

NOTICE INVITING TENDER (NIT)

FOR

**TURNKEY PACKAGE FOR SUPPLY, LAYING,
JOINTING, TESTING AND COMMISSIONING OF
33KV 3X400 SQ MM XLPE INSULATED CABLES
WITH REQUIRED ACCESSORIES AS PER THE SCOPE
OF WORK**

NIT NO CMC/BY/22-23/RS/SkS/SV/69

Due Date for Submission: 23.03.2023, 14:00 HRS

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

CIN: U40109DL2001PLC111525

WEBSITE: www.bsesdelhi.com

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VOLUME – I
INFORMATION TO BIDDER (ITB)

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BSEES

VOLUME – I: INFORMATION TO BIDDER (ITB)

1.00 EVENT INFORMATION

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

Sr.	Scheme Description	Estimate Cost Value In INR	EMD Value In INR
1	TURNKEY PACKAGE FOR SUPPLY, LAYING, JOINTING, TESTING AND COMMISSIONING OF 33KV 3X400 SQ MM XLPE INSULATED CABLES WITH REQUIRED ACCESSORIES AS PER THE SCOPE OF WORK	10.00 Crore	10.00 Lakh

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

All envelopes shall be duly super scribed “**NIT NO CMC/BY/22-23/RS/SkS/SV/69 - TURNKEY PACKAGE FOR SUPPLY, LAYING, JOINTING, TESTING AND COMMISSIONING OF 33KV 3X400 SQ MM XLPE INSULATED CABLES WITH REQUIRED ACCESSORIES AS PER THE SCOPE OF WORK**”

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

Part A – Techno Commercial Bid

Part B – Price Bid

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

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

- 1.2. Bids will be received up to **23.03.2023, 14:00 PM.** at the address given below.
Part A of the Bid shall be opened on **23.03.2023, 17:00 PM.**

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

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

- 1.3 BSES Yamuna Power Ltd reserves the right to accept/reject any or all tenders without assigning any reason thereof in the event of following:
- Tender is received after due date and time.
 - Tender fee of requisite value is not submitted.

- c) Earnest Money Deposit (EMD) of requisite value & validity is not deposited in shape of Bank Guarantee drawn in favor of BSES Yamuna Power Ltd, payable at Delhi or Online transfer of requisite amount through NEFT/RTGS.
- d) Price Bid as per the Price Schedule mentioned in Annexure-I is not submitted.
- e) Incomplete Bids.
- f) Necessary documents against compliance to Qualification Requirements mentioned at Section 1 Clause 2.0 of this Tender Document.
- g) Complete Technical details are not enclosed as per the Technical Bid Submission Checklist.
- h) Filled in Schedule of Deviations as per Annexure.

2.00 QUALIFICATION CRITERIA

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

2.02 Technical Criteria:

SI No.	Criteria	Documents to be submitted by bidder
1	The bidder should be one of the following:	
	a. The Bidder should have own manufacturing facility for 33KV or higher voltage grade Power Cable from last 3 years through Dry Cure CCV or VCV line.	Cable manufacturing and factory incorporation certificate
	b. Bidder should be an EPC company engaged in turnkey execution of 33kV or higher voltage grade cable laying work from last 3 years.	Company Incorporation certificate
2	Bidder should have experience of turnkey execution including design, supply, installation, testing & commissioning project of 33KV or higher voltage grade cables in at least one utility/SEB/PSU having minimum 20 KM cable quantity in last 3 years.	i. Turnkey Purchase order/Work order copy ii. Work completion certificate copy
3	OEM of offered cable should have supplied at least 100 km of 33KV 3Cx300 or higher grade or size cable in last 5 years to Utilities/SEB/PSU.	i. Summary list of executed Purchase orders ii. Purchase order copies iii. Material delivery clearance certificate copy
4	Performance certificate for minimum 2 year satisfactory performance from at least two utilities/SEB/PSUs 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 case of bidder has a previous association with BRPL/BYPL for similar product and service, the performance feedback for that bidder by BRPL/BYPL shall only be considered irrespective of performance certificate issued by any third organization.	Performance certificate
5	The bidder must possess valid ISO 9001:2015	Valid copy of Certification

	certification or above.	
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.	<ul style="list-style-type: none"> i. Electrical Contractor License Copy ii. Undertaking if not available

2.02 Commercial Criteria:

SI No.	Criteria	Documents to be submitted by bidder
1	Bidder should have an Average Annual Sales Turnover of Rs 100 Crores or more in the last three (3) Financial Years (i.e., FY 2019-20, 2020-21 & 2021-22) And In case of EPC company, Proposed Cable Supplier/OEM also should have Average Annual Sales Turnover of Rs 100 Crores or more in last three (3) Financial Years (i.e., FY 2019-20, 2020-21 & 2021-22)	Balance Sheet / Duly certified CA certificate to be submitted
2	The Bidder shall submit an undertaking that "No Litigation" is pending with the BYPL or its Group/Associates Companies as on the date of bid opening.	Self Undertaking
3	An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution/Electricity utilities as on the date of bid opening.	Self Undertaking
4	The bidder must have a valid PAN No. and GST Registration Number, in addition to other statutory compliances. The bidder must submit a copy of registrations and submit an undertaking that the bidder shall comply with all the statutory compliances as per the laws/rules etc. before the start of the supply/work.	Relevant Statutory Documents Copy/ Self Undertaking

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

3.00 BIDDING AND AWARD PROCESS

Bidders are requested to submit their offer strictly in line with this tender document. BYPL shall response to the queries raised by various bidders and the clarification will be distributed to all participating bidders through BYPL website/email.

Vendor shall refrain from taking any deviations on this TENDER. Still in case of any deviations, all such deviations from this tender shall be set out by the Bidder, Clause by Clause in the "ANNEXURE SCHEDULE OF DEVIATIONS" and submit the same as a part of the Technical Bid. Unless **specifically** mentioned in the schedule of deviation, the bid shall be deemed to confirm the BYPL's specifications.

INFORMATION TO BIDDER (ITB) NIT NO: CMC/BY/22-23/RS/SkS/SV/69	Page 6 of 19	Bidders seal & Signature
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3.01 BID SUBMISSION

Please mention our NIT Name & Number: - on the Tender and drop the same in our Tender Box placed at:

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

The bids and the outer envelope shall be addressed to:

Head of Department

Contracts & Materials Deptt.

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

Kindly Note:

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

PART A :: **TECHNICAL BID** comprising (01 no Original + 01 no Duplicate soft copy) of the following:

Sr. No	Descriptions	Type of Documents
Commercial :		
1	Tender Fee - Demand Draft (Rs.1180/-) (Incl GST)	Non-refundable demand draft for Rs 1180/- in case the forms are downloaded from the website
2	EMD	In the prescribed stamp paper & format
3	Power-of-Attorney	In the prescribed stamp paper & format
4	PQR Compliances	Documentary evidence in support of qualifying criteria like: <ol style="list-style-type: none">1. Details of the constitution of the company (Proprietary/Limited/etc along with the details), Memorandum of Association of the company2. Bidders shall submit the certified annual Balance sheets for the last completed three (3) financial years3. Supportive document on Positive Net worth. Credit rating/solvency certificate from the competent authority, wherever required.4. Copies of Orders, Execution /Performance Certificates & Other Documents to support qualification Criteria.
5	Signed Tender document	Original Tender documents duly stamped & signed on each page as token of acceptance

INFORMATION TO BIDDER (ITB)
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Bidders seal & Signature

Sr. No	Descriptions	Type of Documents
6	Black listing undertaking	Bidder should submit a Self undertaking signed by its Authorized Signatories that the Bidder or any of their sub contractor has not been blacklisted/banned by any Govt. Organization or Regulatory Agencies in India or abroad.
7	No litigation Certificate	Duly signed No Litigation Certificate as per attached format.
8	Commercial Terms and Conditions	Acceptance on Commercial Terms and Conditions viz Delivery schedule/period, Payment terms, PBG etc.
9	Acceptance on Reverse Auction	Duly signed Acceptance Form For Participation In Reverse Auction Event as per attached format
10	Bid Form (Unpriced) Duly Signed	Duly Signed Bid Form as per attached format
11	Un price Bid Duly Signed	Duly Signed Un price Bid as per attached format
Technical:		
12	Technical Details/ Filled in GTP/Drawings	Bidder shall submit duly filled GTP with all Technical documents and Drawings.
13	Field Quality and assurance Plan (QAP)	Bidder shall submit the detailed QAP plan in their technical proposal.
14	Type Test Reports	Bidders shall submit the copy of type test reports in their technical bids in support of PQR conditions
15	Project Implementation Plan and Methodology	Bidder shall submit detail Project Implementation plan and methodology in their technical bid.
16	Testing Facilities	Bidder shall submit the details of testing facilities available at their works/factory.
17	Organization Chart & Manpower Details.	Bidder shall submit the details of Manpower to be deployed for project management with qualification and experience.
18	List of Current Commitments/ Work In Progress.	Bidder shall submit the list of projects (Current Commitments/Work in Progress)

- PART B** :: **FINANCIAL BID** comprising of (01 original only)
- Price strictly in the Format enclosed indicating Break up of basic price, taxes & duties, transportation etc

3.02 TIME SCHEDULE

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

S. No.	Events	Due date & Time
1	Date of sale/ availability of tender documents from BYPL Website	Up to 23.03.2023, 14:00 Hours
2	Date & Time of Pre-Bid Meeting Pre-Bid Meeting will be done online, Register in advance for this meeting, Zoom Meeting link: https://zoom.us/join/zoom/register/tJYrd-6rrT4jGdKJbbwpKsO7k_a2MDaTQBNn After registering, you will receive a confirmation email containing information about joining the meeting.	10.03.2023, 16:00 Hours

S. No.	Events	Due date & Time
3	Last Date of receipt of pre-bid queries, if any (Queries to be submitted via e-mail)	12.03.2023 up to 17:00 Hours
4	Last Date of replies to all the pre-bid queries as received	15.03.2023 up to 18:00 Hours
5	Last date and time of receipt of Complete Bids (Tender Fees, EMD, Part A & Part B)	23.03.2023, 14:00HRS
6	Date & Time of Opening of PART A – EMD and Technical Bid	23.03.2023, 17:00HRS
7	Date & Time of opening of Price/RA of qualified bids	Will be notified to the qualified bidders through our website or 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.

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

Part – A:: Technical Bid should not contain any cost information whatsoever and shall be submitted within the due date.

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

Bidder has to submit the item wise price bifurcation in bid. Un priced copy must be attached with the Part A (Technical Bid). Reverse Auction will be carried out on Lump sum Basis/Total Landed Cost i.e. Supply + Services

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

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

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

4.00 AWARD DECISION

4.01 Purchaser intends to award the business on a lowest bid basis, so suppliers are encouraged to submit the bid competitively. The decision to place purchase order/LOI solely depends on purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.

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- 4.02 In the event of your bid being selected by purchaser (and / or its affiliates) and you subsequent DEFAULT on your bid; you will be required to pay purchaser (and / or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in NIT/RFQ.
- 4.03 In case any bidder is found unsatisfactory during the Project execution, the award will be cancelled and BYPL reserves the right to award other bidders who are found fit.
- 4.05 The purchaser reserves all the rights to award the contract to one or more bidders so as to meet the Project execution requirement or nullify the award decision without citing any reason.
- 4.06 Qty Variation: The purchaser reserves the rights to vary the quantities as per the actual requirements.

5.00 MARKET INTEGRITY

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

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

6.00 SUPPLIER CONFIDENTIALITY

All information contained in this RFQ is confidential and shall not be disclosed, published or advertised in any manner without written authorization from BYPL. This includes all bidding information submitted.

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

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

7.00 CONTACT INFORMATION

Technical clarification, if any, as regards this RFQ shall be sought in writing and sent by post/courier to following address. 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 Vashistha DGM (CES)	abhishek.vashistha@relianceada.com
	Puneet Duggal GM (CES)	puneet.duggal@relianceada.com
	Gaurav Sharma AVP (HOD-CES)	gaurav.a.sharma@relianceada.com
Commercial		
C&M Dept. 3 rd Floor, A-Block, BSES Yamuna	Sumit Verma GM (C&M)	sumit.ra.verma@relianceada.com

Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Santosh Singh Addl. VP (Head-Procurement)	santosh.kum.singh@relianceada.com
	Robin Sebastian VP (HOD-C&M)	robin.sebastian@relianceada.com

SECTION – II: INSTRUCTION TO BIDDERS

A. GENERAL

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

2.00 SCOPE OF WORK

The scope shall include survey, design, engineering, manufacturing, shop testing, inspection, packing & dispatches, transportation, loading, unloading, storage at site, erection & installation, commissioning, handing over to bypl including comprehensive marine cum storage cum insurance policy (mse) on "single point responsibility basis" for "on turnkey basis"

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 own estimation and analysis and should check the accuracy, reliability and completeness of the information in this Document and obtain independent advice from appropriate sources in their own interest.

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

4.00 COST OF BIDDING

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

B. BIDDING DOCUMENTS

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

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

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

6.0 AMENDMENT OF BIDDING DOCUMENTS

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

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

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

6.04 Purchaser shall reserve the rights to following:

- a) extend due date of submission,
- b) modify tender document in part/whole,
- c) cancel the entire tender

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

C. PREPARATION OF BIDS

7.0 LANGUAGE OF BID

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

8.0 DOCUMENTS COMPRISING THE BID

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

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

9.0 BID FORM

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

Unpriced "Copy" of the Bid Form and the appropriate Un Price Schedules duly filled in as per the attached format enclosed with the Bidding Documents with TECHNICAL BID Part A.

9.02 EMD

Pursuant to Clause 8.0(b) 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 would 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) Online transfer of requisite amount through IMPS/NEFT/RTGS to BYPL account mentioned herein in Appendix II - **BYPL BANK DETAIL 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 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.

10.0 BID PRICES

10.01 Bidders shall quote for the entire Scope of Supply with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance

with the requirement of Bidding Documents the Bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total Price.

- 10.02 The prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during execution of the supply work, breakup of price constituents, should be there.

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.**

11.0 **BID CURRENCIES**

- 11.01 Prices shall be quoted in Indian Rupees Only.

12.0 **PERIOD OF VALIDITY OF BIDS**

- 12.01 Bids shall remain valid for 180 days from the due date of submission of the Bid.
- 12.02 Notwithstanding Clause 12.01 above, the Purchaser may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing and sent by post/courier

13.0 **ALTERNATIVE BIDS**

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

14.0 **FORMAT AND SIGNING OF BID**

- 14.01 The original Bid Form and accompanying documents (as specified in Clause 5.0), clearly marked "Original Bid" plus Duplicate Soft copy in USB flash drive must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copies, the original shall govern.
- 14.02 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid. The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid. A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

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

- 14.03 The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct

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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

15.0 SEALING AND MARKING OF BIDS

15.01 Bid submission: One original (hard copies) & One Duplicate Soft copy in USB flash drive of all the Bid Documents shall be sealed and submitted to the Purchaser before the closing time for submission of the bid.

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

15.03 The Bidder has the option of sending the Bids in person. Bids submitted by Email/Telex/Telegram /Fax will be rejected. No request from any Bidder to the Purchaser to collect the proposals from Courier/Airlines/Cargo Agents etc shall be entertained by the Purchaser.

16.0 DEADLINE FOR SUBMISSION OF BIDS

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

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause 6.0, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended

17.0 ONE BID PER BIDDER

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

18.0 LATE BIDS

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

19.0 MODIFICATIONS AND WITHDRAWAL OF BIDS

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

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E. EVALUATION OF BID

20.0 PROCESS TO BE CONFIDENTIAL

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

21.0 CLARIFICATION OF BIDS

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

22.0 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

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

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

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

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

23.0 EVALUATION AND COMPARISON OF BIDS

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

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

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

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

(a) Delivery Schedule

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(b) Conformance to Qualifying Criteria

(c) Deviations from Bidding Documents

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

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

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

F. AWARD OF CONTRACT

24.0 CONTACTING THE PURCHASER

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

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

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

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

26.0 AWARD OF CONTRACT

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

27.0 THE PURCHASER'S RIGHT TO VARY QUANTITIES

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

28.0 LETTER OF INTENT/ NOTIFICATION OF AWARD

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

the letter of intent /Notification of Award by Purchaser.

29.0 CONTRACT PERFORMANCE BANK GAURANTEE

Within 15 days of the receipt of Notification of Award/ Letter of Intent from the Purchaser, the successful Bidder shall furnish the Performance Bank Guarantee for an amount of 10% (Ten percent) of the Contract Price. The Performance Bond shall be valid upto contract completion. Upon submission of the performance security, the EMD shall be released.

30.0 CORRUPT OR FRADULENT PRACTICES

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

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

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

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

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

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

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

31.00 GENERAL

All the Bids shall be prepared and submitted in accordance with these instructions.

31.01 Bidder shall bear all costs associated with the preparation and delivery of its Bid, and the Purchaser will in no case shall be responsible or liable for these costs.

31.02 The Bid should be submitted by the Bidder in whose name the bid document has been issued and under no circumstances it shall be transferred /sold to any other party.

31.03 The Purchaser reserves the right to request for any additional information and also reserves the right to reject the proposal of any Bidder, if in the opinion of the Purchaser, the data in support of NIT requirement is incomplete.

31.04 The Bidder is expected to examine all instructions, forms, terms & conditions and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a Bid not substantially responsive to the Bid Documents in every respect may result in rejection of the Bid. However, the Purchaser's decision in regard to the responsiveness and rejection of bids shall be final and binding without any obligation, financial or otherwise, on the Purchaser.

32.0 STATUTORY GUIDELINES & REGULATIONS

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

33.0 PRIORITY OF CONTRACT DOCUMENTS

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 company/BYPL shall be final and binding upon the parties.

APPENDIX I

(FORMAT FOR EMD BANK GUARANTEE)

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

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

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

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

The conditions of this obligation are:

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

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

This guarantee will remain in force up to and including One Hundred 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

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 its licensed distribution network area in Delhi

2 Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods in full conformity with the Terms and Conditions and technical specifications for the sum indicated in Price Bid or such other sums as may be determined in accordance with the terms and conditions of the contract .The amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.

3 If our Bid is accepted, we under take to deliver the entire goods as) as per delivery schedule mentioned in Section IV from the date of award of purchase order/letter of intent.

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

5 We agree to abide by this Bid for a period of 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 supply of equipments/materials and the prices have been quoted accordingly.

7 Unless and until Letter of Intent is issued, this Bid, together with your written acceptance there of, shall constitute a binding contract between us.

8 We understand that you are not bound to accept the lowest, or any bid you may receive.

9 There is provision for Resolution of Disputes under this Contract, in accordance with the Laws and Jurisdiction of Contract.

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

Signature..... In the capacity of

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

(IN BLOCK CAPITALS)

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder)

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

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

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

Signature & seal of the Bidder

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LITIGATION HISTORY

Year	Name of client	Details of contract & date	Cause of Litigation/arbitration and dispute	Disputed amount

CURRENT CONTRACT COMMITMENTS / WORK IN PROGRESS

Year	Name of client	Details of contract & date	Value of outstanding work	Estimated completion date

FINANCIAL DATA

(Duly Certified by Chartered Accountant)

	Actual in previous 5 financial years				
	FY 21-22	FY 20-21	FY 19-20	FY 18-19	FY 17-18
Total assets					
Current assets					
Total Liability					
Current Liability					
Profit before taxes					
Profit after taxes					

ANNEXURE - SCHEDULE OF DEVIATIONS

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

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

Technical Deviations:-

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

Commercial Deviations:-

SL No.	Clause No.	NIT Page 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 to all the terms and conditions, technical specifications, scope of work etc. as mentioned in the standard document except those as mentioned above.

Seal of the Bidder:

Signature:

Name:

Technical Bid Submission Check List

Submission of this duly filled checklist along with the bid is mandatory. The order of documents shall be as per this technical bid submission checklist.

Bids with incomplete/ wrong information are liable for rejection.

S. No.	Description	BYPL Requirement	Bidder's Compliance (Yes/No/ Not Applicable)
1	Tender No.	Required	
2	Tender Fee, EMD & Signed Bid Form as mentioned in the tender, if applicable	Required	
3	Bidder Details		
3.1	Name of the Bidder	Required	
3.2	Company Profile/Organogram	Required	
3.3	Name of duly Authorized contact person (along with Authorizations to submit the Bid)	Required	
3.4	Contact No. of duly Authorized contact person	Required	
3.5	E-mail Id of duly Authorized contact person	Required	
4	Documents Submission Format		
4.1	Documents shall be submitted in Box file/spiral binding in offline tenders and Original pdf for online mode. Any other format is not acceptable	Required	
4.2	Index of documents with page numbers for each document	Required	
4.3	Separator with document description shall be provided before each document	Required	
5	Signed Copy of tender as an unconditional acceptance	Required	
6	Qualification Criteria Requirement Compliance, If applicable		
6.1	Summary of compliance of qualifying criteria in tabular form along with details of documentary proof provided	Required	
6.2	Detailed Documents supporting compliance of qualifying criteria	Required	
7	Technical Specification reference number	Required	
8	Drawings/ Documents as per Technical Specification		
8.1	Signed copy of technical specification	Required	
8.2	Type Test reports of offered model/ type/ rating	Required	
8.3	Guaranteed Technical particulars (GTP)	Required	
8.4	Deviation Sheet – Technical (along with soft editable copy)	Required	
8.5	Detailed Drawings	Required	
8.6	Manufacturer's quality assurance plan	Required	
8.7	Other drawings/ documents mentioned in technical specification	Required	
9	Deviation Sheet – commercial (along with soft editable copy)	Required	
10	Soft copy of complete technical bid in pen drive	Required	
11	Samples as per technical specification	Required	

VENDOR CODE OF CONDUCT

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

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

I. Labour and Human Rights

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

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

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

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

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

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

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

- Working Hours - Studies of good manufacturing practices clearly link worker strain to reduced productivity, increased turnover and increased injury and illness. Work weeks are not to exceed maximum set by local law. Further, a work week should not be more than 60 hours per week, including overtime, except in emergency or unusual situations. Workers should be allowed at least one day off per seven-day week.

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

II. Health and Safety

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

The health and safety standards are:

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

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

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

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

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

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

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

III. Environmental

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

The environmental standards are:

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

IV. Ethics

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

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

V. Management System

Vendors shall adopt or establish a management system whose scope is related to the content of this Code. The management system shall be designed to ensure (a) compliance with applicable laws, regulations and customer requirements related to the Vendors' operations and products; (b) conformance with this Code; and (c) identification and mitigation of operational risks related to this Code. It should also facilitate continual improvement.

The management system should contain the following elements:

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

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

**SPECIAL CONDITIONS OF CONTRACT
(SCC)**

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SPECIAL CONDITIONS OF CONTRACT

1.0 PRIORITY OF CONTRACT DOCUMENTS:

The several documents forming the Contract 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 Purchaser, who shall thereupon issue to the Contractor instructions thereon. In such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

1. The Contract Agreement
2. The Letter of Acceptance/ Intent
3. Agreed Minutes of the Contract Negotiation Meetings
4. Agreed Minutes of the contract Technical Meetings
5. Instruction To Bidders (ITB)
6. Special Condition of Contract (SCC)
7. General Condition of Contract (GCC)
8. Erection Conditions of Contract (ECC)
9. The Priced Bill of Quantities
10. The Particular Technical Specifications
11. The General Technical Specifications
12. The Submitted Tender, including all Appendices and/or Addenda, the latest taking precedence.

2.0 SCOPE OF WORK:

The scope of work under this contract shall include the turnkey execution on End to End Basis, including but not limited to design, manufacturing, inspection & testing, dispatches, loading, unloading, storage at site, erection & installation, testing of the installation, associated civil work, commissioning, Handing over to the purchaser including comprehensive marine cum storage cum erection Insurance (MSE) on "Single Point Responsibility Basis"

The entire scope of work under the contract shall be executed strictly as per the NIT conditions and the technical specification.

Scope of work shall mainly include:

1. The Scope of work under the package shall include all Supply, Survey , Design, Engineering , Manufacturing, Shop testing, Inspection, packing, dispatch, loading, unloading and storage at site, Marine cum Storage cum Erection Insurance policy, assembly, Erection, Structural and Civil work, complete pre-commissioning checks, testing and commissioning at site, obtaining statutory clearance & certification from Electrical Inspector (BYPL) and any other statutory authority for charging the infeed and handing over of complete package.
2. The scope shall also include supply at site of all barricading, free-issued materials if any (including installation, transportation, loading & unloading), dewatering, watch and ward and transportation of scrap (generated at Site), balance free-issued material, dismantled material from site to site , site to BYPL store including loading & unloading and no additional charges shall be paid against these activities. Used barricading material will be

taken back by contractor soon after job is handed over or as directed by BYPL Engineering Incharge. No additional cost for these items will be paid to the Bidder. Any leakage, pilferage and damage of the material shall be in vendor's scope.

3. Contractor shall submit the detailed PERT chart/L2 Network for the execution of the package awarded for BYPL review and approval with major intermediate milestone as mentioned in Annexure- I. Contractor shall strictly adhere to the implementation schedule as per the project plan submitted and approved.
4. All the materials supplied against this contract shall be as per BYPL approved "Makes" and "Specifications" ONLY.
5. Permission for road cutting from Road owning agencies, Tree cutting and other statutory clearances (including all coordination and liasoning) shall be obtained by Bidder. However, All direct Fee shall be borne by BYPL.
6. Wherever BYPL specifications are not available, relevant IS/IEC to be followed. All Drawings mentioned in the Tender Specification and others required for completion of the work shall be submitted and approval of BYPL Engineer in Charge obtained before commencement of any job. Drawing submission process shall not be deemed complete until all the requirements are complied during the submission of the same.
7. The Contractor shall have own testing equipments like IR Tester, Hi Pot Test Kit and Earth Tester with valid Calibration Certificates for testing the cables.
8. The Contractor shall have own Safety equipment like Neon Tester, Portable Earth, Earthing discharge rod etc. along with valid Calibration Certificates of all the equipment.
9. The Bidder should have all major tools and tackles required for execution of work like Bench Machine, Rollers, Jack for lifting the Cable drum along with valid test certificates etc.
10. Any material not specifically mentioned In BOQ but required for successful Erection, Testing and Commissioning of the package awarded shall be deemed to be in the scope of the bidder.
11. Successful Bidder shall depute Safety officer and Quality officer at site separately for each package and for the entire duration of the project and they shall submit the safety report and quality report to BYPL Site In charge on weekly basis.
12. Any item/work, not specifically mentioned in the NIT condition and technical specification but essentially required for completion of the work shall be the responsibility of the contractor
13. All Statuary Compliances (wherever applicable) required to complete the work as defined above are in the scope of contractor.
14. R&R clearance shall also be part of contractors scope of work , However all Statutory payment shall be borne by BYPL.
15. Electrical inspection clearance certification from Electrical Inspector (BYPL) and any other statutory authority for charging the infeed are in scope of Contractors.

3.0 CONTRACT PRICES:

The contract price shall be including all the detailed scope as specified in the contract for the package awarded and shall be inclusive of all taxes and duties (GST) as applicable.

Prices are inclusive of all taxes and duties including labour cess.

However, IT as per applicable rate will be deducted from your bills as Tax Deduction at Source (TDS).

GST is included in the contract price awarded , however GST payment shall be made on submission of GST Registration and self declaration on your letter head stating that contractor have deposited/or will deposit the Tax as per the applicable GST laws. Contractor shall furnish your GST registration number.

4.0 QUANTITIES VARIATION UNDER THE AWARDED CONTRACT:

Contract Unit rate shall applicable for the any addition/reduction in quantities to the extent as Specified below:

For Cable feed: Quantities may vary as per the site requirements

5.0 FIRM CONTRACT PRICES:

The contract price shall remain "Firm" throughout the contract execution. No Price Variation and/or escalation on any account shall be payable to the Contractor for any reason whatsoever.

6.0 STATUARY VARIATION IN TAXES:

The total order value shall remain **FIRM**. However in case of any statutory variation in GST, or Taxes, duties and Levies imposed by Competent Authorities by way of fresh notification(s) shall be borne by BYPL on submission of the documentary evidence.

Any variation in taxes shall be applicable only to the direct/price breakup as mentioned in the contract.

7.0 COMPLETION TIME:

Package Name	Total Months for Handing over of the Package, From Zero Date	Total No. of Day for Handing over of the Package From Zero Date
TURNKEY PACKAGE FOR SUPPLY, LAYING, JOINTING, TESTING AND COMMISSIONING OF 33KV 3X400 SQ MM XLPE INSULATED CABLES WITH REQUIRED ACCESSORIES AS PER THE SCOPE OF WORK	5 months	150 days

Detailed Execution schedule, including intermediate milestone for the execution of the Package is attached as "**Annexure- I**".

8.0 BANK GUARANTEE:

Bank Guarantee	To be submitted on	Valid Upto (tentative)
Contract Performance Guarantee (10% of total Contract value)	Within 15 days of Issue of Order.	Valid till 90 days beyond the Project Completion period/Handing Over.
Bank Guarantee against Advance (For the advance amount)	Invoice for Advance amount along with advance bank guarantee.	Valid till Completion of supplies/work under the contract.
Equipment Performance Bank Guarantee (10% of total Contract value)	Time of claiming the last payment and Issuance of Final Taking over certificate from Purchaser / Owner,	Valid till Completion of Defect Liability Period plus 3 months.

9.0 LIQUIDATED DAMAGES:

9.1 LD FOR DELAY IN COMPLETION OF WORK:

Time is essence of the Contract.

After issuance of the Letter of Intent, the contractual network / L2 network will be finalized and approved by the BYPL. Contractor shall strictly adhere to the completion schedule and intermediate milestones agreed.

If the Contractor fails to successfully hand over the Packages awarded within the agreed contract completion schedule the contractor shall pay to the Purchaser/ Owner, 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.

Maximum LD for delay is 10% of Contract Value.

It is agreed that liquidated damages are a genuine Pre-estimate of damages and not by way of penalty.

9.2 LD ON INTERMEDIATE MILESTONE:

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.

LD on delay in milestone activities shall be redeemable if the delays are covered subsequently and the package is handed over within the agreed schedule.

9.3 OVER ALL LIQUIDATED DAMAGES:

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

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

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.

The liquidated damages for delay will be recovered at the sole discretion of the Purchaser from the Contract Price or from other securities/BG's available with the Purchaser or jointly.

10.0 LIABILITY & DAMAGES:

10.1 Limitation of Liability for Clause 9.1 and 9.2 above: The aggregate amount of Supplier liability to Purchaser for all Late Completion Liquidated Damages and Performances (Considered in aggregate), shall not exceed 10% of Contract Price.

10.2 Aggregate Liability of Supplier: Supplier's / Contractor liability to Purchaser under or in connection with the Supply and Erection Contract shall not exceed 100% of the respective Contract Price.

11.0 WARRANTEE/DEFECT LIABILITY PERIOD:

Warranty /Defect Liability Period shall be of **Twenty Four (24) months** from the date of Final Takeover of Packages by Purchaser.

The Contractor shall be liable to rectify all defects in the works done by the Contractor under this Contract, or from any act or omission of the contractors during Warranty / Defect Liability Period.

Contractor shall replace/ Repair all the materials / items supplied under the contract against any defect or failure, which arise due to faulty materials, workmanship or design for the entire defects liability period.

If during the defects liability period any materials / items are found to be defective, these shall be replaced or rectified by the bidder at his own cost within the agreed time schedule from the date of receipt of intimation. The bidder shall depute their service personnel within 48 hours in case of emergency and shall ensure the availability of manpower/spares for the same during warranty period.

12.0 LATENT DEFECT LIABILITY PERIOD:

At the end of warranty period, the Supplier's Liability ceases except for latent defects.

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Notwithstanding the completion of the Warranty Period, the Supplier 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.

The Contractor's Liability for latent defects warranty shall be limited to a period of Five (5) years from end of Warranty Period for all the supply items and the work executed under the contract.

For the purpose of this clause, the latent defects shall be the defects inherently lying within the material or arising out of design deficiency or the design deficiency of the implementation process adopted, which do not manifest themselves during Warranty period.

13.0 INSURANCE:

Contractor shall, at his own cost shall take Comprehensive Marine cum Storage cum Erection insurance policy for the total Project cost.

Contractor shall take, at his own cost, Third party insurance and suitable insurance policy for his own men and material.

The insurance covers to be taken by the Contractor shall be in a joint name of Purchaser and the Contractor. The Contractor shall, however, be authorized to deal directly with Insurance Company or companies during the contract period and shall be responsible in regard to maintenance of all insurance covers.

Any loss or damage to the equipment during handling, transportation, storage, erection, putting into satisfactory operation and all activities to be performed till the successful completion of and handling over Performance Guarantee tests of the plant shall be to the account of the Contractor. The Contractor shall be responsible for preference of all claims and make good for the damage or loss by way of repairs and/or replacement of the equipment, damaged or lost.

For all the insurance policies taken, Contractor shall be responsible for settlement of claims with the underwriters without any liability on the purchaser and will arrange replacements / rectification expeditiously without waiting for the settlement of insurance claim, at contractor's own cost and this shall not entitle the Contractor for any extension of Time and Cost Overrun.

Marine Transit risk on supply of material on 100% of captioned value & Erection all risk cover on 100% of Project cost which cover include any loss or damage not limited to AOG perils, earthquake and act of terrorism.

14.0 DRAWINGS/DOCUMENTS:

Drawings will be supplied to the Contractor by Purchaser as per Agreed Master Documents List (MDL), Technical Specifications, BOQ and as mentioned in GCC.

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15.0 TERMS OF PAYMENT:

A) FOR SUPPLY OF EQUIPMENT AND MATERIALS:

- A. 70% prorata of supply value item wise shall be payable against R/A bills for supply of equipments and materials within 45 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) Two (02) copies of Supplier's detailed Recipient Invoice showing Commodity description, quantity, unit price, total price and basis of delivery, and being 100% of the value of the consignment claimed.
 - e) Two (02) copies of Supplier'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) Two (02) copies 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) Check list for bill submission.
- B. 20% prorata on account of supply value of the actual executed value after installation/erection of material duly certified by BYPL Project-in- charge.
- C. Balance 10% on account of supply value of the actual executed value shall be paid in 45 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 supplier (The format of No Demand Certificate and Letter of Indemnity are attached as Annexure) and after reconciliation & adjustments of payments, if any towards quantities of materials issued from purchaser's stock and consumed by the contractor for expeditious completion of the job.

B) FOR ERECTION, INSTALLATION AND TESTING & COMMISSIONING:

Payment shall be made to you as under:

- 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 45 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 45 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 supplier (The format of No Demand Certificate and Letter of Indemnity are attached as Annexure) and after reconciliation & adjustments of payments, if any towards quantities of materials issued from purchaser's stock and consumed by the contractor for expeditious completion of the job.

16.0 ARBITRATION:

The venue of arbitration shall be New Delhi.

17.0 UNFORESEEABLE SUB-SURFACE CONDITIONS:

Notwithstanding anything contained elsewhere in the contract, if during the execution stage, the Contractor encounters on the Site any sub-surface conditions that are different from those envisaged from the soil testing / data available at the site, or the Contractor's own testing, which necessitates corrective action / changes in the method(s) of work, all costs related with such changes shall be borne by the Contractor. These conditions shall no way be compensated either for time, or costs, by the Purchaser.

18.0 FORCE MAJEURE:

Force Majeure Events:

For the purpose of this Agreement, Force Majeure means any act, event or circumstance, or combination of acts, events or circumstances, which materially and adversely affects the affected

Party's performance of its obligations pursuant to the terms of this Agreement, but only if and to the extent that such acts, events or circumstances are not within the affected Party's reasonable control, were not reasonably foreseeable and could not have been prevented or overcome by the affected Party through the exercise of reasonable skill or care.

18.1 Political Force Majeure Events:

Which shall comprise the following acts, events and circumstances:

i) Act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot insurrection, civil commotion, act of terrorism or sabotage, in each case occurring inside or directly involving India:

ii) Strikes, lockouts or other difficulties, which are politically motivated (rather than motivated primarily by a desire to improve compensation or working conditions of those involved) or are caused in whole or part by another event of Political Force

Majeure or are part of a nation-wide or regional strike, or other generalised labour action occurring within India; (excluding such events which are site specific and attributable to the Supplier);

iii) Radioactive contamination or ionising radiation or chemical contamination originating from a source in India or resulting from another Political Force Majeure Event;

18.2 Non Political Force Majeure events comprising the following acts, events and circumstances:

i) Flood, cyclone, lightning, earthquake, drought, storm or any other extreme effect of the natural elements;

ii) Epidemic, or plague;

iii) Fire or explosion;

iv) Strikes, lockouts or other labour difficulties not included above (excluding such events which are Site specific and attributable only to the contractor)

v) Air crash, shipwreck or trainwreck or loss of or damage to any major component of the Facility arising in the course of transit.

18.3 Burden of Proof:

In the event that the Parties are unable in good faith to agree that a Force Majeure Event has occurred, the Parties shall submit the dispute for resolution pursuant to clause , provided that the burden of proof as to whether a Force Majeure Event has occurred shall be upon the Party claiming a Force Majeure Event.

18.4 Excused Performance:

The Party claiming Force Majeure shall give notice to the other Party of any Force Majeure Event as soon as reasonably practical after becoming aware of its existence, but not later than **twenty four (24) hours** after the date on which such Party knew or should reasonably have known of the commencement of the Force Majeure Event. Notwithstanding the above, if the Force Majeure Event results in a breakdown of communications rendering it not reasonably practicable to give notice within the applicable time limit specified herein, then the Party claiming Force Majeure shall give such notice as soon as reasonably practicable after the reinstatement of communications, but not later than forty eight (48) hours after such reinstatement.

(a) The Party claiming Force Majeure shall give notice to the other Party of:

i) The cessation of the relevant Force Majeure Event; and

ii) The cessation of the effects of such Force Majeure Event on the enjoyment by such Party of its rights or the performance by it of its obligations under this Agreement;

as soon as practicable after becoming aware thereof.

(b) The suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event.

(c) No liability of either Party which arose before the occurrence of the Force Majeure Event causing the suspension of performance shall be excused as a result of the occurrence, including, without limitation, liability for the timely payment of money otherwise due and earned by performance of tasks required under this Agreement by any Party.

(d) Any Party claiming Force Majeure shall use its reasonable efforts to mitigate and overcome the effects of any act, event or circumstance of Force Majeure as soon as practicable after the occurrence of a Force Majeure Event, including by mutual agreement the expenditure of reasonable sums of money, and to co-operate with the other Party to develop and implement a plan of remedial and reasonable alternative measures to remove the Force Majeure Event, provided, however, that no Party shall be required under this provision, to settle any strike or other labour dispute on terms it reasonably considers to be unfavourable to it. The Party claiming Force Majeure shall furnish weekly written reports to the other Party with respect to its progress in overcoming the effects of the act, event or circumstance of Force Majeure together with such supporting documentation and information as the other Party reasonably requires regarding the claim of Force Majeure.

(e) When the affected Party is able to resume performance of its obligations under this Agreement that Party shall give the other Party written notice to that effect and shall promptly resume performance hereunder.

18.5 Limitations:

Anything in this Agreement to the contrary notwithstanding:

(a) The affected Party shall not be relieved from obligations under this Agreement to the extent that the gross negligence of the affected Party (or, in the case of Supplier, The

Purchaser's Suppliers or any Subcontractor) contributes to or aggravates the Force Majeure Event ; and

(b) The existence of a Force Majeure Event shall not excuse the affected Party from its obligations to make payment of any monies otherwise due and payable by the affected Party pursuant to this Agreement.

18.6 Consequences of Force Majeure

Neither Party shall be considered in default or in breach of its obligations under this Agreement to the extent that performance of such obligations is prevented by any circumstances of a Force Majeure Event.

19.0 SUSPENSION OF WORK:

Purchaser reserves the right to suspend and reinstate execution of the whole or any part of the Works without invalidating the provisions of the Contract. Orders for suspension or reinstatement of the works will be issued to the Contractor in writing.

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The time for Completion of the Works will be extended for a period equal to duration of the suspension.

For an aggregate suspension period of less than Six (6) months the Contractor shall not claim any reimbursement. Any necessary and demonstrable costs incurred by the Contractor, as a result of suspension of the Works beyond the above period, will be paid by The Purchaser, provided such costs are substantiated to the satisfaction of The Purchaser. For this purpose, only the direct costs incurred shall be considered and this shall exclude any overheads, incidentals or profit. The Purchaser's decision in this regard will be final and binding. The Purchaser shall not be responsible for any liability if suspension or delay is due to some default on the part of the Contractor or its sub-contractor. Purchasers decision in this regard shall be final and binding. Purchaser shall not be responsible for any liability if suspension is caused due to some default on the part of the supplier and its sub suppliers.

20.0 FINAL TAKING OVER OF THE PACKAGES:

Upon successful completion of testing and Commissioning of the all the items/work under the package awarded and all the testing conducted to the Purchaser/Owner's satisfaction, the Purchaser shall issue to the Contractor a "Taking over Certificate" as a proof of the final acceptance of the packages only after receipt of such certificate from the Owner to Purchaser.

21.0 OPERATION:

Not Applicable

22.0 CONSTRUCTION WATER AND POWER:

Construction Water and power shall be arranged by Contractor at his own cost.

ANNEXURE - I

EXECUTION SCHEDULE

Contractor shall submit the detailed PERT chart/L2 Network for the execution of the package awarded for BYPL review and approval.

