

Tender Notification for

**SUPPLY, LAYING, TESTING, COMMISSIONING & HANDING
OVER OF 66KV 3CX300 SQMM CABLES WITH REQUIRED
ACCESSORIES IN CONNECTION WITH CONVERSION OF 66
KV D/C O/H LINES TO UNDERGROUND ALONG WITH
DISMANTLING AT NAJAFGARH, BODELLA, JAFARPUR &
BIJWASAN LOCATIONS ON TURNKEY BASIS**

NIT No: CMC/BR/25-26/FK/PR/KG/1296 DT 12.08.2025

Due Date for Submission: 01.09.2025 1500HRS

BSES RAJDHANI POWER LTD (BRPL)

Corporate Identification Number: **U74899DL2001PLC111527**

Telephone Number: +91 11 3009 9999

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Website: www.bsesdelhi.com

Table of Contents

Section No.	Description	Pages
Section-I	Request for Quotation	Pg 03 – Pg 09
Section-II	Instruction to Bidders	Pg 10 – Pg 16
Section-III	Special Terms & Condition of Contracts	Pg 17 – Pg 20
Section-IV	General Terms and Condition – Supply	Pg 21 – Pg 31
Section-V	General Terms and Condition – Erection, Testing & Commissioning	Pg 32 – Pg 46
Section-VI	Summary of the Quoted Price	Pg 47
Appendix-I	Commercial Terms & Conditions - Supply	Pg 48
Appendix-II	Commercial Terms & Conditions - ETC	Pg 49
Appendix-III	Bid Form	Pg 50
Appendix-IV	Reverse Auction Acceptance Form	Pg 51
Appendix-V	EMD Format	Pg 52
Appendix-VI	Form Of Power of Attorney for Consortium	Pg 53 – Pg 54
Appendix-XI	Format For Performance Bank Guarantee	Pg 57- Pg 58
Section-VII	Vendor Code of Conduct	Pg 59 – Pg 64
Annexure-I	Bill of Quantity (BOQ)	Pg 65 – Pg 101
Annexure-II	Technical Specifications	Pg 101 -

SECTION – I: REQUEST FOR QUOTATION

1.00 Event Information

BRPL invites sealed tenders in 2 envelopes for following scope of work:

Table no.1: Scheme Details

S No.	Scheme Name	Scheme Description	Cable Length (Kms)	Estimated Value in (Rs Cr)	EMD Value In (Rs Lakhs)
1	Mehrauli-Bijwasan-Palam	66kV D/C O/H to U/G XLPE cable (25,200m) via Vrindavan Greens to Bijwasan Grid	25.2	20.36	20.36
2	Najafgarh-Jafarpur	66kV O/H to U/G XLPE cable (14,800m) from 220kV Najafgarh Grid to Tower No.16	14.8	12.13	12.13
3	Najafgarh-Bodella	66kV O/H to U/G XLPE cable (36,000m) from crematorium to Bodella-2 Grid on Nala Road	36	28.66	28.62
4	Najafgarh-Nangloi	Conversion of O/H feeders to U/G 3x300sq mm XLPE cable (28,000m)	28	24.39	24.24
5	Najafgarh-Nangloi WW	Conversion of O/H feeders to U/G 3x300sq mm XLPE cable (12,000m)	12	9.95	9.98
6	Najafgarh T18-T37	Partial conversion of O/H NJF-Nagloi/Nagloi WW to U/G XLPE cable (22,000m)	22	17.94	17.94
Total			138 Kms	113.33 Cr	113.33 Lakhs

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

All envelopes shall be duly super scribed **"SUPPLY, LAYING, TESTING, COMMISSIONING & HANDING OVER OF 66KV 3CX300 SQMM CABLES WITH REQUIRED ACCESSORIES IN CONNECTION WITH CONVERSION OF 66 KV D/C O/H LINES TO UNDERGROUND ALONG WITH DISMANTLING AT NAJAFGARH, BODELLA, JAFARPUR & BIJWASAN LOCATIONS ON TURNKEY BASIS"** against NIT No: **CMC/BR/25-26/FK/PR/KG/1296."**

- 1.01 The schedule of specifications with detail terms & conditions can be obtained from address given below against submission of non-refundable demand draft of **Rs.1180/-** drawn in favor of BSES Rajdhani Power Ltd, payable at Delhi. The tender documents & detail terms and conditions can also be downloaded from the website **"www.bsesdelhi.com --> Tenders --> BSES Rajdhani Power Ltd --> 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.
- 1.02 Bids will be received up to 01/08/2025 1500 HRS at the address given at 3.01 below. Part A of the Bid shall be opened on 01/08/2025 1600 HRS.

Part B of the Bid will be opened in case of Techno-Commercially qualified Bidders and the date of opening of same shall be intimated in due course. It is the sole responsibility of the bidder to ensure that the bid documents reach this office on or before the last date.
- 1.03 BSES Rajdhani Power Ltd reserves the right to **reject** any or all Tenders without assigning any reason thereof in the event of following:

- (i) Scheme wise **Earnest Money Deposit (EMD)** as per Table no.1 is not deposited in shape of Bank Guarantee drawn in favour of BSES Rajdhani Power Ltd, payable at Delhi.
- (ii) The offer does not contain prices indicating break-up towards all taxes & duties in prescribed format
- (iii) Complete Technical details are not enclosed.
- (iv) Tender is received after due date and time.
- (iv) Technical offer contains any prices
- (v) Prices are **not FIRM** and subject to Price Variation

2.0 **Qualification Criteria: -**

For the above scope of work prospective bidder must qualify the criteria as mentioned below to participate in the bidding process.

Qualification Criteria QR -01: For the Cable OEM/EPC Bidder for Cable laying Works:

S No	Conditions	Qualification Criteria
1	OEM/ EPC Bidder with Manufacturing base in India	<p>Bidder must be a manufacturer of 33 kV or higher grade HV Power cable in India, for past 2 years through CCV or VCV line with following:</p> <p>Cable OEM shall have true triple extrusion machine along with CCV line with dry curing and dry cooling in Nitrogen. Cable eccentricity monitoring system during triple extrusion in CCV line. Chartered Engineer certificate should to be submitted in support of this QR.</p> <p>Cable OEM can enter into Consortium /JV with the contractors who can jointly fulfil the Qualification Criteria.</p> <p style="text-align: center;">OR</p> <p>Bidders shall be "EPC contractor" with the relevant experience in the field of turnkey execution including supply, laying, testing & commissioning of 33KV or higher voltage grade cables in at least one utility/SEB/PSU</p> <p>For Cable - Bidders shall supply all the Cable required for the Cable In-feed works from vendors meeting Qualification Criteria mentioned in QR-03</p>
2	Experience	<p>Bidder along with consortium, shall have experience of execution of 25 KMs or more cable quantity including supply, laying, testing & commissioning of 33KV or higher voltage grade cables in any utility/SEB/PSU/Govt. organization in last five (05) years. Cable OEM along with Consortium /JV Partner can jointly fulfil the Qualification Criteria.</p> <p>EPC Bidders shall supply all the Cable required for the Cable In-feed work from vendors meeting Qualification Criteria mentioned in QR-03.</p> <p>The copies of orders/LOI for such installations shall be furnished.</p>
3	Performance Certificate	<p>Bidder along with consortium, should have at least two Performance Certificates of two (2) years of satisfactory performance of successful supply, laying, testing & commissioning of 33 KV or higher voltage cable in last Seven (07) from the date of technical bid opening from utilities/SEBs/Govt Bodies/reputed firms for installation in distribution network. Out of these, one certificate should be more than 10 KMs of cable.</p> <p>Cable OEM along with Consortium /JV Partner can jointly fulfil the Qualification Criteria.</p> <p>In case 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.</p>

4	Servicing Base	The bidder shall have servicing, repairing, testing & refurbishment facility in India with necessary spares and testing equipment for providing prompt after sales service for GIS and other major items. Incase Bidder is the EPC Bidder, shall have necessary tie-up with OEMs for servicing, repairing, testing & refurbishment facility in India with necessary spares and testing equipment for providing prompt after sales service for GIS and other Major equipments.
5	Turnover	Bidder must have average annual turnover of 250 Cr during last Three (03) financial years i.e. FY 21-22, 22-23 and 23-24, duly certified CA certificate to be submitted. Balance Sheet of 03 financial years also to be provided. Bidder can also furnish CA certified FY 24-25 provisional certificate, if available. In that case, last three (03) financial years i.e. FY 22-23, 23-24 & 24-25 shall be considered.
6	Litigation	The Bidder shall submit an undertaking that "No Litigation" is pending with the BRPL or its Group/Associates Companies
7	Electrical License	The bidder should possess valid Electrical Bidder License issued by competent statutory agency to undertake work in NCT Delhi. In case bidder is not having this license, Bidder to give the undertaking that it will be obtained by them before the start of the work at site or suitable sub-Bidder having the valid license shall be engaged for works at site where copy of valid license shall be submitted to BRPL before the start of the work.
8	ISO	The bidder must possess valid ISO 9001:2015 certification
9	Blacklisting	An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution/Electricity utilities
10	Registration documents	The bidder must have valid PAN No., GST Registration Number, in addition to other statutory compliances. The bidder must submit the copy of registrations and submit an undertaking that the bidder shall comply all the statutory compliances as per the laws/rules etc. before the start of the supply/work.

Qualification Criteria QR -02 : Criteria For the selection of Cable Supplier for EPC Bidder only

Bidder shall adhere to the following guidelines for the Selection of Cable supplier

S No	Conditions	Qualification Criteria
1	OEM (Manufacturing base in India)	Proposed Cable Suppliers must be an OEM, manufacturer of 33kv or higher grade HV Power cable in India, for past 2 years through CCV or VCV line with following: Cable OEM shall have true triple extrusion machine along with CCV line with dry curing and dry cooling in Nitrogen Cable eccentricity monitoring system during triple extrusion in CCV line. Chartered Engineer certificate should to be submitted in support of this QR.
2	Supply Quantity	Proposed Cable Supplier/OEM should have supplied at least 25 KMS of cable of size 33KV, 3CX300 sq.mm or 66kv, 1Cx1000 sq.mm or higher size and voltage cable during last 5 years in major Utilities/SEBs. Purchase order copy in support of this QR to be submitted.
3	Testing Facility	Proposed Cable Supplier/OEM, should have In –house testing facilities for raw material, routine and acceptance testing facilities as per relevant IS/IEC. Self-declaration & List of testing equipment to be submitted in support of this QR.
4	Manufacturing Capacity	The bidder should have a manufacturing capacity of a minimum 20 km per month.

5	Turnover	Proposed Cable Supplier/ OEM, should have Average Annual Sales Turnover of Rs. 100 Crore or more in last three (3) financial years and positive net worth, duly certified CA certificate to be submitted.
6	Certification	The Bidder must possess valid ISO 9001:2015 certification and BIS License.
7	Performance Certificate	Performance certificate for minimum 2-year satisfactory performance for cable of size 33KV, 3CX300 sq.mm or 66kV, 1Cx1000 sq.mm or higher size and voltage cable supplied in last 7 years from at least two utilities/ SEB/ PSUs / Govt Organization/reputed company (wherein the end user shall be Utility/SEB's/PSU's/ Govt Organization). Note: Performance Certificate has to be issued by End User 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.
8	New Vendor	In case of vendor is not registered with BRPL, factory inspection, and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedure. However, BRPL reserves right to carry out factory inspection and evaluation for any bidder prior to technical qualification evaluation.
9	Debarred/ Blacklisted	An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution including electricity boards.

Note: All reference dates shall be taken as the date of technical bid opening

Notwithstanding anything stated above, BRPL 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. BRPL also reserves the right to evaluate the bidder based on performance of past supplies/projects executed in BRPL. In this regard the decision of the purchaser is final.

TERMS & CONDITIONS TO APPLY AS CONSORTIUM:

- i. Cable OEM may form a consortium with BRPL enlisted contractors and apply against this tender specification, provided they jointly qualify as per qualification criteria of the tender.
- ii. Cable OEM shall be lead partner (Bidder) and this authorization shall be supported by submitting a power of attorney signed by legally authorized signatories of all the partners; Refer Appendix-XII for Sample Format.
- iii. The Bidder (Lead partner) shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partner of the Consortium and the entire execution of the contract including payment shall be done exclusively with the Bidder (lead partner). This authorization shall be evidenced by submitting by a Power of Attorney signed by legally authorized signatories of all partners.
- iv. The Bidder (Lead partner) shall be solely liable for the execution of the contract in accordance with the contract terms and a copy of the agreement entered into by the consortium partners having such a provision shall be submitted with the Bid.
- v. In the event of any default by any partner/partners of the Consortium, BRPL reserves the right to get the work executed from any other source at the Risk & Cost of the Bidder (Lead Partner). The Extra Expenditure so incurred shall be debited to the Bidder (Lead Partner).
- vi. Responsibilities in respect of execution of tendered work by the Bidder (lead partner) as well as of each Consortium member shall be clearly indicated in the agreement.

- vii. The Consortium agreement shall not be cancelled or amended unilaterally without consent of the purchaser and a statement to this effect should appear in the consortium agreement.
- viii. A firm can submit only one bid in the same bidding process, either individually as a bidder or as a partner of a Consortium. A bidder who submits or participates in more than one bid will cause all the bids in which the bidder has participated to be disqualified.
- ix. Original consortium agreement on Non judicial stamp paper duly registered with sub registrar office/Notarized of appropriate value satisfying the above conditions shall be submitted along with the bid indicating role and duties of each consortium member.

Note:

- In case of non-furnishing the requisite documents along with the bid, the bid will be considered as non-responsive and bid may be summarily rejected.
- Composite Order shall be issued in favour of the Lead Partner/Bidder only

3.00 **Bidding and Award Process**

Bidders are requested to submit their offer strictly in line with this tender document. **NO DEVIATION IS ACCEPTABLE.** BRPL shall response to the clarifications raised by various bidders and they will be distributed to all participating bidders through website.

3.01 **BID SUBMISSION**

The bidders are required to submit the bids in 2(two) parts to the following address

**Head of Department
Contracts & Material Department
BSES Rajdhani Power Ltd
1st Floor, C Block
BSES Bhawan, Nehru Place
New Delhi 110019**

PART A: TECHNICAL **BID** comprising of following (1 original + 1 copy)

- EMD in prescribed format
- Non-refundable demand draft for Rs 1180/- in case the forms are downloaded from website
- Documentary evidence in support of qualifying criteria
- Technical Details / Filled in GTP/Type test report etc
- Qualified Manpower available & Organization Chart
- Testing Facilities
- Copies of Orders, Execution /Performance Certificate & Other Documents to support the QC as per clause 2.0
- Original Tender documents duly stamped & signed on each page as token of acceptance
- Acceptance to Commercial Terms and Conditions viz Delivery schedule/period, Payment terms, PBG etc (Appendix I-III)
- Bid Form, RA acceptance, etc. (Appendix IV-XI)

PART B: FINANCIAL **BID** comprising of (1 original only)

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

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

S. No.	Steps	Date
1	Date of sale of bid documents	12.08.2025
2	Site Visit	20.08.2025 & 21.08.2025
3	Pre-Bid Meeting	22.08.2025
4	Last date of Queries, if any	24.08.2025
5	Last date of receipt of bid documents	01.09.2025 1500 HRS
6	Date & time of opening of tender – Part A	01.09.2025 1600 HRS

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 after techno-commercial evaluation and only of the qualified bidders.

