate on overhead line poles or towers located outside substation compounds the contractor shall provide suitable cable supporting galvanized steel work attached to the pole or tower and comprising backboard, runners, sheet, steel cover of not less than 3.0mm thickness, stays, cable cleats, anti climbing guard and all incidental items to provide secure protection for the cables. Isolators and Lightning arrestor. The erection and steel structure required shall also be in scope of the contractor.

11. SUN SHADES

All cables shall be protected from direct solar radiation by ventilated sun shields as approved by BSES.

12. ROUTE PLAN

- i) Contractor should get updated the GIS map of BSES of route along with joints and other obstructions.
- ii) During the progress of the contract works the contractor shall record on a set of route plans and cross section drawings of an approved

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form, these details so that the same can be transferred on the GPS maps. Such particulars will allow an accurate reference to be made in the case of any fault or projected modification. These records shall show, amongst other data, both indoors and outdoors the exact position of every joint, cable end termination and also the particulars of the depth of the trench, the arrangement of the cables, with cable numbers and the position of all obstructions revealed during the course of excavations. These completed records shall be submitted to BSES within 15 days of completion of any particular route/feeder.

13. SITE FACILITIES TO BE MAINTAINED BY THE CONTRACTOR

- i) The contractor shall arrange for all the tools and tackles required for cable laying, jointing testing and commissioning as per this specification.
- ii) The contractor shall arrange illumination and Power supply so that the work can be carried out round the clock.
- iii) The contractor shall maintain functional dewatering pumping facility with suitable power supply so as to protect the cables and the joints from ingress of water due to rain or otherwise
- iv) The contractor shall make arrangement to provide suitable scaffolding arrangement to carry out the termination work
- v) The contractor shall carry out proper barricading of the dug cable route and the joint bays and shall take all necessary precautions to avoid any public hazard.

TECHNICAL SPECIFICATION FOR CABLE LAYING**14. TESTING**

Following tests are to be carried out during and after completion of Cable Laying:

- i) Testing of cable before jointing –Cable shall be tested for Insulation Resistance prior to laying by opening the end and resealing end properly.
- ii) Testing on complete Cable Installation –
 - a. Insulation resistance of each core shall be measured against all the other cores and the metal screen connected to earth.
 - b. The resistance of the conductor shall be measured.
 - c. High voltage – Very Low frequency (VLF) kit shall be used for high voltage testing of complete cables length. Testing voltage and duration shall be as per IEEE 400.2 standards.
 - d. Partial discharge test shall be carried on complete cable length.
 - e. Charging of Cable at No-Load at Nominal working voltage for 24 Hours.
 - f. After laying and before termination of cable a sheath test shall be conducted for 66KV Single core Cable as under:-

At both ends the cable shall be raised from ground. From the end graphite coat over the outer PVC jacket shall be removed with a piece of glass for a length of 300mm. A spiked steel rod with an eye for attaching a wire shall be driven into the ground and connected to a nearby water or hydrant pipe. Insulation resistance of PVC

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jacket shall be measured between the aluminum wire armour and the spike with a 500/1000V insulation tester. Measured resistance shall not be less than 2.5 mega ohm / KM. Thereafter 10KV DC shall be applied for one minute in the same way. After the test the armour shall be kept earthed to the steel spike for 15 minutes for discharging residual charge.

- g. Any other testing required to complete the job shall be performed as per IEC standards.

15. BARRICADING AND SAFETY REQUIREMENT

- a. Dimensions of barricading- Height- 2 mtr, Length- 1.5 mtr.
- b. There shall not be any gap in between two barricades.
- c. LED Bacon light shall be placed at 1st and every 4th barricade
- d. Name, painting, color, cleanliness etc. shall be done on regular basis.
- e. Vendor to ensure that traffic management shall not be excuse of work execution. The contactor shall not undertake loading and unloading at carriageways obstructing the free flow of vehicular traffic.
- f. Full height fence, barriers, barricades etc. shall be erected around the site in order to prevent the working area from the risk of accidents due to speedy vehicular movement. In same way barricades shall protect the road users from the danger due to construction equipment and temporary structures.
- g. The structure dimensions of the barricades , material and composition, its color scheme, BSES logo and details shall be in

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accordance with specification and drawing laid down in the tender documents.

- h. All the barricades shall be erected as per the design requirements of employer, numbered painted and shall be maintained in good condition. Barricading In-charge shall maintain barricade register at site.
- i. All barricades shall be easily seen in the dark/night time by the road users so that no vehicle hits the barricades. Night vision shall be ensured by affixing retro reflective strips of required size and shape at appropriate angle at bottom and middle portion of the barricades at a minimum gap of 1000 mm. In addition minimum one red light /red blinker and red beacon light shall be placed at the top of each barricade.
- j. No dust deposit is permitted at the front side of barricades.
- k. Cable drum shall be returnable and vendor shall take it back (by buy back process or as per PO agreement) from site at their own risk and cost.
- l. Once cable lying of a drum is completed, within two days, empty drum shall be removed from site.
- m. Trained traffic marshal with all PPE and traffic control light (Red and Green) shall be placed at site for 24x7 hours.
- n. During execution of job, any damage to other agency's properties shall be counted in vendor account and necessary action shall be taken by vendor to immediate recover, repair etc.

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- o. Excess earth shall be removed from site after back filling. Site to be cleared to avoid flowing of dust. Barricades to be removed from site within 24 hrs after completion of job.
- p. During non working hrs vendor to ensure presence of supervisor for controlling any event from locals.
- q. PPEs
 - a. Helmets
 - b. Mask
 - c. Jacket
 - d. Safety Shoes
 - e. First Aid Box etc.

Above mentioned PPEs shall be available at site 24x7. Zero tolerance on absence of PPEs to the working personnel. No excuse shall be acceptable in this regards.

- r. EPR/Scanning shall be done by vendor of whole the route and same shall be submitted to BYPL. This work shall be done by vendor before execution of job.
- s. Lifting of cable drums with hydraulic machine, pulling of cable from top end of drum with pulling machine (hydraulic winch) is mandatory.
- t. Violation on barricading guideline and safety norms, a fine of Rs.5000 /day shall be imposed. BYPL inspector/engineer in-charge shall be empowered to impose the above penalty.
- u. Artwork & Text to be printed on barricading sheet shall be approved by BYPL prior to start of work