However the major milestone shall be as under:

SL NO	DESCRIPTION OF MATERIAL	TIMELINE
1	Zero Date (Letter of 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
6	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

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

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BSEES

GENERAL CONDITIONS OF CONTRACT (GCC)-SUPPLY

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

1. PRIORITY AND CONTENT OF CONTRACT DOCUMENTS:

The several documents forming the Contract 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 Purchaser, who shall thereupon issue to the Contractor, instructions thereon. In such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

1. The Contract Agreement
2. The Letter of Acceptance/ Intent
3. Agreed Minutes of the Contract Negotiation Meetings.
4. Agreed Minutes of the contract Technical Meetings.
5. Instruction To Bidders (ITB)
6. Special Condition of Contract (SCC)
7. General Condition of Contract (GCC)
8. Erection Conditions of Contract (ECC)
9. The Priced Bill of Quantities
10. The Particular Technical Specifications
11. The General Technical Specifications
12. The Submitted Tender, including all Appendices and/or Addenda, the latest taking precedence.

All the materials, literature, data and information of any sort given by the contractor along with its bid proposal subject to the approval of the purchaser.

2. CONTRACT LANGUAGE:

All documents, instructions, catalogues, brochures, pamphlets, design data, norms and calculations, drawings, operation, maintenance and safety manuals, reports, labels, on deliveries and any other data shall be in English Language only.

The Contract documents and all correspondence between the BYPL, Third Parties associated with the contract, and the Bidder shall be in English language.

However, all signboards required indicating "Danger" and/or security at site and otherwise statutory required shall be in English, Hindi.

3. DEFINITIONS AND INTERPRETATION:

Definitions TO BE FOLLOWED UNDER THE CONTRACT shall have following meanings:

3.1 COMPANY / PURCHASER / OWNER: Means BSES Yamuna Power Ltd, a company incorporated under the Companies Act 1956 and having its office at Shaktikiran Building, Karkardooma, Delhi - 110032, which expression shall include its authorized representatives, agents, successors and assigns.

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3.2 CONTRACTOR: Shall mean the successful Tenderer / vendor to whom the contract has been awarded.

3.3 Rate: The unit rates for the work to be carried out at site shall be as per finalized unit rates through tender. The finalized rates shall be firm for the entire duration of work to be carried out by the Contractor under the work order and are not subject to escalation for any reason whatsoever.

3.4. CONTRACT SPECIFICATION: The terms "CONTRACT Specification" shall mean the Technical specification of the work as agreed by you and description of work as detailed in Annexure-I enclosed herewith and all such particulars mentioned directly/referred to or implied as such in the contract.

3.5. SITE: The terms "Site" shall mean the working location in BYPL area. Under this tender, working location shall be as mentioned elsewhere.

3.6. ENGINEER IN CHARGE: "Engineer In-charge" means the Company's authorized representative for the purpose of carrying out the work.

3.7 APPLICABLE LAW: Applicable Laws means the constitution of India and any act, rule, regulations, directive, notification, code, order or instruction having its force of law enacted or issued by any competent legislature or Governmental Agency (including those related to taxes, duties, assessments, expropriation and compulsory acquisition) as may be in effect from time to time the implications thereof shall be deemed a Change in Law or Change in Permits.

3.8 OTHER CLEARANCES: Means any consent, approval, permit or other authorisation which is required to be granted by authorities (local, government or any other) essential to start/complete the work.

3.9 DEFECT LIABILITY PERIOD: Shall mean the period during which the contractor shall remain liable for repair or replacement of any defective part of the work performed under the contract, free of cost.

3.10 TENDER SPECIFICATION: The terms "Tender Specification" shall mean the Indian Standard specification of the work and description of work as detailed in Tender document/Tender enclosed and all such particulars mentioned directly/referred to or implied as such in the Tender.

3.11. CONTRACT PRICE shall mean the price referred to in the "Letter of Intent/Purchase Order".

3.12 CONTRACT PERIOD shall mean the period during which the "Contract" shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.

3.13 CODES AND SPECIFICATION shall mean all the applicable codes and standards as indicated in the Specification.

3.14 CHANGE OF WORK means any addition to, deletion from, suspension of or other modification, to the Work, or to the quality, function or as delineated in this Contract, including any such addition, deletion, suspension or other modification, which requires a change in one or more of the Technical Specifications and the completion schedule

3.15 EPC means Engineering, Procurement and Construction wherein the EPC contractor is made responsible for all the activities from design, procurement, supply, storage construction, commissioning and handover of the project to owner.

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3.16 EFFECTIVE DATE OF CONTRACT means the date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

3.17 CONTRACT COMMENCEMENT DATE means the date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

3.18 CONTRACT COMPLETION DATE means the date of expiry of Guarantee/defect liability Period shall be deemed as the Contract Completion Date.

4. EXAMINATION OF SITE AND LOCAL CONDITIONS:

The contractor is deemed to have visited the site of the work and ascertained therefore all site conditions and information pertaining to his work.

Before submitting the bid, all bidders will at their expenses make or obtain any additional information, investigations, explorations, test and studies and obtain any additional information and data which pertains to the physical conditions at or contiguous to the site or otherwise which may affect cost, progress, performance of the work and which the bidder deems necessary to determine its Bid for performing the work in accordance with the time and other terms and conditions of the tender/contract documents.

The company shall not accept any claim whatsoever arising out of the difficult site/terrain/local conditions, if an

5. LANGUAGE AND MEASUREMENT:

The CONTRACT issued to the contractor by the company and all correspondence and documents relating to the CONTRACT placed on the Contractor shall be written in English language.

Metric System shall be followed for all dimension, units etc.

6. TIME – THE ESSENCE OF CONTRACT:

The time and the date of Contract Execution completion of the "Package" as stipulated in the Letter of Intent/ Purchase order issued to the Supplier shall be deemed to be the essence of the "Contract". The "Entire Package" has to be completed and handed over not later than the aforesaid Schedule.

7. PROGRESS REPORT:

The supplier shall submit weekly/fortnightly/monthly progress report as desired by the Purchaser's Engineer in Charge and in the format mutually agreed between the parties.

8. SCOPE OF WORK:

The scope of work under this contract shall include the turnkey execution on End to End Basis, including but not limited to design, manufacturing, inspection & testing, dispatches, loading ,

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unloading ,storage at site, erection & installation, testing of the installation, associated civil work ,commissioning ,handing over to the purchaser including comprehensive marine cum storage cum erection Insurance (MSE) on "Single Point Responsibility Basis" on turnkey Basis for the following packages:

Package Name	Total Months for Handing over of the Package, From Zero Date	Total No. of Day for Handing over of the Package From Zero Date
TURNKEY PACKAGE FOR SUPPLY, LAYING, JOINTING, TESTING AND COMMISSIONING OF 33KV 3X400 SQ MM XLPE INSULATED CABLES WITH REQUIRED ACCESSORIES AS PER THE SCOPE OF WORK	5 months	150 days

Brief Scope of Work related to all the supplies for the successful completion, testing & commissioning and final handover for the above packages shall be as per the NIT conditions with the following salient details.

Any item/work, not specifically mentioned in the NIT condition and technical specification but essentially required for completion of the work shall be the responsibility of the contractor. The "Scope of Supply" shall be on the basis of Bidder's responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.

9. QUANTITY VARIATION AND EXTRA ITEM/WORK:

The purchaser reserves the rights to vary the quantity as below:

- a) For Cable feed: Quantity may vary as per the site requirements.

The Bill of Quantity break-up shown else-where in Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any item not indicated but is required to complete the job, shall be deemed to be included in the prices quoted.

Payment will be made on the basis of actual quantity of supplies/actual measurement of works accepted by BYPL and not on the basis of contract quantity.

10. FIRM CONTRACT PRICES:

The rates finalized for this order shall be firm for the entire duration of work carried out by the Contractor under the order and are not subject to any variation and escalation for any reason whatsoever.

11 CONTRACT RATES:

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The rates finalized for this order shall be firm for the entire duration of work carried out by the Contractor under the order and are not subject to any variation and escalation for any reason whatsoever.

The cost of insurance during loading/unloading of materials/ equipments during its storage and handling/erection at site for installation is included in the contractor's scope and value is included in the unit rates finalized.

The unit rates finalized are also inclusive of Insurance policy taken as defined in Special Conditions Contracts (SCC) Though Bidders shall indicate the value separately.

12 TAXES AND DUTIES:

Prices are inclusive of all taxes and duties including labour cess.

GST is included in the contract price awarded , however GST payment shall be made on submission of GST Registration and self declaration on your letter head stating that contractor have deposited/or will deposit the Tax as per the applicable GST laws. Contractor shall furnish your GST registration number.

13 STATUTORY VARIATION:

Any statutory variations i.e. increase/decrease in Taxes / Duties introduced by central Govt. / State Govt. of shall be reimbursed/recovered to/from Contractor against documentary evidence and proof. Any variation in taxes shall be applicable only to the direct/price breakup as mentioned in the contract.

14 CHANGE OF LAW:

"Change in Law" means:

- a) any enactment or issue of any new Applicable Law,
- b) any amendment, alteration, modification, or repeal of any existing Applicable Law or any new or modified directive or order there under,
- c) any change or variation in taxes payable in connection with and under this Agreement in each case with respect to a), b), and c) above coming into effect after the date of this Agreement.

15 SPECIFICATIONS AND STANDARDS:

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.

Product manufactures /makes names mentioned in the Contract documents are for the purpose of establishing the type and quality of products to be used. The Bidder shall not change the brand name and qualities of the bought out items without the prior written approval of the BYPL. All such products and equipment shall be used or installed in strict accordance with original manufacturer's

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recommendations, unless otherwise directed by the BYPL. In any circumstances the codes, specimen and standards prescribed by any government agency should not be violated.

16 QUALITY ASSURANCE AND INSPECTION:

Immediately on award of contract, the bidder shall prepare detailed quality assurance plan/test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of Purchaser before proceeding with manufacturing. However, Purchaser shall have right to review the inspection reports, quality checks and results of suppliers' in house inspection department which are not Customer hold points and the supplier shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc. In case of standard items, BYPL shall forward the standard QAP which is to be followed by vendor during manufacturing.

Witness and Hold points are critical steps in manufacturing, inspection and testing where the supplier is obliged to notify the Purchaser in advance so that it may be witnessed by the Purchaser. Final inspection is a mandatory hold point. The supplier to proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from BYPL.

The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the supplier of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.

On completion of manufacturing, the items can only be dispatched after receipt of dispatch instructions issued by the Purchaser.

All in-house testing and inspection shall be done without any extra cost. The in-house inspection shall be carried out in presence of BYPL/BYPL authorized third party inspection agency. Cost of Futile/abortive visit(s) shall be debited from the invoices.

Purchaser reserves the right to send any material being supplied to any recognized laboratory for testing, wherever necessary and the cost of testing shall be borne by the Bidder. In case the material is found not in order with the technical requirement / specification, the charges along with any other penalty which may be levied is to be borne by the bidder.

17 ERRORS AND OMISSIONS:

The Supplier shall be responsible for all discrepancies, errors and omissions in the drawings, documents or other information submitted by him, irrespective of whether these have been approved, reviewed or otherwise accepted by the BYPL or not. However any error in design/drawing arising out of any incorrect data/written information from BYPL will not be considered as error and omissions on part of the Supplier.

18 PACKING, PACKING LIST & MARKING:

Packing: Supplier shall pack or shall cause to be packed all Commodities in crates/boxes/drums/containers/cartons and otherwise in such a manner as shall be reasonably

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

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

19 PRICE BASIS FOR SUPPLY OF MATERIALS:

Bidders shall quote their prices on Landed Cost Basis and separate price for each item.

Bidders shall quote FIRM prices for supply to BYPL Delhi/New Delhi stores inclusive of all packing, forwarding, loading at manufacturer's premises, unloading at site/stores and payment of GST. Storage of material is under the bidder Scope. Bidder shall arrange transit Insurance as per clause nos. 8 mentioned in Volume -1 Special Condition of Contract (SCC).

20 TERMS OF PAYMENT AND BILLING – SUPPLY:

Terms of payment and Billing shall be as specified in Volume –I, Special Condition of Contract.

21 COMMISSIONING SPARES AND TOOLS & TACKLES:

Commissioning Spares shall be deemed to be included in the quoted price.

22 RETURN, REPLACEMENT OR SUBSTITUTION:

BYPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BYPL may in its discretion elect to return defective Commodities to Supplier for replacement, free of charge to BYPL, or may reject such Commodities and purchase the same or similar Commodities from any third party. In the latter case BYPL shall furnish proof to Supplier of the cost of such substitute purchase. In either case, all costs of any replacement, substitution, shipping, labour and other related expenses incurred in connection with the return and replacement or for the substitute purchase of a Commodity hereunder should be for the account of Supplier. BYPL may set off such costs against any amounts payable by BYPL to Supplier. Supplier shall reimburse BYPL for the amount, if any, by which the price of a substitute Commodity exceeds the price for such Commodity as quoted in the Bid.

23 PERFORMANCE GUARANTEE:

Performance Guarantee shall be as specified in Volume –I, Special Condition of Contract.

24 WARRANTY/DEFECTS LIABILITY PERIOD:

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All supplies made/Work executed shall be guaranteed against any defect or failure which may arise due to faulty materials, design or workmanship for a period of 24 months from the date of final handing over of the entire package as defined in SCC.

If during the Defect Liability Period any work are found to be defective, shall be immediately rectified or repaired, upto BYPL satisfaction, by the contractor at his own cost within 10 days from the date of receipt of intimation from BYPL.

Under no circumstances any extra claim in terms of time and cost shall be entertained for such repair/rectification.

25 SUPPORT BEYOND THE GUARANTEE PERIOD:

The Bidder shall ensure availability of spares and necessary support for a period of at least Twenty (20) years post completion of guarantee period of equipments supplied against the contract.

26 DOCUMENTATION:

The Bidder's shall procure all equipment from BYPL approved sources as per attached specifications. The Bidder shall submit 5 copies of Material/Type Test Certificates, O&M Manuals, and Approved & As-built drawings. The Bidder shall ensure for the strict compliance to the specifications and Field Quality Procedures issued by BYPL Engineer in-charge.

27 FORFEITURE:

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

28 SUSPENSION OR EXTENSION:

Purchaser reserves the right to suspend and reinstate execution of the whole or any part of the Works without invalidating the provisions of the Contract. Orders for suspension or reinstatement of the works will be issued to the Contractor in writing. The time for Completion of the Works will be extended for a period equal to duration of the suspension.

For an aggregate suspension period of less than Six (6) months the Contractor shall not claim any reimbursement. Any necessary and demonstrable costs incurred by the Contractor, as a result of suspension of the Works beyond the above period, will be paid by The Purchaser, provided such costs are substantiated to the satisfaction of The Purchaser. For this purpose, only the direct costs incurred shall be considered and this shall exclude any overheads, incidentals or profit. The Purchaser's decision in this regard will be final and binding. The Purchaser shall not be responsible for any liability if suspension or delay is due to some default on the part of the Contractor or its sub-contractor. Purchasers decision in this regard shall be final and binding. Purchaser shall not be

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responsible for any liability if suspension is caused due to some default on the part of the supplier and its sub suppliers.

29 TERMINATION DUE TO CONTRACTORS DEFAULT:

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

- a) Contractor fails to complete execution of works within the approved schedule of works, terms and conditions
- b) In case the contractor commits any Act of Insolvency, or adjudged insolvent
- c) Has abandoned the contract
- d) Has failed to commence work or has suspended the progress of works
- e) Has failed to proceed the works with due diligence and failed to make such due progress

30 EVENTS OF DEFAULT:

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

- a) Failing to complete execution of work within the terms specified in this work order.
- b) Failing to complete works in accordance with the approved schedule of works.
- c) Failing to meet requirements of specifications, drawings, and designs as approved by BYPL.
- d) Failing to comply with any reasonable instructions or orders issued by BYPL in connection with the works.
- e) Failing to comply with any of the terms or conditions of this work order.
- (f) Supplier fails or refuses to deliver supplies conforming to this NIT / specifications, or fails to deliver supplies within the period specified in PO or any extension thereof
- (g) Supplier becomes insolvent or unable to pay its debts when due, or commits any act of bankruptcy, such as filing any petition in any bankruptcy, winding-up or reorganization proceeding, or acknowledges in writing its insolvency or inability to pay its debts; or the Supplier's creditors file any petition relating to bankruptcy of Supplier;
- (i) Supplier otherwise fails or refuses to perform or observe any term or condition of the Contract and such failure is not remediable or, if remediable, continues for a period of 30 days after receipt by the Supplier , of notice of such failure from BYPL.

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

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31 CONSEQUENCES OF DEFAULT:

- (a) If an Event of Default shall occur and be continuing, BYPL may forthwith terminate the Contract by written notice.
- (b) In the event of an Event of Default, BYPL may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;
- (c) present for encashment to the bank the relevant Performance Bond;
- (d) Purchase the same or similar Commodities from any third party; and/or
- (e) Recover any losses and/or additional expenses BYPL may incur as a result of Supplier's default

32. RISK & COST:

If the Contractor fails to execute the work as per NIT specification / as agreed in the contract within the scheduled period and even after the extended period, the contract shall get terminated and BYPL reserves the right to get the work executed from any other source at the Risk & Cost of the Contractor.

The Extra Expenditure so incurred shall be debited to the Contract.

33 ARBITRATION:

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

34 TERMINATION FOR CONVENIENCE OF BYPL:

BYPL at its sole discretion may terminate the contract by giving 30 days prior notice in writing or through email to the Supplier. BYPL shall pay the Supplier for all the supplies/ services rendered till the actual date of contract termination against submission of invoice by the Supplier to that effect.

35 LIQUIDATED DAMAGES:

Liquidated damages shall be as per Volume –I, Special Condition of Contract.

36 TRANSFER AND SUB-LETTING:

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

37 RECOVERIES:

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

38 WAIVER:

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

39 INDEMNIFICATION:

Notwithstanding contrary to anything contained in this NIT, Supplier shall at his costs and risks make good any loss or damage to the property of the Purchaser and/or the other Supplier engaged by the Purchaser and/or the employees of the Purchaser and/or employees of the other Supplier engaged by the Purchaser whatsoever arising out of the negligence of the Supplier while performing the obligations under this contract.

40 PATENT RIGHTS AND ROYALTY:

If, in the course of performance of its functions and duties as envisaged by the scope of the present GCC, the Bidder acquires or develops, any unique knowledge or information which would be covered, or, is likely to be covered within the definition of a trademark, copyright, patent, business secret, geographical indication or any other form of intellectual property right, it shall be obliged, under the terms of this present GCC, to share such knowledge or information with BYPL. All rights, with respect to, or arising from such intellectual property, as afore mentioned, shall solely vest in BYPL.

Moreover, the Bidder undertakes not to breach any intellectual property right vesting in a third party/parties, whether by breach of statutory provision, passing off, or otherwise. In the event of any such breach, the Bidder shall be wholly liable to compensate, indemnify or make good any loss suffered by such third party/parties, or any compensation/damages arising from any legal proceeding/s, or otherwise. No liability of BYPL shall arise in this respect, and any costs, damages, expenses, compensation payable by BYPL in this regard to a third party/parties, arising from a legal proceeding/s or otherwise, shall be recoverable from the Bidder.

41 CONFIDENTIALITY:

Bidder and its employees or representatives thereof shall strictly maintain the confidentiality of various information they come across while executing the contract as detailed below.

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Documents

All maps, plans, drawings, specifications, schemes and other documents or information related to the Contract/Project and the subject matter contained therein and all other information given to the Bidder by BYPL in connection with the performance of the contract shall be held confidential by the Bidder and shall remain the property of the BYPL and shall not be used or disclosed to third parties by the Bidder for any purpose other than for which they have been supplied or prepared. The Bidder may disclose to third parties, upon execution of confidentiality agreements, such part of the drawings, specifications or information if such disclosure is necessary for the performance of the Work provided such third parties agree in writing to keep such information confidential to the same extent and degree as provided herein, for the benefit of the BYPL.

Geographical Data

Maps, layouts and photographs of the site including its surrounding regions showing vital installation for national security of country or those of BYPL shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the BYPL and upon execution of confidentiality agreements satisfactory to the BYPL with such third parties prior to disclosure.

Violation

In case of violation of this clause, the Bidder is liable to pay compensation and damages as may be determined by the competent authority of BYPL.

42 DISPUTE RESOLUTION & ARBITRATION:

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

Suspension of Work on Account of Arbitration

The reference to negotiation/arbitration shall proceed notwithstanding that the Works shall not then be or be alleged to be complete, provided always that the obligations of the Purchaser and the Supplier shall not be altered by reasons of arbitration being conducted during the progress of the Works. In no event shall the Supplier be entitled to suspend the Execution of the Works or part of the Works to which the Dispute relates on account of arbitration and payments to the Supplier shall continue to be made in terms of the Contract.

The laws and jurisdiction of contract

Where recourse to a Court is to be made in respect of any matter, the courts at Delhi shall have exclusive jurisdiction.

ERECTION CONDITIONS OF CONTRACT (ECC)

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GENERAL TERMS & CONDITIONS - ERECTION, TESTING & COMMISSIONING

The Erection Condition of the contract shall form a part of the specifications, contract documents.

1. PRIORITY OF CONTRACT DOCUMENTS:

The several documents forming the Contract 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 Purchaser, who shall thereupon issue to the Contractor, instructions thereon. In such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

1. The Contract Agreement
2. The Letter of Acceptance/ Intent
3. Agreed Minutes of the Contract Negotiation Meetings.
4. Agreed Minutes of the contract Technical Meetings.
5. Instruction to Bidders (ITB)
6. Special Condition of Contract (SCC)
7. General Condition of Contract (GCC)
8. Erection Conditions of Contract (ECC)
9. The Priced Bill of Quantities
10. The Particular Technical Specifications
11. The General Technical Specifications
12. The Submitted Tender, including all Appendices and/or Addenda, the latest taking precedence.

All the materials, literature, data and information of any sort given by the contractor along with its bid proposal subject to the approval of the purchaser.

2. DEFINITIONS AND INTERPRETATION:

Definitions TO BE FOLLOWED UNDER THE CONTRACT shall have following meanings:

2.1 COMPANY / PURCHASER / OWNER: Means BSES YAMUNA Power Ltd, a company incorporated under the Companies Act 1956 and having its office at Shaktikiran Building, Karkardooma, Delhi -110032, which expression shall include its authorized representatives, agents, successors and assigns.

2.2 CONTRACTOR: Shall mean the successful Tenderer / vendor to whom the contract has been awarded.

2.3 Rate: The unit rates for the work to be carried out at site shall be as per finalized unit rates through tender. The finalized rates shall be firm for the entire duration of work to be carried out by the Contractor under the work order and are not subject to escalation for any reason whatsoever.

2.4. **CONTRACT SPECIFICATION:** The terms "CONTRACT Specification" shall mean the Technical specification of the work as agreed by you and description of work as detailed in Annexure-I enclosed herewith and all such particulars mentioned directly/referred to or implied as such in the contract.

2.5. **SITE:** The terms "Site" shall mean the working location in BYPL area. Under this tender, working location shall be as mentioned elsewhere

2.6. **ENGINEER IN CHARGE:** "Engineer In-charge" means the Company's authorized representative for the purpose of carrying out the work.

2.7 **APPLICABLE LAW:** Applicable Laws means the constitution of India and any act, rule, regulations, directive, notification, code, order or instruction having its force of law enacted or issued by any competent legislature or Governmental Agency (including those related to taxes, duties, assessments, expropriation and compulsory acquisition) as may be in effect from time to time the implications thereof shall be deemed a Change in Law or Change in Permits.

2.8 **OTHER CLEARANCES:** Means any consent, approval, permit or other authorisation which is required to be granted by authorities (local, government or any other) essential to start/complete the work.

2.9 **DEFECT LIABILITY PERIOD:** Shall mean the period during which the contractor shall remain liable for repair or replacement of any defective part of the work performed under the contract, free of cost.

2.10 **TENDER SPECIFICATION:** The terms "Tender Specification" shall mean the Indian Standard specification of the work and description of work as detailed in Tender document/Tender enclosed and all such particulars mentioned directly/referred to or implied as such in the Tender.

2.11. **CONTRACT PRICE** shall mean the price referred to in the "Letter of Intent/Purchase Order".

2.12 **CONTRACT PERIOD** shall mean the period during which the "Contract" shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.

2.13 **CODES AND SPECIFICATION** shall mean all the applicable codes and standards as indicated in the Specification.

2.14 **CHANGE OF WORK** means any addition to, deletion from, suspension of or other modification, to the Work, or to the quality, function or as delineated in this Contract, including any such addition, deletion, suspension or other modification, which requires a change in one or more of the Technical Specifications and the completion schedule

2.15 **EPC** means Engineering, Procurement and Construction wherein the EPC contractor is made responsible for all the activities from design, procurement, supply, storage construction, commissioning and handover of the project to owner.

2.16 EFFECTIVE DATE OF CONTRACT means the date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

2.17 CONTRACT COMMENCEMENT DATE means the date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

2.18 CONTRACT COMPLETION DATE means the date of expiry of Guarantee/defect liability Period shall be deemed as the Contract Completion Date.

3 EXAMINATION OF SITE AND LOCAL CONDITIONS:

The contractor is deemed to have visited the site of the work and ascertained therefore all site conditions and information pertaining to his work.

Before submitting the bid, all bidders will at their expenses make or obtain any additional information, investigations, explorations, test and studies and obtain any additional information and data which pertains to the physical conditions at or contiguous to the site or otherwise which may affect cost, progress, performance of the work and which the bidder deems necessary to determine its Bid for performing the work in accordance with the time and other terms and conditions of the tender/contract documents.

The company shall not accept any claim whatsoever arising out of the difficult site/terrain/local conditions, if an

4 LANGUAGE AND MEASUREMENT:

The CONTRACT issued to the contractor by the company and all correspondence and documents relating to the CONTRACT placed on the Contractor shall be written in English language.

Metric System shall be followed for all dimension, units etc.

5 SCOPE OF WORK:

The scope of work under this contract shall include the turnkey execution on End to End Basis, including but not limited to design, manufacturing, inspection & testing, dispatches, loading, unloading ,storage at site, erection & installation, testing of the installation, associated civil work ,commissioning ,handing over to the purchaser including comprehensive marine cum storage cum erection Insurance (MSE) on "Single Point Responsibility Basis

Package Name	Total Months for Handing over of the Package, From Zero Date	Total No. of Day for Handing over of the Package From Zero Date
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TURNKEY PACKAGE FOR SUPPLY, LAYING, JOINTING, TESTING AND COMMISSIONING OF 33KV 3X400 SQ MM XLPE INSULATED CABLES WITH REQUIRED ACCESSORIES AS PER THE SCOPE OF WORK	5 months	150 days
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Brief Scope of Work related to Erection and Installation work including testing and commissioning and final handover for the above packages shall be as per the NIT conditions with the following salient details.

5.1 Survey, design, engineering, manufacture, shop testing, inspection, packing, dispatch, loading, unloading and storage at site including comprehensive SCE (Storage cum Erection) insurance, assembly, erection, civil structural, architectural work, complete pre-commissioning checks, testing & commissioning at site, also includes all statutory clearances & certification from Electrical Inspector, Municipal corporation department, Fire officer, Horticulture department , various local bodies like RWA and handing over to the Owner after satisfactory commissioning of complete Packages as defined above for **Cable In feed on Turnkey Basis.**

- Schedule of work shall be as mentioned in the Bill of quantity attached herewith.
- After completion of Erection, Testing & Commissioning of the package awarded, contractor has to obtain the Electrical Inspectorate's Clearance from the Electrical Inspector of BYPL.
- Contractor shall arrange any permission like Road cutting clearance etc. from the Delhi Civic authorities. All Statutory charges and direct fees shall be borne by BYPL.
- All the Labour, plant appliance, ladder, scaffoldings, materials, tool, tackles etc are included in your scope of work.
- Adequate number of engineers, supervisors and labours shall be posted at site and the list of the same along with certificate of Qualification of technical staff should be submitted by the Contractor to the Engineer In Charge for checking the adequacy immediately (within seven days) after award of contract. Detailed Organisation chart, along with the qualification of the manpower to be deployed shall submitted along with Bid.
- The Contractor shall also make his own arrangement for the accommodation/conveyance requirements for its staff at site.
- Contractor shall arrange storage for storing the materials, tools, tackles etc. Contractor shall be responsible for all the unloading of the material, marking, staking and storage at site. The insurance for all the storage material shall be included in the policy taken by Contractor. Contractor shall submit the copy of insurance policy to BYPL. In case of any mishappening/damage to the storage material contractor shall be responsible to lodge the claim. Under no circumstances no delay in execution shall be allowed and contractor shall immediately arrange for the replacement without waiting for the settlement.

- All the incoming and outgoing materials, equipment, tools, tackles and any other items related to said work shall be entered into the register kept for this purpose and shall be in the custody of Contractor, however company does not hold any responsibility for any loss or damage of Contractor's material etc.
- All loading/unloading, of materials at work-site shall be contractors responsibility. Involvement of Crane/Hydra/Tractor/Trailer for this type of work shall be in contractors scope. Adequate weather protection shall be provided by the contractor to keep the materials safe from sun & rain by providing covered storage space as well as using tarpaulins.

While carrying out trenchless / open digging works the existing underground cables are liable to get damaged leading to High Risk Safety Hazard to the working people.

To arrest above problem to the best degree possible, there are technology support available, like Cable Route Tracer which is an important tool to detect the live / dead cables underground to the depth upto 3 meters, comfortably. The vendor must employ Cable Route Tracer before start of excavation / trenchless job and submit reports to the Engineer-in-charge for clearance to start the job. The above will minimize the risk of cable damage and improve safety of the working people.

It may please be noted that in case bidders have no "Cable Route Tracers" with him, as a basic necessity tool. Heavy penalty will be imposed on the vendors, if the vendor damages the cables. The cable route tracer shall be of approved make of BYPL.

Special Instruction for cable laying related works:-

- a. Contractor need to conduct sheath voltage test after finishing the cable laying to check integrity of outer sheath in presence of project engineer.
- b. All cable laying tools and tackles and testing equipment shall be available with contractor in event of order.
- c. Contractor shall submit copy of cable laying schedule to BSES in event of order so that quality checks can be done on sample basis.

6 CONTRACT RATES:

The rates finalized for this order shall be firm for the entire duration of work carried out by the Contractor under the order and are not subject to any variation and escalation for any reason whatsoever.

The cost of insurance during loading/unloading of materials/ equipments during its storage and handling/erection at site for installation is included in the contractor's scope and value is included in the unit rates finalized.

The unit rates finalized are also inclusive of barricading and watch & ward during execution and no separate charges shall be paid for the same.

The cost of training of BYPL Official shall be included in the prices quoted by vendor.

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7 TAXES AND DUTIES:

Prices are inclusive of all taxes and duties including labour cess.

However, IT as per applicable rate will be deducted from your bills as Tax Deduction at Source (TDS).

GST is included in the contract price awarded , however GST payment shall be made on submission of GST Registration and self declaration on your letter head stating that contractor have deposited/or will deposit the Tax as per the applicable GST laws. Contractor shall furnish your GST registration number.

Any statutory variations i.e. increase/decrease in Taxes / Duties introduces by central Govt. / State Govt. of shall be reimbursed/recovered to/from Contractor against documentary evidence and proof.

Any variation in taxes shall be applicable only to the direct/price breakup as mentioned in the contract.

CHANGE OF LAW:

"Change in Law" means:

- a) any enactment or issue of any new Applicable Law,
- b) any amendment, alteration, modification, or repeal of any existing Applicable Law or any new or modified directive or order there under,
- c) any change or variation in taxes payable in connection with and under this Agreement in each case with respect to a), b), and c) above coming into effect after the date of this Agreement.

8 ACCOMODATION & CONVEYENCE FOR THE STAFF:

The Contractor shall also make his own arrangement for the accommodation/conveyance requirements for its staff at site.

9 STORAGE AT SITE:

Contractor shall arrange the storage at site with the adequate open space / closed storage for contractor's site store for storing the materials, tools, tackles etc.

All the Contractor's storage will be within the site premises. All the incoming and outgoing materials, equipment, tools, tackles and any other items related to said work shall be entered into the register kept for this purpose and shall be in the custody of Contractor, however company does not hold any responsibility for any loss or damage of Contractor's material etc. All loading/unloading, of materials at work-site shall be your responsibility. Involvement of Crane/Hydra/Tractor/Trailer for this type of work shall be in your scope.

Adequate weather protection shall be provided by the contractor to keep the materials safe from sun & rain by providing covered storage space as well as using tarpaulins.

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Water and Electricity Power shall be arranged by the Contractor at his own. The cost of insurance during loading/unloading of materials/ equipments during its storage and handling/erection at site for installation is included in the contractor's scope and value is including in the above mentioned

Tender value. The unit rates mentioned in annexure is inclusive of barricading and watch & ward during execution and no separate charges shall be paid for the same.

10 SECURITY, WATCH & WARD:

The contractor, at his own cost, shall arrange for the security and watch and ward of the materials, men and machineries at site. Round the clock security alongwith the CCTV shall be provided for the materials stored at the site.

11 DEFECT LIABILITY PERIOD:

Work executed shall be guaranteed against any defect or failure which may arise due to faulty materials, design or workmanship for a period of Twenty Four (24) months from the date of final handing over of the entire package as defined in SCC. If during the Defect Liability Period any works are found to be defective, shall be immediately rectified or repaired, upto BYPL satisfaction, by the contractor at his own cost within Ten (10) days from the date of receipt of intimation from BYPL.

Under no circumstances any extra claim in terms of time and cost shall be entertained for such repair/rectification.

12 PERFORMANCE GUARANTEE:

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

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

12.03 Contractor shall submit the workmanship / equipment performance bank guarantee equivalent to the 10% of the contract value at the time of claiming the last payment as per TERMS OF PAYMENT (Erection, Testing & Commissioning)), with the validity of the bank guarantee till Defect Liability Period i.e. 24 months from the date of Handing over of entire package plus 3 months.

13 COMPLETION PERIOD:

Contractor is required to mobilize your manpower and Tools & Tackles and furnish a list of equipments to be used for erection and commence the execution activity as per instructions of Engineer In-charge. The detailed schedule and milestone completion dates would be as per the contract schedules given from time to time by Engineer In-charge at site.

The time schedule for carrying out this work and period for mobilization shall be as under:

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13.1 The Contractor's team should be mobilized at site for commencement of work immediately on receipt of the order.

13.2 The entire work under this order as indicated in the scope of work shall be carried out and completed within 150 days for entire package as defined in SCC. Total completion schedule for Engineering, manufacturing, inspection & testing, packing and forwarding and Transportation till site and Erection Testing & Commissioning shall be as per the milestones timelines defined in SCC.

13.3 A detailed L2 Schedule shall be submitted by the supplier within Fifteen (15) days of LOI. The contractor shall plan parallel working (round the clock working) for completion of work as per schedule and mobilize manpower accordingly.

13.4 Progress Review Meeting between the Contractor and the Engineer In charge shall be held at site at least once in a week. Also a weekly progress report giving the details of the manpower engaged at site and the details of the major job completion shall be submitted to Engineer In-charge.

13.5 The above time schedule must be strictly adhered to and improved upon wherever possible. In the event we find that your work is not progressing in quality or time frame as per above agreed schedule and to our satisfaction, we reserve the right to withdraw the work in whole or in part without further notice and liability of the Company.

13.6 The completion of the work shall have to be certified by Engineer In charge.

13.7 In order to maintain the time schedule, if necessary the Contractor shall carry out the work on all Sunday & Holiday except National Holiday with prior written permission from Engineer-in-Charge.

14 CLEANLINESS & PRECAUTIONS AT SITE:

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.

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

14.1 No construction material/ debris shall be stored on metalled road.

14.2 Wind breakers of appropriate height on all sides of ear marked area using CGI sheets shall be raised to ensure that no construction material dust fly outside ear marked area.

14.3 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.

14.4 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.

14.5 Over loading of vehicles shall be strictly prohibited.

14.6 The construction material at site shall be stored under wet and covered condition.

14.7 The dumping sites for temporarily storing the excavated earth shall be properly levelled, watered and rehabilitated by plantation to avoid flying of dust.

14.8 The worker at the site shall be sensitized to adopt / observe the dust controlled measures in true spirit.

14.9 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.

14.10 Wet jet in grinding and stone cutting is being permitted at site.

14.11 The necessary record for dust control is being maintained by the department on day to day basis and being monitored regularly.

14.12 Bidder shall ensure that no tree shall be harmed and no tree roots shall be destroyed/cut while performing the task under contract.

14.13 Bidder shall comply the provisions of The Delhi Preservation of Trees Act 1994.

14.14 Guidelines regarding inspection & maintenance of PITS/DUGS while doing work at site in BYPL Area. The contractor shall ensure strict compliance of the following directions:

- i. The sites of all manholes, pits, holes, tanks or any other opening in the ground of any kinds shall be regularly inspected and maintained.
- ii. Schedule and protocols of inspections and maintenance shall be drawn up and notified to BYPL.
- iii. These sites shall be cordoned off to render them inaccessible to the public.
- iv. The existence of these sites shall be clearly & visibly marked by the display of signboards/ signages.
- v. If they are required to be covered, it shall be ensured that the covers are in place.
- vi. If required, as per law, prior permission from authorities shall be secured before the commencement of work.
- vii. Bidder shall follow all law of the land and prevailing borders issued by various Govt departments like Dept of Power / DERC /NGT/ Dept of forest /Dept of environment/DPCB/Court Orders etc.

14.15 The Execution vendors 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 action by the authorities, The Agency shall indemnify BYPL from all liabilities on this account.

15 COMMISSIONING & ACCEPTANCE TEST:

After completion of the work, the Contractor shall conduct trial run/ operation in the presence of Engineer In charge. During such trial run the system shall be operated under the supervision of the Contractor. If any rectification/modification required during this period the Contractor shall do all necessary measures.

On satisfactory completion of above, the system shall be deemed to have energized and placed in commercial operation. The Engineer In Charge will issue an acceptance certificate.

16 WORK COMPLETION CERTIFICATION, HANDING OVER:

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.

The contractor shall be solely responsible for any shortage or damage of materials issued to them handling of and / or in storage and erection at site and cost of the same will be recovered from the contractor as certified by Engineer In-Charge. Contractor must submit a periodical material reconciliation statement in the approval format with every Running Bill raise by him or end of every month whichever is earlier. The contractor shall maintain an accurate and exhaustive record detailing out the list of all items received by him for the purpose of erection and keep such record open for the inspection of the company.

17 PENALTY AND LIQUIDATED DAMAGES

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

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

18 SAFETY CODE:

The Contractor shall ensure adequate safety precautions at site as required under the law of the land and shall be entirely responsible for the complete safety of their workman as well as other workers at site and premises. The contractor shall not deploy any worker below the age of 18 years.

The contractor shall observe the safety requirements as laid down in the contract and in case of sub-contract (only after written approval of company); it shall be the

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responsibility of main contractor that all safety requirements are followed by the employees and staff of the sub-contractor.

The contractor employing two hundred employees or more, including contract workers, shall have a safety coordinator in order to ensure the implementation of safety requirements of the contract and a contractor with lesser number of employees, including contract workers, shall nominate one of his employees to act as safety coordinator who shall liaise with the safety officer on matters relating to safety and his name shall be displayed on the notice board at a prominent place at the work site.

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

In case of any accident, the contractor shall immediately submit a statement of the same to the owner and the safety officer, containing the details of the accident, any injury or casualties, extent of property damage and remedial action taken to prevent recurrence and in addition, the contractor shall submit a monthly statement of the accidents to the owner at the end of each month.

19. STATUTORY OBLIGATIONS:

The Contractor shall take all steps as may be necessary to comply with the various applicable laws/rules including the provisions of contract labour (Regulation & Abolition Act) 1970 as amended, minimum wages Act, 1948, Workman Compensation Act, ESI Act, PF Act, Bonus Act and all other applicable laws and rules framed there under including any statutory approval required from the Central/State Govt. Ministry of Labour. Broadly, the compliance shall be as detailed below, but not limited to:

- a) An Electrical license issued by Govt. of Delhi.
- b) PF Code No. and all employees to have PF A/c No. under PF every Act, 1952.
- c) All employees to have a temporary or permanent ESI Card as per ESI Act.
- d) ESI Registration No.
- e) PAN No.
- f) Work Contract Tax Registration Number/ GSTN Registration. g) Labour License under Contract Labour Act (R & A) Act 1970

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

The Contractor must follow:

- a) Third party Insurance Policy before start of work.
- b) To follow Minimum Wages Act prevailing in the state.
- c) Salary / Wages to be distributed in presence of representative of Company's representative not later than 7th of each month.
- d) To maintain Wage- cum - Attendance Register.
- e) To maintain First Aid Box at Site.
- f) Latest P.F. and E.S.I. challans pertaining to the period in which work was undertaken along with a certificate mentioning that P.F. and E.S.I. applicable to all

the employees has been deducted and deposited with the Authorities within the time limits specified under the respective Acts.

g) Workman Compensation Policy. {If applicable}

h) Labour license before start of work. {If applicable}

20. WORKMAN COMPENSATION:

The Contactor shall take insurance policy at his own cost under the Workman Compensation Act to cover such workers who are not covered under ESI and PF by the Contractor however engaged to undertake the jobs covered under this order and a copy of this insurance policy will be given to Company for reference and records. This insurance policy shall be kept valid at all times. In case there are no worker involve other than those who are covered under ESI and PF by the Contractor, the Contractor shall certify for the same,

The contractor shall keep the company indemnified at all times, against all claims of compensation under the provision of Workmen Compensation Act 1923 and as amended from time to time or any compensation payable under any other law for the time being workman engaged by the contractor/sub-contractor/sub-agent in carrying out the job involved under this work order and against costs and expenses, if any, incurred by the company in connection therewith and without prejudice to make any recovery.