Bidder has to submit the item wise price bifurcation in bid. Unpriced copy must be attached with the Part A (Technical Bid).

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

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

Reverse Auction shall be conducted Scheme wise on Lump sum Basis/Total Landed Cost i.e. Supply + ETC

In case RA is not concluded/conducted for any reasons, a "final no regret" financial bid in a sealed envelope will be called for from all qualified bidders

BIDS RECEIVED AFTER DUE DATE AND TIME SHALL 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 order/LOI solely depends on purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder 's capacity, in addition to other factors that Purchaser may deem relevant.

4.02 In the event of your bid being selected by purchaser (and / or its affiliates) and your 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 supplier is found unsatisfactory during the delivery process, the award will be cancelled and BRPL reserves the right to award other suppliers who are found fit.

4.04 Qty Variation: The purchaser reserves the rights to vary the quantity by (+/-) 30% of the tender quantity.

Incase execution target timelines is coinciding,, BRPL reserves the right to limit the award of schemes to single party depending on the contractor's turnover, execution capabilities & past performance. The decision shall be as per BRPL discretion and Vendor has to abide by the same.

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. A bidder who violates the marketplace rules or engages in behavior that disrupts the fair execution of the marketplace shall be restricted from bidding for a length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

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

6.00 Confidentiality

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

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

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

7.00 Contact Information

Technical or Commercial clarifications, if any, as regards this RFQ shall be sought in writing and sent by mail to following address. The same shall not be communicated through phone.

	Technical	Commercial
Contact Person	Ms. Deepti Sharma Mr. Anupam Kumar Mr. Pronab Bairagi	Ms. Fauzia Khlaid Mr. Pankaj Goyal Mr. Kumar Gaurav
Address	BSES Rajdhani Power Ltd , 1 st Floor, BSES Bhawan, Nehru Place, New Delhi 110019	BSES Rajdhani Power Ltd , 1 st Floor, D Block, BSES Bhawan, Nehru Place, New Delhi 110019
Email	deepti.r.sharma@reliancegroupindia.com Anupam.o.kumar@reliancegroupindia.com Pronab.bairagi@reliancegroupindia.com	fauzia.khalid@reliancegroupindia.com pankaj.goyal@reliancegroupindia.com kumar.ga.gaurav@reliancegroupindia.com

SECTION – II: INSTRUCTION TO BIDDERS

1.00 GENERAL

BSES Rajdhani Power Ltd, hereinafter referred to as "The Company" is desirous of awarding work for "Supply, Laying, Testing, Commissioning & Handing Over Of 66kv 3Cx300 Sqmm Cables with Required Accessories In Connection with Conversion Of 66 KV D/C O/H Lines to Underground along With Dismantling at Najafgarh, Bodella, Jafarpur & Bijwasan Locations on Turnkey Basis" to single/multiple contractors.

2.00 SCOPE OF WORK

The scope of the work shall be as per BOQ in the tender.

3.00 DISCLAIMER

This Document includes statements, which reflect various assumptions, which may or may not be correct. Each Bidder shall 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.

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.

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.

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 the company will be in no case be responsible or liable for those costs.

5.00 BIDDING DOCUMENTS

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:

Request for Quotation (RFQ) - Section - I
Instructions to Bidders (ITB) - Section - II
Special Terms & Conditions of Contract (SCC) - Section -III
General Terms and Condition Supply (GCC-Supply) - Section -IV
General Terms and Condition Erection, Testing & Commissioning (GCC-ETC) - Section V
Summary of Quoted Price - Section VI
Vendor Code of Conduct - Section VII
BOQ- Annexure-I
Technical Specifications - Annexure II

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.

6.00 **AMENDMENT OF BIDDING DOCUMENTS**

At any time prior to the deadline for submission of Bids, the Company 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.

The Amendment shall be part of the Bidding Documents, pursuant to Clause 5.00, and it will be notified in web site www.bsesdelhi.com, and will be binding on them.

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

Purchaser shall reserve the rights to following

- extend due date of submission
- modify tender document in part/whole
- cancel the entire tender

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

7.00 **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 English translation, in which case, for purposes of interpretation of the Bid, the English translation shall govern.

8.00 **DOCUMENTS COMPRISING THE BID**

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

- Bid Form, Price & other Schedules (STRICTLY AS PER FORMAT) and Technical Data Sheets completed in accordance with Technical Specification
- All the Bids must be accompanied with the required EMD as mentioned in the Section-I Table no.1 against each tender.
- Tender documents duly stamped and signed on each page by authorized signatory

9.00 **BID FORM**

The Bidder shall submit one" Original" and one" Copy" of the Un-priced Bid Form, Price Schedules & Technical Data Sheets duly filled in as per attached specification/BOM etc enclosed.

10.00 **EMD**

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the RFQ Table no.1 separately for each scheme. 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 form:

- (a) Fixed deposit (lien marked in favor of BSES RAJDHANI POWER LTD.) payable at Delhi.
- (b) Bank Guarantee valid for One hundred Twenty (120) days from due date of submission or amended due date of submission plus minimum 30 days claim period drawn in favour of BSES Rajdhani Power Ltd, BSES Bhawan, Nehru Place, New Delhi 110019

The EMD may be forfeited in case of:

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

Please note that bank details as below have been provided only for the purpose of making BG for EMD.

Beneficiary Name: BSES Rajdhani Power Limited

Bank Name: State Bank of India, New Delhi

A/c No. : 40214783615

IFSC Code : SBIN0009601

11.00 **BID PRICES**

- 11.01 Bidders shall quote for the entire Scope of Supply/Work with a break-up of prices for individual items and Taxes & Duties. 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 Survey, Design, Supply, Transportation to site, Erection, testing & commissioning 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 with taxes, duties & freight up to destination.
- 11.02 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. The Bidder is required, at his expense, to obtain all the information he may require to enable him to submit his tender including necessary visits to the site to ascertain the local conditions, procurement of necessary materials, labour, etc., requirements of the local/government/public authorities in such matters.
- 11.03 Prices quoted by the Bidder shall be **"Firm"** and not subject to any price adjustment during the performance of the Contract. **A Bid submitted with an adjustable price/ Price Variation Clause will be treated as non - responsive and rejected.**

12.00 **BID CURRENCIES**

Prices shall be quoted in Indian Rupees Only.

13.00 **PERIOD OF VALIDITY OF BIDS**

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

14.00 **ALTERNATIVE BIDS**

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

15.00 FORMAT AND SIGNING OF BID

- 15.01 The original Bid Form and accompanying documents, clearly marked "Original Bid" and "copy" must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copy, the original shall govern.
- 15.02 The original and copies 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.**
- 15.03 The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

16.00 SEALING AND MARKING OF BIDS

- 16.01 Bid submission: One original & one Copy (hard copies) of all the Bid Documents shall be sealed and submitted to the Purchaser before the closing time for submission of the bid.
- 16.02 The Technical Documents and the EMD shall be enclosed in a sealed envelope and the said envelope shall be super scribed with —"Technical & EMD". The price bid shall be inside another sealed envelope with super scribed "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 super scribed with — "Tender Notice No. & Due date of opening".
- 16.03 The Bidder has the option of sending the Bids in person. Bids submitted by Email/Telex/Telegram /Fax will be rejected. No request from any Bidder to the Purchaser to collect the proposals from Courier/Airlines/Cargo Agents etc shall be entertained by the Purchaser.

17.00 DEADLINE FOR SUBMISSION OF BIDS

- 17.01 The original Bid, together with the required copies, must be received by the Purchaser at the address specified earlier.
- 17.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

18.00 ONE BID PER BIDDER

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

19.00 LATE BIDS

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 shall be rejected and returned unopened to the Bidder.

20.00 MODIFICATIONS AND WITHDRAWAL OF BIDS

- 20.01 The Bidder is not allowed to modify or withdraw its Bid after the Bid's submission.

21.00 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.

22.00 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.

23.0 PRELIMINARY EXAMINATION OF BIDS/ RESPONSIVENESS

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

24.00 EVALUATION AND COMPARISON OF BIDS

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

- 24.01 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 Proposals and the Conditional ties of the Bidders would be evaluated.
- 24.02 Subsequently, the Financial Proposals along with Supplementary Financial Proposals, if any, of Bidders with Techno-commercially Acceptable Bids shall be considered for final evaluation.
- 24.03 The Purchaser's evaluation of a Bid will take into account, in addition to the Bid price, the following factors, in the manner and to the extent indicated in this Clause:
- Delivery Schedule
 - Conformance to Qualifying Criteria
 - 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.

- 24.04 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.

25.00 CONTACTING THE PURCHASER

- 25.01 If any Bidder wishes to contact the Purchaser on any matter related to the Bid, from the time of Bid opening to the time of contract award, the same shall be done in writing only.
- 25.02 Any effort by a Bidder to influence the Purchaser and/or in the Purchaser 's decisions in respect of Bid evaluation, bid comparison or Contract Award, will result in the rejection of the Bidder 's Bid.

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

The Purchaser reserves the right to accept or reject any Bid and to annul the Bidding process and reject all Bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Purchaser 's action.

27.00 AWARD OF CONTRACT

- 27.01 The Purchaser will award the Contract to the successful Bidder whose Bid has been determined to be the lowest-evaluated responsive Bid, provided further that the Bidder has been determined to be qualified to satisfactorily perform the Contract. Purchaser reserves the right to award 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.
- 27.02 The Purchaser intends to issue **single composite order for**
a) Supply
b) Installation, Testing & Commissioning
- 27.03 **BRPL reserves the right to limit the award of schemes to single party depending on the contractor's turnover, execution capabilities & past performance. The decision shall be as per BRPL discretion and Vendor has to abide by the same**

28.00 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.

28.00 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. The date of LOI/PO shall be treated as Start date of work.

30.00 CONTRACT PERFORMANCE BANK GAURANTEE

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

31.00 CORRUPT OR FRAUDULENT PRACTICES

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

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

"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

"Fraudulent practice" means a misrepresentation of facts in order to influence a award process or the execution of a contract to the detriment of the Company, 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 Company of the benefits of free and open competition.

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

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

32.00 COMPLETION PERIOD

06 Months from the date of LOI/PO/WO

SECTION III

SPECIAL TERMS AND CONDITIONS OF CONTRACT

- 1.1 Bidders are requested to visit the site to understand the scope of work, site conditions and requirements prior to Bidding. Hence, no price/time escalation shall be admissible on these accounts.
- 1.2 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 shall 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 any.
- 1.3 The scope of this tender includes Survey, Design, Engineering, Manufacturing, Shop testing, Inspection, Packing, Dispatch, Loading, Supply, Unloading and Storage at site, including comprehensive Marine cum Storage cum Erection Insurance (MSE), Assembly, Erection, Structural, complete pre-commissioning checks, Testing and Commissioning at site as per BOQ, obtaining statutory clearance & certification from state electrical inspector handing over of Cable Laying/ Infeed Works with required accessories to BRPL on single point responsibility basis.
- 1.4 The scope includes supply of all barricading, free issued materials (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 BRPL store including loading & unloading and no additional charges shall be paid against these activities. Used barricading material will be taken back by bidder soon after job is handed over or as directed by BRPL Engineer-In-Charge (E-I-C). 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.
- 1.5 While carrying out trench-less/ 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 up to 3 meters, comfortably. The vendor must employ Cable Route Tracer before start of excavation/ trench-less 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.
- 1.6 Delivery of Major items such as Cable, Joints, etc at site and all other equipment/accessories have to be aligned as per site requirements and progress.
- 1.7 Joints & Terminations installation shall only be done by OEM. No additional cost for this item will be paid to the Bidder. Bidder to provide all support to the Jointers for doing Joints & Terminations of Joint Kits.
- 1.8 Prices for all the activities shall be FIRM till the actual completion of the job. Statutory variation will be allowed for direct supplies only wherever breakup of Taxes & Duties is available in Price Bid. In case bidder has not submitted any price breakup, no variation on account of statutory variation shall be paid extra by BRPL.
- 1.9 There will be no price escalation given to bidder even if there is delay in the project due to ROW permission. Permission from road owning agencies & statutory clearance for road cutting, if required, shall be taken by Bidder. The Bidder shall follow-up with local authorities and other connected persons that may require carrying out the job under this order.
- 1.10 Electrical Inspector Clearance fees shall be in Bidder's scope. The related fees, payments and pursuance work shall be in scope of Bidder only.

- 1.11 Bidder has to submit the technical parameters with details of Spares for each rating with catalogue, reference codes etc.
- 1.12 Wherever BRPL specifications are not available relevant IS/IEC to be followed. All Drawings mentioned in the Tender Specification and other required for the completeness of the tender shall be submitted. Drawing submission process shall not be deemed complete if all the requirements are not complied during the submission of the same.
- 1.13 The bidder should have own testing equipment's/they have to provide like IR Tester, Hi Pot Test Kit, Earth Tester, etc with Calibration Certificates for testing.
- 1.14 The Bidder should have own Safety equipment like Neon Tester, Portable Earth, Earthing discharge rod etc. along with Calibration Certificates of all the equipment.
- 1.15 The Bidder should have all major tools and tackles required for installation, testing & commissioning works. The Bidder should have all major tools and tackles for cable laying like Bench Machine, Rollers, Jack for lifting the Cable drum along with calibration certificates etc.
- 1.16 Bidder has to submit the item wise price bifurcation in bid. Un-priced copy must be attached with the Part A. Reverse Auction will be carried out Package wise on Lump sum Basis/Total Landed Cost i.e. Supply + ETC.
- 1.17 Any other material not specifically mentioned above but required for successful commissioning and operation is in the scope of bidder. Prior approval shall be taken from central engineering department before execution. Commercial approval shall be taken from C&M Department before execution.
- 1.18 Successful bidder has to adhere to the statutory compliance.
- 1.19 Successful Bidder has to depute the safety officer and quality officer separately at site for whole duration and they have to submit the safety report and quality report to BRPL E-I-C on weekly basis.
- 1.20 Successful bidder has to send the weekly progress report to BRPL EIC.
- 1.21 In case of any major deviation, deletion or addition which bidder may feel is relevant to this project & for its safe operation and completion of works; Bidder may clearly highlight and communicate the same to the purchaser with his bid.
- 1.22 Necessary Statutory Clearances from CEI of Delhi & any other authority for energizing shall be in the scope of the Bidder.
- 1.23 After commissioning of the complete system and final approval of Electrical Inspector & Compliance to punch points observed to the satisfaction of Project-in-charges as per statutory requirements, system shall be handed over to BRPL.
- 1.24 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.
- 1.25 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.