The company shall be entitled to deduct from any money due to or to become due to the Contractor, moneys paid or payable by way of compensation as aforesaid or cost or expenses in connection with any claims thereto and the Contractor shall abide by the decision of the Company as to the sum payable by the Contractor under the provisions of this clause.

21. STAFF AND WORKMAN:

It shall be responsibility of contractor

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

b) To obtain workman insurance cover against deployment of workers etc.

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

a) Register of workmen.

b) Register of muster roll.

c) Register of overtime.

d) Register of wages.

e) Any other register as per latest amendment Labour Act.

The records shall be in the prescribed formats only.

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

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

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

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

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

22. HUMAN RESOURCE ISSUES:

22.1 The CONTRACTOR would execute these works through their own resources.

22.2 The CONTRACTOR shall bear all expenses/cost to be incurred towards salary, allowances, perks, traveling allowances, advances, insurance, safety measures, security, transportation and all other misc. expenses etc. of their employees/ workmen during the tenure of AMC. Also, the CONTRACTOR shall be sole responsible for making payment for Out-patient department, Hospitalization, Compensation thereof in case of any accident, injury or death.

22.3 ID CARD: No contractor will issue any ID cards to their staff on their own .All ID Cards for the workforce will be issued by BYPL Security ID Card Cell only. Contractors should maintain the records of Identity Cards of their employees and whenever any employee quits / is removed then his/her Identity card should be collected & submitted to BYPL Security ID Card Cell. Penalty will be imposed on the vendor in case of violation of the above rule. Contractors shall submit the detail list of the employees that they are going to be hire to BYPL Security before start of the contract.

22.4 The CONTRACTOR to deploy their manpower immediately for carrying out the work as specified above.

22.5 The CONTRACTOR should ensure that there are no disputes regarding service, payment etc of the persons engaged by him, anytime during the currency of the contract. At no point of time during the currency of contract, the CONTRACTOR's

employees shall insist upon the COMPANY for employment, wages, and allowances or any other related matter, payment etc.

22.6 The CONTRACTOR shall not deploy the manpower below the age of 18 years.

22.7 The CONTRACTOR shall not deploy the female manpower between 7 PM to 6 AM.

22.8 The CONTRACTOR shall be directly responsible for any / all disputes arising between him and his persons and keep the COMPANY indemnified against all losses, damages and claims arising thereof. The CONTRACTOR shall resolve any dispute of their manpower. All the legal dues of their manpower is to be paid on due date or within 8 days on the termination of manpower.

22.9 All safety wears required for the CONTRACTOR's manpower during the execution of work such as safety shoes, safety helmets, hand gloves, safety belt, goggles etc. must be provided by the CONTRACTOR at his own cost and he shall ensure that his employees regularly use such safety gears while executing COMPANY's work.

22.10 The CONTRACTOR shall be responsible for discipline of his manpower and shall adhere to the disciplinary procedure set by the COMPANY at site. The COMPANY shall be at liberty to object to the presence of any representative or employees of the CONTRACTOR at the site, if in the opinion of the COMPANY such manpower has done any act of misconduct or negligence or otherwise undesirable, then the CONTRACTOR shall remove such a person objected to and provide a competent replacement immediately.

22.11 The CONTRACTOR shall ensure that he has complied with the following:

- has paid minimum wages to his manpower as per the rate notified from time to time by the Government of National Capital Territory of Delhi.
- Contractor shall disburse the salary of his staff through ECS only.

22.12 Deduct and deposited ESI and PF contribution. Copies of the same shall be submitted.

22.13 The COMPANY reserves the right to demand the CONTRACTOR's services on holidays as well as beyond the normal working hours. The Engineer In-charge shall communicate in writing for any work required to be done during Holidays.

22.14 The CONTRACTOR will ensure that none of their person is engaged in any unlawful activities subversive of the COMPANY's interest failing which suitable action may be taken against the CONTRACTOR as per the terms and conditions of this tender.

22.15 The CONTRACTOR shall be liable for payment of all taxes and duties as applicable, to the State/ Central Govt. or any local authority.

22.16 The CONTRACTOR's employees shall not be treated as COMPANY's employees / persons for any purpose whatsoever & facilities/ benefits applicable to the COMPANY's employees shall not be applicable to CONTRACTOR's employees. If due to any reasons whatsoever the COMPANY is made liable to meet any obligation under any of the laws & enactment etc, for any reason whatsoever the same shall be recovered from the CONTRACTOR or from any of the bills payable to him or failing which it shall be recovered as per law.

22.17 The CONTRACTOR shall be responsible and shall comply with the provision of all the STATUTORY ACTS APPLICABLE. Special attention of the CONTRACTOR is drawn towards the compliance of provision of the following statutes: (along with the latest amendments/additions):

- 22.17.1 The Child Labour (Prohibition and Regulation) Act, 1986.
- 22.17.2 The Contract Labour (Regulation and Abolition) Act, 1970.
- 22.17.3 The Employee's Pension Scheme, 1995.
- 22.17.4 The Employee's Provident Funds and miscellaneous provisions Act, 1952.
- 22.17.5 The Employees State Insurance Act, 1948.
- 22.17.6 The Industrial Disputes Act, 1947.
- 22.17.7 The Maternity Benefit Act 1961.
- 22.17.8 The Minimum Wages Act, 1948.
- 22.17.9 The Payment of Bonus Act, 1965.
- 22.17.10 The Payment of Gratuity Act, 1972.
- 22.17.11 The payment of Wages Act, 1936.
- 22.17.12 The Delhi Shops & Establishment Act, 1954.
- 22.17.13 The Workmen's Compensation Act. 1923.
- 22.17.14 The Employer's Liability Act, 1938.

The Contractor shall furnish the above specified compliances as per the format attached as Annexure I.

Contractor shall adhere to the Vendor Code of Conduct as specified in the NIT.

23. INSURANCE:

23 a) THIRD PARTY INSURANCE:

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

23 b) ACCIDENTAL INSURANCE POLICY FOR LIFE COVER:

Before commencing the execution of the work the CONTRACTOR shall take Accidental insurance policy for the staff engaged by him for this work to insure against any loss of life which may occur during the contract for the work of the COMPANY. The policy shall have coverage of Rs. 10 Lacs (Table C- Death + Permanent Total Disability + Partial permanent Disability due to external accidents). The Contractor shall be responsible for on the spot same day claim settlement with the victim's legal heirs without waiting for settlement by insurance claim without any

liability on BYPL. The premium amount for such life cover policy shall be borne by the contractor. The contractor shall furnish copy of policy when demanded by BYPL.

23 C) INSURANCE FOR MAN, MATERIAL & MACHINERY DEPLOYED AT SITE:

Contractor shall be responsible for the insurance for his own man , material and machinery deployed at site for the package awarded. Contractor shall furnish the copy of this insurance policy to the purchaser, prior start of work.

24. SECURITY:

Adequate number of trained Security Guards shall be deployed both at the storage yard and stores as well as places of work to prevent theft and pilferage of material and accessories and various other materials. All security rules and safety rules enforced at site by company shall be strictly observed.

25. ENVIRONMENTAL, HEALTH & SAFETY PLAN:

Contractor will make ensure that the Environment, Health & Safety (EHS) requirements are clearly understood and faithfully implemented at all levels at site as per instruction of Company. Contractors must comply with these requirements:

- a) Comply with all of the elements of the EHS Plan and any regulations applicable to the work
- b) Comply with the procedures provided in the interests of Environment, Health and Safety
- c) Ensure that all of their employees designated to work are properly trained and competent
- d) Ensure that all plant and equipment they bring on to site has been inspected and serviced in accordance with legal requirement and manufacturer's or suppliers' instructions
- e) Make arrangements to ensure that all employees designated to work on or visit the site present themselves for site induction prior to commencement of work
- f) Provide details of any hazardous substances to be brought onsite
- g) Ensure that a responsible person accompanies any of their visitors to site

All contractors staff is accountable for the following:

1. Use the correct tools and equipment for the job and use safety equipment and protective clothing supplied, e.g. helmets, goggles, ear protection, etc. as instructed
2. Keep tools in good condition
3. Report to the Supervisor any unsafe or unhealthy condition or any defects in plant or equipment
4. Develop a concern for safety for themselves and for others
5. Prohibit horseplay

6. Not to operate any item of plant unless they have been specifically trained and are authorized to do so.

26. TEST CERTIFICATE & QUALITY ASSURANCE:

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

27. SUB-CONTRACTING / SUBLETTING:

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

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

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

28. INDEMNITY:

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

- a) any breach non-observance or non-performance by contractor or its employees or agents of any of the provisions of this Work Order.
- b) any act or omission of contractor or its employees or agents.
- c) any negligence or breach of duty on the part of contractor, its employees or agents including any wrongful use by it or them of any property or goods belonging to or by COMPANY.
- d) The vendor shall submit an Indemnity Bond against any damages / loss of free issued materials.

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

29. EVENTS OF DEFAULTS:

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

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

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

30. RISK & COST:

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

31. ARBITRATION:

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

32. SECRECY CLAUSE:

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

order shall be the Company's executive property and shall not be used for any other purpose except for the execution of the work order. The technical information drawing, records and other document shall not be copied, transferred, or divulged and/ or disclosed to third party in full/part, not misused in any form whatsoever except to the extent for the execution of this work order.

These technical information, drawing and other related documents shall be returned to the Company with all approved copies and duplicates including drawing/plans as are prepared by the Contractor during the executions of this work order, if any, immediately after they have been used for agreed purpose.

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

33. TERMINATION DUE TO NON PERFORMANCE:

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

34. TERMINATION BY EMPLOYER CONVENIENCE:

The owner at any time terminate the contract for any reason, by giving the contractor a notice of termination. Upon receipt of the notice of termination, the contractor shall either within 14 days of receipt of such notice, or on the date specified in the notice of termination, carry out the following : Cease all further work, except for such work as the owner may specify in the notice of termination for the sole purpose of protecting that part of the facilities already executed, or any work required to leave the site in a clean and safe condition.

- Terminate all subcontracts, except as mentioned below.
- Remove all Contractor's equipment from the site, repatriate the contractor's and its sub-contractor's personnel from the site, remove from the site any wreckage, rubbish and debris of any kind, and leave the whole of the site in a clean and safe condition.
- Deliver to the owner the parts of the facilities executed by the contractor up to date of termination.
- To the extent legally possible, assign to the owner all right , title and benefit of the contractor to the facilities and to the plant and equipment as at the date of termination, and as may be required by the owner, in any subcontracts concluded between the contractor and its sub-contractors.
- Deliver to the owner all non-proprietary drawings, specifications and other documents prepared by the contractor or its sub-contractors as at date of termination in connection with the facilities. In the event of termination of the contract by the owner,

under this clause, the owner shall pay to the contractor the following amounts after setting off the owner's claim if any under the contract:

- a) The contract price, properly attributable to the parts of the facilities executed by the contractor as of the date of termination.
- b) The costs reasonably incurred by the contractor in the removal of the contractor's equipment from the site and in the repatriation of the contractor's and its sub contractors personnel.
- c) Pre- approved and reasonable cost of satisfying all other obligations, commitments and claims that the contractor may in good faith have undertaken with third parties in connection with the contract and that are not covered above.

35. QUALITY:

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

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

The contractor shall submit SQP indicating Customer Holding Point for design, manufacture, inspection, testing, packing, forwarding, transportation including shop painting and final painting for Purchaser's review and approval.

The contractor shall submit Field Quality Assurance and Filed Quality Control Plan (FQP) indicating Customer Hold Point for unloading, receiving, storage at site, transportation, handling at site, erection, testing, pre-commissioning & commissioning for Purchaser's review and approval as per applicable provisions of Technical Specifications.

The Contractor shall submit a Field Erection Procedure for the scope of work under the Contract Agreement. The same shall be subject to the approval of the Purchaser and the work shall be carried out in accordance with such approved procedures.

36. CONSTRUCTION WATER & POWER:

Construction Water and power shall be arranged by Contractor at his own cost.

37. PROGRESS REPORTS OF WORK EXECUTION:

During the various stages of manufacturing and erection of the critical equipments in the pursuance of the Contract, the Contractor shall at its own cost submit periodic progress reports as may be reasonably required by the Purchaser with such materials as charts, networks, photographs, test certificates, etc. Such progress reports shall be in the form and size as may be required by the Purchaser and shall be submitted in adequate number of copies to be notified by the Purchaser

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The quantitative progress report of the works by reference to the project schedule in sufficient detail should permit the Purchaser to assess performance, plan witness dates and evaluate forecasts, including reports on key Sub-contracts (as applicable). Within 7 days of the submission of each such report and at such other times as the Purchaser may reasonably request, the Contractor and the Purchaser shall meet to discuss progress.. Weekly progress reports shall include the following sections:

- a) Executive summary
- b) Description of the work and services performed and goods and materials delivered and erected during the preceding week.
- c) 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.
- d) 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.
- e) Identification of areas with foreseeable problems which in the opinion of the contractor may affect the project schedule.
- f) 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.

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 to whom they are to be sent. Purchaser will also advise the contractor regarding the format of the Monthly Progress report.

38. FREE ISSUES OF MATERIAL AND /OR EQUIPMENT:

The Purchaser issued Free Issue Material/Equipment to Vendor in order that Vendor may fulfill its obligations under the Agreement, shall remain the property of Purchaser and shall be clearly labelled as such by Vendor until delivery of the completed Goods in accordance with the terms of the Agreement. Risk of loss in respect of all such Free Issue Items shall pass to Vendor upon receipt of such items by Vendor and remain with Vendor until delivery of the completed Goods to Purchaser in accordance with the terms of the Agreement. Vendor shall maintain all such Free Issue Items in good condition and shall use them solely in connection with the requirements of the Agreement. Disposal of surplus items shall be in accordance with written instructions from Purchaser. The vendor shall submit an Indemnity Bond to this effect, as per the format.

39. PROTECTION OF PROPERTY:

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The Contractor shall be responsible for any damage resulting from his operation. He shall also be responsible for protection of all persons including members of public; and employees of the PURCHASER & the PURCHASER; employees of the Contractors & Subcontractors; and all public and private property including structures, buildings, other plants and equipment and utilities either above or below the ground.

The Contractor shall ensure provision of necessary safety equipment such as barriers, sign boards, warning lights and alarms, etc to provide adequate protection to persons and property. The Contractor shall be responsible to give reasonable notice to the PURCHASER & the PURCHASER of public or private property and utilities when such property and utilities are likely to get damaged or injured during the performance of his works and shall make all necessary arrangements with such PURCHASER, related to removal and/or replacement or protection of such property and utilities.

40. VARIATIONS / AMENDEMENTS:

Any additional work beyond the scope enumerated in the work order above shall be carried out as per the instructions of Engineer-In Charge. The company shall not entertain any claim or increase in the Work Order value due to execution of such additional work if the same is not approved by Engineer in Charge, in written form.

41. ACCEPTANCE

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

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

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

Annexure - I

The Contractor must submit the following to Engineer-In-Charge before commencement of work:

- a) An Electrical license. (If applicable)
- b) PF Code No. and all employees to have PF A/c No. under PF every Act, 1952.
- c) All employees to have a temporary or permanent ESI Card as per ESI Act.
- d) ESI Registration No. e) PAN No.
- f) Work Contract Tax/VAT Registration Number.
- g) Labor License under Contract Labor Act (R & A) Act 1970(All Engineer-in-charge responsible for execution of the job should obtain a copy of Labor License as per guidelines of HR department before start of the work by the contractor.)

The Contractor must follow:

- a) Third party Insurance Policy before start of work.
- b) To follow Minimum Wages Act prevailing in the state.
- c) Salary/ Wages to be distributed in presence of Company's representative not later than 7th of each month.
- d) To maintain Wage- cum - Attendance Register.
- e) To maintain First Aid Box at Site.
- f) Latest P.F. and E.S.I. challans pertaining to the period in which work was undertaken along with a certificate mentioning that P.F. and E.S.I. applicable to all the employees has been deducted and deposited with the Authorities within the time limits specified under the respective Acts.
- g) Workman Compensation Policy. (If applicable)
- h) Labor license before start of work. (If applicable)
- i) Group personnel accident insurance shall have coverage of Rs. 10 Lacs (Table C-Death + Permanent Total Disability + Partial permanent Disability due to external accidents).

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

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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	<ul style="list-style-type: none"> • 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	Idealy. Positioned sit strap for extended comfort.
Size	Standard
weight	1200GMS
ENERGY ABSORBING FORKED LANYARDS :	
Spec.	44mm wide polyamide webbing.

Length	1.5 Meter
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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

ENVIRONMENT, HEALTH & SAFETY CONDITIONS NIT NO: CMC/BY/22-23/RS/SKS/SV/69	Page 4 of 10	Bidders seal & Signature
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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:

1. Manufacturer Certificate
2. Test Certificate
3. 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 wavier 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.

13.5 Safety Head may impose penalty for serious violations directly.

13.6 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

ENVIRONMENT, HEALTH & SAFETY CONDITIONS NIT NO: CMC/BY/22-23/RS/SKS/SV/69	Page 9 of 10	Bidders seal & Signature
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Format for PPE's Receipt by workers

Name of Site -----

Division-----

Name of Contractor -----

S.N O.	NAME	DESI.	Safety Helmet	Electrical Insulating Hand gloves	Full Body Harness	Safety Shoes	Safety Goggle	Reflective Jacket	SIGNATU RE

Signature of Contractor / Date.....

APPENDIX II

(To be executed on a Non-Judicial Stamp Paper of appropriate value)

FORMAT OF ADVANCE BANK GUARANTEE

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

1. WHEREAS M/s BSES Yamuna Power Limited, a Company incorporated under the provisions of Companies Act, 1956 having its Registered Office at Shaktikiran Building, Karkardooma, Delhi 110032, India hereinafter referred to as the " Owner ", (which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns).
2. AND WHEREAS the Owner has entered into a contract for _____ (Please specify the nature of contract here) vide Contract No. _____ dated _____ (hereinafter referred to as the "Contract") with M/s. _____, (hereinafter referred to as "the Suppliers", 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 of the services on the terms and conditions as more particularly detailed therein.
3. AND WHEREAS in conformity with the provisions of clause _____ of conditions of Contract, the Suppliers has agreed to furnish a Bank Guarantee for an amount equivalent to the Advance Payment of Rs..... extended by the Owner to the Supplier for the faithful execution of the Contract.
4. AND WHEREAS the Suppliers have agreed to provide the Owner and the Owner has agreed to accept the Advance Bank Guarantee for _____ percent (____%) of the total Contract Value 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).
5. NOW THEREFORE, in consideration inter alia of the Owner granting the Suppliers the Contract, the Bank hereby unconditionally and irrevocably guarantees and undertakes, on a written demand, to immediately pay to the Owner any amount so demanded (by way of one or more claims) not exceeding in the aggregate [Rs.].....) *in words*) without any demur, reservation, contest or protest and/or without reference to the Supplier and without the Owner needing to provide or show to the Bank ,grounds or reasons or give any justification for such demand for the sum/s demanded.

6. The decision of the Owner as to whether the Supplier has fulfilled its obligation or not towards set-off of Advance Payment extended by the Owner to the Supplier shall be final and binding on the Bank and the Supplier. The Bank acknowledges that any such demand by the Owner of the amounts payable by the Bank to the Owner shall be final, binding and conclusive evidence in respect of the amounts payable by the Supplier to the Owner. Any such demand made by the Owner on the Bank shall be conclusive and binding, notwithstanding any difference between the Owner and the Supplier or any dispute raised, invoked, threatened or pending before any court, tribunal, arbitrator or any other authority.
7. The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor without proceeding against the Suppliers notwithstanding any other security or other guarantee that the Owner may have in relation to the Supplier's liabilities.
8. The Bank hereby waives the necessity for the Owner first demanding the aforesaid amounts or any part thereof from the Suppliers before making payment to the Owner and further also waives any right the Bank may have of first requiring the Owner to use its legal remedies against the Suppliers, before presenting any written demand to the Bank for payment under this Guarantee.
9. 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.
10. The Bank further unconditionally and unequivocally agrees with the Owner that the Owner shall be at liberty, without the Bank's consent and without affecting in any manner its rights and the Bank's obligation under this Guarantee, from time to time, to:
 - (i) vary and/or modify any of the terms and conditions of the Contract;
 - (ii) forebear or enforce any of the rights exercisable by the Owner against the Suppliers under the terms and conditions of the Contract; orand the Bank shall not be relieved from its liability by reason of any such act or omission on the part of the Owner or any indulgence shown by the Owner to the Suppliers or any other reason whatsoever which under the law relating to sureties would, but for this provision, have the effect of relieving the Bank of its obligations under this Guarantee.
11. This Guarantee shall not be discharged by any change in the constitution or composition of the Suppliers, and this Guarantee shall not be affected or discharged by the liquidation, winding-up,

bankruptcy, reorganisation, dissolution or insolvency of the Suppliers or any of them or any other circumstances whatsoever.

12. 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 obligations of the Suppliers under the Contract.
13. 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.
14. 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.
15. The Bank undertakes not to revoke this Guarantee during its validity except with the prior written consent of the Owner and agrees that any change in the constitution of the Bank or the Suppliers shall not discharge our liability hereunder.
16. Owner may assign this Guarantee to any Person or body whether natural, incorporated or otherwise under intimation to the Bank. The Bank shall be discharged of its obligations hereunder by performance in accordance with the terms hereof to such assignee without verifying the validity / legality / enforceability of the assignment.
17. This Guarantee shall be governed by the laws of India. Any suit, action, or other proceeding arising out of, connected with, or related to this Guarantee or the subject matter hereof shall be subject to the exclusive jurisdiction of the courts of **Delhi**, India.

Dated this day of 20XX at

(Signature)

.....

(Name)

.....

(Designation with Bank Stamp)

Attorney as per

Power of Attorney No.....

Date.....

APPENDIX II NIT NO: CMC/BY/22-23/RS/SKS/SV/69	Page 3 of 10	Bidders seal & Signature
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(To be executed on a Non-Judicial Stamp Paper of appropriate value)

FORMAT OF PERFORMANCE BANK GUARANTEE

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

1. WHEREAS M/s BSES Yamuna Power Limited, a Company incorporated under the provisions of Companies Act, 1956 having its Registered Office at Shaktikiran Building, Karkardooma, Delhi 110032, India hereinafter referred to as the " Owner ", (which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns).

2. AND WHEREAS the Owner has entered into a contract for _____(Please specify the nature of contract here) vide Contract No. _____dated _____(hereinafter referred to as the "Contract") with M/s._____, (hereinafter referred to as "the Supplier", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include each of their respective successors and assigns) for providing services on the terms and conditions as more particularly detailed therein.

3. AND WHEREAS as per clause ____of conditions of Contract, the Suppliers are obliged to provide to the Owners an unconditional bank guarantee for an amount equivalent to ten percent (10%) of the total Contract Value for the timely completion and faithful and successful execution of the Contract from [_____] *pl. specify the name of Bank*) having its head/registered office at [_____] through its branch in _____(*pl. specify the name of Branch through which B.G is issued*) hereinafter referred to as "the Bank", (which expression shall unless it be repugnant to the context or meaning thereof be deemed to include its successors and permitted assigns).

4. NOW THEREFORE, in consideration inter alia of the Owner granting the Suppliers the Contract, the Bank hereby unconditionally and irrevocably guarantees and undertakes, on a written demand, to immediately pay to the Owner any amount so demanded (by way of one or more claims) not exceeding in the aggregate [Rs.].....(*in words*) without any demur, reservation, contest or protest and/or without reference to the Supplier and without the Owner needing to provide or show to the Bank ,grounds or reasons or give any justification for such demand for the sum/s demanded.

5. The decision of the Owner to invoke this Guarantee and as to whether the Supplier has not performed its obligations under the Contract shall be binding on the Bank. The Bank acknowledges that any such demand by the Owner of the amounts payable by the Bank to the Owner shall be final, binding and conclusive evidence in respect of the amounts payable by the Supplier to the

APPENDIX II NIT NO: CMC/BY/22-23/RS/SkS/SV/69	Page 4 of 10	Bidders seal & Signature
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Owner. Any such demand made by the Owner on the Bank shall be conclusive and binding, notwithstanding any difference between the Owner and the Supplier or any dispute raised, invoked, threatened or pending before any court, tribunal, arbitrator or any other authority.

6. The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor without proceeding against the Suppliers notwithstanding any other security or other guarantee that the Owner may have in relation to the Supplier's liabilities.
7. The Bank hereby waives the necessity for the Owner first demanding the aforesaid amounts or any part thereof from the Suppliers before making payment to the Owner and further also waives any right the Bank may have of first requiring the Owner to use its legal remedies against the Suppliers, before presenting any written demand to the Bank for payment under this Guarantee.
8. The Bank's obligations under this Guarantee shall not be reduced by reason of any partial performance of the Contract. The Bank's obligations shall not be reduced by any failure by the Owner to timely pay or perform any of its obligations under the Contract.
9. The Bank further unconditionally and unequivocally agrees with the Owner that the Owner shall be at liberty, without the Bank's consent and without affecting in any manner its rights and the Bank's obligation under this Guarantee, from time to time, to:
 - (i) vary and/or modify any of the terms and conditions of the Contract;
 - (ii) Forebear or enforce any of the rights exercisable by the Owner against the Suppliers under the terms and conditions of the Contract; or
 - (iii) Extend and/or postpone the time for performance of the obligations of the Suppliers under the Contract;

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

10. This Guarantee shall be a continuing bank guarantee and shall not be discharged by any change in the constitution or composition of the Suppliers, and this Guarantee shall not be affected or discharged by the liquidation, winding-up, bankruptcy, reorganisation, dissolution or insolvency of the Suppliers or any of them or any other circumstances whatsoever.

11. This Guarantee shall be in addition to and not in substitution or in derogation of any other security held by the Owner to secure the performance of the obligations of the Suppliers under the Contract.
12. NOTWITHSTANDING anything herein above contained, the liability of the BANK under this Guarantee shall be restricted to _____ (*insert an amount equal to ten percent (10%) of the Contract Value*) and this Guarantee shall be valid and enforceable and expire on _____ (*pl. specify date*) or unless a suit or action to enforce a claim under this Guarantee is filed against the Bank on or before the date of expiry.
13. On termination of this Guarantee, all rights under the said Guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities hereunder.
14. The Bank undertakes not to revoke this Guarantee during its validity except with the prior written consent of the Owner and agrees that any change in the constitution of the Bank or the Suppliers shall not discharge our liability hereunder.
15. Owner may assign this Guarantee to any Person or body whether natural, incorporated or otherwise under intimation to the Bank. The Bank shall be discharged of its obligations hereunder by performance in accordance with the terms hereof to such assignee without verifying the validity / legality / enforceability of the assignment.
16. This Guarantee shall be governed by the laws of India. Any suit, action, or other proceeding arising out of, connected with, or related to this Guarantee or the subject matter hereof shall be subject to the exclusive jurisdiction of the courts of **Delhi**, India.

Dated this day of 20XX at

(Signature)

.....

(Name)

.....

(Designation with Bank Stamp)

Attorney as per

Power of Attorney No.....

Date.....

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BANK DETAIL 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

BSEES

FORMAT OF WARRANTY/GUARANTEE CERTIFICATE

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

Ref. Purchase Order No. :

Dear Sir,

We hereby confirm that the.....dispatched to BSES YAMUNA POWER LTD vide invoice no.....
DT.....is exactly of the same nature and description as per above mentioned Purchase Order.

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

Vendors Name & Signature

FORMAT OF WARRANTY / DEFECT LIABILITY PERIOD –SERVICE

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.

Vendors Name & Signature

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FORMAT OF NO DEMAND CERTIFICATE

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

To ,

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

Name of the Project:

Contract No.:

Date of Contract:

Name of the Contractor:

We, M/s _____(Contractor) do hereby acknowledge and confirm that we have claimed Rs. _____ (Rs. _____) towards full

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

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

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

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

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

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

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

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

Date:

Place:

Signature:

Name:

Designation:

(Company Seal)

FORMAT FOR LETTER OF INDEMNITY

Format for Letter of Indemnity

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

Place: _____

Date: _____

To,

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

Dear Sirs,

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

For _____

Settlement of Dues

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

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

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

We _____,

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

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

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

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

Yours faithfully,

For M/s _____

Authorized Signatory

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BSEES

PRICE BID FORMATS (SUPPLY & SERVICES)

PRICE BID NIT NO: CMC/BY/22-23/RS/SkS/SV/69	Page 1 of 14	Bidders seal & Signature
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GRAND SUMMARY OF THE QUOTED PACKAGE(S)

ALL PRICES IN INR (₹)

Package Name/Description	Supply Prices - Landed (A)	Services Prices - Landed (B)	Total Prices - Landed (C=A+B)
Package A, B & C			
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) 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.
- 2) 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) The bidder shall, at its own, handle all imported equipment's and handle all formalities for custom clearances, port charges, etc if any
- 4) 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.
- 5) 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.
- 6) Insurance as per the clause defined in SCC and other contract conditions, is included in the quoted prices. However Bidder shall indicate the value of the insurance taken, separately.
- 7) Site visit is advisable prior to submission of quotation.

PRICE BID NIT NO: CMC/BY/22-23/RS/SkS/SV/69	Page 2 of 14	Bidders seal & Signature
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PRICE FORMAT – SUPPLY (Kindly refer detailed package wise SCOPE OF SUPPLY attached as Volume II for Indicative Description of Goods/BOM, BOQ)

S. No.	DESCRIPTION OF GOODS	HSN CODE (8 Digit Mandatory)	UoM	Dev Ngr to SRD (A)	Preet Vihar to C-Block KRN (B)	Vivek Vihar - Preet Vihar OH-UG (C)	TOTAL (D=A+B+C)	UNIT BASIC PRICE (₹) (E)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (₹) (F)	UNIT LANDED COST (₹) (G = E+F)	TOTAL LANDED COST (₹) (H = GXD)
1	Cable 33 kV 3Cx400 sq mm (2 runs)		Km	6.00	8.00	2.80	16.80				
2	Cable End Termination kit for GIS panel suitable for 33 kV 3Cx400 sq mm cable		No's	4	4	-	8				
3	Cable End Termination kit for AIS panel suitable for 33 kV 3Cx400 sq mm cable (Make - Raychem/3M)		No's	2	-	-	2				
4	Cable End Termination kit outdoor Suitable for 33 kV 3Cx400 sq mm cable (Make-Raychem/3M)		No's	-	-	4	4				
5	Cable straight through joint kit Suitable for 33 kV 3Cx400 sq mm cable(Make-Raychem/3M)		No's	30	40	14	84				
6	Line Differential cum distance relay		No's	4	-	-	4				
7	Patch Cord		No's	10	-	-	10				
8	Precast RCC (1:2:4) cable cover 600x550x50 mm		No's	3,250	4,333	1,517	9,100				

9	HDPE PIPE 200 MM Dia PN6 PE 80 with collar	Km	1.8	2.4	0.8	5.0				
10	Weather and acid resistant PVC warning tape of 150mm width 300 micron thick Yellow colour with desired Red/Black lettering	Km	2.1	2.8	1.0	5.9				
11	Route indicating stone at every 50 meter circuit length	No's	60	80	28	168				
12	Joint indicating stones at every cable joint location	No's	30	40	14	84				
13	Galvanized channel, angel and other structural steel including nuts & bolts for all structures including cable support structure, drain crossing structure etc	Kg	200	200	500	900				
14	Fine Sand	Cubic meter	377	507	177	1,061				
15	HDPE cleat with hardware's suitable for 33 kV 3Cx400 sq mm cable	No's	12	8	8	28				
16	Danger Plates	No's	12	8	8	28				
17	Circuit Name Plate	No's	12	8	8	28				
18	Aluminium Cable Identification tag with nylon string at every 15 meter cable length	No's	300	400	140	840				
19	Safety barricading PVC tape	Meter	1	1	1	3				
20	Safety barricading cone	No's	1	1	1	3				

21	Galvanized Nuts and Bolts		Kg	1	1	1	3			
22	Coarse sand for PCC & RCC		Cubic meter	1	1	1	3			
23	Burnt clay Brick - First class		No's	1,890	2,800	980	5,670			
24	Cement Bags 50 kg		No's	1	1	1	3			
25	Reinforcement steel bars		Kg	50	50	50	150			
26	50X6 Sq mm GI Earthing strip		Kg	50	50	100	200			
27	Copper bonded Earth electrodes 3 meter length with earthing enhancement compound as per BYPL Earthing specification		No's	2	2	2	6			
28	Construction Aggregate		Cubic meter	1	1	1	3			
29	RFID based electronic buried type cable route marker for cable joints and turns having facility to feed the joint/turn related information at every 100 meter circuit length		No's	21	28	10	59			
30	Receiver unit for electronic cable route marker cum cable route tracer suitable with offline as well as online cable route tracing functionality		No's	1	1	1	3			
31	Fire retardant coating for application on 33 kV 3Cx400 sq mm cables, suitable to withstand 1100°C temperature		Meter	1	1	1	3			

	(per meter rates)									
32	Phase marking Poly Vinyl Electrical Tape (Red, Yellow and Blue)	No's	1	1	1	3				
33	Cable sheath repair Rubber mastic Tape	No's	1	1	1	3				
34	OFC cable 48 F Single Mode G652 D (2 Runs with each circuit)	Km	-	8.8	-	8.8				
35	40 mm PLB HDPE Duct with collar for Optical Fibre cable	Km	-	8.8	-	8.8				
36	Optical Fiber cable splice enclosure for jointing of optical fiber cable	No's	-	7	-	7				
37	Fibre optic cable Line Interface Unit	No's	-	4	-	4				
38	Optical Fiber cable loop chamber for every 300 meter of cable run	No's	-	15	-	15				

GRAND TOTAL LANDED COST(₹)

In words

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

PRICEFORMAT – SERVICES (Kindly refer detailed package wise SCOPE OF WORK attached as Volume II for Indicative Description of Services/BOM, BOQ)

S. No.	DESCRIPTION OF SERVICES	S A C C O D E	UoM	Dev Ngr to SRD (A)	Preet Vihar to C-Block KRN (B)	Vivek Vihar - Preet Vihar OH-UG (C)	TOTAL (D=A+B+C)	UNIT BASIC PRICE (₹) (E)	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (₹) (F)	UNIT LANDED COST (₹) (G = E+F)	TOTAL LANDED COST (₹) (H = GXD)
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		Km	3.0	4.0	1.4	8.4				
2	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Ordinary Bituminous/C.C.Road (including dewatering if any)		Cubic meter	597	803	903	2303				
3	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Dense Carpeted bituminous Road (including dewatering if any)		Cubic meter	119	161	181	461				
4	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Footpath/tile/Rajast		Cubic meter	239	321	361	921				

PRICE BID
NIT NO: CMC/BY/22-23/RS/SkS/SV/69

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Bidders seal & Signature

	hani Stone/Brick work (including dewatering if any)										
5	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Hard Rocky Soil (including dewatering if any)	Cubic meter	717	963	1084	2764					
6	Laying of XLPE cables in the excavated trench, as per BYPL Standards (Regarding Depth, Layer formation, etc). Cable rollers to be used during Laying.	Km	3.9	5.2	1.8	10.9					
7	Laying of XLPE cable in 200 mm PN6 PE80 HDPE Pipe in open excavated trench	Km	0.3	0.4	0.1	0.8					
8	Laying of cable in trenchless ducts including laying of cable and HDPE pipe using HDD machine including laying of 200 mm dia HDPE pipe PN6 PE 80 Class	Km	1.5	2.0	0.8	4.3					
9	Laying of XLPE cable in RCC Trench	Km	0.3	0.4	0.1	0.8					
10	Continuous steel Barricading for all Excavated areas, till the work is completed.	Lot	1	1	1	3					
11	Fixing of Aluminum Cable identification tags with Nylon string at every 30 Mtrs cable length	No's	300	400	140	840					
12	Installation of straight through joints for 33 kv 3Cx400 sq mm cables by jointing kit OEM authorized jointer	No's	30	40	14	84					

13	Installation of End Termination kit in 33 kV GIS panel suitable for 33 kV 3Cx400 sq mm cable by jointing kit OEM authorized jointer	No's	4	4	-	8				
14	Installation of Cable End Termination kit outdoor Suitable for 33 kV 3Cx400 sq mm cable (Make-Raychem/3M) by jointing kit OEM authorized jointer	No's	-	-	4	4				
15	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Ordinary bituminous road/C.C. Road	No's	10	14	5	29				
16	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Dense carpeted bituminous road.	No's	5	6	2	13				
17	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Footpath/ tile/ Rajasthani Stone / Brick Works	No's	5	6	2	13				
18	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Hard Rocky Soil.	No's	10	14	5	29				
19	Spreading of fine sand forming cushion and cover around the cable	Cubic meter	377	507	177	1061				
20	Disposal of debris/surplus malba including Loading / Unloading	Cubic meter	377	507	177	1061				
21	Digging of test pits of required size(not less than 1/2 Meter	No's	2	2	2	6				

PRICE BID
NIT NO: CMC/BY/22-23/RS/SkS/SV/69

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	Wide at site for identification of cable route)										
22	Watch and ward of complete circuit till project handover	Lot	1	1	1	3					
23	Installation of precast RCC Cable cover	No's	3250	4333	1517	9100					
24	Installation of Route and Joint indicating stone marked with "BYPL 33 KV Cable Helpline No-91-11-4124 9808"	No's	90	120	42	252					
25	Laying of PVC warning tape	Km	2.1	2.8	1.0	5.9					
26	Fabrication and installation of galvanized channel, angel and other structural steel including nuts & bolts for all structures including cable support structure, drain crossing structure etc	Kg	200	200	500	900					
27	Laying of optical fiber cable in open excavated trench including laying of 40 mm dia HDPE pipe including blowing and pulling	Km	-	6.2	-	6.2					
28	Laying of optical fiber cable in trenchless ducts using HDD machine including laying of 40 mm dia HDPE pipe including blowing and pulling	Km	-	2.6	-	2.6					
29	Installation of OFC cable splice enclosure	No's	-	7	-	7					
30	Testing of optical fiber cable after installation	Lot	1	1	-	2					
31	VLF High voltage test on complete cable length at site before circuit energization as per IEEE 400.2	Lot	1	1	1	3					

32	Partial discharge test on complete cable length at site before circuit energization as per IEEE 400.2	Lot	1	1	1	3				
33	Tan Delta test on complete cable length at site before circuit energization as per IEEE 400.2	Lot	1	1	1	3				
34	ETC of Fiber optic cable Line Interface unit including integration with Optical Fiber Cable	No's	-	4		4				
35	Fixing of HDPE cleats on 33 kV 3Cx400 sq mm cable for cable mounting structures	No's	12	8	8	28				
36	Fixing of danger plate on poles including fabrication of clamps etc	No's	12	8	8	28				
37	Fixing of circuit Name plate including fabrication of clamps etc	No's	12	8	8	28				
38	Transportation of empty 33 kV cable drums from site to BSES store	No's	30	40	14	84				
39	Submission of actual laid drawing of cable circuits including GPS coordinates of every 30 meter circuit length, Cable joints, Every turn/curve, Every road crossing (both ends) and Land marks	Lot	1	1	1	3				
40	Phase Sequencing of cables before commissioning. The work includes Cable Phase Sequence (R,Y,B) Marking, Cable 1&2 Marking, disconnection/reconnection of cable for matching the cable phase sequence including providing skilled workmen at both ends.	Lot	1	1	1	3				

41	Masonry Brick work with bricks, cement, badarpur in the ratio of 1:6 and duly plastered on all sides	Cubic meter	1	1	1	3				
42	Providing and laying in position cement concrete 1:1.5:3 (1 cement :1.5 coarse sand : 3 graded stone aggregate) excluding the cost of centering, shuttering, finishing and enforcement	Cubic meter	1	1	1	3				
43	Providing and laying in position cement concrete 1:2:4 (1 cement :2 coarse sand : 4 graded stone aggregate) excluding the cost of centering, shuttering, finishing and enforcement	Cubic meter	1	1	1	3				
44	Providing and laying in position cement concrete 1:4:8 (1 cement :4 coarse sand : 8 graded stone aggregate) excluding the cost of centering, shuttering, finishing and enforcement	Cubic meter	1	1	1	3				
45	Centering, shuttering including shuttering propping etc and removal of shuttering	Sq meter	1	1	1	3				
46	Fabrication of reinforcement for RCC work including straightening, cutting, bending, placing in position and binding all complete thermo mechanically treated bars.	Kg	50	50	50	150				
47	Laying of GI earthing strip of 50x6 sq mm size including required welding, painting on joints etc	Kg	50	50	100	200				

48	Erection of earthing electrodes with earth enhancement compound and interconnection with equipment including nut-bolts, welding, paint work on welding as per BYPL earthing specification	No's	2	2	2	6				
49	Making of civil goomitties around earthing electrode as per standard design of BSES including supply of necessary bricks, cement, badarpur, sand, cover of size 1'x1' and providing the same at the top of goomitties.	No's	2	2	2	6				
50	Installation of Brick as Cable Separator only where minimum required space between cables is not available at site meeting the minimum spacing requirement mentioned in BSES specification for cable laying	No's	1890	2800	980	5670				
51	Installation of Optical Fiber cable loop chamber including laying of OFC loops in loop chamber	No's	-	15	-	15				
52	ETC of RFID based electronic buried type cable route marker	No's	21	28	10	59				
53	Application of Poly Vinyl Electrical Tape (Red, Yellow and Blue) on cable end termination kit	No's	1	1	1	3				
54	Application of Rubber mastic Tape for cable sheath repair	No's	1	1	1	3				
55	Retrofitting in existing switchgear panel for installation of Line Differential cum distance relay	No's	4	2	-	6				

56	Application of fire retardant coating on 33 kV 3Cx400 sq mm cables	Meter	1	1	1	3				
57	Dismantling of the existing 33KV OH conductors, Fittings, Towers & Poles of section 1 & section 2 and handing over the dismantled Material to BSES Stores	Lot	-	-	1	1				
58	Locating and pin pointing of existing 33 kV cables for LILO with new circuits	No's	2	-	-	2				
59	Installation of End Termination kit in 33 kV AIS panel suitable for 33 kV 3Cx400 sq mm cable by jointing kit OEM authorized jointer	No's	2	-	-	2				
60	ETC of Line differential cum distance relay including integration with LIU and optical fiber cable including installation of patch cord	No's	4	-	-	4				
61	Interconnection of Line Interface unit using patch cord at Gangaram Substation	No's	2	-	-	2				

GRAND TOTAL LANDED COST (₹)

In words

Note: All the Testing's shall be witnessed by BYPL. All the Site Test Reports should be submitted, before charging of the Cables.

VOLUME – II

**SCOPE OF TURNKEY EXECUTION & TECHNICAL
SPECIFIC**

**SCOPE OF WORK
FOR
SUPPLY, LAYING, TESTING AND COMMISSIONING OF
33 KV 3CX400 SQ MM XLPE INSULATED CABLES
FOR INFEEDS**

- Package (A) : DTL Dev Nagar to BYPL Shankar Road & Anand Parbat
- Package (B) : DTL Preet Vihar to BYPL C Block Krishna Nagar
- Package (C) : BYPL Vivek Vihar to BYPL Preet Vihar

Revision - 0	No. of Page – 17	Date – 10 FEB 2023
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1 INTENT

This document defines the Supply, Laying, Installation, Testing and Commissioning of 33 KV XLPE insulated cable against the three packages mentioned herewith. This document shall be read in conjunction with all technical documents enclosed in tender. In event of any contradiction between tender documents, the most stringent one shall govern.

2 PACKAGE DETAILS

2.1 Package (A) - DTL Dev Nagar to BYPL Shankar Road & Anand Parbat

Ckt No.	Circuit Detail	Nos of Circuit	Total Ckt Length (M)	Ckt Length to be laid (M)	33 kV 3Cx400 Cable length (M)	Cable Connection - Source End	Cable Connection - Receiving End	OFC Laying required	OFC Length (M)
1	DTL 220 kV Dev Nagar Grid to BYPL Anand Parbat Grid	1	2000	150	300	GIS type Cable Termination at Dev Nagar	Straight Through Joint by LILO in existing Shastri Park Central - Anand Parbat circuit	No	0
2 (i)	DTL 220 kV Dev Nagar Grid to BYPL Shankar Road Grid-Section 1	1	5000	150	300	GIS type Cable Termination at Dev Nagar	Straight Through Joint by LILO in existing Shastri Park Central - Anand Parbat circuit	No	0
2 (ii)	DTL 220 kV Dev Nagar Grid to BYPL Shankar Road Grid-Section 2			2700	5400	Straight Through Joint by LILO in existing Shastri Park Central - Anand Parbat circuit	AIS type Cable Termination at Shankar Road		
Package (A) – Circuit 1, 2 (i) & 2 (ii)				3000	6000			No	NIL

2.2 Package (B) - DTL Preet Vihar to BYPL C Block Krishna Nagar

Ckt #	Ckt. Detail	Nos of Ckts	Total Ckt Length (M)	Ckt Length to be laid (M)	33 kV 3Cx400 Cable length (M)	Cable Connection - DTL Preet Vihar Grid End	Cable Connection - C Block Krishna Nagar Grid End	OFC Laying required	OFC Length (M)
1	DTL 220 kV Preet Vihar Grid to BYPL C Block Krishna Nagar Grid	1	4000	4000	8000	GIS type Cable Termination	GIS type Cable Termination	Yes, 2 no's runs	8800
Package (B)				4000	8000			Yes	8800

2.3 Package (C) - BYPL Vivek Vihar to BYPL Preet Vihar (OH to UG conversion)

Ckt #	Ckt. Detail	Nos of Ckts	Total Ckt Length (M)	Ckt Length to be laid (M)	33 kV 3Cx400 Cable length (M)	Cable Connection - BYPL Vivek Vihar End	Cable Connection - BYPL Preet Vihar End	OFC Laying required	OFC Length (M)
1	BYPL Vivek Vihar to BYPL Preet Vihar Circuit (Section 1 & 2)	1	4500	1400	2800	Outdoor Termination	Outdoor Termination	No	0
Package (C)				1400	2800			No	NIL

3 BIDDER'S SCOPE

3.1 GENERAL INSTRUCTIONS

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

3.2 SCOPE OF SUPPLY

S#	Material Description	UoM	Package (A)	Package (B)	Package (C)
3.2.1	Cable 33 kV 3Cx400 sq mm (2 runs)	Km	6	8	2.8
3.2.2	Cable End Termination kit for GIS panel suitable for 33 kV 3Cx400 sq mm cable	No's	4	4	-
3.2.3	Cable End Termination kit for AIS panel suitable for 33 kV 3Cx400 sq mm cable (Make - Raychem/3M)	No's	2	-	-
3.2.4	Cable End Termination kit outdoor Suitable for 33 kV 3Cx400 sq mm cable (Make- Raychem/3M)		-	-	4
3.2.5	Cable straight through joint kit Suitable for 33 kV 3Cx400 sq mm cable(Make- Raychem/3M)	No's	30	40	14
3.2.6	Line Differential cum distance relay	No's	4	-	
3.2.7	Patch Cord	No's	10	-	
3.2.8	Precast RCC (1:2:4) cable cover 600x550x50 mm	No's	3250	4333	1517
3.2.9	HDPE PIPE 200 MM Dia PN6 PE 80 with collar	Km	1.8	2.4	0.8
3.2.10	Weather and acid resistant PVC warning tape of 150mm width 300 micron thick Yellow colour with desired Red/Black lettering	Km	2.1	2.8	1
3.2.11	Route indicating stone at every 50 meter circuit length	No's	60	80	28
3.2.12	Joint indicating stones at every cable joint location	No's	30	40	14
3.2.13	Galvanized channel, angel and other structural steel including nuts & bolts for all structures including cable support structure, drain crossing structure etc	Kg	200	200	500

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEEDS

S#	Material Description	UoM	Package (A)	Package (B)	Package (C)
3.2.14	Fine Sand	Cubic meter	377	507	177.45
3.2.15	HDPE cleat with hardware's suitable for 33 kV 3Cx400 sq mm cable	No's	12	8	8
3.2.16	Danger Plates	No's	12	8	8
3.2.17	Circuit Name Plate	No's	12	8	8
3.2.18	Aluminium Cable Identification tag with nylon string at every 15 meter cable length	No's	300	400	140
3.2.19	Safety barricading PVC tape	Meter	1	1	1
3.2.20	Safety barricading cone	No's	1	1	1
3.2.21	Galvanized Nuts and Bolts	Kg	1	1	1
3.2.22	Coarse sand for PCC & RCC	Cubic meter	1	1	1
3.2.23	Burnt clay Brick - First class	No's	1890	2800	980
3.2.24	Cement Bags 50 kg	No's	1	1	1
3.2.25	Reinforcement steel bars	Kg	50	50	50
3.2.26	50X6 Sq mm GI Earthing strip	Kg	50	50	100
3.2.27	Copper bonded Earth electrodes 3 meter length with earthing enhancement compound as per BYPL Earthing specification	No's	2	2	2
3.2.28	Construction Aggregate	Cubic meter	1	1	1
3.2.29	RFID based electronic buried type cable route marker for cable joints and turns having facility to feed the joint/turn related information at every 100 meter circuit length	No's	21	28	10
3.2.30	Receiver unit for electronic cable route marker cum cable route tracer suitable with offline as well as online cable route tracing functionality	No's	1	1	1
3.2.31	Fire retardant coating for application on 33 kV 3Cx400 sq mm cables, suitable to withstand 1100°C temperature (per meter rates)	Meter	1	1	1
3.2.32	Phase marking Poly Vinyl Electrical Tape (Red, Yellow and Blue)	No's	1	1	1
3.2.33	Cable sheath repair Rubber mastic Tape	No's	1	1	1
3.2.34	OFC cable 48 F Single Mode G652 D (2 Runs with each circuit)	Km	-	8.8	-
3.2.35	40 mm PLB HDPE Duct with collar for Optical Fibre cable	Km	-	8.8	-

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEDS

S#	Material Description	UoM	Package (A)	Package (B)	Package (C)
3.2.36	Optical Fiber cable splice enclosure for jointing of optical fiber cable	No's	-	7	-
3.2.37	Fibre optic cable Line Interface Unit	No's	-	4	-
3.2.38	Optical Fiber cable loop chamber for every 300 meter of cable run	No's	-	15	-

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

3.3 SCOPE OF WORK

S#	Activity Description	UoM	Package (A)	Package (B)	Package (C)
3.3.1	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	Km	3.0	4.0	1.4
3.3.2	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Ordinary Bituminous/ C.C.Road (including dewatering if any)	Cubic meter	597	803	903
3.3.3	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Dense Carpeted bituminous Road (including dewatering if any)	Cubic meter	119	161	181
3.3.4	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Footpath/tile/Rajasthani Stone/Brick work (including dewatering if any)	Cubic meter	239	321	361
3.3.5	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling for Hard Rocky Soil (including dewatering if any)	Cubic meter	717	963	1084
3.3.6	Laying of XLPE cables in the excavated trench, as per BYPL Standards (Regarding Depth, Layer formation, etc). Cable rollers to be used during Laying.	Km	3.9	5.2	1.8
3.3.7	Laying of XLPE cable in 200 mm PN6 PE80 HDPE Pipe in open excavated trench	Km	0.3	0.4	0.1
3.3.8	Laying of cable in trenchless ducts including laying of cable and HDPE pipe using HDD machine including laying of 200 mm dia HDPE pipe PN6 PE	Km	1.5	2.0	0.8

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEEDS

S#	Activity Description	UoM	Package (A)	Package (B)	Package (C)
	80 Class				
3.3.9	Laying of XLPE cable in RCC Trench	Km	0.3	0.4	0.1
3.3.10	Continuous steel Barricading for all Excavated areas, till the work is completed.	Lot	1	1	1
3.3.11	Fixing of Aluminum Cable identification tags with Nylon string at every 30 Mtrs cable length	No's	300	400	140
3.3.12	Installation of straight through joints for 33 kv 3Cx400 sq mm cables by jointing kit OEM authorized jointer	No's	30	40	14
3.3.13	Installation of End Termination kit in 33 kV GIS panel suitable for 33 kV 3Cx400 sq mm cable by jointing kit OEM authorized jointer	No's	4	4	-
3.3.14	Installation of Cable End Termination kit outdoor Suitable for 33 kV 3Cx400 sq mm cable (Make-Raychem/3M) by jointing kit OEM authorized jointer	No's	-	-	4
3.3.15	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Ordinary bituminous road/C.C. Road	No's	10	14	5
3.3.16	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Dense carpeted bituminous road.	No's	5	6	2
3.3.17	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Footpath/ tile/ Rajasthani Stone / Brick Works	No's	5	6	2
3.3.18	Digging of joint pit suitable for 33 cable joint box and covering the joint box with sand and providing protection for Hard Rocky Soil.	No's	10	14	5
3.3.19	Spreading of fine sand forming cushion and cover around the cable	Cubic meter	377	507	177
3.3.20	Disposal of debris/surplus malba including Loading / Unloading	Cubic meter	377	507	177
3.3.21	Digging of test pits of required size(not less than 1/2 Meter Wide at site for identification of cable route)	No's	2	2	2
3.3.22	Watch and ward of complete circuit till project handover	Lot	1	1	1
3.3.23	Installation of precast RCC Cable cover	No's	3250	4333	1517
3.3.24	Installation of Route and Joint indicating stone marked with "BYPL 33 KV Cable Helpline No-91-11-4124 9808"	No's	90	120	42
3.3.25	Laying of PVC warning tape	Km	2.1	2.8	1.0
3.3.26	Fabrication and installation of galvanized channel, angel and other structural steel including nuts & bolts for all structures including cable support structure, drain crossing structure etc	Kg	200	200	500

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEDS

S#	Activity Description	UoM	Package (A)	Package (B)	Package (C)
3.3.27	Laying of optical fiber cable in open excavated trench including laying of 40 mm dia HDPE pipe including blowing and pulling	Km	-	6.2	-
3.3.28	Laying of optical fiber cable in trenchless ducts using HDD machine including laying of 40 mm dia HDPE pipe including blowing and pulling	Km	-	2.6	-
3.3.29	Installation of OFC cable splice enclosure	No's	-	7	-
3.3.30	Testing of optical fiber cable after installation	Lot	1	1	-
3.3.31	VLF High voltage test on complete cable length at site before circuit energization as per IEEE 400.2	Lot	1	1	1
3.3.32	Partial discharge test on complete cable length at site before circuit energization as per IEEE 400.2	Lot	1	1	1
3.3.33	Tan Delta test on complete cable length at site before circuit energization as per as per IEEE 400.2	Lot	1	1	1
3.3.34	ETC of Fiber optic cable Line Interface Unit including integration with Optical Fiber Cable	No's	-	4	-
3.3.35	Fixing of HDPE cleats on 33 kV 3Cx400 sq mm cable for cable mounting structures	No's	12	8	8
3.3.36	Fixing of danger plate on poles including fabrication of clamps etc	No's	12	8	8
3.3.37	Fixing of circuit Name plate including fabrication of clamps etc	No's	12	8	8
3.3.38	Transportation of empty 33 kV cable drums from site to BSES store	No's	30	40	14
3.3.39	Submission of actual laid drawing of cable circuits including GPS coordinates of every 30 meter circuit length, Cable joints, Every turn/curve, Every road crossing (both ends) and Land marks	Lot	1	1	1
3.3.40	Phase Sequencing of cables before commissioning. The work includes Cable Phase Sequence (R,Y,B) Marking, Cable 1&2 Marking, disconnection/reconnection of cable for matching the cable phase sequence including providing skilled workmen at both ends.	Lot	1	1	1
3.3.41	Masonry Brick work with bricks, cement, badarpur in the ratio of 1:6 and duly plastered on all sides	Cubic meter	1	1	1
3.3.42	Providing and laying in position cement concrete 1:1.5:3 (1 cement :1.5 coarse sand : 3 graded stone aggregate) excluding the cost of centering, shuttering, finishing and enforcement	Cubic meter	1	1	1
3.3.43	Providing and laying in position cement concrete 1:2:4 (1 cement :2 coarse sand : 4 graded stone aggregate) excluding the cost of centering, shuttering, finishing and enforcement	Cubic meter	1	1	1
3.3.44	Providing and laying in position cement concrete	Cubic	1	1	1

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEEDS

S#	Activity Description	UoM	Package (A)	Package (B)	Package (C)
	1:4:8 (1 cement :4 coarse sand : 8 graded stone aggregate) excluding the cost of centering, shuttering, finishing and enforcement	meter			
3.3.45	Centering, shuttering including shuttering propping etc and removal of shuttering	Sq meter	1	1	1
3.3.46	Fabrication of reinforcement for RCC work including straightening, cutting, bending, placing in position and binding all complete thermo mechanically treated bars.	Kg	50	50	50
3.3.47	Laying of GI earthing strip of 50x6 sq mm size including required welding, painting on joints etc	Kg	50	50	100
3.3.48	Erection of earthing electrodes with earth enhancement compound and interconnection with equipment including nut-bolts, welding, paint work on welding as per BYPL earthing specification	No's	2	2	2
3.3.49	Making of civil 'goomitties' around earthing electrode as per standard design of BSES including supply of necessary bricks, cement, badarpur, sand, cover of size 1'x1' and providing the same at the top of 'goomitties'.	No's	2	2	2
3.3.50	Installation of Brick as Cable Separator only where minimum required space between cables is not available at site meeting the minimum spacing requirement mentioned in BSES specification for cable laying	No's	1890	2800	980
3.3.51	Installation of Optical Fiber cable loop chamber including laying of OFC loops in loop chamber	No's	-	15	-
3.3.52	ETC of RFID based electronic buried type cable route marker	No's	21	28	10
3.3.53	Application of Poly Vinyl Electrical Tape (Red, Yellow and Blue) on cable end termination kit	No's	1	1	1
3.3.54	Application of Rubber mastic Tape for cable sheath repair	No's	1	1	1
3.3.55	Retrofitting in existing switchgear panel for installation of Line Differential cum distance relay	No's	4	2	-
3.3.56	Application of fire retardant coating on 33 kV 3Cx400 sq mm cables	Meter	1	1	1
3.3.57	Dismantling of the existing 33KV OH conductors, Fittings, Towers & Poles of section 1 & section 2 and handing over the dismantled Material to BSES Stores	Lot	-	-	1
3.3.58	Locating and pin pointing of existing 33 kV cables for LILO with new circuits	No's	2	-	-
3.3.59	Installation of End Termination kit in 33 kV AIS panel suitable for 33 kV 3Cx400 sq mm cable by jointing kit	No's	2	-	-

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEDS

S#	Activity Description	UoM	Package (A)	Package (B)	Package (C)
	OEM authorized jointer				
3.3.60	ETC of Line differential cum distance relay including integration with LIU and optical fiber cable including installation of patch cord	No's	4	-	-
3.3.61	Interconnection of Line Interface unit using patch cord at Gangaram Substation	No's	2	-	-

Note: All the testing shall be witnessed by BYPL. All site test reports shall be submitted before charging of the cable.

3.4 SCOPE DEMARCATION

S#	Head	BYPL Scope	Bidder Scope	Remarks
3.4.1	Road Cutting Permission and Road Restoration	✓	✗	NA
3.4.2	Permissions from Various External and Internal Agencies Regarding Cable Laying and Commissioning (Traffic Police, GAIL, IGL etc)	✗	✓	Statutory fees will be borne by BYPL
3.4.3	Supply, Erection, Testing and commissioning of Equipment related to schemes	✗	✓	As per specifications & Standards
3.4.4	Drawing Submissions	✗	✓	NA
3.4.5	Engineering Approvals	✓	✗	NA
3.4.6	Testing Equipment	✗	✓	NA
3.4.7	Lighting Arrangement	✗	✓	NA
3.4.8	Construction Power and Construction Water	✗	✓	NA
3.4.9	Safety of Manpower (Labour, Engineers, Supervisors etc) and Security of Material, till Handing-over to O&M.	✗	✓	NA
3.4.10	Various Tools and Tackles related to Job	✗	✓	NA
3.4.11	Transportation of Material and any other tender related work	✗	✓	NA
3.4.12	Cleanliness around work premises	✗	✓	NA
3.4.13	Security and Safety of material until handing over to O&M.	✗	✓	NA
3.4.14	Various Machines, Material, Special Tools & tackles, e.g. Crane, Hydra, JCB, Hammer Cutting Machine etc to complete the Job	✗	✓	NA

SCOPE OF WORK FOR SUPPLY, LAYING, TESTING & COMMISSIONING OF 33 KV 3CX400 SQ MM CABLE INFEEDS

S#	Head	BYPL Scope	Bidder Scope	Remarks
3.4.15	Maintenance of Equipment Until Handover	x	✓	NA
3.4.16	Loading and Unloading of material	x	✓	NA
3.4.17	Electrical Inspector Clearance	x	✓	Statutory fees will be borne by BYPL
3.4.18	Continuous Steel Barricading with Mobile no of Vendor's Engineer Incharge	x	✓	Steel barricade should have small scheme description along with vendor and BYPL name on it
3.4.19	Permit to work request to BYPL authority	x	✓	Permit Should be applied to Engineer Incharge prior to work through proper procedure
3.4.20	Permit to work issuance from BYPL authority	✓	x	NA
3.4.21	Temporary office and Material Store near work premises	x	✓	NA
3.4.22	Storage of Material	x	✓	BYPL store will not be used for any kind of material storage and issuance
3.4.23	Dismantled material loading, Unloading and transportation to BYPL store	x	✓	Store location will be within BYPL premises
3.4.24	Preparation, updation and submission of PERT chart, detailed work Progress Report with Photographs, fortnightly to track activities	x	✓	NA
3.4.25	Submission of final drawing showing layout of cable in Google map along with of cable joint locations	x	✓	Approval will be done by BYPL Representative
3.4.26	Removal and renaming of existing switchboards' painting as per their route	x	✓	Painting colour and material should be in line with the existing ones for aesthetic look
3.4.27	Any other supply item or scope of work missing in given sheet to complete all these schemes/ Work	x	✓	NA
3.4.28	Any damage to Public Utilities/Properties, Like Gas Pipeline, Water Pipeline, Sewage Pipeline, Telephone/ Fiber optic cables, Power Cables of any other Circuits, Traffic Signal or camera cables, etc Shall be rectified/ replaced.	x	✓	Any Damages to be rectified on priority, in minimum possible Time.

3.5 DOCUMENT SUBMISSION MATRIX

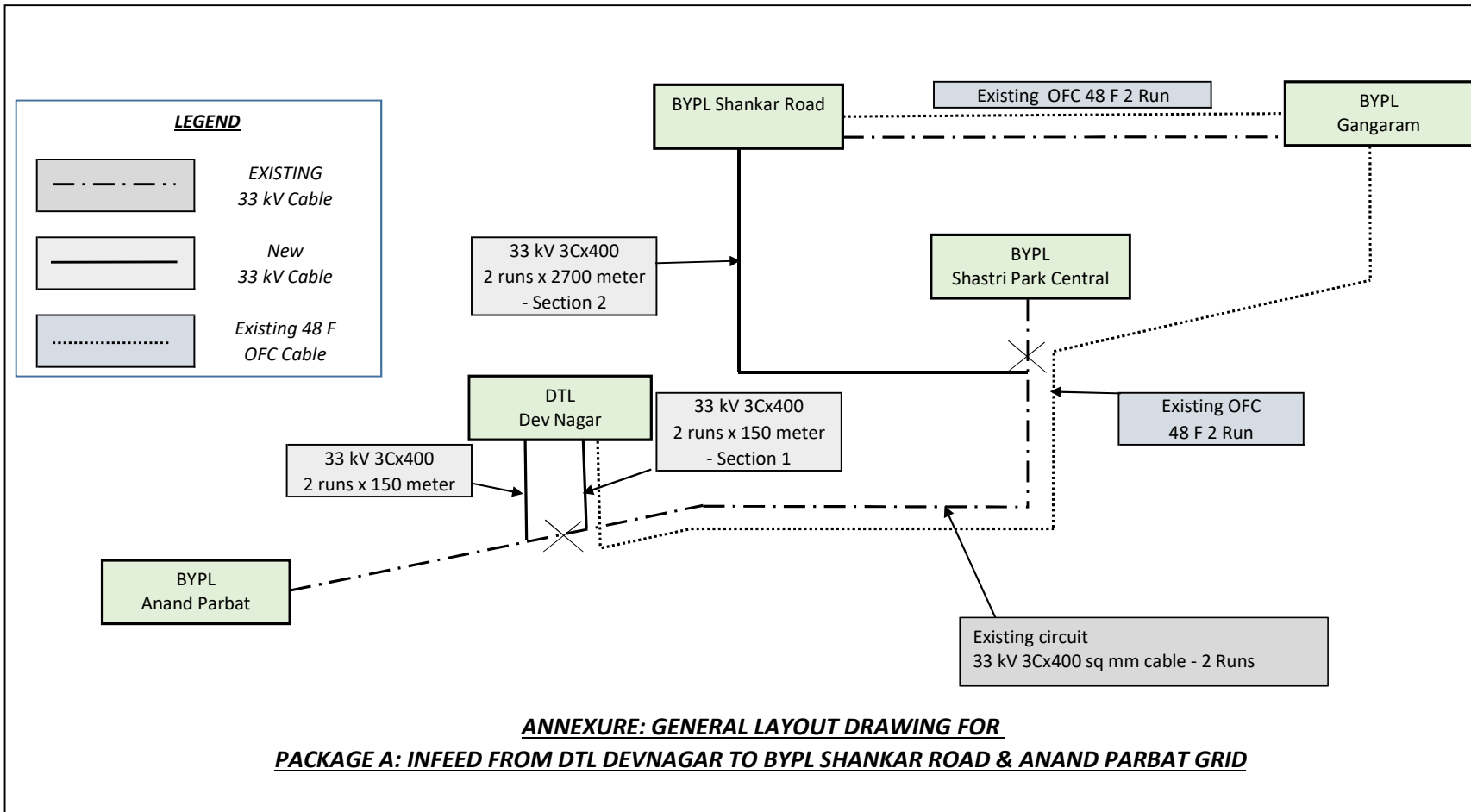
Document/Drawing submission shall be as per the matrix given below:

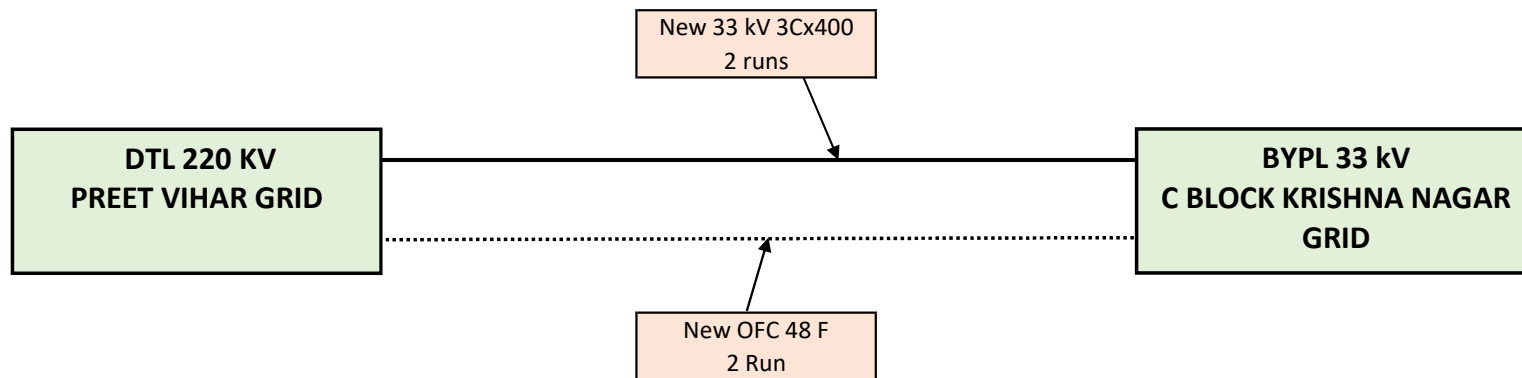
- a. All documents/drawings shall be provided in soft copy only in returnable Pen drives
- b. Language of the documents shall be English only.
- c. Incomplete submission shall be liable for rejection.
- d. Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical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

S#	Detail of Document	Technical Bid	Approval	Pre Dispatch	Pre closure
3.5.1	Cable GTP in accordance with BSES specification	Yes	Yes	Yes	
3.5.2	Cross sectional drawing of offered cable	Yes	Yes		
3.5.3	GTP & component drawing of cable straight through joint	Yes	Yes	Yes	
3.5.4	GTP & component drawing of cable End termination kit	Yes	Yes	Yes	
3.5.5	CPRI/ERDA type test report of offered cable design	Yes	Yes		
3.5.6	CPRI/ERDA type test report of offered straight through Joint kit along with offered make cable	Yes	Yes		
3.5.7	CPRI/ERDA type test report of offered end termination kit along with offered make cable	Yes	Yes		
3.5.8	Cable Route Layout drawing	Yes	Yes		
3.5.9	Cable Route Profile drawing with land marks using Ground penetration Radar System		Yes		
3.5.10	Installation drawings including cable trench drawing, joint pit, earthing electrodes, HDPE Pipe, Lightning Arrester, Name Plate, Warning Tape, Route Marker, Joint Marker, RCC cover, Danger plate and other miscellaneous items		Yes		
3.5.11	VLF, Partial discharge and Tan delta test results for every circuit duly stamped and signed by BSES representative				Yes

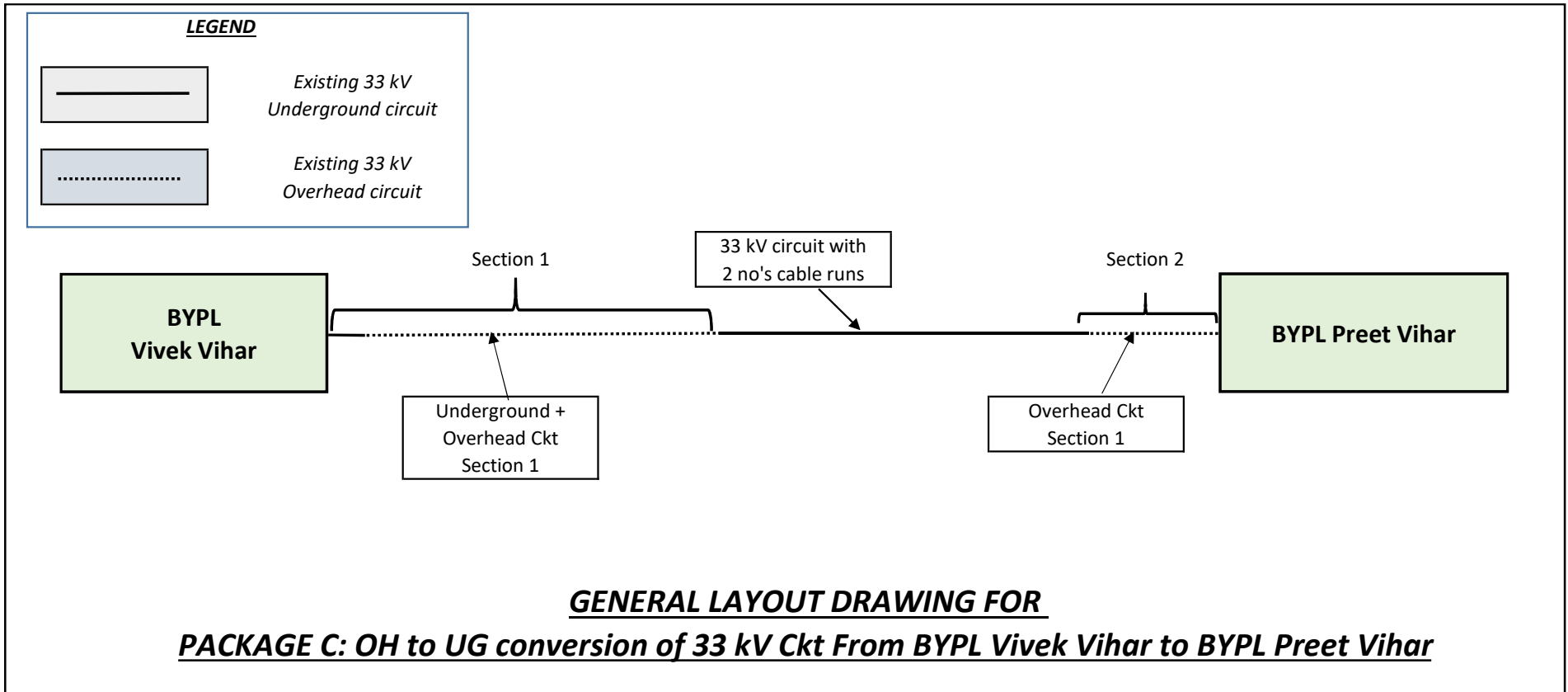
S#	Detail of Document	Technical Bid	Approval	Pre Dispatch	Pre closure
3.5.12	Deviation Sheet	Yes	Yes		
3.5.13	Actual as laid drawing of complete circuit with GPS coordinates at every a) 30 meter circuit length b) Cable joints c) Every turn/curve d) Every road crossing (both ends) Drawing shall be submitted in hard copy (minimum A3 Size) and AutoCAD dwg				Yes
3.5.14	Factory Test Reports to be submitted, for the Material supplied (Cables, Cable Jointing Kit etc)			Yes	

4 ANNEXURE- GENERAL LAYOUT DRAWINGS





GENERAL LAYOUT DRAWING FOR
PACKAGE B: 33 kV INFEDS FROM DTL PREET VIHAR TO BYPL C BLOCK KRISHNA NAGAR GRID





Technical Specification
for
33 kV 3Cx400 sq mm cable

Specification No: BSES-TS-09-33CBL-R0

Rev:	0	
Date:	8 Apr 2022	
Prepared by	Abhishek Vashistha	<i>Abhishek Vashistha</i>
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Reviewed by	Puneet Duggal	<i>Puneet Duggal</i>
	Amit Tomar	<i>Amit Tomar</i> 08/04/22
Approved by	Gaurav Sharma	<i>Gaurav Sharma</i>
	K. Sheshadri	<i>K. Sheshadri</i> 08/04/22

Technical Specification for 33 kV 3Cx400 sq mm cable

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 Technical Specification for 33 kV 3Cx400 sq mm cable

General Specification**1.0.0 Codes & Standards**

The cables shall be designed, manufactured and tested in accordance with the following National Standards and IEC Standards.

National Standards

IS 7098 Part-2	Cross linked polyethylene (XLPE) insulated PVC sheathed cables for working voltages from 3.3 kV up to and including 33 kV.
IS 5831 : 1984	PVC insulation & sheath of electric cables.
IS 10810 : 1984	Methods of test for cables.
IS 8130 : 1984	Conductors for insulated electric cables and flexible cords.
IS 3975 : 1999	Mild steel wires, formed wires and tapes for armouring of cables.
IS 0462 (Part 1) / 1983	Fictitious Calculation Method for determination of dimensions of protective covering of cables

International Standards

IEC 60183	Guide to the selection of high voltage cables
IEC 60228	Conductors of insulated cables. Guide to the dimensional limits of circular conductors.
IEC 60332 - 3	Tests on electric cables under fire conditions. Part 3: Tests on bunched wires or cables.
IEC 60502 - 2	Power cables for rated voltages from 6 kV ($U_m = 7.2$ kV) up to 30 kV ($U_m = 36$ kV)
IEC 60811 Pts 1 through 5	Common test methods for insulating and sheathing materials of electric cables.
IEC 885 Pts 1 through 3	Electric test methods for electric cables.
IEC 28	International Standard of Resistance for Copper
IEC 332	Test on Electric Cables under fire conditions

2.0.0 Cable Construction Features

This Specification generally covers following types / sizes of XLPE H. T. Cables used in BSES network in Delhi Discom area, mostly under-ground (buried, with chances of flooding by water) or for laying on racks, in ducts, trenches, conduits, and so on.

Technical Specification for 33 kV 3Cx400 sq mm cable

Note: (Ref.: Table stating Cable sizes given below.)

Cable Code:

As per IS, cable designations comprise of following codes / options, as applicable for this Specification:

(N.A. - Not applicable for Specification)

- (with Copper conductor) (N.A.)

A Aluminium conductor

 2X XLPE insulation

W Steel round Wire armour (N.A.)

W W Double steel round Wire armour (N.A.)

Wa Non-magnetic round Wire armour

F Steel formed wire (strip) armour

FF Double steel formed wire (strip) armour (N.A.)

Fa Non-magnetic formed wire (strip) armour (N.A.)

- ("un-armoured" or without armour) (N.A.)

Y PVC outer sheath

Sr. No.	Description	Conductor Material	Cable Code
1.	33 kV, 3C x 400 sq. mm.	Al	A 2X W Y

Description of each item mentioned in the Specification (the text, BOQ, GTP or any site specific requirement) shall be followed, along with IS: 7098 – Part 2.