1.26 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. 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. Purchaser's 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.

1.27 Guarantee period/Defect Liability period:

The Guarantee Period will be equipment/service/work specific and shall be as specified in the Technical Specifications for the equipment/material/service/work and where technical specifications are not part of contract documents or guarantee period is not specified in the technical specifications, the guarantee period shall be as per the Special Terms and Conditions of the Contract. In case of no mention of the guarantee period in technical specifications, Defect liability period will be 24 Months from the Date of Commissioning or 30 months from the date of delivery of final lot of supplies made, whichever is later.

For Cable & Joints: The defect liability period shall be 60 months from the date of commissioning or 66 months from the date of delivery whichever is later.

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 30 days from the date of receipt of intimation

1.28 Failure during Guarantee Period:

If the equipment and material supplied/service or work rendered under the contract fails to perform its due, rated & intended quality performance, during the Guarantee period, the bidder is liable to undertake repair/rectify/replace the equipment and material supplied/service or work rendered under the contract within time frame as specified below at bidder's cost to make the equipment and material supplied/service or work rendered under the contract of performing its due, rated and intended quality performance. If bidder fails to repair/rectify/replace the equipment or material supplied/service or work rendered under the contract, failed in Guarantee Period, purchaser will be at liberty to get the same done at bidder's risks and costs and recover all such expenses plus the purchaser own charges (@ 15% of expenses incurred), from the bidder or from the "Performance Bank Guarantee" as the case may be.

If during the Warranty/ Guarantee period some parts of the supplies are replaced owing to the defects/ damages under the Warranty, the Warranty period for such replaced parts shall be until the expiry of twelve months from the date of such replacement or renewal or until the end of original Guarantee period, whichever is later.

Service Engineer Availability to Attend, Identify & Restore Defects (Minor) of materials/Equipment's under Guarantee Period within 48 Working Hours (Exclusion of Material Support Cases)

Spare Material Delivery for rectification of defect (Major) Under Guarantee Period within Two Weeks. Bidder must keep Requisite Inventory of Critical Spares & Other Equipment Covered in Guarantee Period to Restore Equipment within Two Weeks.

In Case of Complete Replacement of material, within a Period of 4 Weeks.

Note: BRPL is in the business of Power distribution and is committed to providing reliable and continuous power supply to its customers. In case of any fault in the system, BRPL's top most priority is to rectify the fault and restore the system as soon as possible and maintain the supply.

If during the defect liability period any fault occurs in the system due to faulty materials, design or workmanship, BRPL shall intimate the vendor of such occurrence for taking immediate corrective action.

However, if the situation, in BRPL's sole discretion warrants an emergency restoration, it reserves the right to take immediate action for identifying the fault and restoring the system with available resources & materials or with help from any other third-party agency under intimation to the Vendor. All costs of replacement, substitution, shipping, labour and other related expenses including taxes and levies incurred in connection with the restoration of fault plus 15% of expenses incurred as administrative overheads shall be for the account of Vendor. BRPL will charge the vendor for the costs incurred for fault restoration or may set off such costs against any amounts payable by BRPL to the Vendor or deduct from the PBG submitted by the Vendor. Vendor shall pay BRPL the amount within 30 days.

Root cause analysis of the fault shall be done jointly by BRPL's CES, O&M teams and Vendor. In case the fault is due to any reason other than faulty materials, design or workmanship, Vendor shall be exempted from any further action or Cost.

All the bay equipment (i.e- LA, CT, PT, Disc Insulator, String, Suspension Insulator, Bushing etc.) shall be Polymeric type in the place of porcelain with creepage 31mm/kV. Rest of the parameter to be followed as per technical specifications.

1.29 Project Information & Completion:

The Bidder shall be fully responsible to complete the project in time. It is desired that the project should be completed as per the schedule from the date of LOI or order whichever is earlier. The detailed completion schedule shall be prepared by vendor and shall be submitted at the time of detailed engineering for approval. Vendor has to submit the progress report fortnightly with this tender/as asked by the Purchaser.

1.30 Project Implementation & Execution control

The bidders are requested to submit the following along with the bid, about the project implementation & execution methodology.

- a. Write up/overview of project Plan
- b. Implementation Methodology
- c. Project Organization Chart for Representatives, Project Office & site office teams along with the functions.
- d. Bar Chart & Network Diagram (with critical path) for various activities to achieve scheduled completion.

SECTION IV

GENERAL TERMS AND CONDITIONS - SUPPLY

- 1.01** All the Bids shall be prepared and submitted in accordance with these instructions.
- 1.02** Bidder shall bear all costs associated with the preparation and delivery of its Bid, and the Purchaser will in no case shall be responsible or liable for these costs.
- 1.03** The Bid should be submitted by the Bidder in whose name the bid document has been issued and under no circumstances it shall be transferred /sold to the other party.
- 1.04** The Purchaser reserves the right to request for any additional information and also reserves the right to reject the proposal of any Bidder, if in the opinion of the Purchaser, the data in support of RFQ requirement is incomplete.
- 1.05** The Bidder is expected to examine all instructions, forms, terms & conditions and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a Bid not substantially responsive to the Bid Documents in every respect may result in rejection of the Bid. However, the Purchaser's decision in regard to the responsiveness and rejection of bids shall be final and binding without any obligation, financial or otherwise, on the Purchaser.
- 2.0 Definition of Terms**
- 2.01** "Purchaser" shall mean BSES Rajdhani Power Limited, on whose behalf this bid enquiry is issued by its authorized representative / officers.
- 2.02** "Bidder" shall mean the firm who quotes against this bid enquiry issued by the Purchaser. "Supplier" or "Supplier" shall mean the successful Bidder and/or Bidders whose bid has been accepted by the Purchaser and on whom the "Letter of Acceptance" is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assigns wherever the context so admits.
- 2.03** "Supply" shall mean the Scope of Contract as described.
- 2.04** "Specification" shall mean collectively all the terms and stipulations contained in those portions of this bid document known as RFQ, Commercial Terms & Condition, Instructions to Bidders, Technical Specifications and the Amendments, Revisions, Deletions or Additions, as may be made by the Purchaser from time to time.
- 2.05** "Letter of Acceptance" shall mean the official notice issued by the Purchaser notifying the Supplier that his proposal has been accepted and it shall include amendments thereto, if any, issued by the Purchaser. The "Letter of Acceptance" issued by the Purchaser shall be binding on the "Supplier" The date of Letter of Acceptance shall be taken as the effective date of the commencement of contract.
- 2.06** "Month" shall mean the calendar month and "Day" shall mean the calendar day.
- 2.07** "Codes and Standards" shall mean all the applicable codes and standards as indicated in the Specification.
- 2.08** "Offer Sheet" shall mean Bidder's firm offer submitted to BRPL in accordance with the specification.
- 2.09** "Contract" shall mean the "Letter of Acceptance/Order" issued by the Purchaser.
- 2.10** "Contract Price" shall mean the price referred to in the "Letter of Acceptance/Order".

- 2.11** "Contract Period" shall mean the period during which the "Contract" shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.
- 2.12** "Acceptance" shall mean and deemed to include one or more of the following as will be stipulated in the specification:
- a) The written acceptance of material by the inspector at suppliers works to ship the materials.
 - b) Acceptance of material at Purchaser site /stores after its receipt and due inspection/ testing and release of material acceptance voucher.
 - c) Where the scope of the contract includes supplying, acceptance shall mean issue of necessary equipment / material takeover receipt after installation & commissioning and final acceptance.

3.0 Contract Documents & Priority

Contract Documents: The terms and conditions of the contract shall consist solely of these RFQ conditions and the offer sheet. 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 Bidder, instructions thereon. In such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

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

4.0 Scope of Supply - General

- 4.01 The "Scope of Supply" shall be on the basis of Bidder's responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.
- 4.02 Bidder shall have to quote for the Bill of quantities as listed elsewhere.
- 4.03 All relevant drawings, data and instruction manuals.

5.0 Quality Assurance and Inspection

- 5.01 Immediately on award of contract, the bidder shall prepare detailed quality assurance plan/test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of Purchaser before proceeding with manufacturing. However, Purchaser shall have right to review the inspection reports, quality checks and results of suppliers in house inspection department which are not Customer hold points and the supplier shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc. In case of standard items, BRPL shall forward the standard QAP which is to be followed by vendor during manufacturing.
- 5.02 Witness and Hold points are critical steps in manufacturing, inspection and testing where the supplier is obliged to notify the Purchaser in advance so that it may be witnessed by the Purchaser. Final inspection is a mandatory hold point. The supplier can proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from BRPL.

- 5.03 The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the supplier of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.
- 5.04 On completion of manufacturing the items can only be dispatched after receipt of dispatch instructions issued by the Purchaser.
- 5.05 All in-house testing and inspection shall be done without any extra cost. The in-house inspection shall be carried out in presence of BRPL/BRPL authorized third party inspection agency. Cost of Futile/abortive visit(s) shall be debited from the invoices
- 5.06 Purchaser reserves the right to send any material being supplied to any recognized laboratory for testing, wherever necessary and the cost of testing shall be borne by the Bidder. In case the material is found not in order with the technical requirement / specification, the charges along with any other penalty which may be levied is to be borne by the bidder. To avoid any complaint the supplier is advised to send his representative to the stores to see that the material sent for testing is being sealed in the presence of bidder's representative.

6.0 Packing, Packing List & Marking

- 6.01 **Packing:** Supplier shall pack or shall cause to be packed all Commodities in crates/ boxes/ drums/ containers/ cartons and otherwise in such a manner as shall be reasonably suitable for shipment by road or rail to BRPL, Delhi/New Delhi stores/ site without undue risk of damage in transit.
- 6.02 **Packing List:** The contents of each package shall be itemized on a detailed list showing the exact weight, extreme outside dimensions (length, width & weight) of each container/box/drum/carton, Item SAP Code, PO No & date. One copy of the packing list shall be enclosed in each package delivered.

7.01 Price basis for supply of materials

Bidder has to quote their prices on Landed Cost Basis and quote separate price for each item.

FIRM prices for supply to BRPL Delhi/New Delhi stores inclusive of packing, forwarding, loading at manufacturer's premises, payment of all taxes, GST, Freight, any other local charges etc.

The above supply prices shall also include unloading at BRPL Delhi/New Delhi stores/site.

Transit insurance will be arranged by bidder.

8.0 Terms of payment and billing – SUPPLY

- a) 70% pro-rata of supply value shall be payable against R/A bills for supply of equipment and materials within 30 days against receipt of material at site and submission of following documents duly certified by BRPL Project-in-charge:
- i. Consignee copy of LR
 - ii. Detailed invoice showing commodity description, qty, unit & total price,
 - iii. Original certificate issued by BRPL confirming receipt of material at site & acceptance
 - iv. Dispatch clearance & inspection report issued by the inspection authority
 - v. Packing List, Test Reports
 - vi. Guarantee Certificate.
- b) 20% pro-rata after installation/erection of equipment duly certified by BRPL Project-in-charge

- c) 10% pro-rata after completion of successful acceptance testing, commissioning and Handing Over of the entire Installation and duly certified by BRPL Project-in-charge and submission of PBG of 10% of contract value valid up to Defect Liability period i.e. 24 months from the date of Handing over of entire Installation Plus 3 months towards Claim period.

9.0 Price Validity

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

10.0 Performance Guarantee

- 10.01 Bank guarantee shall be drawn in favor of "BSES Rajdhani Power Ltd" as applicable. The performance Bank guarantee shall be in the format as specified by BRPL.
- 10.02 Contract performance bank guarantee of total 10% of the contract price shall be submitted within 15 days of award of contract with the validity till completion of the contract period.
- 10.03 Bidder shall submit the performance bank guarantee equivalent to the 10% of the contract value at the time of claiming the last payment as per clause no. 8.0(C) (Terms of payment and billing – SUPPLY), with the validity of the bank guarantee till Defect Liability Period plus 3 months towards Claim period.

Notwithstanding anything stated in this agreement, it is agreed by the Seller that in case of default by the seller in furnishing the Performance Bank Guarantee, the purchaser/BRPL, without prejudice to the rights available with the purchaser, shall be entitled to retain a total sum not exceeding 120% of the amount of required performance bank guarantee for the tenure and upon the terms as specified in this agreement. It is agreed that the purchaser shall not be paying any interest for the said sum retained by the purchaser in lieu of default by the seller in furnishing the performance bank guarantee and no claim of any nature shall be maintainable from the side of seller, disputing the above said retention. Whereas, in case, after the deduction of above sum by the purchaser, if the seller at any point of time, submits the PBG of the required value and tenure and requests for the refund of the amount retained on this ground, the purchaser shall be releasing the money retained in lieu of PBG without any interest/cost

11.0 Forfeiture

- 11.01 Each Performance Bond established under Clause 10.0 shall contain a statement that it shall be automatically and unconditionally forfeited without recourse and payable against the presentation by BRPL 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.
- 11.02 Each Performance BG established under will be automatically and unconditionally forfeited without recourse if BRPL at its sole discretion determines that supplier has failed to comply with any term or condition set forth in the contract.

12.0 Release

All Performance Bonds will be released without interest within seven (7) days from the last date up to which the Performance Bond has to be kept valid (as defined in Clause 10.0) except for the case set forth in Clause 21.0.

13.0 Guarantee of Performance

The bidder shall stand guarantee that the equipment and material supplied/service or work rendered under the contract is free from design, manufacturing, material, construction, erection & installation and workmanship & quality defects and is capable of its due, rated and intended quality performance, as an integrated product delivered under the contract for a specific period termed as Guarantee Period. The bidder should also guarantee that the equipment/material is new and unused except for the usage required for the tests and checks required as part of quality assurance.

14.0 Guarantee Period/ Defects Liability Period

The Guarantee Period will be equipment/service/work specific and shall be as specified in the Technical Specifications for the equipment/material/service/work and where technical specifications are not part of contract documents or guarantee period is not specified in the technical specifications, the guarantee period shall be as per the Special Terms and Conditions of the Contract. In case of no mention of the guarantee period in Technical specifications, Defect liability period will be 24 Months from the Date of Commissioning or 30 months from the date of delivery of final lot of supplies made, whichever is later.

For Cable & Joints: The defect liability period shall be 60 months from the date of commissioning or 66 months from the date of delivery whichever is later.

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 30 days from the date of receipt of intimation.

Cost of repairs on failure in Guarantee Period:

The cost of repairs/rectification /replacement, apart from the actual cost of repairs/rectification/replacement is also inclusive of all bidder costs of required transportation, site inspection /mobilization/dismantling and re-installation costs as applicable, to be borne by the bidder. The bidder has to ensure that the interruption in the usage of intended purpose of the equipment is minimized to the maximum extent in lieu of the time taken for repairs/rectification/replacement.