2.1.1	Conductor	a) Electrolytic Grade Stranded Aluminium Conductor b) Grade: H2 as per IS: 8130 / 1984 (For Al) c) Stranded, compacted and circular in shape
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Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>d) Class 2</p> <p>e) “Longitudinal Water-Blocking Arrangement” (or water-tight construction or water barrier protection) shall be provided within the Conductor 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</p> <p>f) Semi-conducting water blocking tapes shall be applied over the conductor, suitable for continuous operating conductor temperature of 90 deg C.</p> <p>g) All detailed constructional features shall be shown in the cross-sectional drawing.</p>
2.1.2	Conductor Screen	<p>Extruded semi-conducting material. (Also refer Cl. 2.1.3.) (Tapes are not acceptable)</p>
2.1.3	Insulation	<p>a) Extruded XLPE (Cross-Linked Poly-Ethylene) Insulation, with water-tree retardant (WTR) property</p> <p>b) The required compound used shall be from BSES-approved sub-vendors and not from any other (refer Annexure – C).</p> <p>c) Uniform thickness of insulation shall be within the permissible values as per IEC Standards; eccentricity check shall be carried out to ensure this.</p> <p>d) Insulation Color : natural</p>
2.1.4	Insulation Screen	<p>a) Freely-strippable semi-conducting screen, which should not require application of heat for its removal.</p>

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>(Refer Cl. 2.1.3.)</p> <p>b) Text “Do not Heat - Freely Strippable” to be printed on insulation screen (at every 600 mm interval).</p> <p>c) Round shape over the outer semi-con shall be within the permissible limits as per IEC standards; Ovality check shall be carried out to ensure this.</p> <p>d) Compound used shall be suitable for the operating temperature of the Cable and shall be compatible with the insulation used.</p>
2.1.5	XLPE Process	
2.1.5.1	33 KV	Dry Cure and Dry Cooling process only.
2.1.5.2	Extrusion	The Conductor Screen, Insulation and Insulation Screen shall be extruded simultaneously, in a Single One-Time Process (i.e. as a triple-head extrusion) to ensure homogeneity of layers over the conductor, and absence of voids.
2.1.5.3	Make of Compounds for Insulation and Semi-conducting	Any deviation from Approved Makes mentioned in Annexure-C shall not be acceptable, unless the deviation has been specifically approved by BSES, prior to sourcing the compounds and taking up manufacturing of cable.
2.1.6	Water-Swellable Tape	<p>a) Semi-Conducting Water-Sellable Tape shall be provided, under the copper tape, on each core.</p> <p>b) Nominal thickness : 0.3 mm</p> <p>c) Weight: 118 gm / sq. m apprx.</p> <p>d) Swell height: ≥ 12 mm in 1 min.</p> <p>e) Compatible to strippable / non-strippable semi-con, over which it is applied.</p>
2.1.7	Core Identification	a) For 3-core cables, cores shall be identified by coloured strips (Red, Yellow, Blue), applied

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>helically / longitudinally below the copper tape.</p> <p>The coloured strips shall carry the name of manufacturer permanently printed at 1 meter intervals; this is to provide additional identification of manufacturer of the cable.</p>
2.1.8	Copper Tape	<p>Copper Tape of minimum thickness 0.1 mm shall be applied helically over the layer formed after application of insulation screen, water-swellaable tape and identification strip.</p> <p>Zero Negative tolerance in thickness of copper tape</p>
2.1.9	Filler	<p>a) All interstices, including center interstices shall be filled by PP filler.</p> <p>b) PP Filler shall be non-hygroscopic, not having any effect on other compounds used, stable at cable temperatures, etc.</p> <p>c) PVC filler is not acceptable.</p> <p>d) Filler is not applicable for single-core cables.</p>
2.1.10	Binder Tape	As per manufacturer's standard
2.1.11	Inner Sheath	Extruded Inner Sheath of Black PVC type ST-2 (IS 5831)
2.1.12	Armour	<p>a) For 3-core Cables :</p> <p>Galvanised Steel round wire armour</p> <p>b) Minimum area of coverage of armouring shall be 90 % (min.). At any time, the gap between any two adjacent armour wires shall not be more than the diameter of wire.</p> <p>c) Zero negative tolerance is for :</p> <ul style="list-style-type: none"> • Diameter of armour wire

Technical Specification for 33 kV 3Cx400 sq mm cable		
2.1.13	Binder Tape	Rubberised cotton tape
2.1.14	Outer Sheath	<p>a) Extruded outer sheath of PVC (ST-2 as per IS 5831) with termite-repellant and anti-rodent properties. Color - Blue (Outer Sheath shall be FRLS-type, if chosen by purchaser.)</p> <p>b) Shape of the cable over the outer sheath shall be circular, when manufactured / completed. Regular Ovality check shall be carried out at factory, to detect any abnormality. Manufacturing quality shall be such that cable will retain its circular shape, even after it is laid at site.</p> <p>c) The Outer Sheath shall be embossed as well as laser printed with following minimum text at a interval of 1 mtr:</p> <ol style="list-style-type: none"> 1. The voltage designation 2. Type of construction / cable code (e.g. A2XWY) 3. Manufacturer's Name and Trade-mark 4. Number of cores and nominal cross-sectional area of conductor 5. Name of buyer / purchaser, 6. Month & Year of manufacturing 7. IS reference, i.e. IS : 7098 8. Batch No. / Lot No. (For traceability purpose, in case of any, in case of any manufacturing defect or otherwise arising in the cable in future.) 9. Purchase Order Number & date 10. Word ' FRLSH ', in case the cable is of FRLSH type. <p>Note:</p> <ul style="list-style-type: none"> ○ Drum no and Progressive length marking

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>shall be provided by Laser printing at every meter with proper contrast in colouring</p> <ul style="list-style-type: none"> Progressive (sequential) length marking of cable shall be at every meter, starting from zero for every drum
2.1.15	<p>Pulling-eye Assembly and Sealing-end Cap (for Cables)</p>	<p>a) A cable pulling-eye assembly Drg. No. MISC/E/4-1131/1699 (see Annexure-F) shall be provided at the loose end (outer end) of the cable on each drum. Sealing material shall be filled in inside the spaces / gaps between the pulling-eye assembly and cable outer sheath. Further, a heat-shrinkable sleeve shall be provided over the pulling-eye assembly and outer sheath of cable.</p> <p>b) Other end (inner end) of the cable shall be sealed as per MISC/E/4-1131/1698 (see Annexure-E.) One PVC cap with Polyurethane compound shall be provided as primary sealing and heat-shrink end-cap shall form a secondary sealing over the PVC cap.</p>
3.0.0	(This number not used.)	
4.0.0	Testing & Inspection	Tests shall be carried out in accordance with IS 7098 (Part-2).
	a) Type Tests	<p><u>1) To Qualify in Tender:</u></p> <p>Cables must be of type tested quality. Type Test Reports shall be submitted for the type, size and voltage rating of cable offered in the bid.</p> <p>For participation in the tender Type Test report shall be submitted from CPRI/ERDA only and shall not be more than 5 years old from the date of tender. If the report is more than 5 years and</p>

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>but less than 10 years old than bidder to submit undertaking that there is no design changes from the Type test conducted.</p> <p>2) <u>Type Test Required After Award of PO:</u> 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.</p>
	b) BSES QAP (Typical)	In general, all tests mentioned in the BSES QAP (Characteristics – Typical) mentioned in Annexure-G shall be included in the Routine Tests, Type Tests and Acceptance Tests stated above.
	c) Routine Tests	<ol style="list-style-type: none"> 1. Measurement of Electrical Resistance 2. HV Test with power frequency AC voltage 3. PD test 4. “Strippability Test” at both the ends of cable for each drum, to check the freely-strippable property of the Insulation Screen (outer semi-con). 5. Impulse voltage test of one drum 6. Armour coverage measurement 7. Physical test-Dimensions of each and every layer and components. <p>Test results from the above tests must appear in the documents forwarded by the vendor for Inspection call / waiver.</p>
	d) Inspection	<ol style="list-style-type: none"> 1. The Buyer reserves the right to witness all tests specified on completed cables. 2. The Buyer reserves the right to inspect cables at Sellers works at any time prior to dispatch, to verify compliance with the specifications. 3. In-process (stage inspection) and final

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>inspection call intimation shall be given sufficiently in advance to the purchaser.</p> <p>4. Minimum lot size of Cables to be offered for inspection shall be mutually agreed between Purchaser and Vendor, before placing the order. Vendor shall raise inspection call only after a minimum lot size is ready and with due factory routine tests already carried out.</p>
	e) Acceptance Tests	<p>Acceptance Tests shall be conducted as per Cl. 18.2 of IS 7098 (Part-2) and the approved Quality Assurance Plan (QAP) in each lot of cables.</p> <p>Following tests shall also be carried out during the Acceptance Tests :</p> <p>a) "Wafer Boil Test" for checking integrity of semi-conducting layers.</p> <p>b) "Void-and-contamination Test" for the Insulation</p> <p>c) "Strippability Test" at both the ends of cable for each drum, to check freely-strippable property of the Insulation Screen (outer semi-con).</p> <p>d) "Water Penetration Test (WPT)", as per applicable IEC standards, to check adequacy of water-blocking arrangement provided inside the conductor.</p> <p>e) Heating cycle test along with potential shall be applicable on sample basis once in a PO. Jointing and Termination kits required for this test shall be in the scope of bidder.</p> <p>f) Impulse voltage test Internal type test shall be carried out once against each tender, on sample basis at manufacturer lab.</p>
	f) Test Certificates (TC)	<p>Three sets of complete Test Certificates (Routine tests and Acceptance tests) shall be submitted along with the delivery of cables.</p> <p>Soft copy of the TCs shall be separately e-mailed to</p>

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>the Purchaser.</p> <p>Note :</p> <p>Make/grades of critical materials (such as, for conductor screen, insulation, insulation screen, etc.), actually used during manufacturing of cables for order-on-hand, shall be clearly stated in the TCs forwarded by the Manufacturer, enabling references in future.</p>
5.0.0	Drawing, Data and Manuals	<p>a) Refer Annexure-A regarding Document Submission.</p> <p>b) Cross-Sectional Drawing shall show every feature of construction, including the thickness / diameter over every layer. This drawing shall also state the text to be embossed over the outer sheath - i.e. type/size, etc. of the cable, drum no./lot no., sequential marking over every meter, printing text on outer semi-con (“Do Not Heat-Freely Strippable”), font sizes to be used, additional text, if any, etc. Also, drum details, markings to be made on both sides of the drum, and so on.</p>
5.0.1	Documents to be submitted along with bid	<p>The vendor shall submit :</p> <p>a) Cross-sectional drawing</p> <p>b) GTP (all data to appear)</p> <p>c) Type Test certificates</p> <p>d) Dimensional drawing for pulling eye</p> <p>e) Fault Level Calculation for armour and copper tape screen</p> <p>f) Complete Cable Catalogue and Manual</p> <p>g) Armour Coverage Calculation</p>
5.0.2	Documents after award of contract	<p>Within 15 days, the seller has to submit four sets of above-mentioned drawings, along with one soft copy</p>

Technical Specification for 33 kV 3Cx400 sq mm cable		
		for buyer's approval.
5.0.3	Final As-Built Drawings	One soft copy of all documents, including type & routine test certificates.
6.0.0	Drum length & tolerance	Cable length per drum
6.0.1	a) 33 KV, Three core	a) 300 mtr +/- 5 %
6.0.2	Overall tolerance	- 2 % for the total cable length for the entire order.
6.0.3	Short length of cables	<p>Manufacturer shall take prior approval from Purchaser for any supply of short length cables.</p> <p>For 33 KV, cables, minimum acceptable short length cable can be 150 meter In any case, manufacturer shall not put two cable pieces of different short lengths in same cable drum.</p>
7.0.0	Packing, Shipping, Handling & Storage	
	a) Packing	<ol style="list-style-type: none"> 1. Both the ends of the cables shall be properly sealed to prevent any deterioration of the cable, due to ingress of water, etc. 2. Cable inner end (starting end) shall project, outside the completely wound cable, by sufficient length enabling verify cable details, including the initial length marking. 3. Similarly, outer end of the cable shall be saddled / secured to the drum properly to prevent any external damage to the end at any time. 4. Before putting on wooden planks, protective covers (thick plastic sheets, etc.) shall be secured over the wound cable, to avoid any abrasion by wooden planks, over the outer sheath of the cable. Alternatively PP sheets can

Technical Specification for 33 kV 3Cx400 sq mm cable		
		<p>be put as protective covers.</p> <p>5. After providing the protective covers, the cable drums shall be finally closed by wooden planks (with saddles), without leaving any gaps between the planks; i.e. 100 % covering shall be ensured.</p>
	<p>b) Drum Identification Markings:</p>	<p>Direct marking (i.e. text painting through stencils, etc.) shall be done on the drums, instead of attaching labels, which may be misplaced/lost over a period of time.</p> <ol style="list-style-type: none"> 1. Drum identification number 2. Cable voltage grade 3. Cable code (e.g. A2XWY, etc.) 4. Number of cores and cross sectional area 5. Cable quantity, i.e. cable length (metre) 6. Purchase order number & date 7. SAP item code 8. Total weight of cable and drum (kg) 9. Manufacturer's Name 10. Buyer's name 11. Month & Year of Manufacturing 12. Direction of rotation of drum 13. Cable length final end-markings (i.e., reading at the inner end and reading at the outer end, just before packing, shall be marked on the drum.)
	c) Shipping information	The seller shall give complete shipping information concerning the weight, size of each package
	d) Transit damage	The seller shall be responsible for any transit damage due to improper packing.
	e) Type of Drum	<p>Non Returnable Steel drums, as per relevant IS / IEC.</p> <p>(Steel drums shall be with M.S. spindle plate with nut-bolts)</p>
	f) Cable Drum handling	The drums shall be with M.S. spindle plate (with nut-

Technical Specification for 33 kV 3Cx400 sq mm cable		
		bolts) of adequate size to suit the spindle rods, normally required for handling the drums, according to expected weight of the cable drums.
8.0.0	Quality Assurance Plan (QAP)	
8.0.1	Vendor's QAP	Manufacturer shall submit QAP in line with BSES QAP format (Annexure-G) for purchaser's approval.
8.0.2	Inspection Points	To be mutually identified and agreed upon in QAP.
9.0.0	Progress Reporting	
9.0.1	Outline Document	To be submitted for purchaser's approval for outline of programmes for production, stage-inspection, testing, final inspection, packing, dispatch and documentation.
9.0.2	Detailed Progress Report	To be submitted to Purchaser once a month containing: <ul style="list-style-type: none"> i) Progress on material procurement ii) Progress on fabrication (as applicable) iii) Progress on assembly (as applicable) iv) Progress on internal stage-inspection v) Reason for any delay in total programme vi) Details of test failures, if any, during manufacturing stages. vii) Progress on final box-up Constraints / Forward Path
10.0.0	Deviation	<p>a) Deviations from this specification are only acceptable, where the Seller has listed in his quotation the requirements he cannot, or does not, wish to comply with, and the Buyer has accepted, in writing, the deviations before the order is placed.</p> <p>b) In the absence of any list of deviation, it will be</p>

Technical Specification for 33 kV 3Cx400 sq mm cable

		<p>assumed by the Buyer that the Seller complies fully with this specification.</p> <p>c) Any deviations mentioned in any other submitted bid documents (i.e.in filled GTP, Catalog, BSES old approval, buyer's/seller's standards etc) by seller without separate deviation sheets with BSES acceptance, will not be considered as a deviation from this tech spec at any stage of contract.</p>
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Technical Specification for 33 kV 3Cx400 sq mm cable

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

Technical Specification for 33 kV 3Cx400 sq mm cable

Annexure - B**GUARANTEED TECHNICAL PARTICULARS
(GTP)****Note:**

- 1) For every type / size of cable, every data shall be mentioned.
- 2) Seller may submit separate GTP for every type / size of cable, as suitable.
- 3) GTP requirements are generally as per IS : 7098 (Part-II).
- 4) GTP shall be read in line with purchaser's Project Site Specific Requirement.

Sr. No.	Description	Buyer's requirement	Unit	Seller's Data
1.0	Purchase Req. No.	-		
2.0	Guarantee Period (Min.)	60 Months (from date of commissioning) / 66 Months (from date of receipt at purchaser's store) whichever is earlier		
3.0	Applicable IS / IEC Standard followed by vendor	IS 7098 Part-2 / IEC 60502-2		
4.0	Make	-		
5.0	Type			
	a) 33 kV, 3c x 400 sq. mm.	A2XWY		
6.0	Voltage Grade			
	a) 33 kV, 3c	19 / 33	kV	
7.0	Maximum Conductor temperature			
A	Continuous	90	deg. C	
B	Short time	250	deg. C	
8.0	Conductor			
A	Material and Grade	As per Cl. 2.1.1		
B	Size	As shown under 5.0 above		
C	Wires in each conductor	As per Table 2 of IS 8130	Nos.	
D	Conductor Shape	As per Cl. 2.1.1		

Technical Specification for 33 kV 3Cx400 sq mm cable				
E	Dia. of wires in each conductor before compaction	Manufacturer Standard	mm	
F	Diameter over conductor		mm	
G	Maximum Conductor resistance at 20 ° C			
	c) 33 kV, 3c x 400 sq. mm.	0.0778	ohm/km	
H	Longitudinal Water Blocking Arrangement within conductor	Is it provided and shown in the cross-sectional drawing? (Yes / No)		
I	Semiconducting water blocking tape over conductor	Yes/No		
J	Short circuit current-carrying capacity of conductor		kA for 1 sec.	
9.0	Conductor Screen (inner semi-con)			
A	Material & type	As per Cl. 2.1.2		
B	Thickness (min)	0.50	mm	
C	Diameter over conductor screen		mm	
D	Make and grade of semi-conducting compound			
10.0	Insulation			
A	Insulation Material	As per Cl. 2.1.3		
B	Nominal thickness			
	33 kV, 3c	8.8	mm	
C	Minimum thickness			
	b) 33 kV, 3c	7.82	mm	
D	Diameter over Insulation (Approx.)		mm	
E	Make and grade of Insulation compound			
F	Eccentricity	As per IEC standards	%	
G	Water-tree retardant property	Required		
11A.	Insulation Screen (outer semi-con)			
a.	i) Thickness of freely strippable Semi conducting screen	0.50	mm	
	ii) Make and grade of semi-conducting compound			
	iii) Printing	As per Cl. No. 2.1.4 (Yes / No)		
	iv) Ovality of the core	As per IEC Standards	%	

Technical Specification for 33 kV 3Cx400 sq mm cable				
b.	Diameter over Insulation Screen (apprx.)		mm	
11B.	Water-Swellable Tape (if required by Purchaser)			
	a) Thickness b) Weight c) Swell height d) Compatible to strippable / non-strippable semi-con, over which it is applied. e) Make & Grade f) Pre-slitted packed tapes from sub-vendors approved by BSES	a) 0.3 mm b) 118 gm / sq. m c) ≥ 12 mm in 1 min. d) Yes / No e) Pl. state f) Yes / No		
11C.	Cable Core identification a) By coloured strips over cores applied helically / longitudinally b) Manufacturer's name shall be permanently printed on the strips, at close intervals.			
11D.	Copper Tape			
	i) Dimensions	a) Thickness : 0.1 +/- 5 % b) Width : 50 mm C) Overlap: 20% d) No Negative tolerance on thickness of copper tape	Mm	
	ii) Fault current-carrying capacity of copper tape	Manufacturer's Standard (Calculation sheet shall be attached)	... kA for ... sec.	
11E.	Diameter over laid up core (apprx.)		mm	
12.0	Filler (Material and type)	As per Cl. 2.1.9 (Specify no. & size of filler at center & core interstices)		

Technical Specification for 33 kV 3Cx400 sq mm cable				
	a) 33 kV, 3c x 400 sq. mm.			
12A.0	Binder Tape	over laid-up cores		
13.0	Inner Sheath			
A	Material and type	As per Cl. 2.1.11		
B	Minimum thickness			
	a) 33 kV, 3c x 400 sq. mm.	0.7	mm	
C	Approx. dia. over inner sheath		mm	
14.0	Armour			
A	Material			
	33 kV, 3Cx400	G. I. Round wire	No.	
B	Armour – GI round wire			
	a) Minimum Dia of wire	a) 4.00 (zero negative tolerance)	mm	
	b) Number of wire (min.)	b) As per manufacturer calculation	nos.	
C	Approx. Equivalent Area		sq. mm.	
D	Area covered by armour	Min. 90 % Calculation shall be attached.	%	
E	Dia. over armour - apprx.		Mm	
F	Fault current carrying capacity of armour	Calculation sheet shall be attached.	... kA for ... sec.	
15.0	Outer Sheath			
A	Material and type	As per Cl. 2.1.14		
B	Thickness (min.)	** As per Table-5 of IS 7098 Part-2		
	a) 33 kV, 3c x 400 sq. mm.	**	mm	
C	Color	Blue		
D	Embossing (details as per Cl. 2.1.14)	Yes / No		
E	FRLS Properties	As per customer's requirement		
16.0	Approx. overall diameter		mm	
17.0	Standard drum length with tolerance			
	a) 33 kV, 3c x 400 sq. mm.	300 +/- 5%	meters	
17A	Overall order tolerance	- 2 % for the total		

Technical Specification for 33 kV 3Cx400 sq mm cable				
		cable length for the entire order.		
18.0	Cable Drum			
a.	Type of drum	Steel (Specify the relevant IS / IEC followed for drum design)		
b.	Markings on the drum (as per Cl. 7.0.0)	On both faces		
18A.0	Cross-Sectional Drawing (ref. Cl. 5.0.0)	Is drawing submitted, showing every feature of constructions? (Yes / No)		
19.0	a. Sealing-end Cap (provided at both ends)	Yes/No Is manufacturer's / Sub-Vendor's drawing submitted? (Yes / No)		
	b. Cable pulling eye at one end and Sealing end cap at other end	Yes/No Is manufacturer's / Sub-Vendor's drawing submitted? (Yes / No)		
20.0	Weights			
	a) Net weight of cable (apprx.)		kg / km	
	b) Weight of empty drum	300 mtr	Kg	
	c) Weight of Cable with drum	300 mtr	kg	
	d) Drum size	300 mtr	mm	
	e) Drawing of Drum	Required	--	
21.0	Continuous current rating for standard I. S. condition laid Direct			
	a) In ground 30° C		Amp	
	b) In duct 30° C		Amp	
	c) In air 40° C		Amp	
22.0	(not used)			
23.0	Electrical Parameters at Maximum Operating temperature:			
A	AC Resistance		ohm / km	
B	Reactance at 50 c/s		ohm / km	
C	Impedance		ohm / km	
D	Zero sequence impedance		ohm / km	
E	Positive sequence		ohm / km	

Technical Specification for 33 kV 3Cx400 sq mm cable				
	impedance			
F	Negative sequence impedance		ohm / km	
G	Capacitance		micro-farad / km	
H	Conductance		Amperes per volts	
I	Inductive susceptance		mho	
J	Capacitive susceptance		ohms	
24.0	Recommended minimum bending radius	15 x O. D.	mm	
25.0	De-rating factor for following Ambient Temperatures :	Ground / Air		
	a) At 30° C			
	b) At 35° C			
	c) At 40° C			
	d) At 45° C			
	e) At 50° C			
26.0	Group factor for following numbers of cables laid :	Touching Trefoil		
	a) 3 Nos.			
	b) 4 Nos.			
	c) 5 Nos.			
	d) 6 Nos.			
27.0	Recommended pressure for laying cable using power winch	30 N / mm ²	N / sq. mm.	
28.0	Process of Cross-linking of Polyethylene			
	a) 33 kV, 3c x400	Dry Cure and Dry Cooling process only		
29.0	Type test (TTR - Type Test Report)	Is copy of latest valid TTR for respective sizes enclosed? (Yes / No)		
30.0	Quality Assurance Plan (QAP)	Is QAP Format (Annexure-F), duly filled in and enclosed? (Yes / No)		

Technical Specification for 33 kV 3Cx400 sq mm cable

31.0	List of Sub-Vendors for construction items (Annexure-C)	Is this list enclosed for BSES approval? (Yes / No)		
------	--	---	--	--

Technical Specification for 33 kV 3Cx400 sq mm cable

Annexure - C**List of Sub-Vendors
for critical items**

Vendor to state sub-vendors' names for other items, wherever approved names are not mentioned, for purchaser's approval during pre-order / post-order stages.

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)

Technical Specification for 33 kV 3Cx400 sq mm cable

6.	Copper Tape	1	Aggarwal Metal
		2	Indian Smelting
		3	Luvata Swedan
		4	Outokumpu Copper Strip AB, Swedan
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

Technical Specification for 33 kV 3Cx400 sq mm cable

Annexure - D**Service Conditions**

(Atmospheric / Soil conditions at Site)

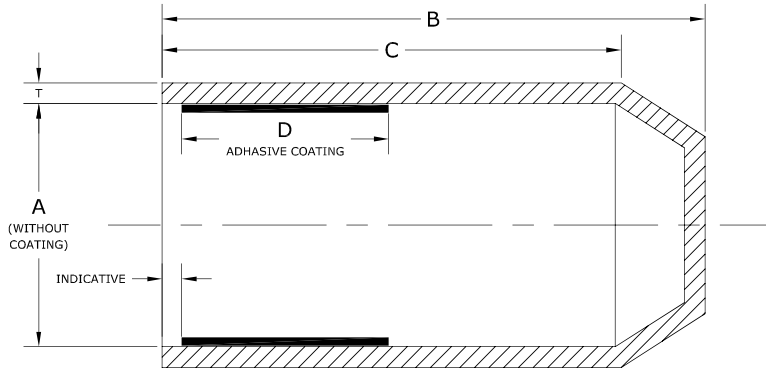
A. Delhi		
a)	Average grade atmospheric condition	Heavily polluted, dry
b)	Average grade soil condition	
c)	Maximum altitude above sea level	1000 M
d)	Air temperature Ambient	i) Highest : 50 deg C ii) Average : 40 deg C iii) Minimum : 0 deg C
e)	Relative Humidity	100 % max
f)	Thermal Resistivity of Soil	150 deg. C . cm / W max.
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

ANNEXURE E

DIMENSIONS

SIZE	A		B	C	D	LC %	T (WALL REC. ± 20 %)
	EXP.(Min.)	REC.(Max)					
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

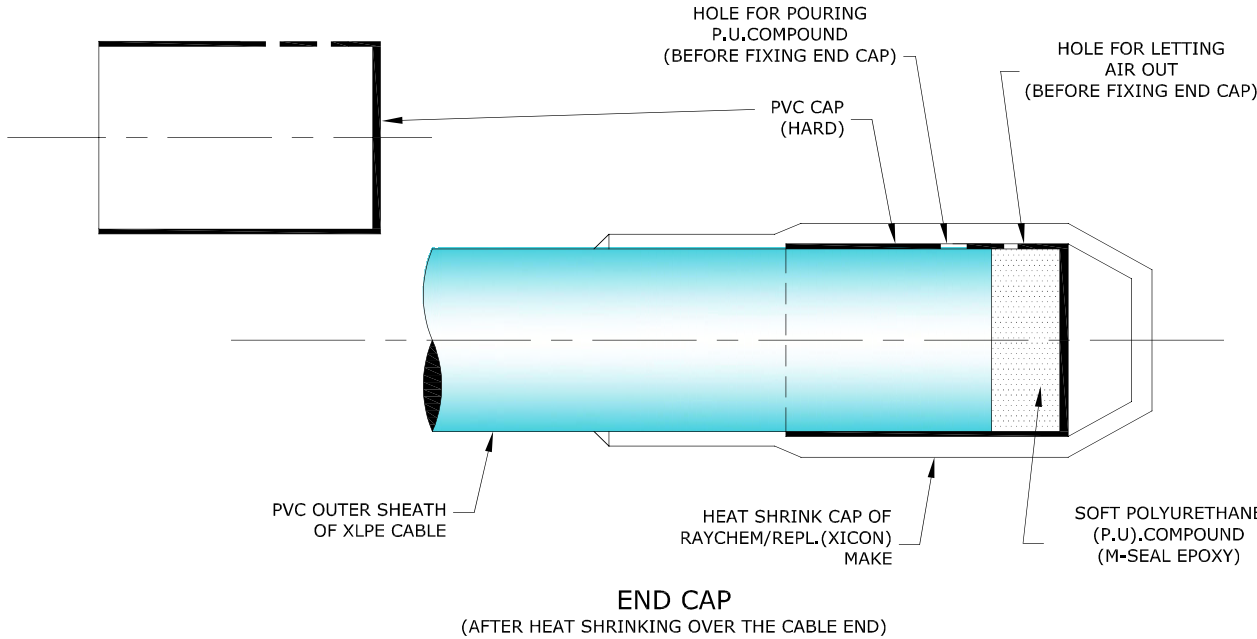
EXP - Expanded (as supplied), REC - Recovered freely, LC - Longitudinal Change, T - Wall Thickness, EC - End Cap



END CAP
(AS SUPPLIED)
SECTIONAL VIEW

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



END CAP
(AFTER HEAT SHRINKING OVER THE CABLE END)

- 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:

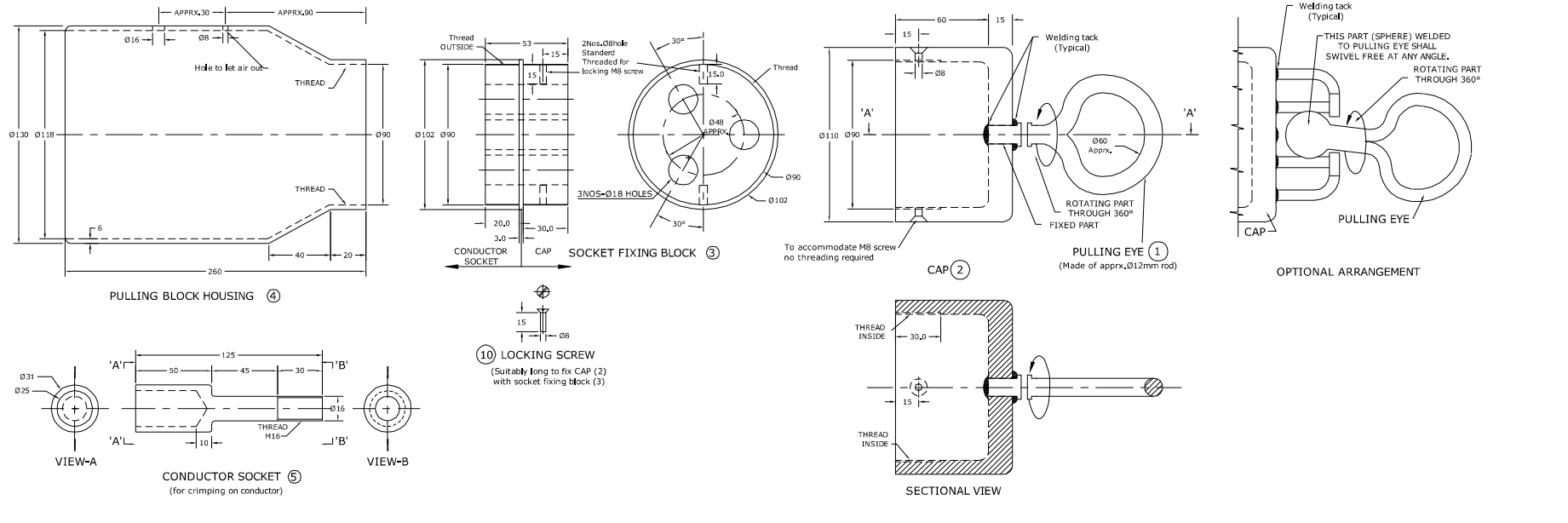
CHECKED BY:

APPROVED BY:

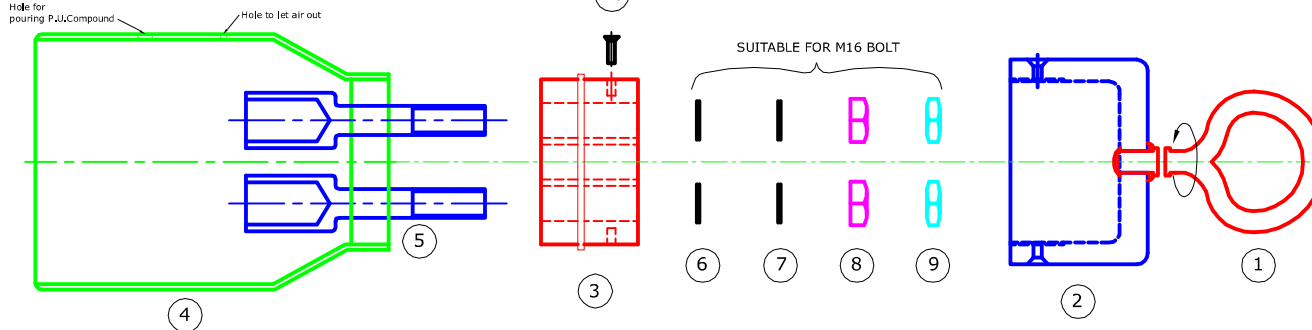
REVISIONS

Addl V.P.

ANNEXURE F



Exploded View



NO.	DISCRIPTION	QTY.	MATERIAL
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

BSES

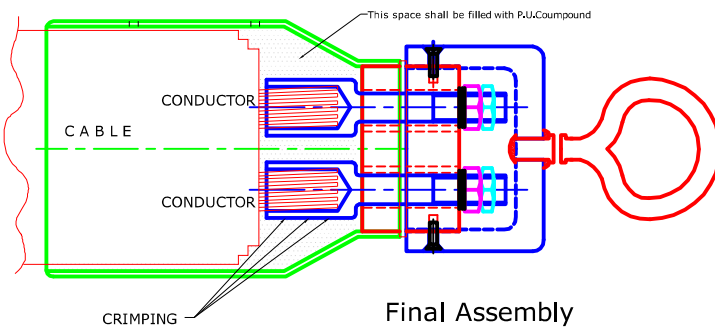
DRAWING No. MISC/E/4-1133/1699
 SCALE :NOT TO SCALE DATE: 09-05-2011

CABLE PULLING EYE ASSEMBLY (TYPICAL)

DRAWN BY: CHECKED BY: APPROVED BY:

REVISIONS

Addl. V.P.



Final Assembly

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.



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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	



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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												
	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/II/2011	Tech. Data Sheet / IS 7098/II/2011	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/II/2011	IS 7098/II/2011	Reg./Sheet	-	P	V	
		f) Elongation at break	Major	Physical	Sample	IS 7098/II/2011	IS 7098/II/2011	Reg./Sheet	-	P	V	
		g) Hot set test	Major	Physical	Sample	IS 7098/II/2011	IS 7098/II/2011	Reg./Sheet	-	P	V	
		g1) Ovality of core	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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												
		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/II/2011, PIL-W-02	IS 7098/II/2011, 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/II/2011	ech. Data Sheet & IS 7098/II/2011	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/II/2011	IS 7098/II/2011	-	-	P	-	
		d) Direction of lay	Major	Visual	During m/c setting	IS 7098/II/2011	IS 7098/II/2011	-	-	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	



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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												
		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/II/2011	IS 7098/II/2011	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/II/2011	IS 7098/II/2011	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/II/2011, 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/II/2011, 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/II/2011 & Tech. Data sheet	IS 7098/II/2011 & Tech. Data sheet	Test Report	-	P	W	
		f) Hot set test for insulation	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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												
3	Acceptance tests	g) Tensile strength & Elongation at break of insulation & outer sheath	Major	Physical	Each Lot Sample Basis	IS 7098/II/2011 & IS 5831/84	IS 7098/II/2011 & IS 5831/84	Test Report	-	P	W	
		h) Partial discharge test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		i) High voltage test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		j) Insulation resistance (Volume resistivity) test	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	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/II/2011	IS 7098/II/2011	Test Report	-	P	W				



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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														
		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			
		Z3) OFC Continuty Test and verification of outer sheath marking with continuous 15mm red strip for OFC embedded identification	Major	Physical	Each Lot					P	W			
4	Type tests at vendor's works	a) Tests on conductor												
		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/II/2011 & Tech. Data sheet	IS 7098/II/2011 & Tech. Data sheet	Test Report	-	P	W	
		d) Physical tests for insulation											W	
		i) Tensile strength & Elongation test	Major	Physical				IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical				IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		iii) Hot set test	Major	Physical				IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		iv) Shrinkage test	Major	Physical				IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		v) Water absorption (gravimetric)	Major	Physical				IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
e) Physical tests for outer sheath											W			

One sample per Tender



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 66 kV EHV CABLES

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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, P : Perform, W : Witness, V : Verification												
		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	
		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/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		ii) Bending test	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		iii) Partial discharge test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		iv) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		v) Dielectric power factor as a function of temperature	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		vi) Heating cycle test	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		vii) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		viii) Partial discharge test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		ix) Impulse withstand test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		x) High voltage test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		g) Insulation resistance (Volume resistivity test)	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		h) Flammability test	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
D PACKING & MARKING												
1	Packing & Marking	a) Cable end sealing	Major	Visual	100 %	IS 7098/II/2011/ Agreement	IS 7098/II/2011/ 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	



ANNEXURE G: QUALITY ASSURANCE PLAN (QAP)

FOR 33 & 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												
Note	<ol style="list-style-type: none">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											

 Technical Specification for 33 kV 3Cx400 sq mm cable

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

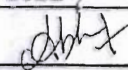
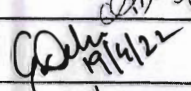
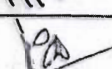
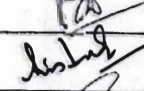
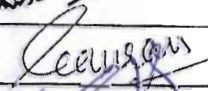

Annexure-I: Deviation Format

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

BSES

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

Rev:		0
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Date:		19 Apr 2022
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4.0.0	Straight-Through Joints (STJ)	5
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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)

		<p>For 33kV and 66kV</p> <p>a) Shear bolt type mechanical connector</p> <p>b) Approved make:</p> <ul style="list-style-type: none"> • Tyco Electronics (BSM-185/400-U) • Pfisterer (332617010) • Nexans • Niled • Or equivalent type tested make (Manufacturer shall take prior approval from CES) <p>d) Maintain smooth surface over connector after cut the shear head bolt</p> <p>e) Vendor to furnish drawing for the mechanical connector</p> <p>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.</p>
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	<p>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.</p> <p>b) GI Support Ring shall be 'zinc-sprayed with central bulge / bump'.</p>
4.1.6	Minimum Armour Fault Current Carrying capacity	<p>11 kV Cable – 11 kA for 1 sec</p> <p>33 kV Cable – 31.5 kA for 1 sec</p> <p>66 kV Cable – 31.5 kA for 1 sec</p>
4.1.7	Provision of Armour continuity	<p>By means of tinned copper braided conductor as per following</p> <p>11 kV cables –</p> <p>11 kV Cable – Three No's of 25 sq mm each</p> <p>33 kV Cable – Four No's of 50 sq mm each</p> <p>66 kV Cable – Four No's of 50 sq mm each</p>

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)	<p>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</p> <ol style="list-style-type: none"> 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 <p>2. In addition to above Stainless Steel Tag shall be provided with following details for straight through joint</p> <ol style="list-style-type: none"> 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	<p>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.</p> <p>After back filling a joint marker shall be fixed by bidder above ground to mark the joint location. Drawing is enclosed with this</p>

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> a) For 3-core cable: By means of a rollable steel mat (with required protective coating against corrosion) b) For 1-core cable: <ul style="list-style-type: none"> 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.
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4.5.0 Testing & Inspection

4.5.1	Type Tests (CPRI/ERDA)	<p>a) Straight-Through Joint shall be of type-tested quality from CPRI/ERDA. Type Test report shall not be more than 5 years old.</p> <p>b) In addition to this, in case of rate contact, 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.</p> <p>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.</p>
4.5.2	Routine & acceptance Tests	<p>I) All the routine and acceptance tests shall be carried out as per EA TS 09-13 guidelines, refer Annexure C.</p> <p>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.</p> <p>III) The joint shall withstand a test of 4Uo voltage for 4 hours.</p>

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	<p>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.</p> <p>b). Every kit box shall be wrapped in polythene covers.</p> <p>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.</p> <p>i) Crotch Kit Components</p> <ul style="list-style-type: none"> --Conductive cable break-out -- Yellow moulded wedge -- Break-out end sealing tube -- Break-out finger sealing tube -- Stress grading mastic <p>ii) Connector Kit : Components</p> <ul style="list-style-type: none"> -- Ferrule (connector) -- Void Filling mastic (yellow)
4.9.1	Identification Label	<p>Markings / Labels shall be on both sides of every packed box.</p> <ol style="list-style-type: none"> 1) Identification number/type designation (as per manufacturer’s standard) 2) Voltage grade, size, description of the Kit (including the voltage grade, size, type of the cables, for which it is to be used) 3) Batch no., lot no., etc. 4) Quantity 5) a) Purchase Order no. & date b) Purchaser’s name c) BSES’s SAP code number 6) 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	<p>a) Deviations from this specification shall be listed by bidder clause wise along with optional offer and has to submit the list along with bid./quotation. BSES will review the deviations and if BSES is agreed with the deviation, seller has to take written confirmation from BSES on deviation during tender evaluation..</p> <p>b) In the absence of any list of deviations from the Seller with bid as well as written confirmation from BSES on deviations, it will be assumed by the Buyer that the Seller complies with the Specification fully.</p> <p>c) Any deviations mentioned in any other submitted bid documents (i.e.in filled GTP, Catalog, BSES old approval, buyer's/seller's standards etc) by seller without separate deviation sheets will not be considered as a deviation from this tech spec at any stage of contract.</p>
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7.0.0 Delivery

7.1.0	Delivery	<p>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.</p>
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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

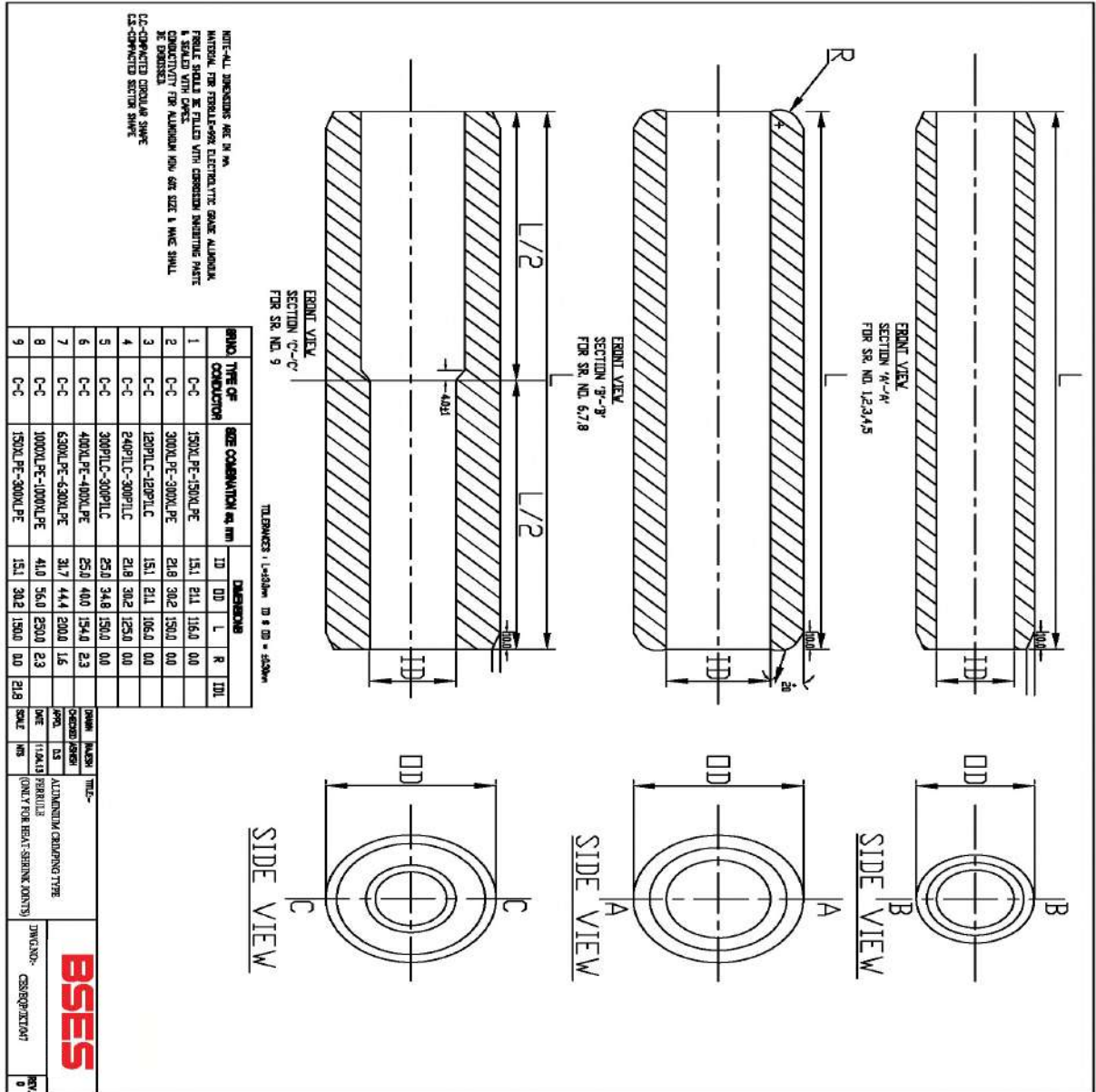
Annexure - E: Service Conditions

(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

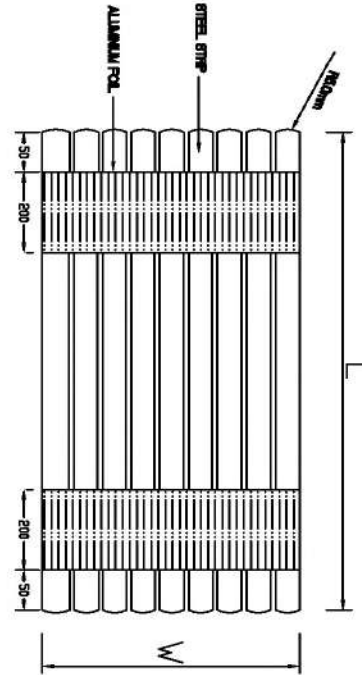
Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

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

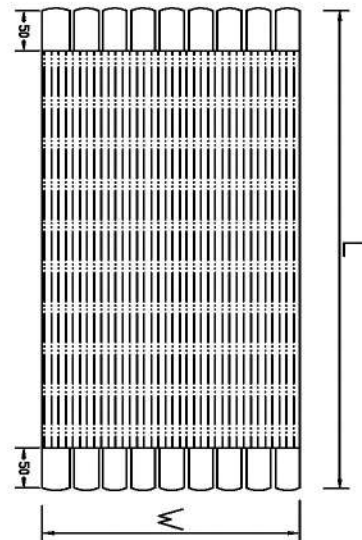


Technical Specification For Heat Shrinkable And Cold Shrinkable Straight Through Jointing Kit (11 kV, 33 kV, 66 kV XLPE Insulated Cables)

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



SIDE-B



SIDE-B

NOTE-1- WHICH IS WITH TWO SMALL ALUMINUM FOIL STRIPS, IT SHOULD BE INSTALLED UPWARD.
 SIDE-2- WHICH IS WITH ALMOST COMPLETE ALUMINUM FOIL, IT SHALL BE RESTING OVER THE JOINT.

NOTE- ALL DIMENSIONS ARE IN MM

- 1) D MATERIAL- STEEL STRIPS
- 2) THICKNESS 1mm-4.5mm
- 3) WIDTH 10mm-40mm
- 4) ANTICORROSION
- 5) GAP BETWEEN STEEL STRIPS- 5mm MINIMUM & 5mm MAXIMUM
- 6) ADHESIVE TYPE-3 P.V.C LAMINATE INSIDE ALUMINUM FOIL WITH POLYESTER FILM

DIMENSIONS FOR STRIP TYPE GI CANISTER

SR.NO.	VOLTAGE	JOINT SIZE	NO. OF STRIPS	LENGTH	WIDTH (MM)
1	11KV	1E0P1L.C-1E0P1L.C	40	1450	400
2	11KV	2E40P1L.C-2E40P1L.C	46	1550	460
3	11KV	1E20P1L.C-1S0X1.PE	40	1450	400
4	11KV	2E40P1L.C-300X1.PE	46	1550	460
5	11KV	1E20P1L.C-300X1.PE	46	1550	460
6	11KV	70P1L.C-300X1.PE	46	1550	460
7	11KV	1S0X1.PE-1S0X1.PE	34	1260	340
8	11KV	300X1.PE-300X1.PE	36	1360	360
9	11KV	1S0X1.PE-300X1.PE	36	1360	360
10	33KV	300P1L.C-300P1L.C	50	1850	500
11	33KV	300P1L.C-400P1L.C	50	1850	500

DESIGN	DATE	TITLE	DWG. NO.	REV.
CREATED	DATE	STRIP TYPE GI CANISTER (V.B. CAN) FOR JOINT PROTECTION (GENERAL ARRANGEMENT)	BSES	0
APPR.	DATE			
CHKD	DATE			
SCALE	M/S			



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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 / Schema: O&M:

Contractor:

Voltage Grade: 11kv 33kv 66kv 11 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 Termination 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 Coordinate: 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



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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)

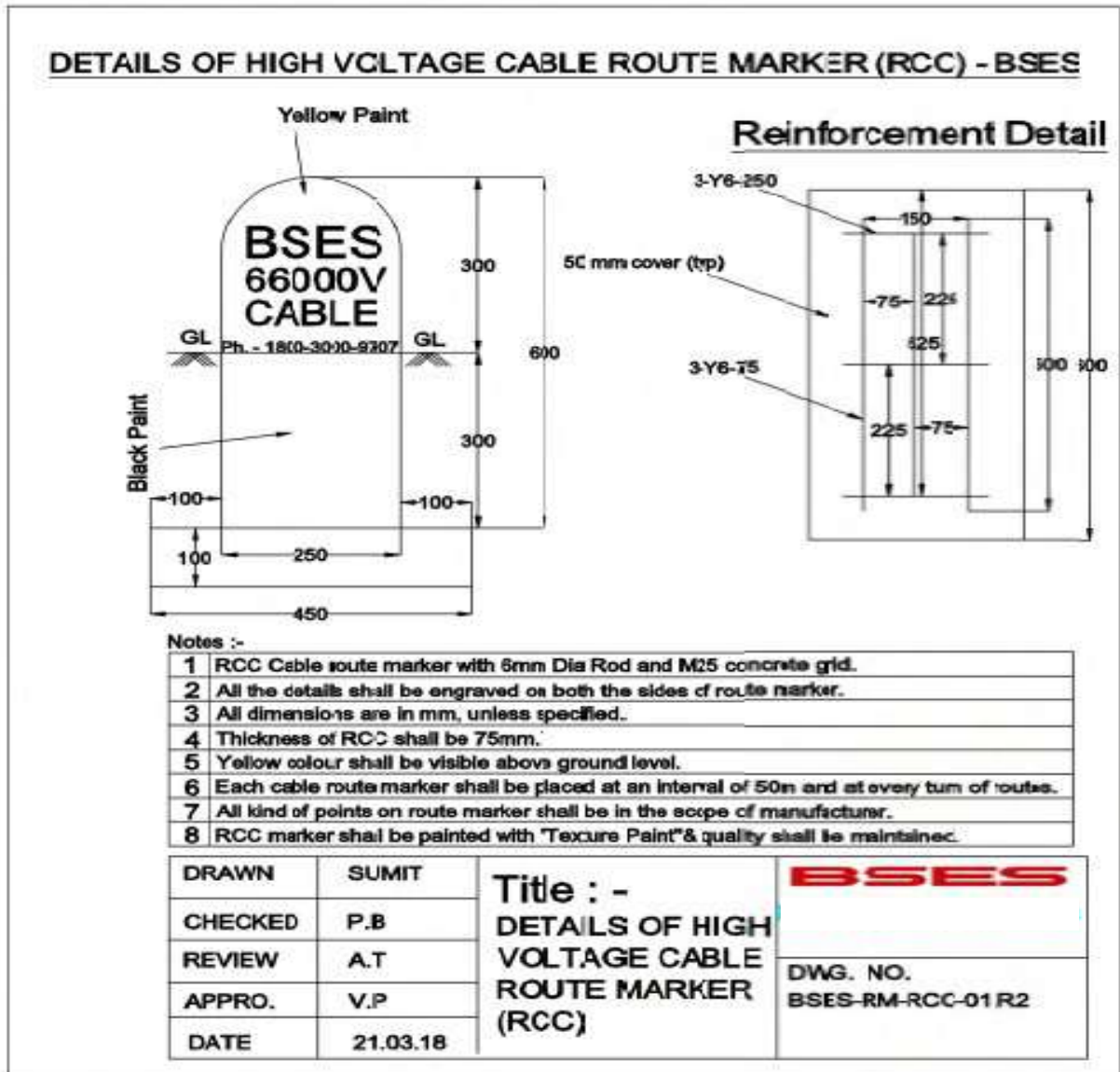
4	Backfilling, compaction of excavated soil and removing of excess earth from the site	Cable jointing contractor
5	Completion information in Job Card (Details of work done, material consumption, location, feeder name and joint tag no., date, supervisor name, jointer name) sent to SDO	Cable jointing contractor
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)


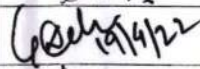

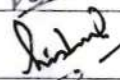
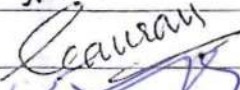

Annexure – J Joint Marker



BSES

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

Specification no – BSES-TS-45-TERM-R0

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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 ($U_m=36$ kV) up to 150 KV ($U_m=170$ kV) – test methods and requirements.

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)**3.0.0 Cable Construction**

Normal sizes of XLPE cables used in BSES system and the construction features of these cables are indicated below:

- a. 11 kV, 3-core x 150 sq mm AL
- b. 11 kV, 3-core x 300 sq mm AL
- c. 11 kV, 3-core x 400 sq mm AL
- d. 11 kV, 3-core x 400 sq mm AL(OFC Embedded)
- e. 11 kV, 1-core x 1000 sq mm AL
- f. 11 kV, 1-core x 150 sq mm AL HTAB with copper metallic screen
- g. 11 kV, 1-core x 150 sq mm AL HTAB with Aluminium wire metallic screen
- h. 11 kV, 1-core x 95 sq mm AL HTAB with copper metallic screen
- i. 11 kV, 1-core x 95 sq mm AL HTAB with Aluminium wire metallic screen
- j. 33 kV, 3-core x 400 sq mm AL
- k. 33 kV, 3-core x 400 sq mm AL (OFC Embedded)
- l. 33 kV, 1-core x 1000 sq mm AL
- m. 66 kV, 1-core x 630 sq mm AL
- n. 66 kV, 1 core x 1000 sq mm AL
- o. 66 kV, 3-core x 300 sq mm AL
- p. 66 kV, 3-core x 300 sq mm AL(OFC Embedded)

PILC type Cables:

3-core 240 or 300 sq. Mm. Al

3.1.0	Conductor	For XLPE : a) Electrolytic Grade stranded Aluminium Conductor / Annealed Copper Conductor b) Grade: H2/ H4 as per IS: 8130/84 (For Al) c) Shape: Compacted Circular d) Class 2 For PILC : a) 11 kV : sector-shaped b) 33Kv: oval-shaped
3.2.0	Conductor Screen	For XLPE : Extruded Semi Conducting material For PILC : 11 kV : no conductor screen 33 kV : carbon paper
3.3.0	Insulation	For XLPE: Extruded TR XLPE For PILC: Layers of impregnated papers

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

3.4.0	Insulation Screen	<p>Non Metallic Screen: For XLPE Insulated cable: a) For 11, 33 U/G cable and HTAB cable - Freely strippable Semi Conducting (without application of heat) b) For 66kV cable - Firmly bonded semi conducting</p> <p>Metallic Screen: a) For For 11, 33 & 66 Kv U/G cable – Copper Tape b) For HTAB – option 1 – Copper Tape (old installations) and option 2 – Aluminium wire (new installations) For PILC : a) 11 kV : absent (Belted) b) 33kV: metallised paper tape</p>
3.5.0	Water Swellable Tape	<p>For XLPE: Semi-conducting Water Swellable Tape shall be provided under the copper tape on each core. For PILC : not applicable</p>
3.6.0	Filler	<p>For XLPE: All interstices, including centre interstices filled by PP filler. Note- In special cases, for 66kV 3CX300 sqmm, 33kV, 3CX400 and 11kV 3CX400 cable are with-36 nos. Single mode and 12 nos. Multi modes OFC are also inbuilt as filler.Requirement of cable joint kit with OFC shall be fulfilled as per tender requirement For PILC : a) 11 kV : Crushed paper filler b) 33kV: Jute twine</p>
3.7.0	Over all three cores	<p>XLPE : Binder tape PILCA : 11 kV : belt paper 33kV: Copper Woven Fabric tape</p>
3.8.0	Inner Sheath	<p>For XLPE: Extruded Inner Sheath of Black PVC type ST-2. For PILC : Lead alloy sheath</p>
3.9.0	Bedding Tape	<p>For XLPE: not applicable For PILC: two layers of paper, followed by compounded (bituminized) cotton tape.</p>
3.10.0	Copper Woven Fabric Tape (CWF tape)	<p>For XLPE : not applicable For PILC : a) 11 kV : absent (Belted cable) b) 33 kV : applicable for screened cable</p>
3.11.0	Armour	<p>For XLPE : a) Galvanised Steel round Wires/ Galvanised steel flat strip armour (For 3 core cables) b) Hard drawn Aluminium Wire (For 1 core cables) c) Aluminium or lead sheathed for 1Core 66kV cables For PILC : a) 11 kV double steel tape armour</p>
3.12.0	Binder Tape	<p>For XLPE: Rubberised cotton tape</p>

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

3.13.0	Outer Sheath	For XLPE: Extruded outer sheath of PVC (ST-2) for 11 kV/ 33 KV and HDPE for 66kV Cable with termite- repellent. For 66kV Cable- HDPE extruded semicon layer or HDPE with graphite layer. For PILC : compounded (bituminised) Jute/PVC
3.14.0	HTAB Cable (1CX150 and 1CX95) core construction	Aluminium conductor-conductor semicon screen- TR XPLE insulation- insulation semicon screen–Water Swell-able tape –Round wire armour installation) / Copper Tape (old installation)) Water Swell-able tape-outer sheath

4.0.0 Cable Termination Kits

General Technical Requirements for Cable Termination Kits are as follows:

4.1.0	Scope	Design, manufacture, testing and supply of Cable Termination Kits for H. T. Power Cables.																																																																
4.2.0	Functional Requirements																																																																	
4.2.1	Conductor Connection	<table border="1"> <thead> <tr> <th>Voltage Grade</th> <th>Cable Size</th> <th>Application</th> <th>Material of Lug</th> <th>Connection Method</th> </tr> </thead> <tbody> <tr> <td rowspan="4">11 kV</td> <td rowspan="2">3Cx150, 3Cx300 and 3Cx400 sq mm</td> <td>Indoor</td> <td>Bi-Metal</td> <td>Crimping</td> </tr> <tr> <td>Outdoor</td> <td>Bi-Metal/ Aluminium as per tender requirement</td> <td>Crimping</td> </tr> <tr> <td rowspan="2">1Cx1000 sq mm</td> <td>Indoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td rowspan="2">HTAB (indoor not required)</td> <td>1Cx95</td> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td>1Cx150</td> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td rowspan="4">33 kV</td> <td rowspan="2">3Cx400 sq mm</td> <td>Indoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td rowspan="2">1Cx1000 sq mm</td> <td>Indoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td rowspan="4">66 kV</td> <td rowspan="2">3Cx300</td> <td>Indoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td rowspan="2">1Cx630, 1Cx1000 sq mm</td> <td>Indoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> <tr> <td>Outdoor</td> <td>Aluminium</td> <td>Crimping</td> </tr> </tbody> </table>	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				
Voltage Grade	Cable Size	Application	Material of Lug	Connection Method																																																														
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Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

		<p>a) For GIS cable termination kits: Plug in type, Conductor connection assembly shall be by standard method of split, silver-plated copper cone and pressure-fit contact assembly or as per manufacturer's standard.</p> <p>b) Top corners of all lugs shall be circular shape not rectangular. Refer Annexure F for details.(Except GIS kit)</p>			
4.2.2	Stress Control System	<p>a) The earthed insulation screen of an XLPE cable is terminated at a suitable distance from the conductor.</p> <p>b) The tube is in electrical contact with insulation screen.</p> <p>c) Impedance of the tube shall be constant up to an operating temperature and shall be within the range 1×10^{08} ohm-cm to 8×10^{08} ohm-cm.</p> <p>d) Length of stress control tube for 11 kV and 33 kV shall be 130 mm and 260 mm respectively or according to insulation tube length. For 66kV termination kits, stress control tube shall be as per type tested design.</p> <p>e) The physical and electrical properties shall conform to ESI 09: 13.</p> <p>f) For GIS cable termination kits Stress control shall be by means of a polymeric stress cone. External profile of the cone shall match inner profile of GIS epoxy bushing. Vendor shall specify the material (EPDM / Silicone) of the cone.</p>			
4.2.3	Insulation Protection	<p>a) XLPE insulation shall be protected by means of an outer tube, resistant to tracking and weathering.</p> <p>b) One end of the tube shall be coated internally with red sealant mastic for a length of 50 mm.</p> <p>c) Physical and Electrical properties shall conform to ESI 09: 13.</p> <p>d) Insulation Tube length for termination- shall be 650 mm for both Indoor and Outdoor Termination kits of 11kV, 3CX150, 3CX300 and 3CX400 sqmm cable. All other accessories related to termination shall be according to 650mm insulation tube length.</p>			
4.2.3.1	Outer Anti-tracking Tube	<p>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.</p>			
4.2.3.2	OFC (66kV, 3CX300 sqmm , 33kV, 3Cx400 sqmm and 11kV, 3Cx400 sqmm cable)	<p>Termination kit for OFC (36 single mode and 12 nos. Multi mode) shall be supplied along with termination kit.</p>			
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)	<p>a) Transparent tube is used for restoring the insulation provided by belt paper, which is terminated at the crotch.</p> <p>b) 33 kV PILC Termination: The oil barrier tube provides an oil-resistant layer to contain impregnating compound within, thus preventing anti-tracking tube coming in contact with the impregnating compound.</p>
4.2.4	Environmental Sealing System	<p>a) Red Sealant Mastic Tape: This tape, used for sealing at ends, shall be synthetic rubber-based and resistant to tracking and weathering. Sufficient quantity of this tape shall be provided.</p> <p>b) Lug-sealing Sleeve: It shall have the same material composition as outer anti-tracking tube. The sleeve shall be fully coated internally with red sealant mastic tape. Length of the sleeve shall be so as to cover half length of the lug barrel and an equal length of track-resistant tube.</p> <p>c) Conductive Break-out: It shall be provided over the crotch for 3-core cables. The break-out base shall overlap PVC outer sheath by a 50 mm. Minimum.</p> <p>d) For GIS termination kits : Environmental sealing of cores below the switchgear shall be by means of a trifurcation kit, consisting of heat shrinkable conductive break-out and heat-shrinkable conductive tube of total length of 6 metres supplied in one roll.</p>

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

4.2.5	Earth Bond System	<p>Minimum Armour Fault Current Carrying capacity of cables is as following: 11 kV U/G Cable – 11 kA for 1 sec 33 kV Cable – 31.5 kA for 1 sec 66 kV Cable – 31.5 kA for 1 sec 11 kV HTAB Cable – 11 kA for 1 sec</p> <p>Fault current requirement shall be met by Tinned copper braid as per following: 11 kV U/G cables – Three No's 25 sq mm each 33 kV Cable – Four No's of 50 sq mm each 66 kV Cable – Four No's of 50 sq mm each HTAB Cable with copper tape metallic screen – Three No's of 25 sq mm each</p> <p>Length of the copper braided conductor shall be 750 mm.</p> <p>Each copper braided conductor shall be supplied with copper lug, crimped at one end</p> <p>For HTAB Cable with Aluminium wire metallic screen – Tinned copper braid is not required. 1 No's of Aluminium crimping lug of 120 sq mm cross section area shall be provided instead</p>
4.2.6	Suppression of electrical discharges	<p>Following materials are required for use during cable termination :</p> <p>a) Silicone-based compound Required for filling-in minute services/ surface cracks over XLPE insulation. b) Polymeric mastic Required for application over semicon screen, for, eliminating any air-entrapment at any cut point on the surface. It should have sufficient elongation and electrical properties compatible with stress control tube.</p>
4.2.7	Installation. Instruction Sheet	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)	<p>a) An aluminum pouch with paper tag & sealing arrangement at one end shall be provided. b) This tag is required to be tied over the cable at one side of the joint. c) The paper tag shall give following information 1) Vendor kit designation 2) Division 3) Breakdown ID/Shutdown ID/Scheme No. 4) Cable section 5) Type of joint 6) Size of Joint 7) Make of joint 8) Voltage class</p>

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

		<p>9) Serial no. of kit 10) Vendor lot & batch no 11) Month & year of manufacturing 12) Date of installation 13) Name of joiner 14) Name of vendor supervisor 15) Name of BSES supervisor 16) Remarks In addition to above Stainless Steel Tag shall be provided with following details for straight through joint</p> <p>a. Manufacturing month and year (MM/YY format) b. Manufacturer name i.e Comp c. Manufacturer own sl no for future tracing</p>
4.3.0	Technical Particulars	Vendor shall submit Guaranteed Technical Particulars (GTP) as per Annexure A.
4.4.0	Type Tests	<p>i. Termination Kit shall be of type-tested quality from CPRI/ERDA/KEMA/CESI as per the BIS/IEC/IEEE within last 5 years.</p> <p>ii. In case of type test is more than 5 years old but less than 10 years old, bidder has to give undertaking that there is no changes in design.</p> <p>iii. In case of type test report is more than 10 years old, bidder has to conduct type test from CPRI/ERDA/KEMA/CESI as per the BIS/IEC/IEEE without any cost implications to BSES</p>
4.5.0	Testing & Inspection	
	a) Tests	All the routine and acceptance tests shall be carried out as per ESI guidelines. (Also refer Annexure -C)
	b) Inspection	<p>1) Buyer reserves the right to witness all tests specified on individual H. S. components, Moulded components or completed Cable Termination Kit.</p> <p>2) Buyer reserves the right to inspect Cable Termination Kit at the Seller's works at any time, prior to dispatch, to verify compliance with the specification.</p> <p>3) In-process and final inspection call intimation shall be given in 10 days advance to purchaser.</p>
	c) Test Certificates	Three sets of complete Test Certificates (Routine & Acceptance tests) shall be submitted along with the delivery of Cable Termination Kits.
4.6.0	Documents	"Documents" refer to Documents, Data, Manuals, etc. (Scanned copy of signed documents also shall be part of entire soft file (e-file) or CD.)

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

4.6.1	Along with the Bid	Vendor shall submit signed 3 sets (plus 1 set of soft copy) of following documents: a) GTP (duly filled-in) (as per Annexure - A). b) Cross-sectional drawings for components Assembly c) Type Test Certificates d) Complete Catalogue and Instructions. e) Any other document.
4.6.2	After Award of Contract	Vendor shall submit signed 2 sets (plus 1 set of soft copy) of above mentioned documents within 15 days, for Purchaser's approval.
4.6.3	"As-Built" documents	Final signed "As-built" documents for the equipment in 3 sets (hard copy), 1 no. soft copy and 1 no. CD. These documents shall include signed Routine & Acceptance Test Certificates also.
4.7.0	Packing, Marking, Shipping, Handling and Storage	Every component/kit/box shall be properly sealed/ packed for protection against damage.
a)	Identification Labels:	<p>Markings / Labels shall be on both sides of every packed box.</p> <ol style="list-style-type: none"> 1) Identification number/type designation (as per manufacturer's standard) 2) Voltage grade, size, description of the Kit (including the voltage grade, size, type of the cables, for which it is to be used) 3) Batch no., lot no., etc. 4) Quantity 5) a) Purchase Order no. & date b) Purchaser's name c) BSES's SAP code number 6) Weight (kg) of each Cable Termination Kit and of each box containing kits. 7) Manufacturer's name 8) Month & Year of Manufacturing 9) Date of packing, Shelf life (if applicable) 10) In case, the termination kit is for RMU, following text shall be written in bold letters, with higher font size : "For RMU Application".
b)	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

5.0.0 Quality Assurance (QA)

5.1.0	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.
5.2.0	Sampling Method	Sampling Method for quality checks shall be as per manufacturer's standard practice / ESI guidelines and Purchaser's prior approval shall be taken for the same.
5.3.0	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.

Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)**6.0.0 Deviations**

6.1.0.	Deviations	<p>a) Deviations from this specification shall be listed by bidder clause wise along with optional offer and has to submit the list along with bid./quotation. BSES will review the deviations and if BSES is agreed with the deviation, seller has to take written confirmation from BSES on deviation during tender evaluation..</p> <p>b) In the absence of any list of deviations from the Seller with bid as well as written confirmation from BSES on deviations, it will be assumed by the Buyer that the Seller complies with the Specification fully.</p> <p>c) Any deviations mentioned in any other submitted bid documents (i.e.in filled GTP, Catalog, BSES old approval, buyer's/seller's standards etc) by seller without separate deviation sheets will not consider as a deviation from this tech spec at any stage of contract.</p>
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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.
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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.



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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?	Yes/No	
	b) Loose Components: CPRI TTR as per EA TS 09-13 enclosed?	Yes/No	

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

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

**LUG FOR
240/300 sqmm CABLE**

**LUG FOR
120/150 sqmm CABLE**

CONDUCTIVE MATERIAL

ALUMINIUM BARREL >=99.5%
 COPPER PLAN >=99.95%
 FINAL METAL STATE FULLY ANNEALED INCLUDING JOINT
 JOINING METHOD BARREL SHALL BE FRICTION WELDED TO THE PLAN THUS ACHIEVING THE BEST POSSIBLE TRANSITION BETWEEN THE COPPER PLAN AND ALUMINIUM BARREL

FINISH
 BRIGHT

1) ALL TEST SHALL BE CARRIED OUT AS PER ICE-61238-1
 2) BARRELS SHALL BE CAPPED AND FILLED WITH GREASE SD AS TO AVOID OXIDATION OF THE ALUMINIUM
 3) LUGS SHALL HAVE MARKING AS MAKE & SIZE ENGRAVED ON LUG.

SIZE	ALUMINIUM					COPPER						
	ØA	ØC	B	G	H	L	ØI	I	F	K	J	
120/150	15.3	21.5	6.0	NA	83.0	23.0	17.0	35.0	4.20	7.3	3.0	11.0
240/300	21.9	31.0	7.0	83.0	90.0	20.0	17.0	35.0	4.20	7.3	31.7	117.0

OWN	MAKER	TITLE
CHECKED	DESIGN	
DATE	11.04.13	BIMETALLIC ALUMINIUM/COPPER LUG
SCALE	1/1	

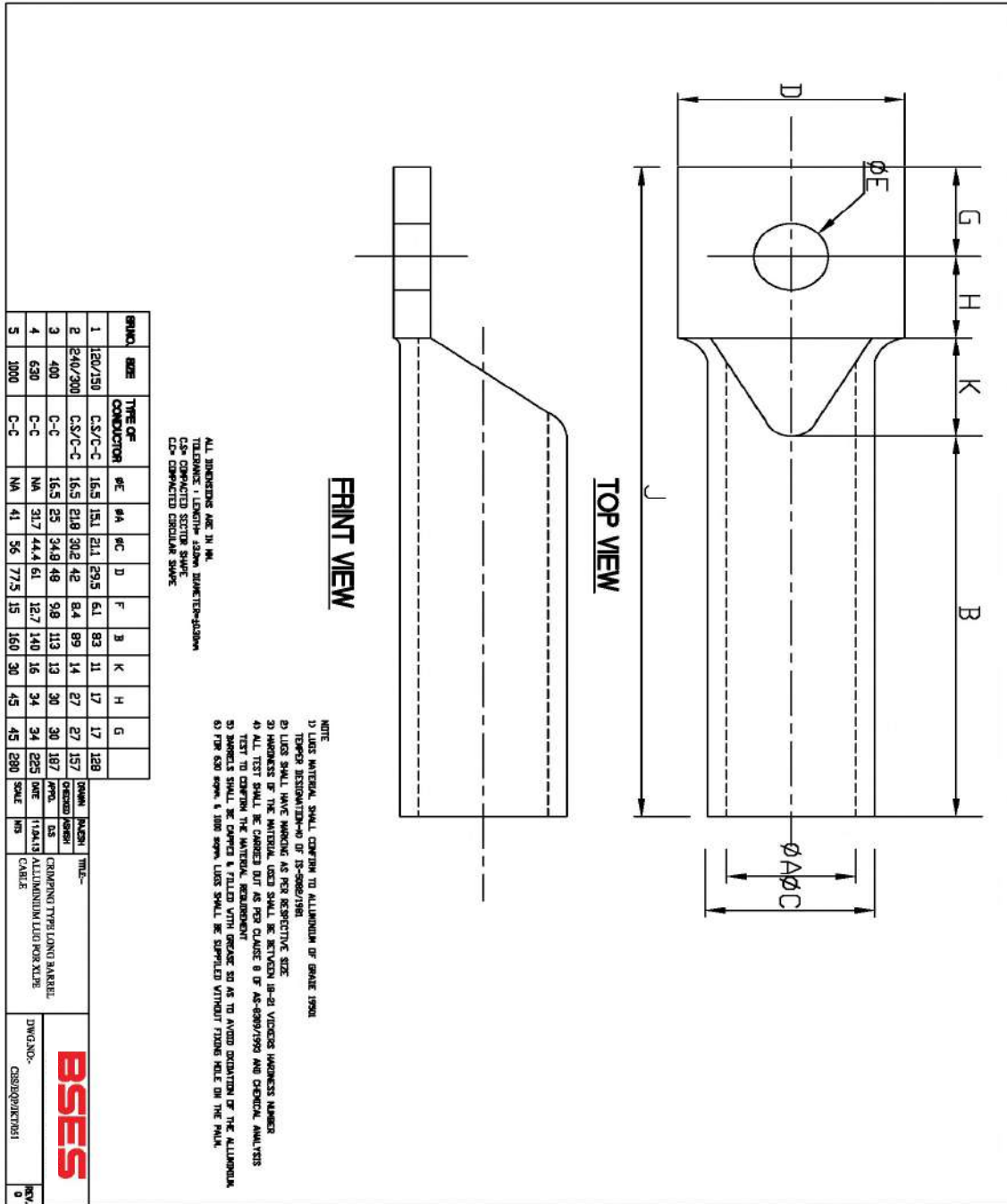
BSES

DESIGN NO- CSB/02/13/04

NOTE-ALL DIMENSIONS ARE IN MM

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





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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



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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 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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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

5.0. CONSTRUCTIONAL FEATURES OF HDPE PIPE FOR OPTICAL FIBER CABLE

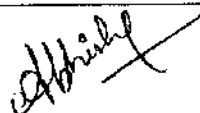
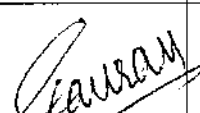
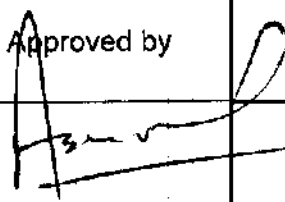
S No	Parameter	Units	Guaranteed Value
PLB HDPE Pipe Parameters			
5.1	Manufacturer's Name		
5.2	Pipe diameter - Nominal - Tolerance	mm %	40 +1% & -0%
5.3	Wall Thickness - Nominal - Tolerance	mm %	3.5 +1% & -0%
5.4	Standard Length - Nominal - Tolerance	meter &	500 +/- 5%
5.5	Weight	Kg/meter	
5.6	Pipe 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 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
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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 – $30 \text{ N/mm}^2 = 3 \text{ Kg/sq. mm}$

TECHNICAL SPECIFICATION FOR CABLE LAYING

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

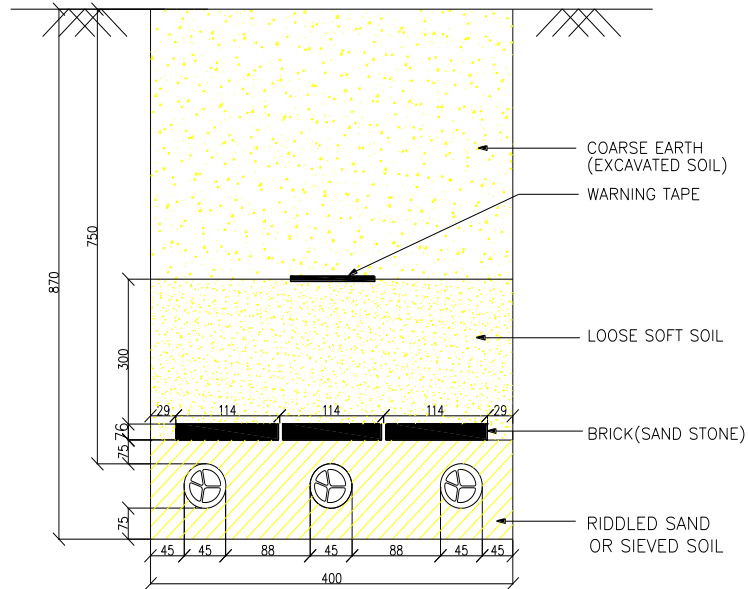


Figure 1.1 – 1.1kV, 150sqmm Buried Cable

TECHNICAL SPECIFICATION FOR CABLE LAYING

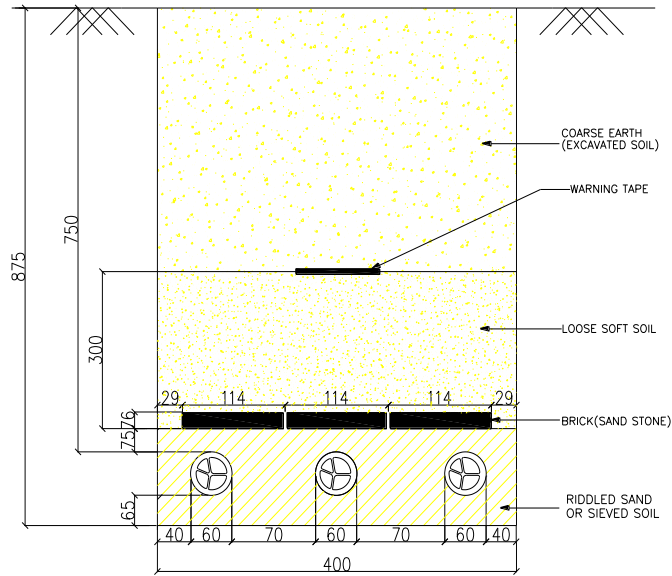


Figure 1.2 – 1.1kV, 300sqmm Buried Cable

TECHNICAL SPECIFICATION FOR CABLE LAYING

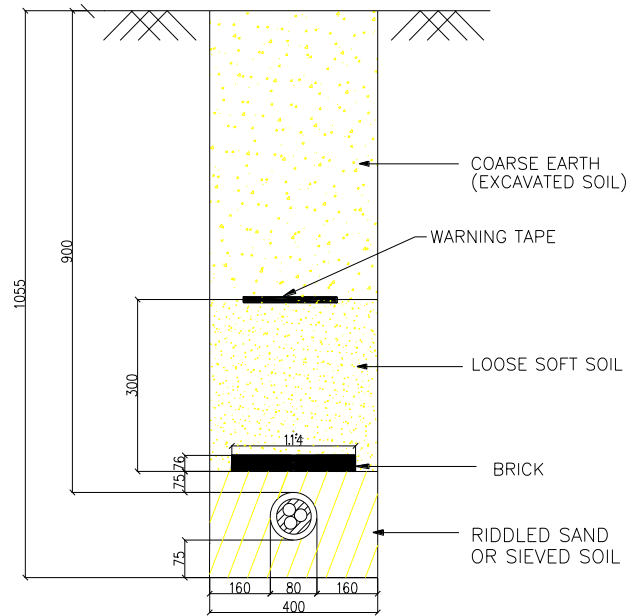


Figure 1.3 – 11kV Buried Cable for Single Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

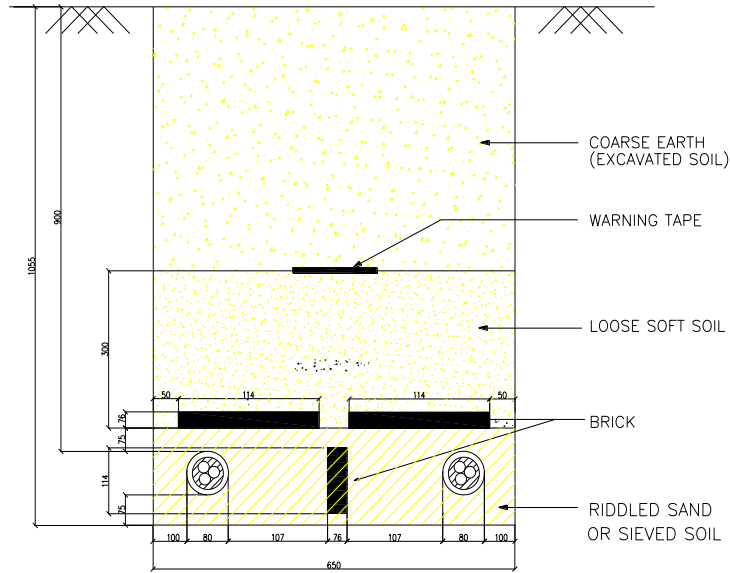


Figure 1.4 – 11kV Buried Cable for Double Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

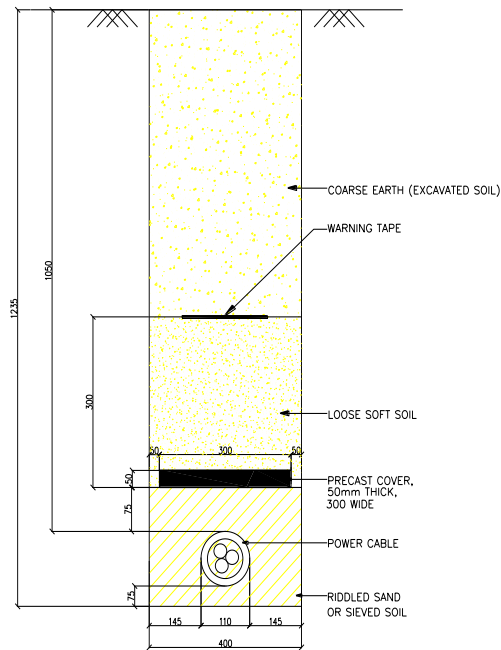


Figure 1.5 – 33kV Buried Cable for Single Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

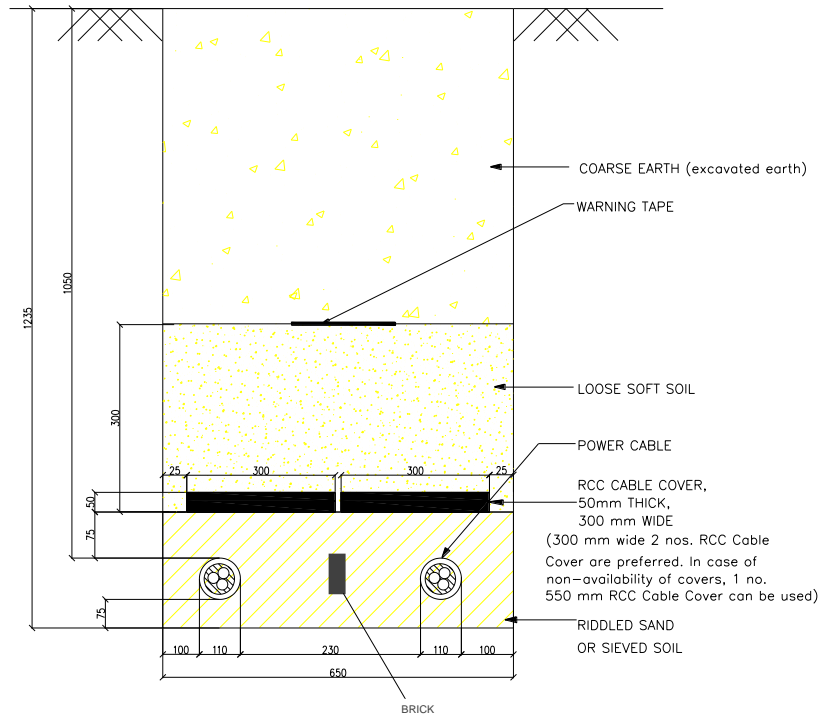


Figure 1.6 – 33kV Buried Cable for Double Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