15.0 Latent Defect

Hidden defects in manufacturing or design of the product supplied and which could not be identified by the tests conducted but later manifested during operation of the equipment are termed as latent defects. Bidder shall further be responsible for 'free replacement' for another period of FIVE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

16.0 Support beyond the Guarantee Period

The Bidder shall ensure availability of spares and necessary support for a period of at least 10 years post completion of guarantee period of equipment /technology supplied against this contract. BRPL shall be duly intimated by the Vendor of End-of-Life Support for the product /technology supplied at least 12 months in advance.

17.0 Return, Replacement or Substitution

BRPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BRPL may at its discretion elect to return defective Commodities to Supplier for replacement, free of charge to BRPL, or may reject such Commodities and purchase the same or similar Commodities from any third party. In the latter case BRPL 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. BRPL may set off such costs against any amounts payable by BRPL to Supplier. Supplier shall reimburse BRPL for the

amount, if any, by which the price of a substitute Commodity exceeds the price for such Commodity as quoted in the Bid.

18.0 Effective Date of Commencement of Contract

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

19.0 Time – The Essence of Contract

The time and the date of completion of the "Supply" as stipulated in the Letter of Acceptance / order issued to the Supplier shall be deemed to be the essence of the "Contract". The Supply has to be completed no later than the aforesaid Schedule and date of completion of supply.

20.0 The Laws and Jurisdiction of Contract

Any dispute or difference arising out of this Order shall be discussed by the Purchaser and Supplier. Both shall endeavor to reach an amicable settlement within a period of fifteen (15) days. If an agreement could not be reached within this period, then the dispute shall be referred to arbitration under the Indian Arbitration and Conciliation Act-1996, as may be amended from time to time. The venue of arbitration shall be Delhi.

The award shall be a reasoned award and shall be final and binding on both the parties and shall not be subjected to appeal. Subject to arbitration the Courts at Delhi shall have exclusive jurisdiction over all matters arising under this Order. During pendency of arbitration the parties shall continue to perform respective obligations under this Order.

21.0 Events of Default

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

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

22.0 Consequences of Default

- (a) If an Event of Default shall occur and be continuing, BRPL may forthwith terminate the Contract by written notice.
- (b) In the event of an Event of Default, BRPL may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;

- (i) Present to Bank for forfeiture to the relevant bank the Performance Bond;
- (ii) Purchase the same or similar Commodities from any third party; and/or
- (iii) Recover any losses and/or additional expenses BRPL may incur as a result of Supplier's default.

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

23.0 Liquidated Damages

- 23.01 If supply of items / equipment is delayed beyond the supply schedule as stipulated in LOI/PO, then the Supplier shall be liable to pay the Purchaser for delay a sum of 0.5% (half percent) of the total price for every week of delay or part thereof for undelivered units.
- 23.02 The total amount for delay under the contract will be subject to a maximum of ten percent (10%) of the total contract value.
- 23.03 The Purchaser may, without prejudice to any method of recovery, deduct the amount for such damages from any amount due or which may become due to the Supplier or from the Performance Bond or file a claim against the supplier. The levy payment or deduction of such damages shall not relieve the Bidder from his obligation to complete the Supply on time or from any other part of his obligation and liabilities under the Contract. Once the maximum is reached, the Company reserves the right for termination of contract without any liabilities to the Company.

In the event of an extension of time being granted by the EIC, in writing for the Completion of the works, this clause shall be applicable after the expiry of such an extended period.

24.0 Statutory variation in Taxes and Duties

The total order value shall remain **FIRM** within stipulated delivery period and shall not be adjusted on account of any price increase/variations in commodities & raw materials. However Statutory Taxes, duties and Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period shall be borne by BRPL on submission of necessary documents claiming such variation. The variation will be applicable only on such value wherever price breakup of same is submitted by vendor/available in PO/WO

25.0 Force Majeure

25.01 General

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

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

- (iv) Such Party has given the other Party prompt notice describing such events, the effect thereof and the actions being taken in order to comply with above clause.
- 25.02 Specific Events of Force Majeure: Subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements:
- (i) The following events and circumstances:
 - a) Effect of any natural element or other acts of God, including but not limited to storm, flood, earthquake, lightning, cyclone, landslides or other natural disasters.
 - b) Explosions or fires
 - (ii) War declared by the Government of India, provided that the ports at Mumbai are declared as a war zone.
 - (iii) Dangers of navigation, perils of the sea.
- 25.03 Notice of Events of Force Majeure: If a force majeure event prevents a party from performing any obligations under the Contract in part or in full that party shall:
- i) Immediately notify the other party in writing of the force majeure events within 7(seven) working days of the occurrence of the force majeure event
 - ii) Be entitled to suspend performance of the obligation under the Contract which is affected by force majeure event for the duration of the force majeure event.
 - iii) Use all reasonable efforts to resume full performance of the obligation as soon as practicable
 - iv) Keep the other party informed of all such efforts to resume full performance of the obligation on a regular basis.
 - v) Provide prompt notice of the resumption of full performance or obligation to the other party.
- 25.04 Mitigation of Events of Force Majeure Each Party shall:
- (i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure including recourse to alternate methods of satisfying its obligations under the Contract;
 - (ii) Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and
 - (iii) Keep the other Party informed at regular intervals of the circumstances concerning the event of Force Majeure, with best estimates as to its likely continuation and what measures or contingency planning it is taking to mitigate and or terminate the Event of Force Majeure.
- 25.05 Burden of Proof: In the event that the Parties are unable in good faith to agree that a Force Majeure event has occurred to an affected party, the parties shall resolve their dispute in accordance with the provisions of this Agreement. The burden of proof as to whether or not a force Majeure event has occurred shall be upon the party claiming that the force majeure event has occurred and that it is the affected party.
- 25.06 Termination for Certain Events of Force Majeure: If any obligation of any Party under the Contract is or is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 3 months, the Parties shall promptly discuss in good faith how to proceed with a view to reaching a solution on mutually agreed basis. If a solution on mutually agreed basis cannot be arrived at within a period of 30 days after the expiry of the period of three months, the Contract shall be terminated after the said period of 30 days and neither Party shall be liable to the other for any consequences arising on account of such termination.
- 25.07 The Purchaser may terminate the contract after giving 7(seven) days notice if any of following occurs:
- a) Bidder fails to complete execution of works within the approved schedule of works, terms and conditions
 - b) In case the Bidder 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

- 25.08 Limitation of Force Majeure event: The Supplier shall not be relieved of any obligation under the Contract solely because cost of performance is increased, whether as a consequence of adverse economic consequences or otherwise.
- 25.09 Extension of Contract Period due to Force Majeure event: The Contract period may be extended by mutual agreement of Parties by way of an adjustment on account of any period during which an obligation of either Party is suspended due to a Force Majeure event.
- 25.10 Effect of Events of Force Majeure: Except as otherwise provided herein or may further be agreed between the Parties, either Party shall be excused from performance and neither Party shall be construed to be in default in respect of any obligations hereunder, for so long as failure to perform such obligations shall be due to an event of Force Majeure."

26.0 Transfer and Sub-Letting

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.

27.0 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 detecting any sum due to which any time thereafter may become due from the supplier in this or any other contract. In case the sum be not sufficient to cover the full amount recoverable, the bidder shall pay to the purchaser on demand the remaining balance.

28.0 Waiver

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

29.0 Indemnification

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

30.0 Termination

The Supplier hereby undertakes to fully comply and conform to the terms and conditions of this Order. In the event of failure to do so, Purchaser shall have the right to terminate the assignment and claim damages. The upper limit for the damages will be the value of equivalent material / services, which are available from Third parties.

Should unforeseen conditions arise and the Purchaser deems it necessary, to suspend indefinitely or abandon the supplies, the order may be terminated by Purchaser after having given 10 days notice in writing. In the event of such termination, the Supplier shall be entitled to be paid the amount due for the supplies rendered and/or expenses incurred up to the date of such termination. Any such compensation being claimed shall be substantiated by the Supplier. The upper limit for the compensation being claimed shall be the value of the order.

31.0 Termination by Employer for convenience

The Employer shall, in addition to any other right enabling it to terminate the Contract, have the right to terminate the Contract at any time by giving a written 30 days notice to the Contractor. The Contract shall stand terminated on receipt of such notice but such termination shall be without prejudice to the rights of the Parties accrued on and before the date of termination.

32.0 Documentation:

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

33.0 Commissioning Spares

Commissioning Spares shall be deemed to be included in the quoted prices

34.0 Limitation on Liability

Notwithstanding anything to the contrary in the Order but subject to clause 35.0 Consequential Damages, the aggregate liability of either Party to the other Party in respect of all claims for Liabilities arising under the Order shall not exceed the aggregate value of the Order(s) under which the Liabilities arose except that such limitation shall not apply to the Bidder's indemnification obligations in accordance with clause 29.0 Indemnification herein.

35.0 Consequential Damages

Notwithstanding anything to the contrary in the Order, except for breach of obligations under Non-disclosure and except as expressly provided in a Order, in no event, as a result of breach of contract or breach of warranty or otherwise, shall either Party hereto or either Party's Affiliates or sub Bidders, be liable under the Order to the other Party for any consequential, special, indirect, exemplary or incidental damages, and/or for any lost profits, goodwill or revenues of such Party, howsoever arising, before or after Acceptance of the Goods and whether or not such damages are foreseeable.

36.0 Risk & Cost

If the Bidder of fails to supply the items 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 got cancel and company reserves the right to get the material supplied from any other source at the Risk & Cost of the Bidder. The Extra Expenditure so incurred shall be debited to the Bidder.

37.0 Non-Disclosure Agreement

All information including, without limitation, all oral and written information, disclosed by either party (Disclosing Party) to the other party, (Receiving Party) is deemed to be confidential, restricted and proprietary to the Disclosing Party.

Non-Disclosure: The Receiving Party shall maintain the Confidential Information received from the Disclosing Party in strict confidence and shall not disclose it to any third party without the prior written consent of the Disclosing Party.

Limited Use: The Receiving Party shall use the Confidential Information solely for the Purpose outlined in this Agreement and shall not use it for any other purpose without the prior written consent of the Disclosing Party.

Protection Measures: The Receiving Party shall exercise reasonable care to protect the Confidential Information from unauthorized access, use, or disclosure. This includes implementing appropriate security measures and restricting access to the Confidential Information to only those individuals who have a need to know for the Purpose.

Exceptions: The obligations of confidentiality shall not apply to any portion of the Confidential Information that:

- Is or becomes publicly available through no fault of the Receiving Party;

- b. Was already lawfully in the possession of the Receiving Party prior to its disclosure by the Disclosing Party;
- c. Is rightfully received by the Receiving Party from a third party without any obligation of confidentiality; or
- d. Is required to be disclosed by law, regulation, or court order. However, the Receiving Party shall promptly notify the Disclosing Party of any such requirement and cooperate with the Disclosing Party to seek a protective order or other appropriate remedy.

Upon the written request of the Disclosing Party or upon termination of this Agreement, whichever occurs first, the Receiving Party shall promptly return or destroy all Confidential Information received from the Disclosing Party, including any copies, notes, or extracts thereof, and provide written certification of such return or destruction upon request.

The obligations of confidentiality shall survive the termination or expiration of this Agreement and shall continue for a period of five years from the date of termination or expiration.

38.0 Acceptance

Acceptance of the order implies and includes acceptance of all terms and conditions enumerated in this 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 order. No amendments to the concluded 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 order, if at any time the Company's representative observe and form an opinion that the Supplies under the order is not being performed in accordance with the terms of this order, the company reserves its right to cancel this order forthwith without assigning any reason.

Successful Bidders need to sign the duplicate copy of the order as a token of their acceptance and return it to BRPL.

SECTION V

GENERAL TERMS & CONDITIONS - ERECTION, TESTING & COMMISSIONING

1. DEFINITIONS and INTERPRETATION

The following terms shall have the following meanings:

- i. Company: means BSES Rajdhani Power Ltd, a company incorporated under the Companies Act 1956 and having its office at BSES Bhawan, Nehru Place, New Delhi 110 019, which expression shall include its authorized representatives, agents, successors and assigns.
- ii. Bidder: shall mean the successful Bidder / vendor to whom the contract has been awarded
- iii. 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 Bidder under the order and are not subject to escalation for any reason whatsoever.
- iv. 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-II enclosed herewith and all such particulars mentioned directly/referred to or implied as such in the contract.
- v. SITE: The terms "Site" shall mean the working location in BRPL area. Under this tender, working location shall be as mentioned elsewhere.
- vi. ENGINEER IN CHARGE: "Engineer In-charge" means the Company's authorized representative for the purpose of carrying out the work.

2. EXAMINATION OF SITE AND LOCAL CONDITIONS:

The Bidder is deemed to have visited the site of the work under the Tender 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 entertain any claim whatsoever arising out of the difficult site/terrain/local conditions, if any.

3. LANGUAGE AND MEASUREMENT:

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

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

4. SCOPE OF WORK:

The scope includes Survey, Design, Engineering, Manufacture , Shop testing, Inspection, Packing, Dispatch, Loading, Unloading and Storage at site, storage and construction insurance, Assembly, Erection, Structural, complete pre-commissioning checks, Testing and Commissioning at site, obtaining statutory clearance & certification from state Electrical inspector, Municipal Corporation department (if required), Fire Officer (if required), Horticulture department (if required), and handing over to owner after successful testing & Commissioning of Cable Infeed/ Laying works at New Delhi, BRPL on single point responsibility basis. Schedule of work shall be as per BOQ attached herewith.

After completion of E/T/C work of the scheme, Bidder has to obtain the Electrical Inspectorate's Clearance from the Electrical Inspector of Delhi Govt. Electrical Inspector Clearance fees shall be in Bidder's scope. The related fees, payments and pursuance work shall be in scope of Bidder only.

Bidder shall arrange any permission like road cutting clearance, if required, etc from the Delhi Civic authorities. The Bidder shall follow-up with local authorities and other connected persons that may be required to carry out the job under this work order.

All the labour, cranes, tool and tackles, and technical supervision etc. are including in your scope of work. Adequate number of engineers, supervisors and laborers shall be posted at site and the list of the same along with certificate of Qualification of technical staff should be submitted by the Bidder to the Engineer in Charge for checking the adequacy immediately (within seven days) after award of contract.

The Bidder shall also make his own arrangement for the accommodation/conveyance requirements for its staff at site. Company will be provided at site the adequate open space for Bidder's site store for storing the materials, tools, tackles etc. The entire Bidder'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 Bidder, however company does not hold any responsibility for any loss or damage of Bidder's material etc.

All loading/ unloading, of materials at work-site shall be Bidder's 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 Bidder to keep the materials safe from sun & rain by providing covered storage space as well as using tarpaulins.

The Bidder at his own shall arrange Water and Electricity Power at his cost.