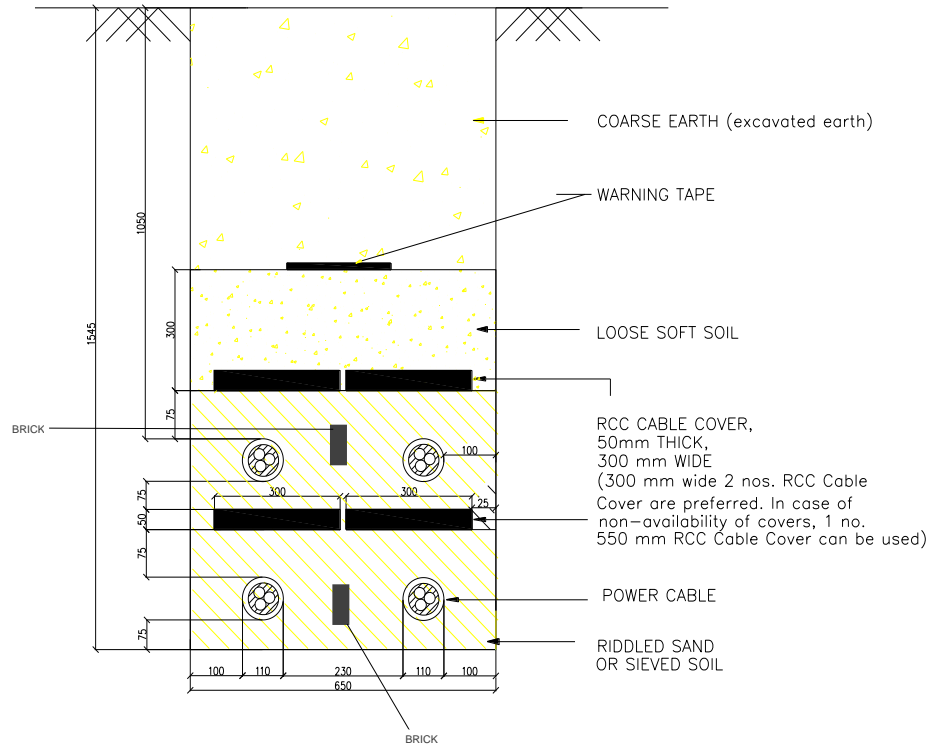


Figure 1.7 – 33kV Buried Cable Option-1 for Four Circuits

TECHNICAL SPECIFICATION FOR CABLE LAYING

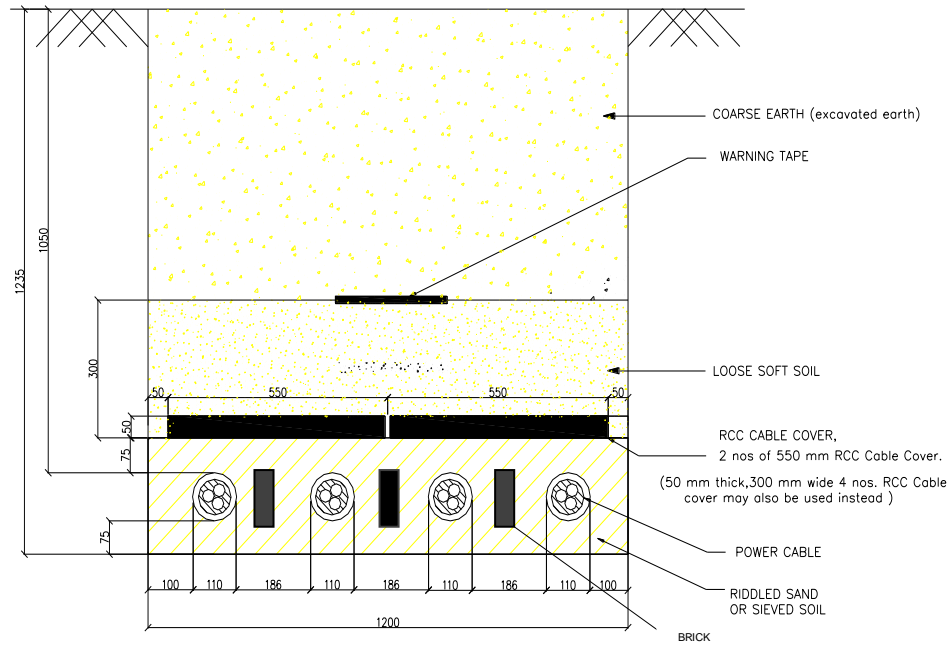


Figure 1.8 – 33kV Buried Cable Option-2 for Four Circuits

TECHNICAL SPECIFICATION FOR CABLE LAYING

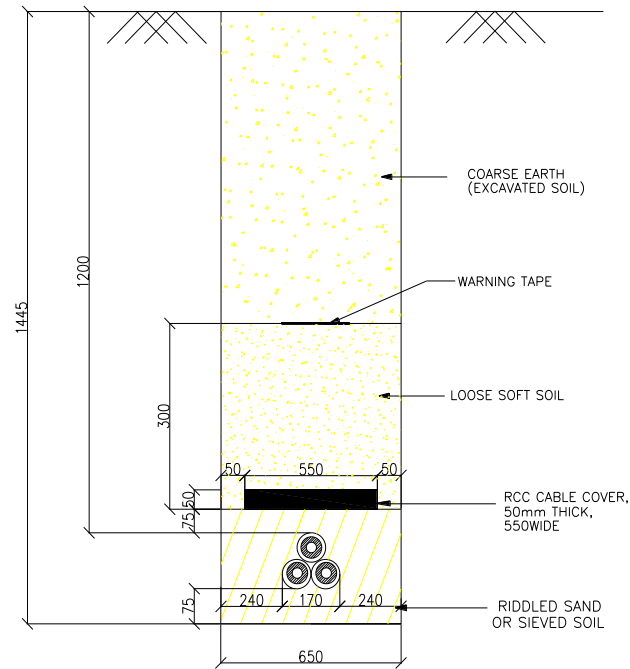


Figure 1.9 – 66kV Buried Cable for Single Circuit

TECHNICAL SPECIFICATION FOR CABLE LAYING

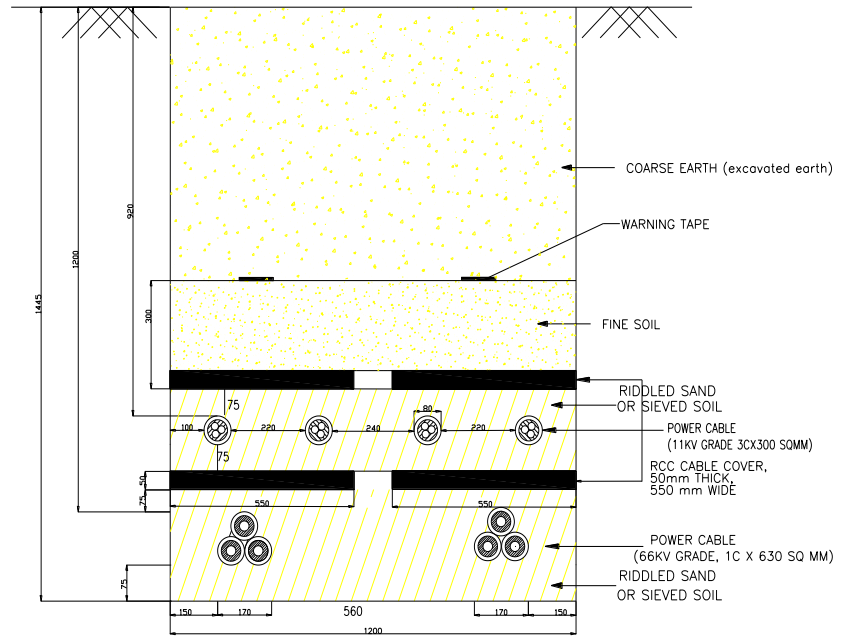


Figure 1.10 – 66kV Double Circuit and 11kV Circuits

TECHNICAL SPECIFICATION FOR CABLE LAYING

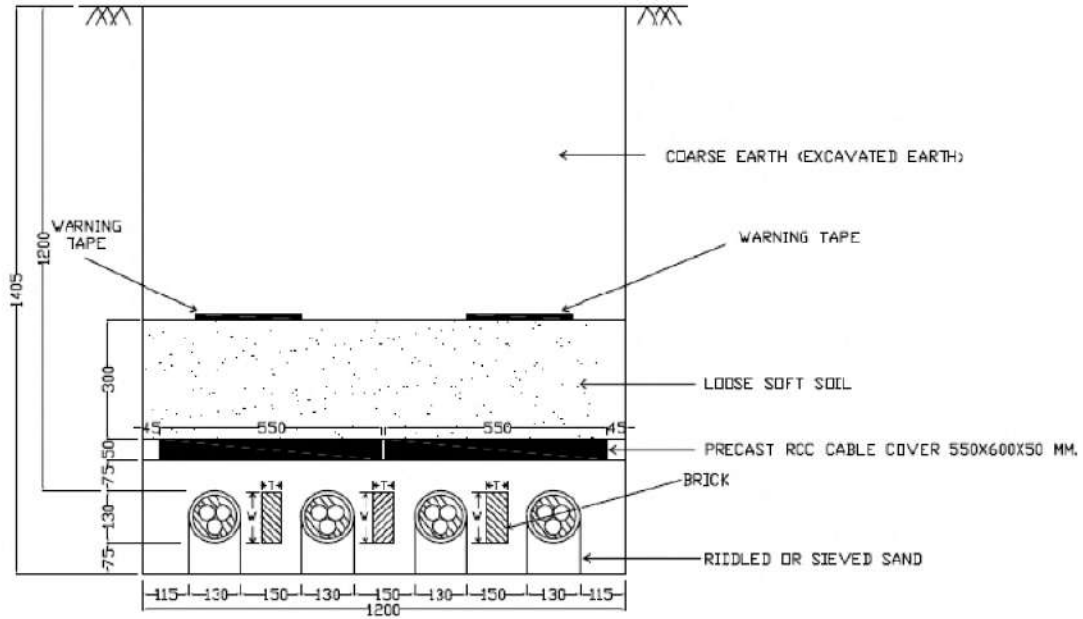


Figure 1.11 – 66kV 3Cx300 sq mm Four No's Cable Runs

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. In case 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.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- 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

TECHNICAL SPECIFICATION FOR CABLE LAYING

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.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- 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

TECHNICAL SPECIFICATION FOR CABLE LAYING

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

TECHNICAL SPECIFICATION FOR CABLE LAYING

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.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- 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.

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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.

TECHNICAL SPECIFICATION FOR CABLE LAYING

- 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

TECHNICAL SPECIFICATION FOR CABLE LAYING

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

TECHNICAL SPECIFICATION FOR CABLE LAYING

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

TECHNICAL SPECIFICATION FOR CABLE LAYING

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.

TECHNICAL SPECIFICATION FOR CABLE LAYING

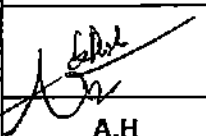
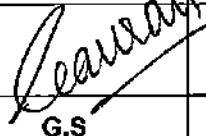
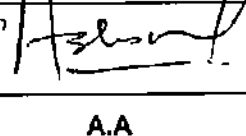
- o. Excess earth shall be removed from site after back filling. Site to be cleared to avoid flowing of dust. Barricades to be removed from site within 24 hrs after completion of job.
- p. During non working hrs vendor to ensure presence of supervisor for controlling any event from locals.
- q. PPEs
 - 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

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

TECHNICAL SPECIFICATION
FOR
EARTHING PRACTICE IN GRID SUBSTATION

PREPARED BY	REVIEWED BY	APPROVED BY	REV	0
 A.H	 G.S	 A.A	DATE	18/10/2017

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

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TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION**1. SCOPE**

This specification covers the guidelines of earthing at 66/11, 33/11, 66/33/11 kV Grid substation and the technical requirements of material required for earthing.

2. STANDARDS & CODES

2.1.	CEA guidelines	Technical standards for construction of electrical plants and electrical lines
2.2.		IE Rules of 1956
2.3.	IEEE Std 80	IEEE guide for safety in AC substation grounding
2.4.	CBIP :2006 – publication no. 229	Manual on substation layout
2.5.	IS 3043: 1987	Code of practice for earthing
2.6.	IS 2629 (1985)	Recommended practice for hot dip galvanizing of Iron & Steel
2.7.	IS 2633 (1986)	Method for testing uniformity of coating on zinc coated article
2.8.	IS 5358 (1969)	Specification for hot dip galvanized coating on fasteners
2.9.	IS 4759 (1996)	Specification of Hot dip zinc coatings on structural steel and other allied products
2.10.	IS 1239 (2004)	Steel tubes, tubular and other wrought steel fittings- specification
2.11.	IEC 62561-2	Requirements for conductors and earth electrodes
2.12.	IEC 62561-7	Requirements for earthing enhancing compounds
2.13.	UL 467	Standard for safety - Grounding and bonding equipment
2.14.		Handbook on Electrical Earthing (Ministry of Railways)

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

3. REQUIREMENT OF EARTHING

3.1.	Primary guidelines	<p>Following are primary guidelines for a good earthing system in a Grid substation:</p> <ul style="list-style-type: none"> a. The impedance to ground should be as low as possible. In general it should not exceed 0.5 ohm. b. The step and touch potentials shall be within safe limits. c. The contractor shall do the calculation for number of earthing rods being used in a substation for achieving the desired earth resistance.
3.2.	Earthing lead size	<ul style="list-style-type: none"> a. The actual size of earthing lead will depend on the maximum fault current which the earthing lead will be required to carry safely. b. Please refer Annexure A1 for HT fault level.
3.3.	Earthing type	<ul style="list-style-type: none"> a. Rod earthing shall be provided for the Grid substation. b. The size of the rod depends upon the current to be carried and the type of the soil. Soil resistivity testing will be carried out by vendor. c. The Earth Electrode should be embedded vertically. Wherever hard rock is encountered, the rod can be inclined at an angle of about 30deg to the horizontal as per clause 9.2.2 of IS 3043. d. The vertically driven rods shall be interconnected with each other using horizontal grid conductors.
3.4.	Earth Pit	<ul style="list-style-type: none"> a. As per clause 20.5.2 of IS 3043, the minimum distance between the vertical earth electrodes shall not be less than the length of rod. b. Minimum of 1m distance of earth pit from electrical equipment and structures shall be maintained. c. The earth pits shall be backfilled with earth enhancing material as per Drawing . d. Treated Earth pits shall be used where earth resistance value is getting over the prescribed value in specification i.e. 0.5 ohms.
3.5.	Horizontal Conductor	<ul style="list-style-type: none"> a. The entire earth rod driven in ground vertically shall be interconnected with earth grid conductors horizontally under the ground. b. The Horizontal conductors shall be laid 600 mm below FGL. c. Minimum earth coverage of 300 mm shall be provided between the Horizontal conductor and the bottom of trench/foundation/underground pipe at the crossing. d. Horizontal conductors around a building /switchyard fence shall be buried outside the boundary at a minimum distance of 2000 mm. e. Risers shall be provided 300mm above the ground level for equipment earthing. Two number earth pits shall be provided with riser for connection of transformer neutral. f. All the joints between rods flats shall be exothermic type for creating better electrical contact between two. Welding between rods to flat, flat to flat should be arc welding type. g. Wherever bolted connection is done, it shall be done through two bolts at each joint to ensure tightness and avoid loosening with passage of time.
3.6.	Equipment earthing	<ul style="list-style-type: none"> a. GI strips shall be used for the equipment earthing. b. Two separate and distinct earth connections shall be provided for earthing of electrical frameworks.

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

		<ul style="list-style-type: none"> c. The connection of GI strip with riser of earth mat shall be electric arc welding arrangement; connection of equipment with earthing end shall be double bolted arrangement. d. The transformer neutral shall be earthed with two independent grounding conductors connected to two separate earth pits. e. Fence within the earth grid shall be bonded to the plant earth system at regular interval not exceeding 10 meters. Fence gate shall be separately earthed with flexible connection to permit movement. f. Bolted connection shall be made only for earthing of equipment/devices and for some removable structures. The contact surfaces shall be thoroughly cleaned before connection to ensure good electrical contact. g. Cable armor shall be earthed at both ends for multi core cables. For single core cables, the earthing shall be at switchgear end only. h. Metallic stairs and hand rails shall be earthed as for columns. Additionally a 25x6 GI flat shall run the entire length of the stairs. The GI flat shall be welded to the stairs and hand rails at intervals of 1500 mm. i. The main earth conductor shall be securely fixed to the columns /walls/trays by welding /clamping at the intervals not exceeding 1500 mm. The earth conductors shall be interconnected between them and to the main earth grid through risers.
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4. SPECIFICATION OF EARTHING MATERIALS

4.1.	GI earthing strip	<ul style="list-style-type: none"> a. Fully galvanized iron strips shall be used conforming to IS 2629. b. The zinc deposition shall not be less than 610gm/sqm of the galvanized surface area of the MS Earthing strips. c. The zinc coating used for the galvanization shall be of 9.99 % purity grade as per IS 209. d. All the galvanized material shall be checked for uniformity and weight as per IS. e. The standard length of galvanized iron earthing strip shall be minimum 7Mtrs.
4.2.	Vertical and Horizontal Earth Electrode	<ul style="list-style-type: none"> a. Copper clad steel rod driven in the earth vertically shall be a high tensile-low carbon steel rod of adequate diameter(as per the clause 6.0 of the specs) and 3 m length complying UL467, IEC62561-2 and IS 3043, molecularly bonded by 99.99% pure high conductivity copper on the outer surface with copper coating thickness 254 microns or more with sufficient amount of earth enhancement compound as per IEC 62561-7. b. Copper bonding must be UL/CPRI/ERDA certified. c. Rod shall be tested and certified from CPRI/ERDA for a short circuit current withstanding of desired value. d. There shall be following marking on the rod-Dimension Detail, product model no, Reference number of certification. e. It shall have high corrosion resistance and shall eliminate electrolytic action. f. The rod shall have thread profile at both the ends to ensure no copper is removed from the steel.

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

4.3.	Earth enhancing compound	<ul style="list-style-type: none"> a. It shall be as per IEC 62561-7. b. It shall be chemically inert to subsoil. c. It shall not pollute the environment. The RoHS certificate shall be provided from any NABL accredited lab for not having any toxic chemical in earth enhance material. d. It shall provide a stable environment in terms of physical and chemical properties and exhibit low resistivity. e. The earthing enhancing compound shall not be corrosive to the earth electrodes being used. f. It shall be maintenance free. g. The earth enhancement material shall be supplied in sealed, moisture proof bags. These bags shall be marked with manufacturer's name or trade name, quantity, batch no. & date of manufacturer, resistivity, Buyer's name, PO no. & date. h. As per IEEE 80-2013 clause 14.5 d, grounding material shall be tested and certified for resistivity less than 0.12 Ω-m.
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5. SIZES OF THE EARTHING MATERIALS FOR EQUIPMENT EARTHING

S.No.	Title	Material	Sizes of the earthing	Type	UOM	No of Lead
	Main Earthing Grid					
5.1	Vertical Rods	Cu Bonded Rods	25	Rod	mm (dia)	
5.2	Above Ground risers	GI	50x10	Flat	sqmm	2
5.3	Horizontal Rods	Cu Bonded Rods	25	Rod	mm (dia)	
5.4	Treated Earth Pit	Cu Bonded Rods	25	Rod	mm (dia)	
	Power Transformers					
5.5	Frame	GI	75X10	Flat	sqmm	2
5.6	Marshalling Box	GI	50X6	Flat	sqmm	2
5.7	Radiator	GI	50X6	Flat	sqmm	2
5.8	Neutral	GI	65x10	Flat	sqmm	2
5.9	Fan	GI		As per sizes mentioned for fans		
	11 KV System					
5.10	11 KV Switchgear	GI	50X6	Flat	sqmm	2

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

5.11	11 KV Bus Duct	GI	50X6	Flat	sqmm	2
5.12	11 KV Cable Box	GI	50X6	Flat	sqmm	2
	415 V System					
5.13	ACDB	GI	50X6	Flat	sqmm	2
5.14	Station Trafo Frame	GI	50X6	Flat	sqmm	2
	DC System					
5.15	Battery Charger	GI	50X6	Flat	sqmm	2
5.16	DCDB	GI	50X6	Flat	sqmm	2
	Other Electrical Items					
5.17	Three phase receptacles, welding outlet	GI	25x3	Flat	sqmm	1
5.18	C&R Panel	GI	50X6	Flat	sqmm	2
5.19	Push Button	GI	8	Wire	swg	1
5.20	Cable Trays(one run along the tray section)	GI	50X6	Flat	sqmm	1
	Other Non Electrical Items					
5.21	Railway Tracks	GI	25x6	Flat	sqmm	At suitable Points
5.22	Metallic noncurrent carrying structures like stair case	GI	25x6	Flat	sqmm	1
5.23	Columns, Structures	GI	50X6	Flat	sqmm	2
5.24	Steel pipe racks	GI	25x6	Flat	sqmm	1
5.25	Fence/Gate	GI	50X6	Flat	sqmm	At suitable Points(2 min)
5.26	Hand Rail	GI	8	Wire	swg	1

TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

6. TESTING AND INSPECTION

6.1.	Earthing materials	<ul style="list-style-type: none"> a. The purchaser reserves the right to inspect the material at the time of tests. All tests shall be performed in the presence of BYPL representative. The bidder shall give intimation in advance to witness the test. b. Acceptance test for GI earthing strips – Tests for Visual examination, dimensional verification and galvanization shall be witnessed at the time of inspection. c. Acceptance test of Earth enhancement compound – Tests for leaching, sulphur determination, corrosion and resistivity shall be done as per IEC 62561-7 d. Type test reports of the earthing materials from CPRI/ERDA/Equivalent lab shall be submitted. The bidder shall submit UL-467/CPRI/ERDA test reports for copper clad steel rod.
6.2.	Measurement of Earth resistance	<ul style="list-style-type: none"> a. After the completion of work ground resistance of each installation shall be measured by BYPL/Contractor. b. The measurement of resistance shall be witnessed and signed by representative of BYPL as well as the contractor. The test certificates shall be generated for each installation clearly indicating the details of the transformer, name of the substation, location, district, serial no. of testing equipment and name of testing engineer. c. The desire ground resistance shall be measured after interconnection of earth pits is completed. The value of earth resistance shall not be more than 0.5 ohm. d. In case where this value exceeds 0.5 ohms, the earthing design shall be redesigned. The pit location, earth electrode, soil treatment, earth conductor, GI strip used shall be checked whether properly used at site. If not, these shall be changed as per the redesigned plan.

7. DEVIATIONS

7.1.	Deviation	<p>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.</p>
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TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

8. DOCUMENTS SUBMISSION

The bidder has to submit the following documents along with bid:-

8.1.	Complete earthing calculation
8.2.	Complete product catalogue, Manual and calibration certificate of the equipment
8.3.	Type test reports
8.4.	Deviation Sheet (if any)

9. GUARANTEED TECHNICAL PARTICULARS

S. No	Parameter	BYPL Requirement	Vendor Data
9.1	Rod to rod welding	Exothermic	
9.2	Zinc deposition of GI earthing Strip	610gm/sqm	
9.3	Length of GI Strip	7m (Minimum)	
9.4	Diameter of Cu clad Rod	25 mm	
9.5	UL/CPRI/ERDA Certification of Cu Bonding	Test certificate to be provided	
9.6	Cu bonding	250 Micron	
9.7	Length of Copper bonded rod	3 m	
9.8	Purity of Copper	99.99%	
9.9	Short circuit withstand test of Rod	31.5kA	
9.10	Marking on the rod-Dimension Detail, product model no, Reference number of certification	Sample Required	
9.11	ROHS Certificate from NABL accredited lab for not having toxic chemical in earth enhance material	Test certificate to be provided	
9.12	Resistivity of earth enhancing material	0.12 ohm-m(Max)	

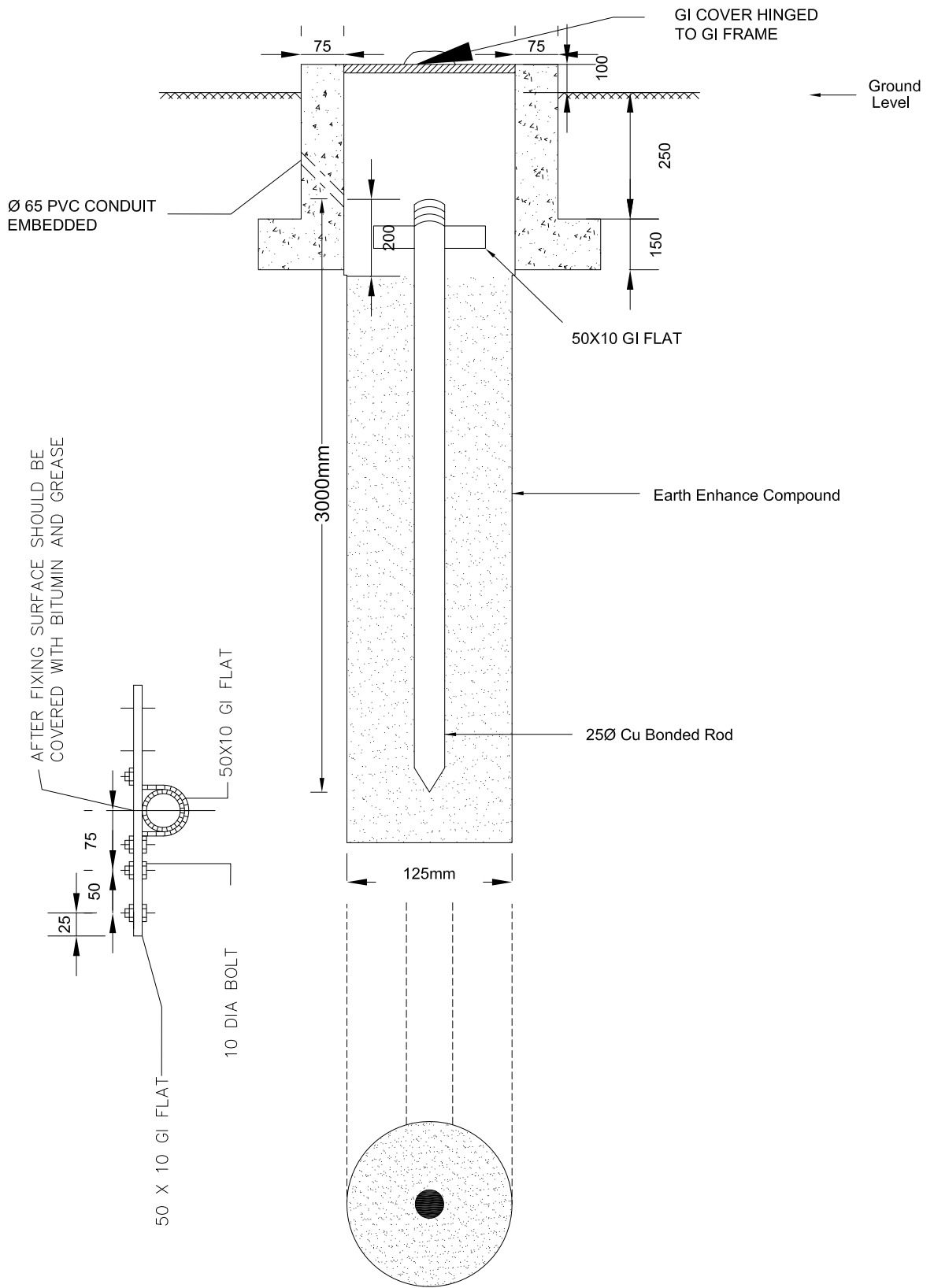
TECHNICAL SPECIFICATION FOR EARTHING PRACTICE IN GRID SUBSTATION

9.13	Exothermic welding material	IEEE 837 Complied	
9.14	Make of Steel	SAIL/ESSAR/TATA	

ANNEXURE A1 : REFERENCE FAULT LEVEL

Voltage Level(kV)	Design Fault Level
66/11	31.5 KA
33/11	25 KA

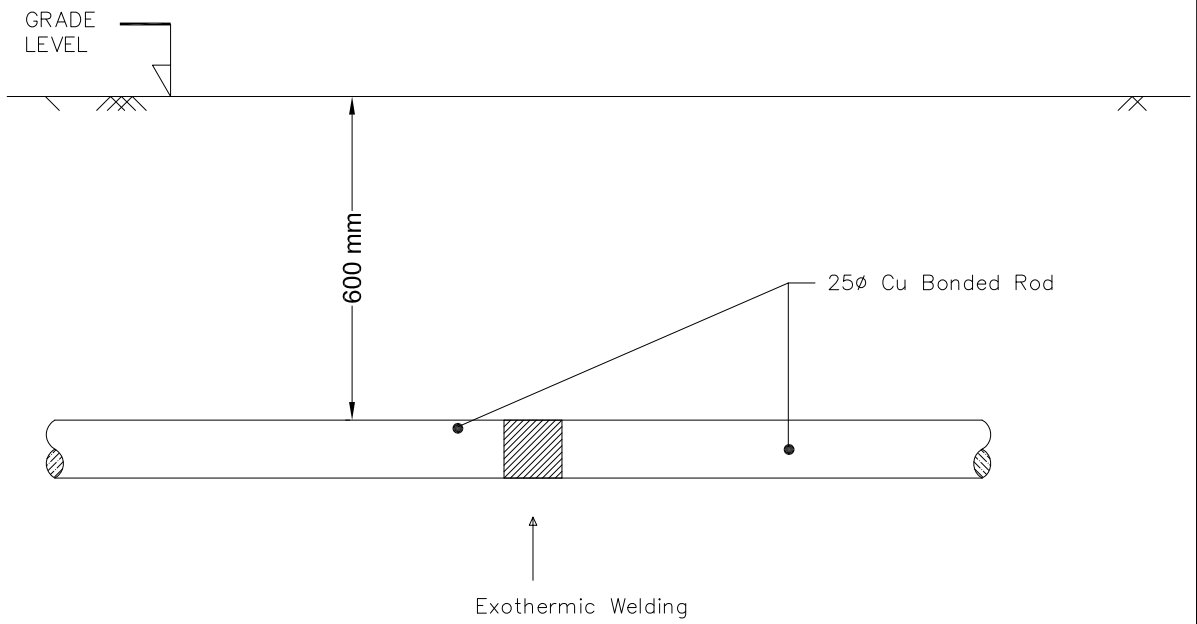
ANNEXURE A2: REFERENCE DRAWINGS



DRAWN	A.H
CHECKED	G.S
APPD.	A.A
DATE	17.10.17
SCALE	NTS

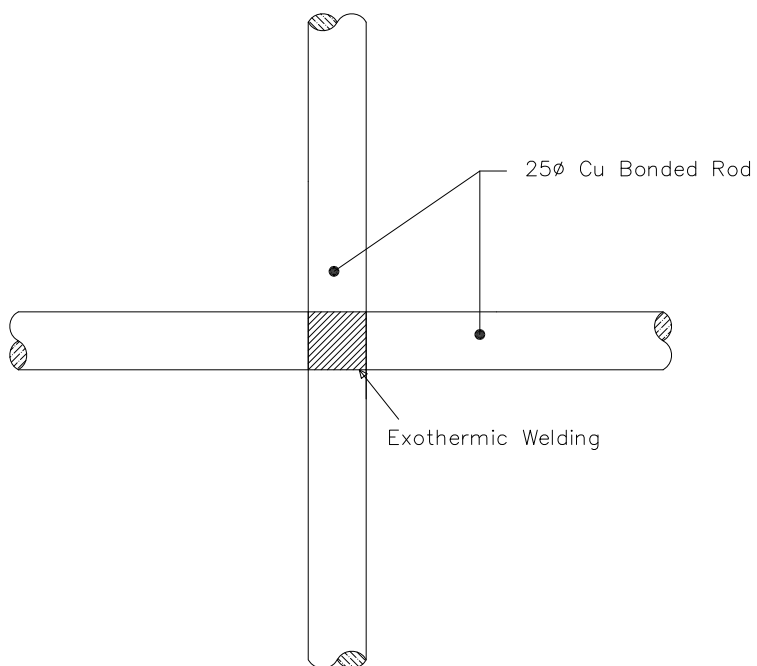
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EARTH ELECTRODE





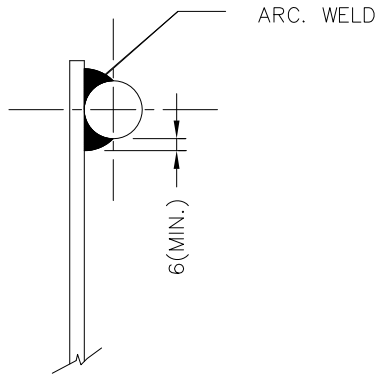
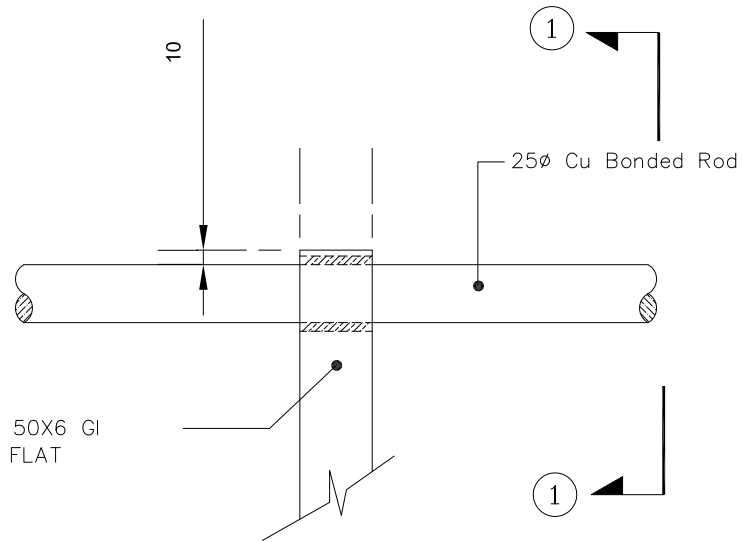
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CHECKED	G.S	
APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	

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DRAWN	A.H	TITLE: - CROSS JOINT BETWEEN RODS
CHECKED	G.S	
APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	

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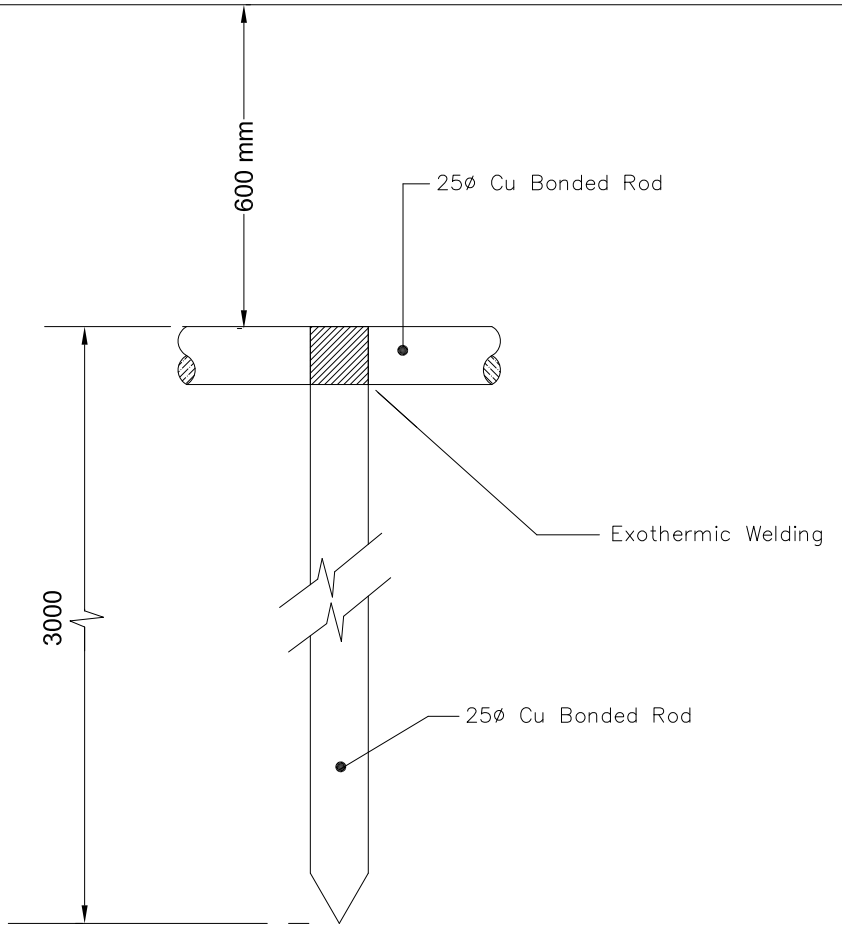


SECTION - ①

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APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	

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GRADE LEVEL

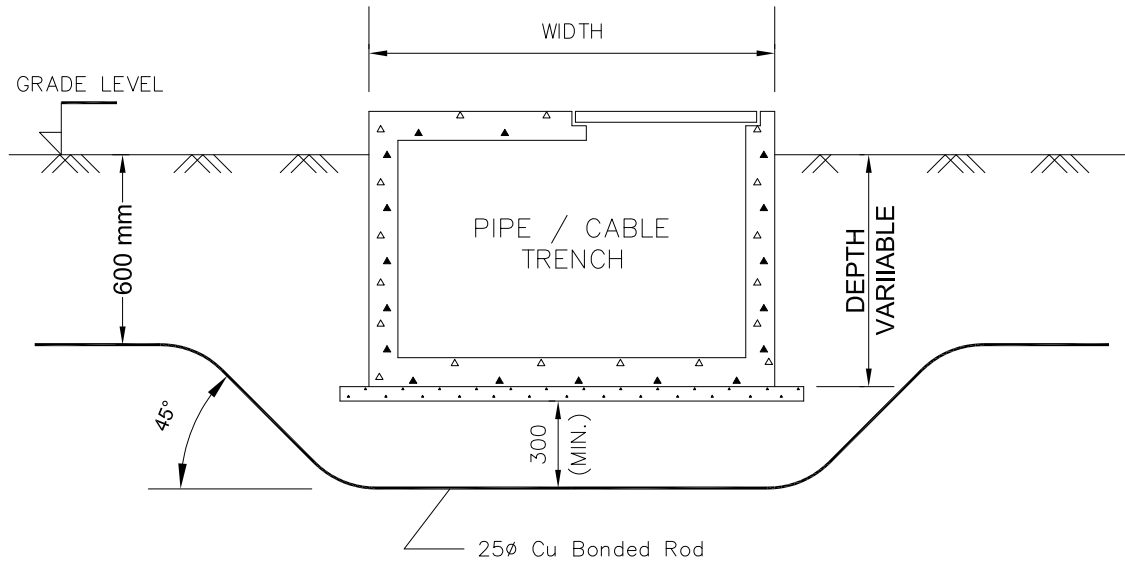


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DATE	17.10.17
SCALE	NTS

TITLE: -

EARTH ELECTRODE

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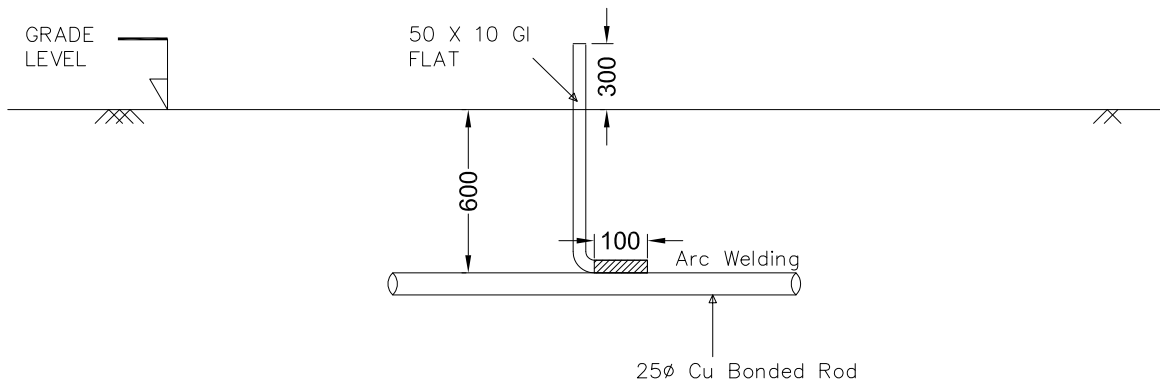


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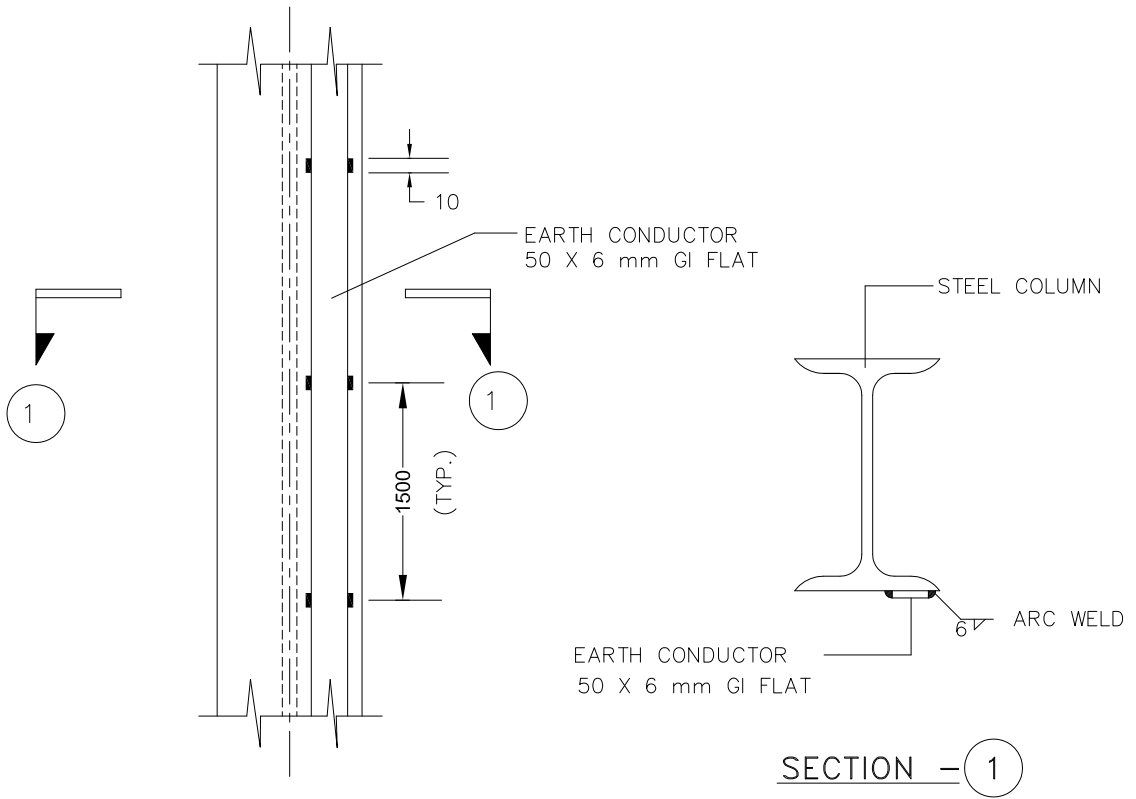
TRENCH CROSSING OF
EARTHING CONDUCTOR

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CHECKED	G.S	
APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	



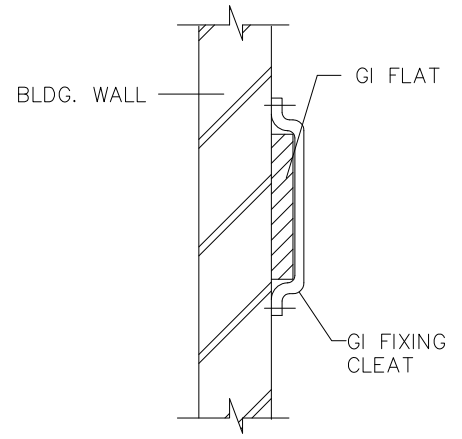
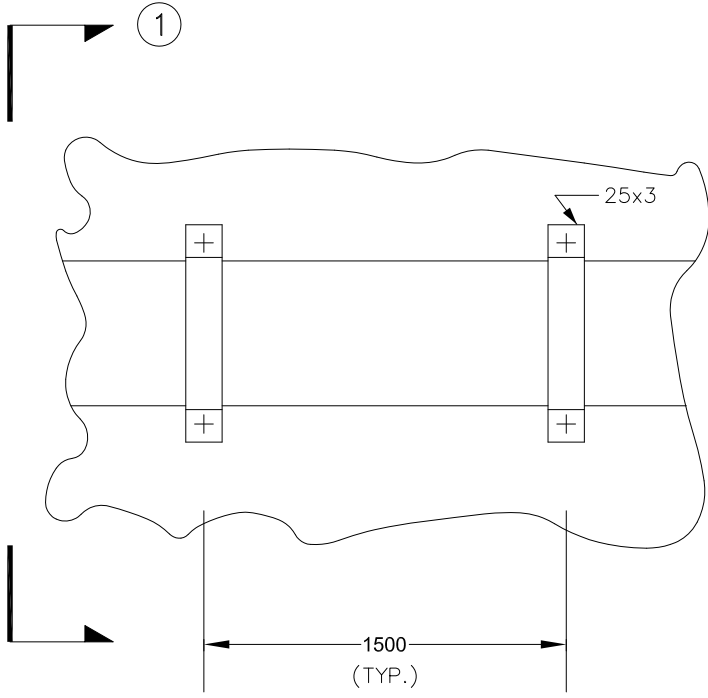