Special Instruction: -

- a. Contractor needs to conduct sheath voltage test after finishing the cable laying to check integrity of outer sheath in presence of project engineer (for 66kV only)
- b. EHV Cable should be tested as per the specification only. Contractor shall test the complete cable; BRPL will also witness the same.
- c. Contractor shall submit copy of Execution schedule to BRPL in event of order so that quality checks can be done on sample basis.
- d. Penalty clause shall be incorporated in case any of workmen of contractor is found violating safety protocol as per BRPL WO.
- e. In case cable is damaged / fails during commissioning or during period of defect liability contractor shall bear all the repair and material cost
- f. All Erection tools and tackles and testing equipment shall be available with Bidder in event of order.

Any additional work beyond the scope enumerated in the 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 Order value due to execution of such additional work if the same is not approved by Engineer in Charge.

5. RATES:

The rates finalized for this order shall be firm for the entire duration of work carried out by the Bidder 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/ equipment during its storage and handling/erection at site for installation is included in the Bidder's scope and value shall be included in the unit rates finalized.

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

6. TAXES AND DUTIES:

Prices are inclusive of all taxes and duties including GST as applicable. However, Income Tax as per applicable rate will be deducted from your bills as Tax Deduction at Source (TDS).

The total order value shall remain **FIRM** within stipulated delivery period and shall not be adjusted on account of any price increase/variations in labour. However Statutory Taxes, duties and Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period shall be borne by BRPL on submission of necessary documents claiming such variation. The variation will be applicable only on such value wherever price breakup of same is submitted by vendor/available in PO/WO.

7. TERMS OF PAYMENT (Erection, Testing & Commissioning)

(i) 10% mobilization advance against submission of Advance Bank Guarantee of equivalent amount valid up to completion period/ handing over, whichever is earlier plus 3 months claim period. In case of delay, the BG shall be extended suitably.

(ii) 80% pro-rata of total installation value shall be payable against R/A bills payable within 30 days after installation, testing & commissioning of material at site duly certified by Engineer in charge.

(iii) 10% of contract value payable after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by Engineer in charge, submission of Electrical Inspector Clearance Certificate & submission of Performance Bank Guarantee of 10% of contract value valid up to defect liability period i.e. 24 months from the date of Handing over of entire Installation Plus 3 months towards Claim period.

All the Bank guarantees shall be submitted as per Company's format (Appendix I) and from any scheduled Bank approved by Company.

Company shall make payments of the bills either by crossed cheque or by electronic transfer directly to Bidder's designated bank account.

8. Guarantee of Performance

The bidder shall stand guarantee that the equipment and material supplied/service or work rendered under the contract is free from design, manufacturing, material, construction, erection & installation and workmanship & quality defects and is capable of its due, rated and intended quality performance, as an integrated product delivered under the contract for a specific period termed as Guarantee Period. The bidder should also guarantee that the equipment/material is new and unused except for the usage required for the tests and checks required as part of quality assurance.

9. Guarantee period/ Defect Liability period:

The works 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 handing over of the substation. In case any defect in the work is observed during the defect liability period, the same shall be rectified by the Bidder at own cost including supply of all materials, labour, equipment and any other appliance in this regard (as per prevailing rates) for the fulfillment of all obligations under the Contract and to the satisfaction of the Company, within 10 days from the date of receipt of intimation from BRPL.

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 30 days from the date of receipt of intimation.

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

10. Performance Guarantee

10.01 Bank guarantee shall be drawn in favor of "BSES Rajdhani Power Ltd" as applicable. The performance Bank guarantee shall be in the format as specified by BRPL.

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

10.03 Bidder shall submit the performance bank guarantee equivalent to the 10% of the contract value at the time of claiming the last payment as per clause no. 7.0 (iv) (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 Installation plus 3 months.

Notwithstanding anything stated in this agreement, It is agreed by the Seller that in case of default by the seller in furnishing the Performance Bank Guarantee, the purchaser/BRPL, without prejudice to the rights available with the purchaser, shall be entitled to retain a total sum not exceeding 120% of the amount of required performance bank guarantee for the tenure and upon the terms as specified in this agreement. It is agreed that the purchaser shall not be paying any interest for the said sum retained by the purchaser in lieu of default by the seller in furnishing the performance bank guarantee and no claim of any nature shall be maintainable from the side of seller, disputing the above said retention. Whereas, in case, after the deduction of above sum by the purchaser, if the seller at any point of time, submits the PBG of the required value and tenure and requests for the refund of the amount retained on this ground, the purchaser shall be releasing the money retained in lieu of PBG without any interest/cost.

11. COMPLETION PERIOD

You are required to mobilize your manpower and Tools & Tackles and furnish a list of equipment to be used for erection and commence the execution activity as per instructions of Engineer In-charge. The entire Erection, Testing & Commissioning work should be completed within 06 months from the date of issue of LOI/ WO 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. You shall submit a weekly progress report to Engineer In charge.

12. CLEANLINESS

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, you 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 Bidder's risk and costs.

13. COMMISSIONING & ACCEPTANCE TEST:

After completion of the work, the Bidder 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 Bidder. If any rectification/modification required during this period the Bidder 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.

14. WORK COMPLETION CERTIFICATION, HANDING OVER.

The work carried out by the Bidder under this order has to be certified by Engineer In-charge for satisfactory completion of work allotted to the Bidder with respect to specifications / Field Quality Procedures as per applicable standards. In case of modification/correction to be carried out, Bidder shall carry out the said modifications/correction without additional cost. The Bidder 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 Bidder 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 Bidder as certified by Engineer In-Charge. Bidder 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 Bidder 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.

15. PENALTY AND LIQUIDATED DAMAGES

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

15.2 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 Bidder, the Bidder shall pay to the Company liquidated damages.

If the Bidder failed perform the services within the time period specified in the order, the Company shall, without prejudice to its other remedies under the contract, deduct liquidated damages a sum equivalent to 0.5% of the total order value for each week or part there of delay until the actual date of completion up to a maximum deduction of 10% of total order value. The levy payment or deduction of such damages shall not relieve the Bidder from his obligation to complete the Works on time or from any other part of his obligation and liabilities under the Contract. Once the maximum is reached, the Company reserves the right for termination of contract without any liabilities to the Company.

In the event of an extension of time being granted by the EIC, in writing for the Completion of the works, this clause shall be applicable after the expiry of such an extended period.

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

18. SAFETY REGULATIONS & SAFETY CODE:

The Bidder shall indemnify the Company from any consequence arising due to Bidder's failure in respect to safety compliance.

First Aid facilities at easily accessible place shall be provided by the Bidder at his own cost as per provisions of Labor act or as advised by the Company wherever works are carried out.

All critical injuries shall be reported promptly to the Company. The report shall cover type, nature, cause, physician's report and actions for prevention of those types again.

To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Bidder shall be open to inspection by the Company.

The cost so incurred by the Bidder in providing for safety standards and requirements as above shall be deemed to be included in the rates quoted for various items under the scope of Contract and no extra amounts shall be payable to the Bidder on this account.

The Bidder shall furnish to the Company within seven days from issue of Order whichever is earlier, for approval of Company, the proposed safety program on how it intends to implement the safety procedures and precautions to ensure that the site is accident free.

The Bidder 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 Bidder shall not deploy any worker below the age of 18 years.

The Bidder shall observe the safety requirements as laid down in the contract and in case of sub-contract (only after written approval of company), it shall be the responsibility of main Bidder that all safety requirements are followed by the employees and staff of the sub-vendor.

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

17. STATUTORY OBLIGATIONS:

The Bidder 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, 1984, 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

(The Bidder shall provide BRPL Engineer-in-charge a copy of Labour License responsible for execution of the job before start of the work.)

The Bidder must follow:

Third party Insurance Policy before start of work.

- i. To follow Minimum Wages Act prevailing in the state.
- ii. Salary / Wages to be distributed in presence of representative of Company's representative not later than 7th of each month.
- iii. To maintain Wage-cum-Attendance Register.
- iv. To maintain First Aid Box at Site.

- v. 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.
- vi. Workman Compensation Policy. {If applicable}
- vii. Labour license before start of work. {If applicable}

18. WORKMAN COMPENSATION:

The Contactor shall take insurance policy under the Workman Compensation Act to cover such workers who are not covered under ESI and PF by the Bidder 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 workers involved other than those who are covered under ESI and PF by the Bidder, the Bidder shall certify for the same.

The Bidder 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 Bidder/sub-Bidder/sub-agent in carrying out the job involved under this 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 Bidder, moneys paid or payable by way of compensation as aforesaid or cost or expenses in connection with any claims thereto and the Bidder shall abide by the decision of the Company as to the sum payable by the Bidder under the provisions of this clause.

19. STAFF AND WORKMAN

It shall be responsibility of Bidder

- 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.
- c) To maintain, proper records relating to workmen employed, in the form of various Registers, namely,
 - i. Register of workmen.
 - ii. Register of muster roll.
 - iii. Register of overtime.
 - iv. Register of wages.
 - v. Any other register as per latest amendment Labour Act.
- d) The records shall be in the prescribed formats only.
- e) To disburse monthly wages to your workers/ supervisors in time and in the presence of Company representatives or as directed by the Labour authorities.
- f) To maintain proper liaison with the Project authorities, local police and all other government and local bodies.
- g) To pay your workmen at least not less than the minimum prescribed wages as per state/Central Labour laws as may be, applicable. The Bidder 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 Bidder.

- h) 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.
- i) 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.

20. INSURANCE

THIRD PARTY INSURANCE

Before commencing the execution of the work the Bidder 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 Bidder shall be responsible for settlement of claims with the underwriters without any liability on the purchaser / owner and will arrange replacements / rectification expeditiously without awaiting settlement by insurance claim at Bidders own cost.

ACCIDENTAL INSURANCE POLICY FOR LIFE COVER:

Before commencing the execution of the work, the Bidder 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 (Death + Permanent Total Disability + Partial permanent Disability due to external accidents). The Bidder 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 BRPL. The premium amount for such life cover policy shall be borne by the Bidder. The Bidder shall furnish copy of policy when demanded by BRPL.

INSURANCE FOR MAN, MATERIAL & MACHINERY DEPLOYED AT SITE

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

21. 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.

22. ENVIRONMENTAL, HEALTH & SAFETY PLAN:

Bidder 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. Bidders 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 manufacturers' 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 Bidders staffs are accountable for the following:

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

23. TEST CERTIFICATE & QUALITY ASSURANCE:

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

24. SUB-CONTRACTING/ SUBLETTING:

BIDDER shall not assign or transfer the whole or any part of this 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 & before start of work.

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

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

25. INDEMNITY:

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

- 1 Any breach non-observance or non-performance by Bidder or its employees or agents of any of the provisions of this Order.
- 2 Any act or omission of Bidder or its employees or agents.

- 3 Any negligence or breach of duty on the part of Bidder, its employees or agents including any wrongful use by it or them of any property or goods belonging to or by COMPANY or any other third party at site including adjoining neighbors.

Bidder shall at all times indemnify COMPANY against all liabilities to other persons, including the employees or agents of COMPANY or Bidder 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.

26. EVENTS OF DEFAULTS:

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

- 1 Failing to complete execution of work within the terms specified in this order.
- 2 Failing to complete works in accordance with the approved schedule of works.
- 3 Failing to meet requirements of specifications, drawings, and designs as approved by COMPANY.
- 4 Failing to comply with any reasonable instructions or orders issued by COMPANY in connection with the works.
- 5 Failing to comply with any of the terms or conditions of this order.

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

27. RISK & COST:

If the Bidder 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 Bidder. The Extra Expenditure so incurred shall be debited to the Bidder.

28. ARBITRATION:

Any dispute or difference arising out of this Order shall be discussed by the Purchaser and Supplier. Both shall endeavor to reach an amicable settlement within a period of fifteen (15) days. If an agreement could not be reached within this period, then the dispute shall be referred to arbitration under the Indian Arbitration and Conciliation Act-1996, as may be amended from time to time. The venue of arbitration shall be Delhi.

The award shall be a reasoned award and shall be final and binding on both the parties and shall not be subjected to appeal. Subject to arbitration the Courts at Delhi shall have exclusive jurisdiction over all matters arising under this Order. During pendency of arbitration the parties shall continue to perform respective obligations under this Order.

29. FORCE MAJEURE:

29.1 General:

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

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

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

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

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

29.2 Specific Events of Force Majeure:

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

The following events and circumstances:

- a) Effect of any natural element or other acts of God, including but not limited to storm, flood, earthquake, lightning, cyclone, landslides or other natural disasters, and
- b) Explosions or fires
- c) Declaration of the Site as war zone.
- d) Any order, regulation, directive, requirement from any Governmental, legislative, executive or judicial authority.

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

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

29.4 Mitigation of events of force majeure:

The Bidder shall:

(i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure, including applying other ways in which to perform the Contract;

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

29.5 Burden of proof:

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

29.6 Terminations for certain events of force majeure:

If any obligation of any Party under the Contract is or is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 1 (one) month during the Term of the Contract the Contract shall be terminated at the discretion of the Company and neither Party shall be liable to the other for any consequences arising on account of such termination.

30. SECRECY CLAUSE:

The technical information, drawing and other related documents forming part of order and the information obtained during the course of investigation under this order shall be the Company's executive property and shall not be used for any other purpose except for the execution of the 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 order.

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

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

31. TERMINATION

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

32. QUALITY

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

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

33. LIABILITY OF BIDDERS

Subject to the due discharge of its obligations under the Contract and except in case of gross negligence or willful misconduct on the part of the Bidder or on the part of any person acting on behalf of the Bidder, with respect to any loss or damage caused by the Bidder to the Employer's property or the Site, the Bidders shall not be liable to the Employer for the following:

- a) For any indirect or consequential loss or damage; and
- b) For any direct loss or damage that exceeds:
 - (i) The total payments made and expected to be made to the Bidder under the Contract including reimbursements, if any; or
 - (ii) The insurance claim proceeds which the Bidder may be entitled to receive from any insurance purchased by the Bidder to cover such a liability, whichever is higher.

This limitation of liability shall not affect the Bidder's liability, if any, for damage to any third party, caused by the Bidder or any Person or firm acting on behalf of the Bidder in executing the Works.

Notwithstanding anything contained in the Contract, the Bidder shall not be liable for any gross negligence or willful misconduct on the part of the Employer or any of its affiliates, any Bidder, or any party, other than Bidder and/or, its directors, officers, agents or representatives or its affiliates, or Sub-vendor, or the Bidder or any third party engaged by it.

Notwithstanding anything contained in the Contract, including but not limited to approval by the Employer of any drawings, documents, Bidder list, supply of information or data or the participation of the Employer in any meeting and/or discussion or otherwise, shall not absolve the Bidder from any of its liabilities or responsibilities arising in relation to or under the Contract.

34. POLLUTION CONTROL:

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 Bidder 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 Bidder's risk and costs.

All BRPL vendors and execution engineers are hereby advice to adhere below mentioned guidelines while carrying out any civil work including road/ pit digging, plinth/ fence making, road restoration etc.