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APPD.	A.A
DATE	17.10.17
SCALE	NTS

TITLE: -

EARTHING CONDUCTOR ALONG
STEEL COLUMN

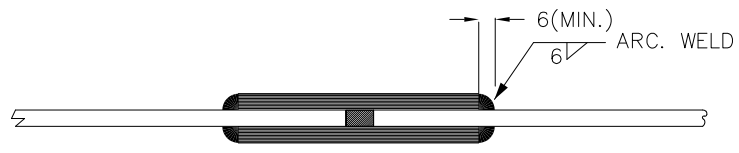
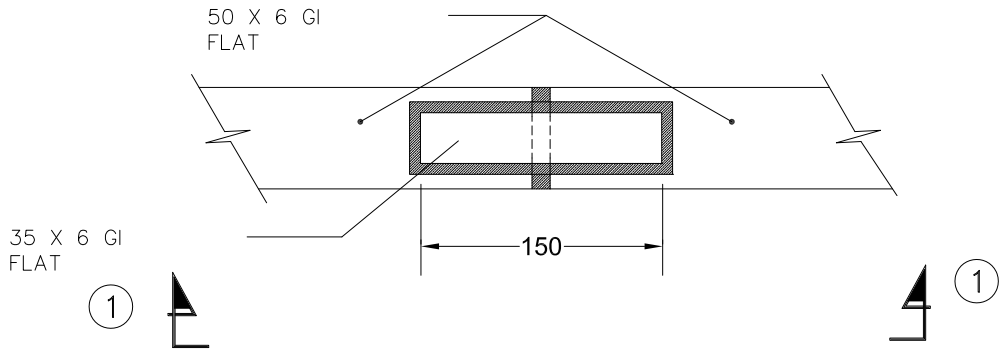
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SECTION - ①

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APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	





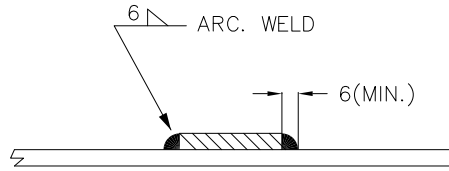
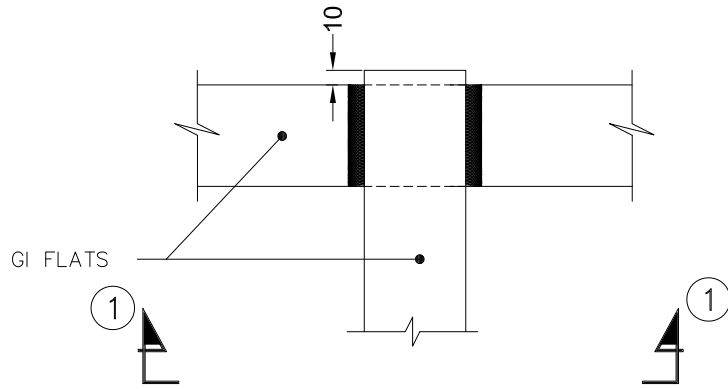
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APPD.	A.A
DATE	17.10.17
SCALE	NTS

TITLE:-

BUTT JOINT BETWEEN GI FLATS

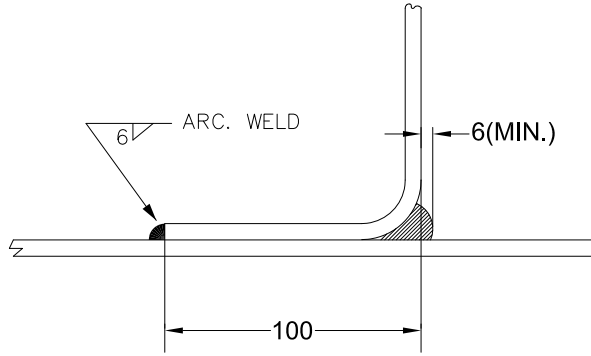
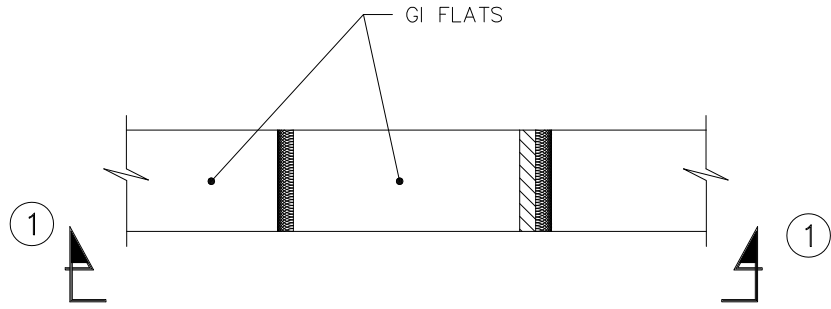




SECTION - ①

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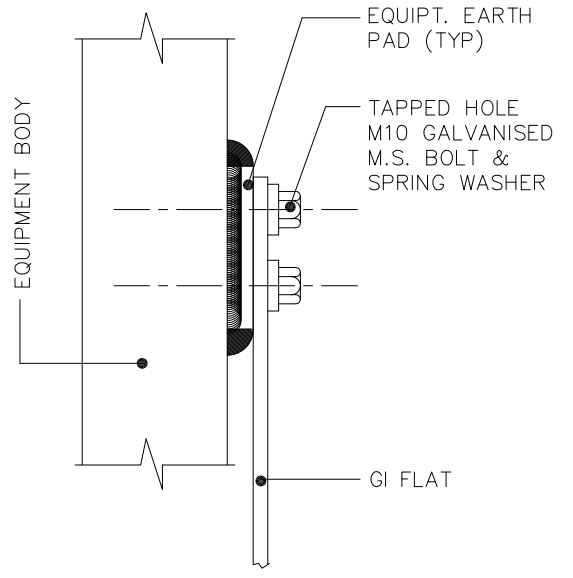
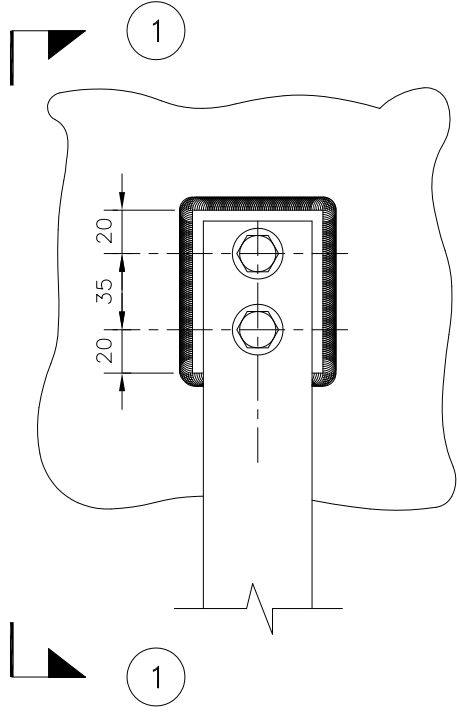
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SECTION - ①

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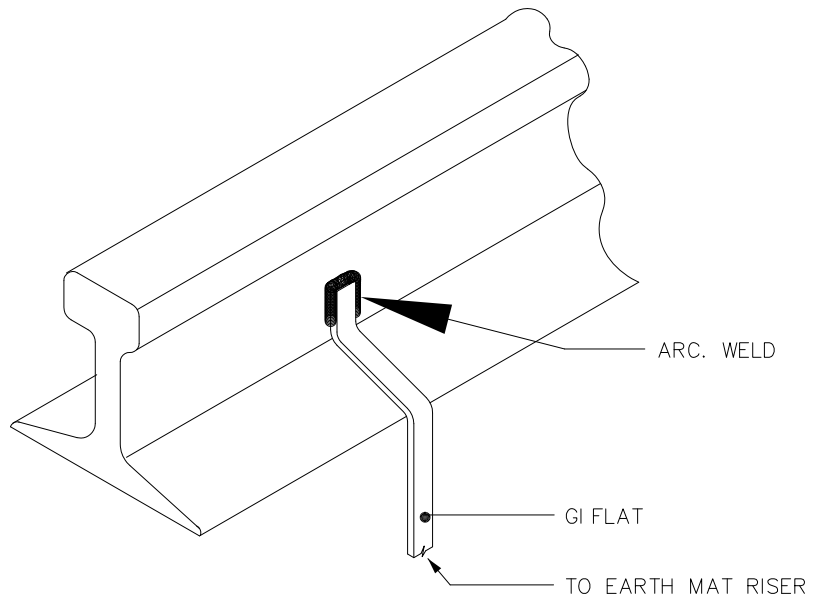
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SECTION - ① - ①

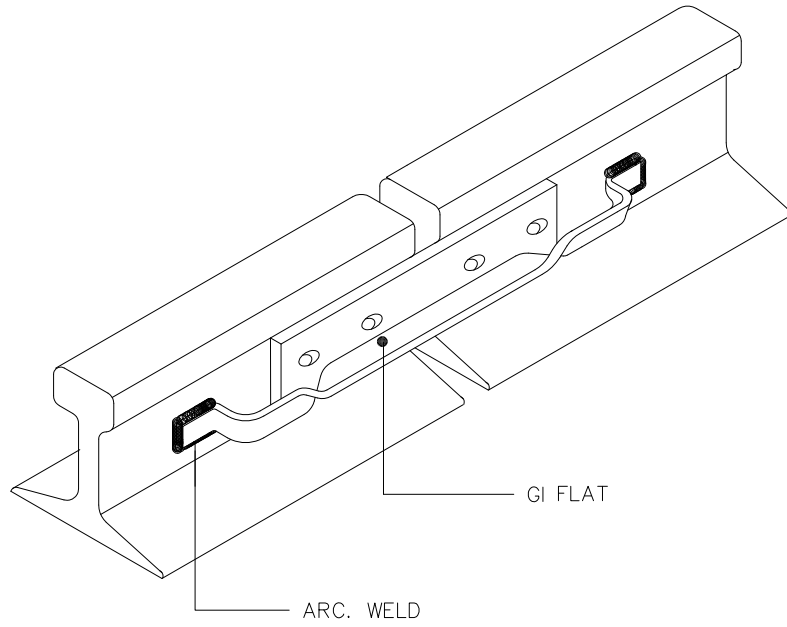
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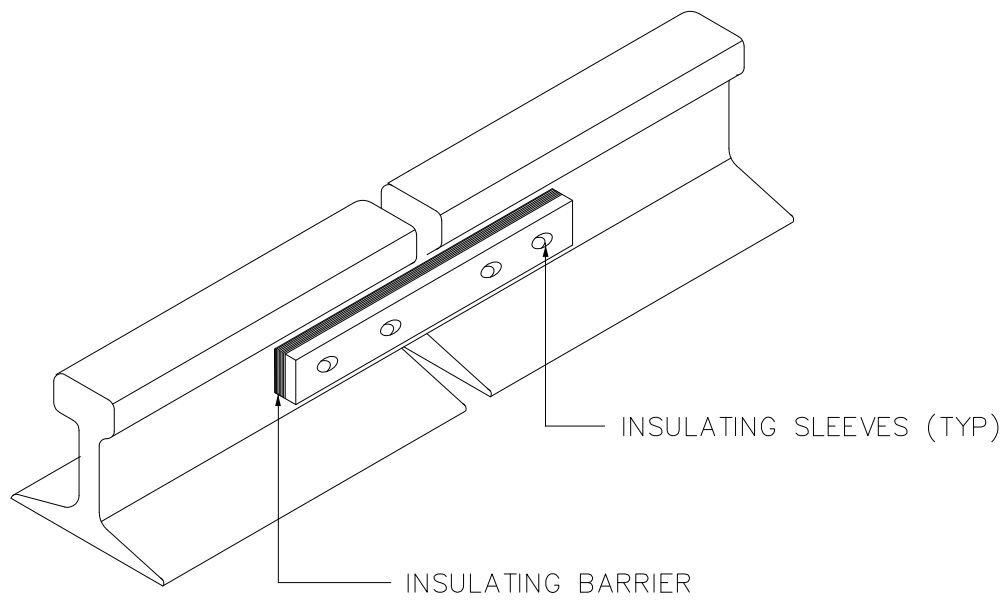
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DATE	17.10.17	
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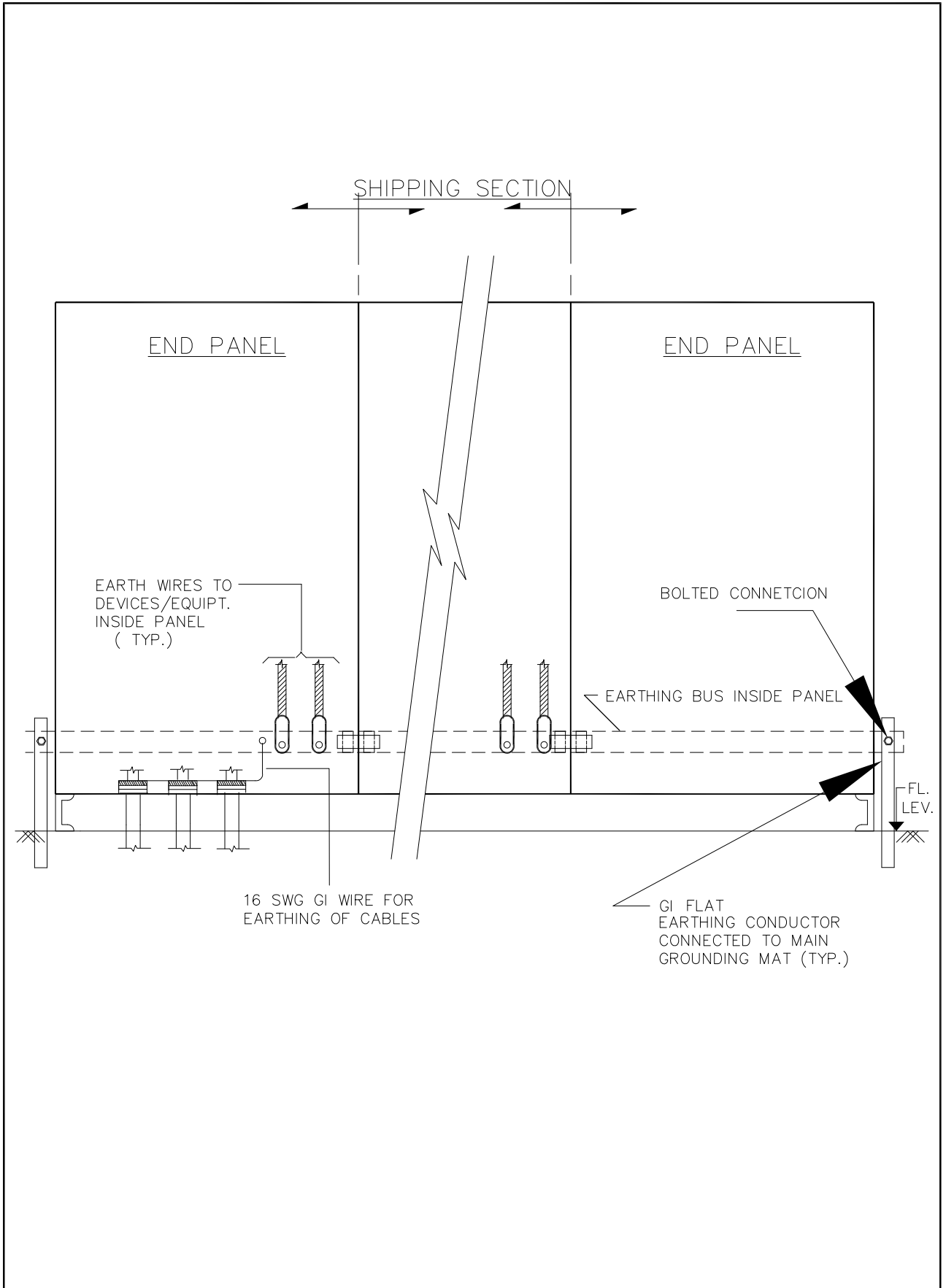
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Note: Such installation shall be provided at points where the rail track leaves the earth grid (typically at the plant boundary)

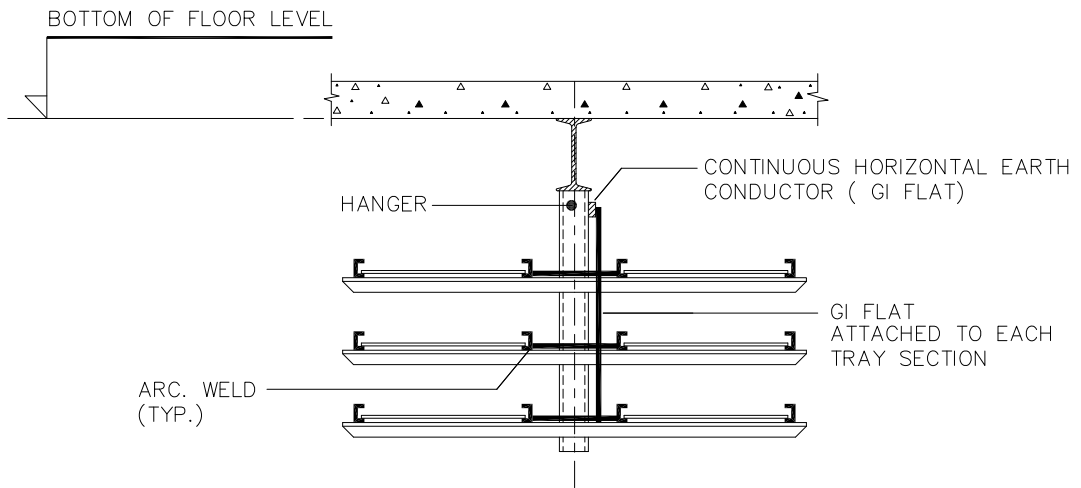
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SCALE	NTS	

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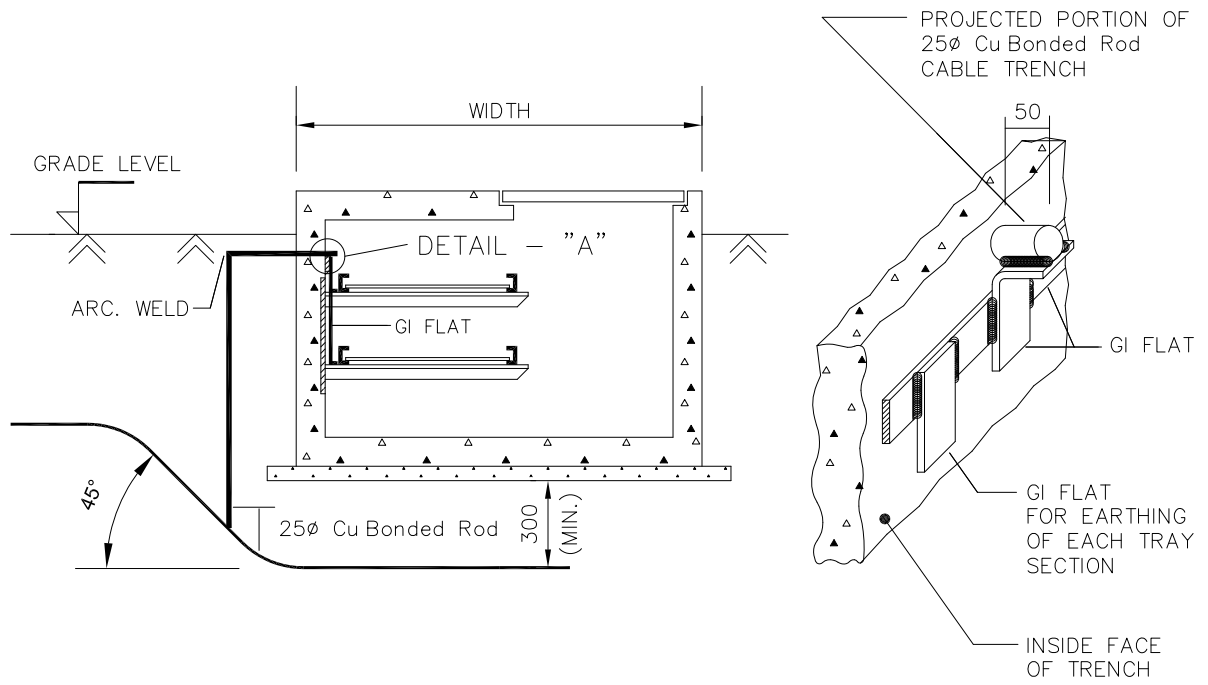


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DATE	17.10.17	
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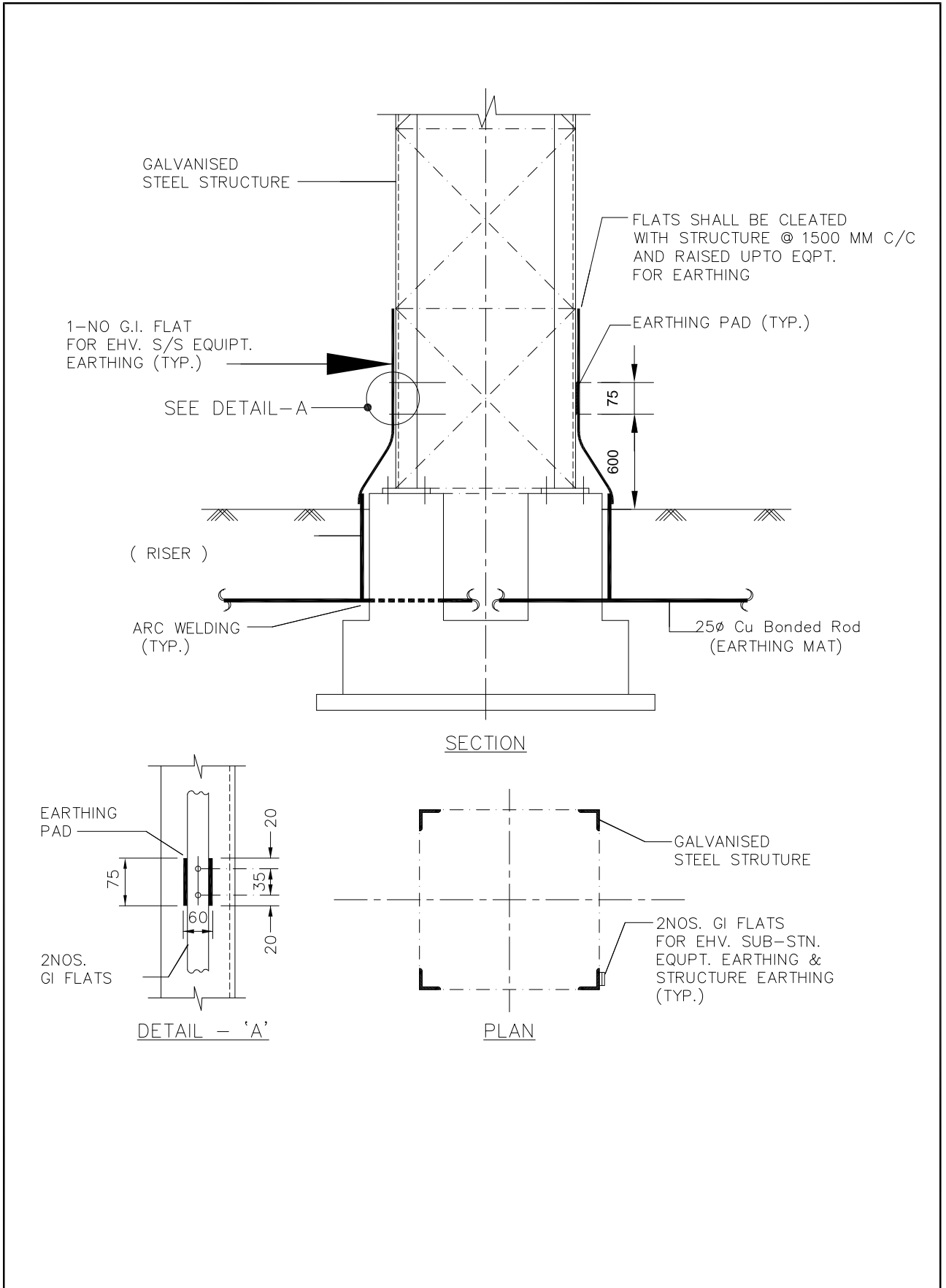
OVERHEAD CABLE TRAY EARTHING




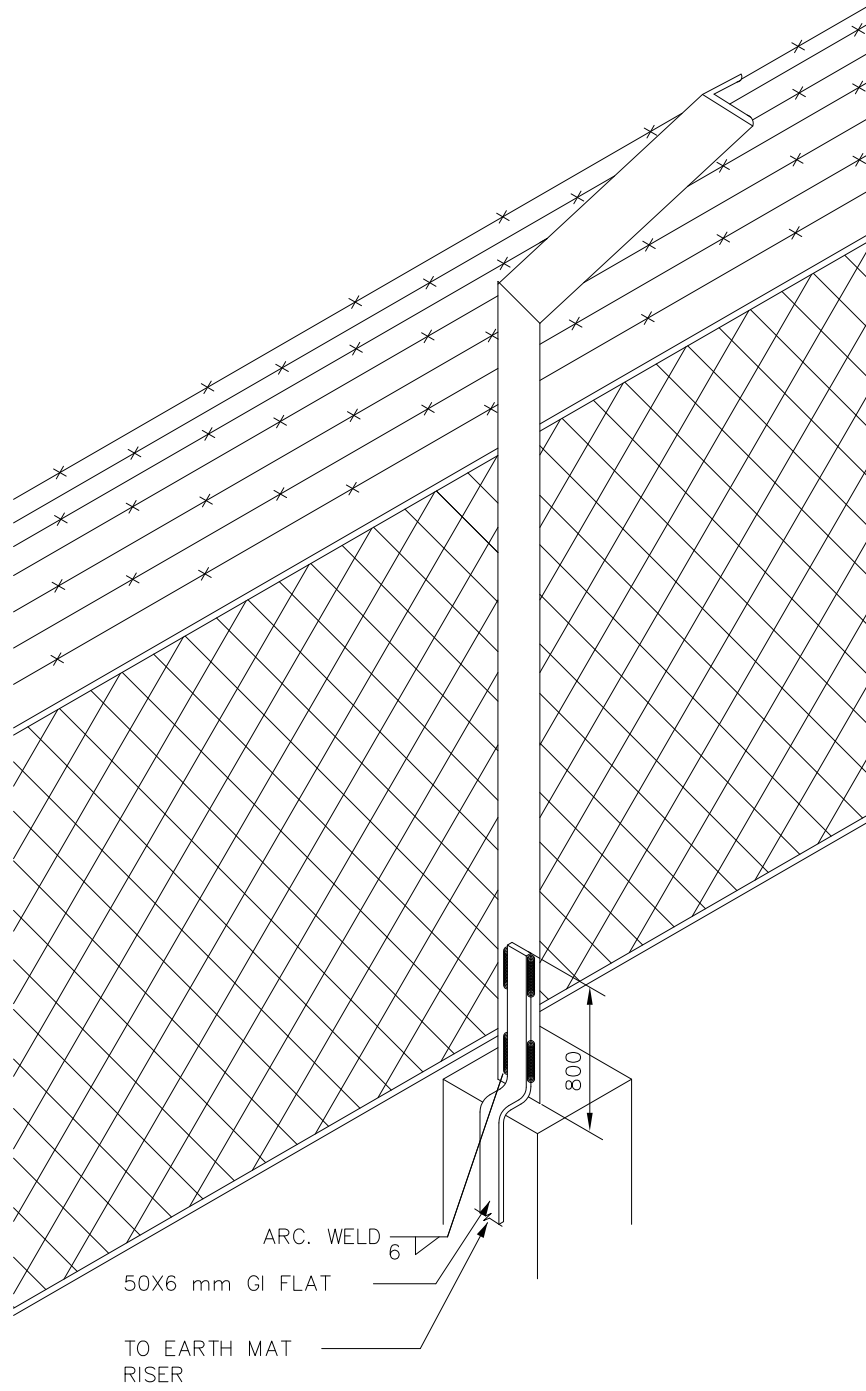
DETAIL - A

DRAWN	A.H	TITLE: - CABLE TRANCH/TRAY EARTHING
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APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	



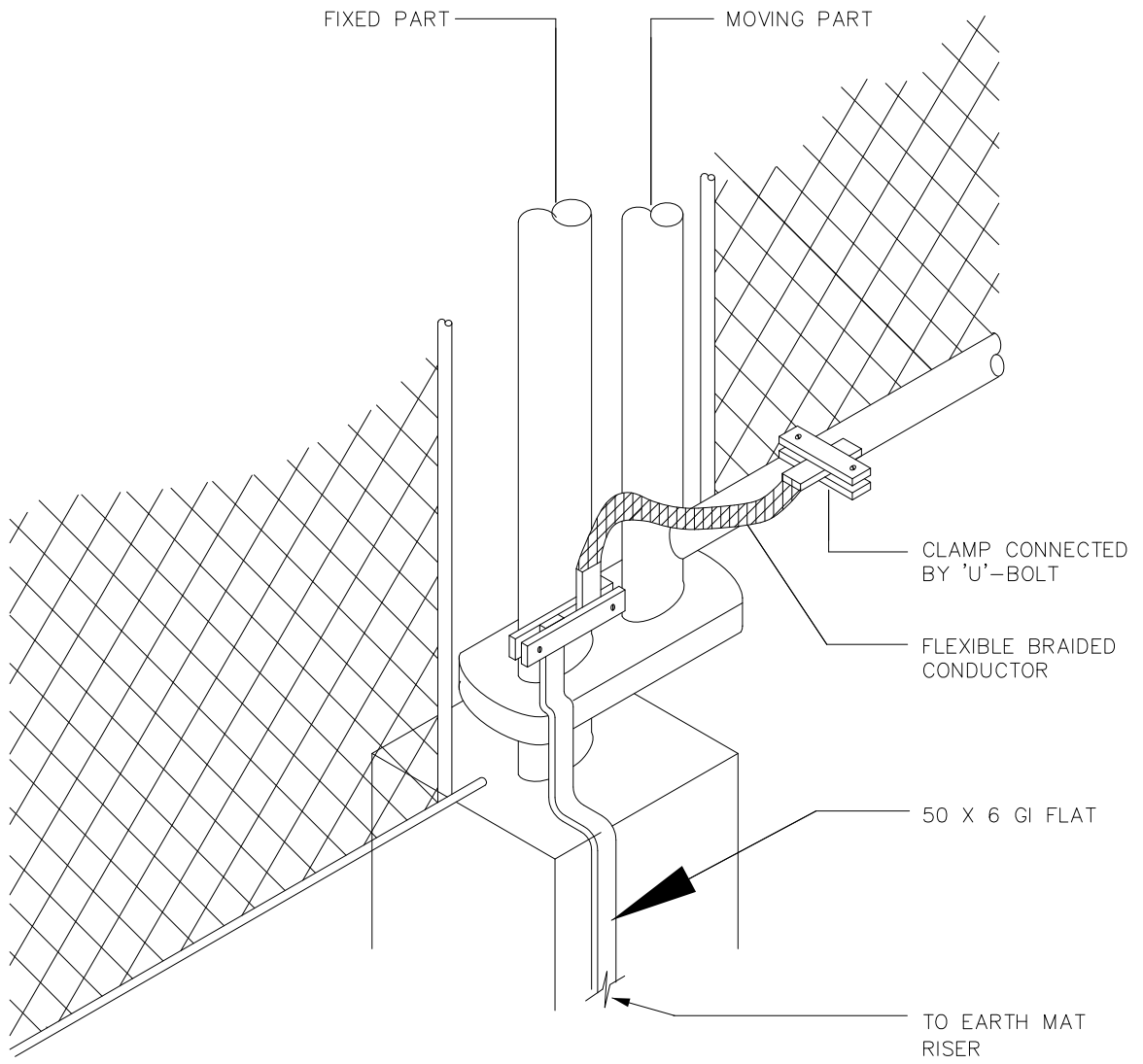


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APPD.	A.A		
DATE	17.10.17		
SCALE	NTS		



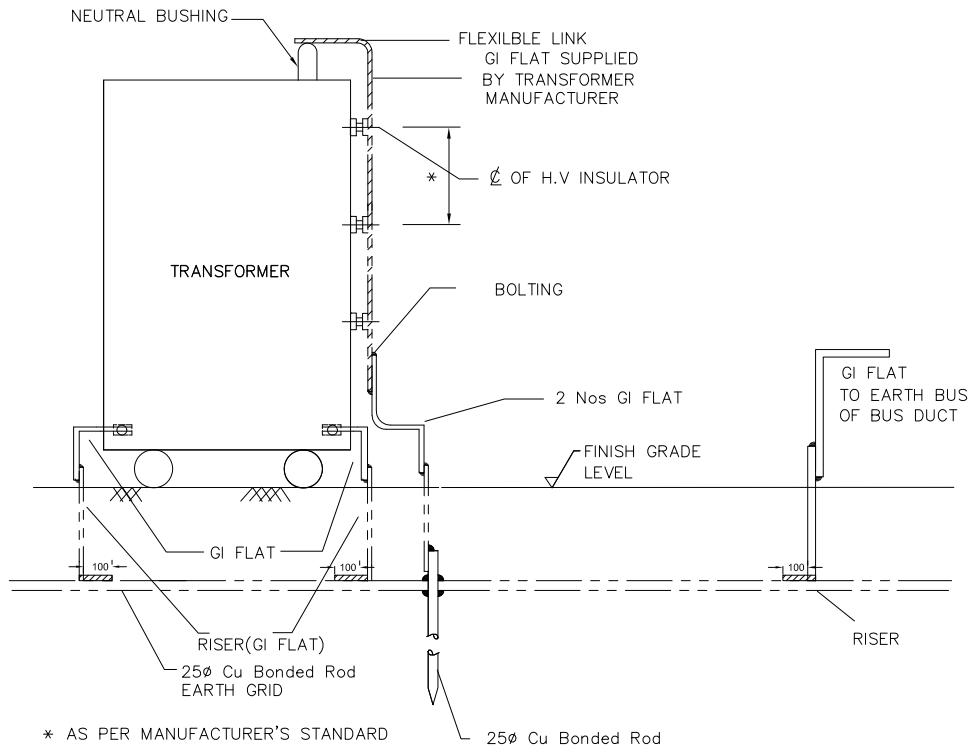
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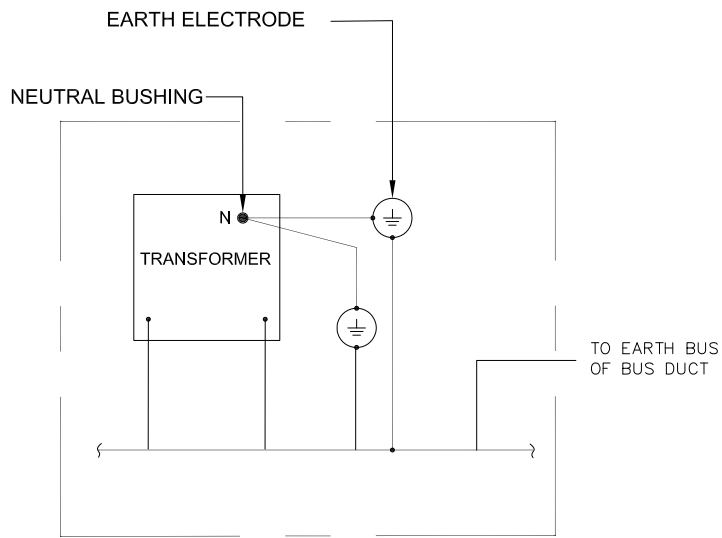


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DATE	17.10.17	
SCALE	NTS	

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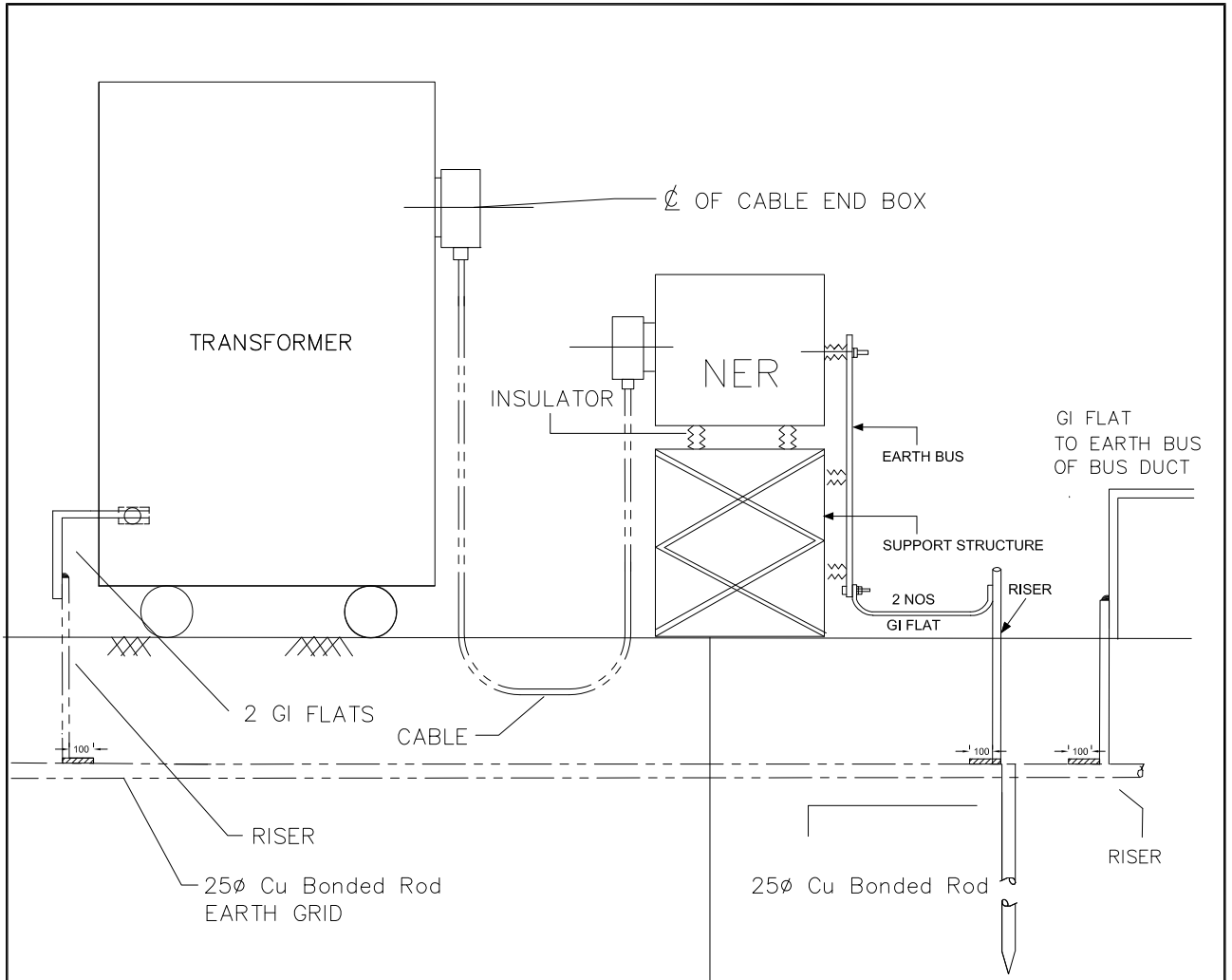
NOTE: APPLICABLE TO EHV WINDINGS AND LV (415V) WINDINGS OF TRANSFORMERS
REQUIRING DIRECT EARTHING OF NEUTRALS.



LINE DIAGRAM
SOLID NEUTRAL EARTHING

DRAWN	A.H	TITLE: - TRANSFORMER NEUTRAL EARTHING (DIRECT)
CHECKED	G.S	
APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	

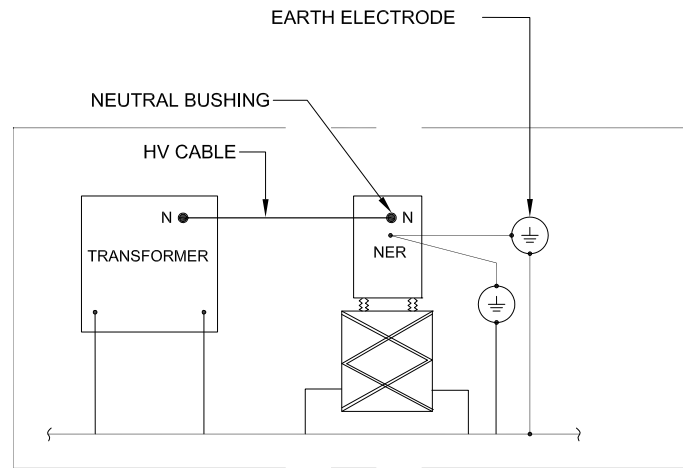
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NOTES

1. APPLICABLE to MV(3.3KV,6.6KV,11KV WINDING)

STRUCTURE EARTHING AS PER SHEET 30



LINE DIAGRAM

NEUTRAL EARTHING THROUGH NGR

DRAWN	A.H	TITLE: - TRANSFORMER NEUTRAL EARTHING (THROUGH NGR)
CHECKED	G.S	
APPD.	A.A	
DATE	17.10.17	
SCALE	NTS	