- i. No construction material/ debris shall be stored on metalled road.
- ii. Wind breakers of appropriate height on all sides of ear marked area using CGI sheets shall be raised to ensure that no construction material dust fly outside ear marked area.
- iii. The construction material i.e. coarse sand, stone aggregates, excavated earth, cement and any other material to and from the site shall be transported under wet and covered condition to ensure their non-slippage en-route to avoid air contamination.
- iv. The Bidder shall provide mask and helmet to every worker working on the construction site and involved in loading/unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.
- v. Over loading of vehicles shall be strictly prohibited
- vi. The construction material at site shall be stored under wet and covered condition.
The dumping sites for temporarily storing the excavated earth shall be properly leveled, watered and rehabilitated by plantation to avoid flying of dust.
- vii. The worker at the site shall be sensitized to adopt / observe the dust-controlled measures in true spirit.
- viii. 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.
- ix. Wet jet in grinding and stone cutting is being permitted at site.
- x. The necessary record for dust control is being maintained by the department on day-to-day basis and being monitored regularly.

The Bidder shall be responsible for all the preventive and protective environmental steps as per guidelines. Execution in-charge has to ensure all vendors comply with these instructions. 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 BRPL from all liabilities on this account.

Guidelines regarding inspection & maintenance of pits/ dug area while doing work at site in BRPL area:

The contractor shall ensure strict compliance of the following directions:

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

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 BRPL from all liabilities on this account.

35. TERMINATION BY EMPLOYER FOR CONVENIENCE:

The Employer shall, in addition to any other right enabling it to terminate the Contract, have the right to terminate the Contract at any time by giving a written 30 days notice to the Contractor. The Contract shall stand terminated on receipt of such notice but such termination shall be without prejudice to the rights of the Parties accrued on and before the date of termination.

36. RISK & COST:

If the Bidder fails to execute the works 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 cancelled and company reserves the right to get the works executed from any other source at the Risk & Cost of the Bidder. The Extra Expenditure so incurred shall be debited to the Bidder.

37. NON-DISCLOSURE AGREEMENT:

All information including, without limitation, all oral and written information, disclosed by either party (Disclosing Party) to the other party, (Receiving Party) is deemed to be confidential, restricted and proprietary to the Disclosing Party.

Non-Disclosure: The Receiving Party shall maintain the Confidential Information received from the Disclosing Party in strict confidence and shall not disclose it to any third party without the prior written consent of the Disclosing Party.

Limited Use: The Receiving Party shall use the Confidential Information solely for the Purpose outlined in this Agreement and shall not use it for any other purpose without the prior written consent of the Disclosing Party.

Protection Measures: The Receiving Party shall exercise reasonable care to protect the Confidential Information from unauthorized access, use, or disclosure. This includes implementing appropriate security measures and restricting access to the Confidential Information to only those individuals who have a need to know for the Purpose.

Exceptions: The obligations of confidentiality shall not apply to any portion of the Confidential Information that:

- a. Is or becomes publicly available through no fault of the Receiving Party;
- b. Was already lawfully in the possession of the Receiving Party prior to its disclosure by the Disclosing Party;
- c. Is rightfully received by the Receiving Party from a third party without any obligation of confidentiality; or
- d. Is required to be disclosed by law, regulation, or court order. However, the Receiving Party shall promptly notify the Disclosing Party of any such requirement and cooperate with the Disclosing Party to seek a protective order or other appropriate remedy.

Upon the written request of the Disclosing Party or upon termination of this Agreement, whichever occurs first, the Receiving Party shall promptly return or destroy all Confidential Information received from the Disclosing Party, including any copies, notes, or extracts thereof, and provide written certification of such return or destruction upon request.

The obligations of confidentiality shall survive the termination or expiration of this Agreement and shall continue for a period of five years from the date of termination or expiration.

38. QUALITY:

Contractor shall ensure that strict quality is maintained and execution of works under the 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.

39. 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.

40. ACCEPTANCE:

Acceptance of the order implies and includes acceptance of all terms and conditions enumerated in this 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 order. No amendments to the concluded 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 order, if at any time the Company's representative observe and form an opinion that the work under the order is not being performed in accordance with the terms of this order, the company reserves its right to cancel this order forthwith without assigning any reason.

Bidder needs to sign the duplicate copy of the order as a token of their acceptance and return to BRPL.

SECTION VI

SUMMARY OF THE QUOTED PRICES

SCHEME DESCRIPTION	Scheme no.	Location	Total price for supply F.O.R site inclusive all Taxes & freight (INR)	Total for Erection, Testing & Commissioning inclusive all Taxes (INR)	Grand Total (INR)
Supply, Laying, Testing, Commissioning & Handing Over Of 66KV 3cx300 Sqmm Cables with Required Accessories in Connection with Conversion Of 66 Kv D/C O/H Lines to Underground Along with Dismantling at Najafgarh, Bodella, Jafarpur & Bijwasan Locations on Turnkey Basis	1	Mehrauli-Bijwasan-Palam			
	2	Najafgarh-Jafarpur			
	3	Najafgarh-Bodella			
	4	Najafgarh-Nangloi			
	5	Najafgarh-Nangloi WW			
	6	Najafgarh T18-T37			
Total (incl. GST)					
In Words:					

We declare that the following are our quoted prices in INR for the entire project/schemes.

Date:

Bidder Name:

Place:

Bidders Address:

Name & Signature

Designation:

Common Seal:

Note: Bidder has to submit Price Bids for all the schemes compulsorily. Any Partial Price bid is liable for rejection.

APPENDIX- I

COMMERCIAL TERMS AND CONDITIONS - SUPPLY

SI No	Item Description	AS PER BRPL	BIDDER'S CONFIRMATION
1	Validity	120 days from the due date of submission or amended due date of submission	
2	Price basis	a) Firm , FOR Delhi store basis. Prices shall be inclusive of all taxes & duties, freight up to Delhi stores. b) Unloading at stores - in Bidder scope c) Transit insurance in Bidder scope	
3	Payment terms	a) 70% pro-rata of supply value shall be payable against R/A bills for supply of equipment and materials within 30 days against receipt of material at site b) 20% pro-rata after installation/erection of equipment duly certified by BRPL Project-in-charge c) 15% pro-rata after completion of successful acceptance testing, commissioning and Handing Over of the entire Installation and duly certified by BRPL Project-in-charge and submission of PBG of 10% of contract value valid up to Defect Liability period i.e. 24 months from the date of Handing over of entire Installation Plus 3 months towards Claim period.	
4	Completion time	06 months from date of LOI/Order	
5	Defect Liability period	DLP shall be 24 Months from the Date of Commissioning or 30 months from the date of delivery of final lot of supplies made, whichever is later. For Cable & Joints: The defect liability period shall be 60 months from the date of commissioning or 66 months from the date of delivery whichever is later. For other Equipment: As per technical Specification of equipment. If not specified, DLP shall be 24 Months from the Date of Commissioning or 30 months from the date of delivery of final lot of supplies made, whichever is later.	
6	Liquidated damages	0.5% (half percent) of the total price for every week of delay or part thereof for undelivered units subject to maximum of 10% of total contract value	
7	Contract Performance Bank Guarantee	10% (Ten percent) of the Contract Price valid up to completion period/handing over.	
8	Performance Bank Guarantee	10% (Ten percent) of the Contract Price valid up to 24 Months from Handing Over & Taking Over (HOTO) Date plus 3 months towards claim period.	

APPENDIX-II

COMMERCIAL TERMS AND CONDITIONS – E/T/C

SI No	Item Description	AS PER BRPL	BIDDER'S CONFIRMATION
1	Validity	120 days from the due date of submission or amended due date of submission	
2	Price basis	Firm. Prices shall be inclusive of all taxes & duties.	
3	Payment terms	<p>(i) 10% mobilization advance against submission of Advance Bank Guarantee of equivalent amount valid up to completion period/ handing over, whichever is earlier plus 3 months claim period. In case of delay, the BG shall be extended suitably.</p> <p>(ii) 80% prorata of total installation value shall be payable against R/A bills payable within 30 days after installation, testing & commissioning of material at site duly certified by Engineer in charge.</p> <p>(iii) 10% of contract value payable after completion of successful acceptance testing, commissioning and handing over of complete systems duly certified by Engineer in charge, submission of Electrical Inspector Clearance Certificate & submission of Performance Bank Guarantee of 10% of contract value valid up to defect liability period i.e. 24 months from the date of Handing over of entire Installation Plus 3 months towards Claim period.</p>	
4	Completion time	06 months from date of LOI/Order	
5	Defect Liability period	24 months from the date of Handing over of entire Installation.	
6	Liquidated damages	0.5 % of the order value for each week or part there of delay until the actual date of completion up to a maximum deduction of 10% of total order value	
7	Contract Performance Bank Guarantee	10% (Ten percent) of the Contract Price valid up to completion period/handing over.	
8	Performance Bank Guarantee	10% (Ten percent) of the Contract Price valid up to Defect Liability Period i.e. 24 months from the date of Handing over of entire Installation plus 3 months towards claim period.	

APPENDIX - III

BID FORM

To

Head of Department
Contracts & Material Deptt.
BSES Rajdhani Power Ltd
New Delhi 110019

Sir,

1. We understand that BRPL is desirous of execution of(Name of work)
2. Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods/execute the project 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 above amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.
3. If our Bid is accepted, we undertake to deliver the entire goods and execute the project as per delivery schedule/completion schedule mentioned in Tender from the date of award of this order/letter of intent.
4. If our Bid is accepted, we will furnish a performance bank guarantee for an amount of 10% (Ten)percent of the total contract value for due performance of the Contract in accordance with the Terms and Conditions.
5. We agree to abide by this Bid for a period of 120 days from the due date of bid submission or subsequent corrigendum/amendment/extension of due date of submission. It shall remain binding upon us and may be accepted at any time before the expiration of that period.
6. We declare that we have studied the provision of Indian Laws for supply of equipments/materials and the prices have been quoted accordingly.
7. Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
8. We understand that you are not bound to accept the lowest, or any bid you may receive.
9. There is provision for Resolution of Disputes under this Contract, in accordance with the Laws and Jurisdiction of Contract.

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

Signature..... In the capacity of

.....duly authorized to sign for

and on behalf of

(IN BLOCK CAPITALS).....

APPENDIX - IV

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed & stamped by the bidder along-with bid)

BSES Rajdhani Power Ltd (BRPL) intends to use reverse auction through SAP-SRM tool as an integral part of entire tendering process. All techno-commercially qualified bidders shall participate in the reverse auction.

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

1. In case of bidding through Internet medium, bidders are advised to ensure availability of all associated infrastructure as required for participating in the reverse auction event. Inability to bid due to telephone glitch, internet response issues, software & hardware hangs/failures, power failures or any other reason shall not be the responsibility of BRPL.
2. In case bidder fails to participate in the reverse auction event due to any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid submitted by them as a part of tender shall be considered as bidder's Final No Regret offer. Any off-line price bids received from a bidder in lieu of non-participation in the reverse auction event shall be rejected by BRPL.
3. The bidder is advised to understand the bid process to safeguard them against any possibility of non-participation in the reverse auction event.
4. The bidder shall be prepared with competitive price quotes during the day of reverse auction event.
5. The prices quoted by bidder in reverse auction event shall be on FOR Landed cost BRPL Store/site basis inclusive of all relevant taxes, duties, levies, transportation charges etc.
6. The prices submitted by the bidder during reverse auction event shall be binding on the Bidder.
7. The bidder agrees to non-disclosure of trade information regarding bid details e.g. purchase, Identity, bid process/technology, bid documentation etc.
8. BRPL will make every effort to make the bid process transparent. However award decision of BRPL will be final and binding on the bidder.
9. The prices submitted during reverse auction event shall be binding on the bidder.
10. No request for Time extension of the reverse auction event shall be considered by BRPL.
11. BRPL shall provide the user id and password to the authorized representative of the bidder. Authorization letter in lieu of the same shall be submitted along with the signed and stamped acceptance form.
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 reverse auction event for arriving at contract amount

APPENDIX – V

FORM OF POWER OF ATTORNEY FOR CONSORTIUM

(On Non –Judicial Stamp Paper of Appropriate value to be purchased in the Name of Lead Member)

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Members whose details are given hereunder..... have formed a Consortium and having our Registered Office (s)/Head Office (s) at(hereinafter called the 'Consortium' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) do hereby constitute, nominate and appoint M/s..... a company incorporated under the laws ofand having its Registered/Head Office atas our duly constituted lawful Attorney hereinafter called "Attorney" (hereinafter called Bidder) to exercise all or any of the powers for and on behalf of the Consortium in regard to Tender Notice No..... for "Supply, Installation, Testing & Commissioning of 11 kV feeders including RMU, Cable and accessories on single point responsibility basis in connection with providing new load of 1345 kw on HT system for NICF, Ghitrani " under jurisdiction of BRPL (hereinafter called the "**Owner**") for which bids have been invited by the Owner, to undertake the following acts :

(i) To submit proposal, participate and negotiate in respect of the aforesaid Bid – Specification of the Owner on behalf of the "Consortium".

(ii) To negotiate with Owner the terms and conditions for award of the contract pursuant to the aforesaid Bid and to sign the contract with the Owner for and on behalf of the "Consortium".

(iii) To do any other act or submit any document related to the above.

(iv) To receive, accept and execute the contract for and on behalf of the "Consortium".

(v) To submit the Contract performance security in the form of an unconditional irrecoverable Bank Guarantee in the prescribed format and as per terms of the contract.

It is clearly understood that the Bidder/Lead Partner shall ensure performance of the contracts(s) and if one or more Member fail to perform their respective portion of the contracts(s), the same shall be deemed to be a default by all the Partners.



BSES RAJDHANI POWER LIMITED

It is expressly understood that this power of Attorney shall remain valid, binding and irrevocable till expiry of contract period or any extension thereof.

The Consortium hereby agrees and undertakes to ratify and confirm all the whatsoever the said Lead Partner quotes in the bid, negotiates and signs the Contract with the Owner and / or proposes to act on behalf of the Consortium by virtue of this Power of Attorney and the same shall bind the Joint Consortium as if done by itself.

IN WITNESS THEREOF the Members Constituting the Consortium as aforesaid have executed these presents on this day of under the Common Seal (s) of their Companies.

For and on behalf of the members of Consortium

.....
.....
.....

The Seal of the above Partners of the Consortium:

The Seal has been affixed there unto in the presence of:

WITNESS

1. Signature
Name
Designation
Occupation

2. Signature
Name
Designation
Occupation

APPENDIX - VI

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 Rajdhani Power Ltd., with its Corporate Office at BSES Bhawan Nehru Place, New Delhi -110019, (herein after called —the "Purchaser") in the sum of Rs./- (Rupees only) for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents.

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

THE CONDITIONS of this obligation are:

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

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

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

(Stamp & signature of the bank)

Signature of the witness

APPENDIX - VII

LITIGATION HISTORY

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

APPENDIX - VIII

CURRENT CONTRACT COMMITMENTS/ WORK IN PROGRESS

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

APPENDIX - IX

FINANCIAL DATA

(Duly Certified by Chartered Accountant)

	FY 23-24	FY 23-22	FY 22-21
Total assets			
Current assets			
Total Liability			
Current Liability			
Profit before taxes			
Profit after taxes			
Sales Turnover			

APPENDIX - X

CHECK LIST

Sl No	Description	Compliance
1	INDEX	YES/NO
2	COVERING LETTER	YES/NO
3	BID FORM (UNPRICED) DULY SIGNED	YES/NO
4	BILL OF MATERIAL (UNPRICED)	YES/NO
5	DOCUMENTS IN SUPPORT OF QUALIFICATION CRITERIA	YES/NO
6	TECHNICAL BID	YES/NO
7	ACCEPTANCE TO COMMERCIAL TERMS AND CONDITIONS	YES/NO
8	FINANCIAL BID (IN SEALED ENVELOPE)	YES/NO
9	EMD IN PRESCRIBED FORMAT	YES/NO
10	DEMAND DRAFT OF RS 1000/- DRAWN IN FAVOUR OF BSES RAJDHANI POWER LTD	YES/NO
11	POWER OF ATTORNEY/AUTHORISATION LETTER FOR SIGNING THE BID	YES/NO
12	FINANCIAL DATA IN TABULAR FORMAT	YES/NO
13	LIST OF CURRENT COMMITMENTS/ WORK IN PROGRESS	YES/NO
14	BANK SOLVENCY CERTIFICATE	YES/NO
15	NO LITIGATION CERTIFICATE	YES/NO

APPENDIX - XI
FORMAT FOR PERFORMANCE BANK GUARANTEE

(TO BE ISSUED ON RS 100/- STAMP PAPER)

Bank Guarantee No.

Place:

Date:

To
BSES Rajdhani Power Limited

Whereas BSES RAJDHANI POWER LTD (hereinafter referred to as the "Purchaser", which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) has awarded to M/s. with its Registered/ Head Office at

(Hereinafter referred to as the "Supplier" which expression shall unless repugnant to the context or meaning thereof, include its successors administrators, executors and assigns), a contract no. Dated (the Contract);

And whereas the value of the Contract is Rs. (The Contract Value).

And whereas it is a condition of the Contract that the Supplier shall provide a Performance Bank Guarantee for the due and faithful performance of the entire Contract for a sum equivalent to - % of the Contract Value to the Purchaser on or before

And whereas the Bank under instructions from the Supplier has agreed to guarantee due performance of the Contract. Now it is agreed as follows:

1. We (Name of the Bank) having its Head Office at (hereinafter referred to as the Bank, which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) shall indemnify and keep indemnified the Purchaser for, and guarantee and undertake to pay to the Purchaser immediately on written demand, a sum equivalent to % of the Contract Value as aforesaid at any time up to (day/month/year) without any demur, reservation, contest, recourse or protest and/or without any reference to the Supplier, against all losses, damages, costs and expenses that may be caused to or suffered by the Purchaser by reason of any default on the part of the Supplier in performing and observing any and all the terms and conditions of the Contract or breach on the part if the Supplier of terms or conditions of the Contract.
2. The demand shall consist only of an original letter issued by Purchaser stating that the Supplier has failed to fulfill its obligations under the Contract. Such demand made by the Purchaser on the Bank shall be conclusive and binding notwithstanding any difference or dispute between the Purchaser and the Supplier or any difference or dispute pending before any Court, Tribunal, Arbitrator or any other authority.
3. The Bank undertakes not to revoke this guarantee during its currency without previous written consent of the Purchaser and further agrees that the guarantee herein contained shall continue to be enforceable during the period that would be taken for satisfactory performance and fulfillment in all respects of the Contract or in the event of any dispute between the Purchaser and Supplier until the dispute is settled (provided that due claim demand under this guarantee is lodged /referred during the currency of this guarantee) or till the Purchaser discharges this guarantee whichever is earlier.
4. The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee from time to time to extend the time for performance of the Contract by the Supplier. The Purchaser shall have the

fullest liberty, without affecting the liability of the Bank under this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Supplier, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract or any other course or remedy or security available to the Purchaser. The Bank shall not be released of its obligations under these presents by any exercise by the Purchaser of its liberty with reference: to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Purchaser or any other indulgence shown by the Purchaser of by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank.

5. The Bank agrees that the Purchaser and its option shall be entitled to enforce this guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Supplier and notwithstanding any security or other guarantee that the Purchaser may have in relation to the Supplier's liabilities.
6. Notwithstanding anything contained hereinabove the liability of the Bank under this guarantee is restricted to a sum equivalent to % of the Contract Value i.e. Rs.(Rupees) and it shall remain in force up to and including . Unless a demand to enforce a claim under this guarantee is made against the Bank within 3 months from the above date of expiry i.e. up to all the rights of the Purchaser under the said guarantee shall be forfeited and the Bank shall be released and discharged from all liabilities thereafter.
7. This Performance Bank Guarantee shall be governed by the laws of India.

Dated this Witness

day of 20..... at

1. For Bank

2. Signature
Name Power of Attorney No:

Banker's Seal

SECTION – XI

VENDOR CODE OF CONDUCT

Bidder shall agree to comply with Vendor code of Conduct as mentioned in BRPL Website. 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 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 Labour - Child labour 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 Labour - 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 the 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.

III.

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 with appropriate emergency egress, 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.

IV. 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.

V. 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 a 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.

VI. 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:

- 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, targets and 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.

ANNEXURE-I

BILL OF QUANTITY (BOQ)

PRICE FORMAT

SCHEME 1

Conversion of 66kV D/C O/H Line from 220 kV Mehraulli - Bijwasan - Palam by laying 04 Nos. 3Cx300sq.mm. XLPE cable from Vrindawan Greens Farms at NH-8 near Rajokari flyover to Bijwasan Grid substation Under PSDF Scheme

SUPPLY

S. No.	Item Description	UOM	Qty	Basic (Rs)	Freight (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	CBL,PWR,300MM2;3C;66KV;AL (OFC embedded)	M	25200					
2	JNT KIT HS ST 66KV 3C 300MM2 XLPE (including OFC kit)	EA	84					
3	KIT,TERM,HS O/D;66KV;3CX300MM2 (including OFC kit)	EA	8					
4	TERM KIT HS O/D 66KV1CX1000 MM2	EA	6					
5	ARRSTR,ELEC,OUTDR ELEC;60KV;10KA	EA	6					
6	ANGLE,STRCTL,65MM;65MM;6MM;MS	MT	1.0					
7	CHNL,STRCTL,ISMC100;100MM;50mm;7.7mm	MT	6.0					
8	STRIP,MTLC,EARTHNG;50X6MM;MS GALVANIZED	KG	1000					
9	Cable identification Tags	EA	1440					
10	RCC Slab (550X675) as per the specification of BRPL	EA	16000					
11	Warning Tape	M	9600					
12	PI,SPL PUR, 225MM; HDPE; PE80PN6; ROLLING	M	11200					
13	RFID Electronic Passive Ball Marker 3M Make	EA	126					
14	RFID Electronic Active Ball Marker 3M Make	EA	84					
15	Cable Route Marker as per the specification of BRPL	EA	126					

16	Cable Joint Marker as per the specification of BRPL	EA	21					
17	RCC Coffin for joint as per the specification of BRPL	EA	84					
18	Wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	86					

Erection, Testing & Commissioning

S. No.	Item Description	UOM	Qty	Basic (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Rocky Soil	CUM	3780				
2	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	CUM	2700				
3	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BRPL design. For Hard Rocky Soil	Cum	486				
4	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BRPL design. For Dense carpeted bituminous road.	Cum	270				
5	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Hard Rocky Soil	EA	76				
6	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Dense carpeted bituminous road	EA	51				
7	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	CUM	1721				
8	Laying of underground cable in trench ,covering with RCC cable cover, covering with sand ,Sand cushion will be min 75mm below and 75mm above the cable, fixing of cable identification tags (9" X 4") at every 30 Mtrs, Laying of warning tape above 250mm of the docket, refilling the trench and ramming the surface & removal of malba if any, including watch and ward till charging of cable (This	M	25200				

	activity includes only labour jobs) for 66 KV three core cable Running Mtr						
9	Fixing of Cable identification Tags	EA	1440				
10	Sand for cable route as per BRPL specification	CUM	1470				
11	Installation of RCC Cable Cover	EA	16000				
12	Installation of Warning Tape as per the Specification of BRPL.	M	9600				
13	Laying of HDPE pipe of 225mm dia. of PN6 Class PE80 For crossing of roads by trenchless technology including required equipment, manpower & transport of equipment from one place to another.	M	6000				
14	Crossing of roads by trench-less technology by laying of HDPE pipe excluding supply of pipe .Laying by Pneumatic Jack Hammer Road Cutting. laying. 225 mm dia.	M	4800				
15	Installation of single 66KV STRAIGHT THROUGH JOINTING KITS 3X300 SQMM XLPE with OFC kit	NOS	84				
16	Installation of single 66KV END TERMINATION KITS - OUTDOOR 3X300 SQMM XLPE, with OFC kit	NOS	8				
17	Mounting of 66KV,1x630 Sq.mm. XLPE cable with cable end box on the steel structure and fixing it with suitable wooden cleats (wooden cleats shall be supplied by contractor) i/c. its jumpering with the isolator as required.	EA	6				
18	Charges of Making O/D End termination Kit for 66kv, 1Cx1000SQ MM	EA	12				
19	Installation, testing and commissioning of RFID active Electronic ball markers (for 33kv and 66kv joint)	EA	84				
20	Installation, testing and commissioning of RFID passive Electronic ball markers (for 33kv and 66kv joint)	EA	126				
21	Laying of 8" O.D. GI/HDPE pipe for crossing small Nallas in the cable route.	M	400				
22	Charges for providing continuous steel barricade including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance. As per new specification.	M	4800				
23	Survey and submission of Ground penetration report for entire Route.	M	6300				
24	Charges for carrying out Route survey and identification of underground utilities of various civic agencies before/ during execution of scheme involving cable laying work. Route length will be considered for payment. Route length will be specifically verified by DGM.	M	25200				
25	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work up to plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	CUM	25				

26	Fabrication of MS structure as well as galvanized for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's etc, cable supporting structure including supply of nuts and bolts, consumables , welding electrode, hacksaw blades etc. excluding supply of steel.	MT	8				
27	Erection of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.	MT	7				
28	Painting of any M.S. Structure with one coat of Red oxide and two coats of AL. Paint ISI marked including supply of paint by contractor.	KG	8000				
29	Digging of earth pit up to depth of 10 ft. in-rocky/ semi rocky as per feasibility at site of embedding 600 x600mm earth plate with M.S Plate 50 x8 mm running the same through 3/4 " dia G.I. grouting pipe. Earth Plate to be covered by charcoal 200kg. And 100 Kg. Sodium chloride in the earth pit and refilling etc. NOTE: Charcoal, common salt, earth plate, G.I. Pipe, MS flat, Badarpur, Cement and bricks to be supplied by the contractor	EA	26				
30	Making of civil goomitties around GI earthpipe as per standard design of BSES. Supply of necessary bricks, cement, badarpur, sand, C1 cover of size 1'x1' and providing the same at the top of goomitties.	EA	26				
31	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	6				
32	Fixing of wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	86				
33	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand)	CUM	3.3				
34	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand)	Sqm	16				
35	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand)	Sqm	16				
36	Laying of MS flat in the excavated trench including risers, equipment earthing, overlapping of MS flat at the joints by twice of its width and welding of over lapping and cross joints including supply of electrodes, red oxide/bitumin compound , paint etc. and Laying of GI earth strip for equipment earthing, along the wall, trench, cable trays etc including fabrication of supports/cleats and fixing with wall bolts, welding works, painting of earth	M	416				

	strip and riser with red oxide paint/bitumin compound and final. For 50X6 Sq.mm.						
37	Erection of electrical equipment Including supply of T & P, all consumable items such as welding rods, hacksaw blades etc and minor modification in support structure for fixing as required. For 66 kV LA's with or without surge counter.	EA	6				
38	Erection of Number plate	EA	4				
39	Erection of Danger Plate	EA	4				
40	Erection of Phase Plate in Set of red Blue & Yellow	EA	4				
41	Dismantling of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)	KM	8.6				
42	Dismantling of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	MT	38				
43	Insulation resistance Test of Cable, After laying, before jointing and termination - Insulation resistance of each core shall be measured against all the other cores and the metal screen connected to earth. Necessary manpower to be provided by the vendor for preparations of the Cable End for testing purpose, Testing Equipment and manpower to be provided by the Vendor. After completion of testing Cable end to be sealed again.	EA	88				
44	VLF High Voltage test as per IEEE 400.2	LS	1				
45	VLF Tan Delta as per IEEE 400.2	LS	1				

46	VLF Partial Discharge as per IEEE 400.2	LS	1				
47	Sheath integrity test as per IEEE 400.2	LS	1				

PRICE FORMAT

SCHEME 2

Conversion of 66kV D/C O/H Line from 220 kV Mehraulli - Bijwasan - Palam by laying 04 Nos. 3Cx300sq.mm. XLPE cable from Vrindawan Greens Farms at NH-8 near Rajokari flyover to Bijwasan Grid substation Under PSDF Scheme

SUPPLY

S. No.	Item Description	UOM	Qty	Basic (Rs)	Freight (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	CBL,PWR,300MM2;3C;66KV;AL (OFC embedded)	M	14800					
2	JNT KIT HS ST 66KV 3C 300MM2 XLPE (including OFC kit)	EA	52					
3	KIT,TERM,HS O/D;66KV;3CX300MM2 (including OFC kit)	EA	8					
4	ARRSTR,ELEC,OUTDR ELEC;60KV;10KA	EA	12					
5	CLMP,PARRL GROV,ACSR GOAT CNDCTR	EA	18					
6	POLE,RAIL,MS,105LBS	MT	5.4					
7	INSLTR,DISC;CER;11KV;ANTIFOG TYP;120KN	EA	36					
8	CNDCTR,ACSR GOAT UNINSUL	M	300					
9	Single Tension bolted type Fitting for ACSR Goat	EA	6.0					
10	ANGLE,STRCTL,65MM;65MM;6MM;MS	MT	1.0					
11	CHNL,STRCTL,ISMC100;100MM;50mm;7.7mm	MT	7.0					
12	STRIP,MTLC,EARTHNG;50X6MM;MS GALVANIZED	KG	1000					
13	Fixing of Cable identification Tags	EA	860					
14	Supply of RCC Slab (550X675) as per the specification of BRPL	EA	9000					
15	Warning Tape	M	5400					

16	PI,SPL PUR, 225MM; HDPE; PE80PN6; ROLLING	M	6400					
17	RFID Electronic Passive Ball Marker 3M Make	EA	74					
18	RCC Coffin for joint as per the specification of BRPL	EA	52					
19	Cable Route Marker as per the specification of BRPL	EA	74					
20	Supply Cable Joint Marker as per the specification of BRPL	EA	13					
21	RFID Electronic Active Ball Marker 3M Make	EA	52					
22	wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115					

Erection, Testing & Commissioning

S. No.	Item Description	UOM	Qty	Basic (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	CUM	3870				
2	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BRPL design. For Dense carpeted bituminous road.	Cum	468				
3	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Dense carpeted bituminous road	EA	74				
4	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	CUM	1019.16				
5	Laying of underground cable in trench ,covering with RCC cable cover, covering with sand, Sand cushion will be min 75mm below and 75mm above the cable, fixing of cable identification tags (9" X 4") at every 30 Mtrs, Laying of warning tape above 250mm of the docket,	M	14800				

	refilling the trench and ramming the surface & removal of malba if any, including watch and ward till charging of cable (This activity includes only labour jobs) for 66 KV three core cable Running Mtr						
6	Fixing of Cable identification Tags	EA	860				
7	Sand for cable route as per BRPL specification	CUM	903				
8	Installation of RCC Cable Cover	EA	9000				
9	Installation of Warning Tape as per the Specification of BRPL	M	5400				
10	Laying of HDPE pipe of 225mm dia. of PN6 Class PE80 For crossing of roads by trenchless technology including required equipment, manpower & transport of equipment from one place to another.	M	4000				
11	Crossing of roads by trench-less technology by laying of HDPE pipe excluding supply of pipe. Laying by Pneumatic Jack Hammer Road Cutting. laying. 225 mm dia.	M	2200				
12	Installation of single 66KV STRAIGHT THROUGH JOINTING KITS 3X300 SQMM XLPE with OFC kit.	NOS	52				
13	Installations of single 66KV END TERMINATION KITS - OUTDOOR 3X300 SQMM XLPE, with OFC kit.	NOS	8				
14	Installation, testing and commissioning of RFID active Electronic ball markers (for 33kV and 66kV joint).	EA	52				
15	Installation, testing and commissioning of RFID passive Electronic ball markers (for 33kV and 66kV joint).	EA	74				
16	Laying of 8" O.D. GI/ HDPE pipe for crossing small Nallas in the cable route.	M	200				
17	Charges for providing continuous steel barricade including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance. As per new specification.	M	2700				
18	Survey and submission of Ground penetration report for entire Route.	M	3700				
19	Charges for carrying out Route survey and identification of underground utilities of various civic agencies before/ during execution of scheme involving cable laying work. Route length will be considered for payment. Route length will be specifically verified by DGM.	M	14800				
20	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work up to plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	CUM	5.00				
21	Fabrication of MS structure as well as galvanized for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's etc, cable supporting structure including supply of	MT	9.00				

	nuts and bolts, consumables , welding electrode, hacksaw blades etc. excluding supply of steel.						
22	Erection of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.	MT	8.00				
23	Painting of any M.S. Structure with one coat of Red oxide and two coats of AL. Paint ISI marked including supply of paint by contractor.	KG	9,000.00				
24	Digging of earth pit up to depth of 10 ft. in-rocky/ semi rocky as per feasibility at site of embedding 600 x600mm earth plate with M.S Plate 50 x8 mm running the same through 3/4 " dia G.I. grouting pipe. Earth Plate to be covered by charcoal 200kg. And 100 Kg. Sodium chloride in the earth pit and refilling etc. NOTE: Charcoal, common salt, earth plate, G.I. Pipe, MS flat, Badarpur, Cement and bricks to be supplied by the contractor	EA	28.00				
25	Making of civil goomitties around GI earthpipe as per standard design of BSES. Supply of necessary bricks, cement, badarpur, sand, C1 cover of size 1'x1' and providing the same at the top of goomitties.	EA	28.00				
26	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	4.00				
27	fixing of wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115.00				
28	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand)	CUM	4.40				
29	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand)	Sqm	21.00				
30	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand)	Sqm	21.00				
31	Laying of MS flat in the excavated trench including risers, equipment earthing, overlapping of MS flat at the joints by twice of its width and welding of overlapping and cross joints including supply of electrodes, red oxide/bitumin compound , paint etc. and Laying of GI earth strip for equipment earthing, along the wall, trench, cable trays etc including fabrication of supports/cleats and fixing with wall bolts, welding	M	416.00				

	works, painting of earth strip and riser with red oxide paint/bitumin compound and final. For 50X6 Sq.mm.						
32	Erection of 42' rails including digging, refilling, ramming of the foundation and including removal of malba, grouting with cement concrete mortar to 16 cft. of 1:3:6 ratios (1 cement, 3 Badarpur, 6 Stone blast-Cement, Sand and Mortar to be supplied by the contractor).including transportation of pole from stacking site within 1kms.Painting of Rail with one coat of primer & two coat of Al (Paint to be supplied by the contractor).Including brick padding.	EA	8.00				
33	Stringing of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)	KM	0.100				
34	Erection of electrical equipment Including supply of T & P, all consumable items such as welding rods, hacksaw blades etc and minor modification in support structure for fixing as required. For 66 kV LA's with or without surge counter	EA	12.00				
35	Erection of Number plate	EA	4				
36	Erection of Danger Plate	EA	4				
37	Erection of Phase Plate in Set of red Blue & Yellow	EA	4				
38	Dismantling of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single	KM	4				

	drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor, Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)						
39	Dismantling of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	MT	18				
40	VLF High Voltage test as per IEEE 400.2	LS	1				
41	VLF Tan Delta as per IEEE 400.2	LS	1				
42	VLF Partial Discharge as per IEEE 400.2	LS	1				
43	Sheath integrity test as per IEEE 400.2	LS	1				

PRICE FORMAT

SCHEME 3

Conversion of 66 kV D/C O/H NJF - BODELA-2 ckt 1&2 Tower line by laying of 3Cx300 sq.mm. XLPE Cables (4 nos cable) from Gantry structure (inside crematorium) to Budela -2 Grid on Nala Road having Route length-9000 M

SUPPLY

S. No	Item Description	UOM	Qty	Basic (Rs)	Freight (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	CBL,PWR,300MM2;3C;66KV;AL	M	36000					
2	JNT KIT HS ST 66KV 3C 300MM2 XLPE	EA	124					
3	KIT,TERM,HS O/D;66KV;3CX300MM2	EA	4					
4	ARRSTR,ELEC,OUTDR ELEC;60KV;10KA	EA	6					
5	CHNL,STRCTL,ISMC100;100MM;50mm;7.7m m	MT	2.0					
6	STRIP,MTLC,EARTHNG;50X6MM;MS GALVANIZED	KG	500					
7	Cable identification Tags	EA	2000					
8	RCC Slab (550X675) as per the specification of BRPL	EA	21000					
9	Warning Tape	M	12600					
10	PI,SPL PUR, 225MM; HDPE; PE80PN6; ROLLING	M	16400					
11	RFID Electronic Passive Ball Marker 3M Make	EA	180					
12	RFID Electronic Active Ball Marker 3M Make	EA	124					
13	RCC Coffin for joint as per the specification of BRPL	EA	124					
14	Cable Route Marker as per the specification of BRPL	EA	180					
15	Cable Joint Marker as per the specification of BRPL	EA	31					

Erection, Testing & Commissioning

S. No.	Item Description	UOM	Qty	Basic (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	CUM	9000				
2	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BYPL/BRPL design. For Dense carpeted bituminous road.	Cum	1116				
3	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Dense carpeted bituminous road	EA	180				
4	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	CUM	2371.04				
5	Laying of underground cable in trench ,covering with RCC cable cover, covering with sand ,Sand cushion will be min 75mm below and 75mm above the cable, fixing of cable identification tags (9" X 4") at every 30 Mtrs, Laying of warning tape above 250mm of the docket, refilling the trench and ramming the surface & removal of malba if any, including watch and ward till charging of cable (This activity includes only labour jobs) for 66 KV three core cable Running Mtr	M	36000				
6	Fixing of Cable identification Tags	EA	2000				
7	Providing/supply Sand for cable route as per BRPL specification	CUM	2100				
8	Installation of RCC Cable Cover	EA	21000				
9	Installation of Warning Tape as per the Specification of BRPL	M	12600				
10	Laying of HDPE pipe of 225mm dia. of PN6 Class PE80 For crossing of roads by trenchless technology including required equipment, manpower & transport of equipment from one place to another.	M	10800				
11	Crossing of roads by trench-less technology by laying of HDPE pipe excluding supply of pipe .Laying by Pneumatic Jack Hammer Road Cutting.laying . 225 mm dia.	M	5200				
12	Installation of single 66KV STRAIGHT THROUGH JOINTING KITS 3X300 SQMM XLPE with OFC kit	NOS	124				

13	Installation of single 66KV END TERMINATION KITS - OUTDOOR 3X300 SQMM XLPE, with OFC kit	NOS	4				
14	Installation, testing and commissioning of RFID active Electronic ball markers (for 33kV and 66kV joint)	EA	124				
15	Installation, testing and commissioning of RFID passive Electronic ball markers (for 33kV and 66kV joint)	EA	180				
16	Laying of 8" O.D. GI/HDPE pipe for crossing small Nallas in the cable route.	M	400				
17	Charges for providing continuous steel barricade including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance. As per new specification.	M	6300				
18	Survey and submission of Ground penetration report for entire Route.	M	9000				
19	Charges for carrying out Route survey and identification of underground utilities of various civic agencies before/ during execution of scheme involving cable laying work. Route length will be considered for payment. Route length will be specifically verified by DGM.	M	36000				
20	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work up to plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	CUM	5.00				
21	Fabrication of MS structure as well as galvanized for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's etc, cable supporting structure including supply of nuts and bolts, consumables , welding electrode, hacksaw blades etc. excluding supply of steel.	MT	2.00				
22	Erection of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.	MT	2.00				
23	Painting of any M.S. Structure with one coat of Red oxide and two coats of AL. Paint ISI marked including supply of paint by contractor.	KG	2,000.00				
24	Digging of earth pit up to depth of 10 ft. in-rocky/ semi rocky as per feasibility at site of embedding 600 x600mm earth plate with M.S Plate 50 x8 mm running the same through 3/4 " dia G.I. grouting pipe. Earth Plate to be covered by charcoal 200kg. And 100 Kg. Sodium chloride in the earth pit and refilling etc. NOTE: Charcoal, common salt, earth plate, G.I. Pipe, MS flat, Badarpur, Cement and bricks to be supplied by the contractor	EA	8.00				
25	Making of civil goomitties around GI earthpipe as per standard design of BSES. Supply of necessary	EA	8.00				

	bricks, cement, badarpur, sand, C1 cover of size 1'x1' and providing the same at the top of goomitties.						
26	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	2.00				
27	Laying of MS flat in the excavated trench including risers, equipment earthing, overlapping of MS flat at the joints by twice of its width and welding of over lapping and cross joints including supply of electrodes, red oxide/bitumin compound, paint etc. and Laying of GI earth strip for equipment earthing, along the wall, trench, cable trays etc including fabrication of supports/cleats and fixing with wall bolts, welding works, painting of earth strip and riser with red oxide paint/bitumin compound and final. For 50X6 Sq.mm.	M	208.00				
28	Erection of electrical equipment Including supply of T & P, all consumable items such as welding rods, hacksaw blades etc and minor modification in support structure for fixing as required. For 66 kV LA's with or without surge counter.	EA	6.00				
29	Erection of Number plate	EA	2				
30	Erection of Danger Plate	EA	2				
31	Erection of Phase Plate in Set of red Blue & Yellow	EA	2				
32	Dismantling of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor, Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)	KM	10				

33	Dismantling of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	MT	44				
34	VLF High Voltage test as per IEEE 400.2	LS	1				
35	VLF Tan Delta as per IEEE 400.2	LS	1				
36	VLF Partial Discharge as per IEEE 400.2	LS	1				
37	Sheath integrity test as per IEEE 400.2	LS	1				

PRICE FORMAT

SCHEME 4

Partial conversion of 66 kV D/C O/H NJF - Nagloi & NILOTHI – Nagloi Ckt Tower line by laying of 3Cx300 sq.mm. XLPE Cables (4 nos cable) from 66 KV Nagloi Grid to Tower no 37 at Nilothe more having Route length-7000 M

SUPPLY

S. No.	Item Description	UOM	Qty	Basic (Rs)	Freight (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	CBL,PWR,300MM2;3C;66KV;AL (OFC embedded)	M	28000					
2	JNT KIT HS ST 66KV 3C 300MM2 XLPE (including OFC kit)	EA	96					
3	KIT,TERM,HS O/D;66KV;3CX300MM2 (including OFC kit)	EA	8					
4	ARRSTR,ELEC,OUTDR ELEC;60KV;10KA	EA	12					
5	CLMP,PARRL GROV,ACSR GOAT CNDCTR	EA	18					
6	66 kV D/C Monopole PD (0-90deg) with BXA@20m,span of 200m for ACSR Goat Conductor, Suitable for Mounting of 1CX1000 SQMM XLPE Cable with arrangement of Installation of 66 kV Lightning Arrester.	EA	1					
7	INSLTR,DISC;CER;11KV;ANTIFOG TYP;120KN	EA	72					
8	Single Tension compression Fitting for A	EA	36					
9	PLT,MTLC,RECTANGULAR;AL;NUMBER	NOS	8					
10	PLT,MTLC,RECTANGULAR;AL;PHASE R Y B	NOS	8					
11	KIT,JOINTING,TRM;66KV;1X1000MM2;HS;OD;RY	NOS	24					
12	CBL,PWR,1000MM2;1C;66KV;AL	M	1500					
13	POLE,RAIL,MS,105LBS	MT	5.4					
14	CNDCTR,ACSR GOAT UNINSUL	M	300					

15	Single Tension bolted type Fitting for ACSR Goat	EA	6					
16	ANGLE,STRCTL,65MM;65MM;6MM;MS	MT	1					
17	CHNL,STRCTL,ISMC100;100MM;50mm;7.7mm	MT	7					
18	STRIP,MTLC,EARTHNG;50X6MM;MS GALVANIZED	KG	1000					
19	Cable identification Tags	EA	1640					
20	RCC Slab (550X675) as per the specification of BRPL	EA	16666					
21	Warning Tape	M	10000					
22	PI,SPL PUR,225MM;HDPE;PE80PN6;ROLLING	M	12000					
23	RFID Electronic Passive Ball Marker 3M Make	EA	140					
24	RFID Electronic Active Ball Marker 3M Make	EA	96					
25	RCC Coffin for joint as per the specification of BRPL	EA	96					
26	Cable Route Marker as per the specification of BRPL	EA	140					
27	Cable Joint Marker as per the specification of BRPL	EA	24					
28	Wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115					

Erection, Testing & Commissioning

S. No.	Item Description	UOM	Qty	Basic (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	CUM	7380.00				

2	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BRPL design. For Dense carpeted bituminous road.	Cum	864.00				
3	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Dense carpeted bituminous road	EA	140.00				
4	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	CUM	1915.00				
5	Laying of underground cable in trench ,covering with RCC cable cover, covering with sand ,Sand cushion will be min 75mm below and 75mm above the cable, fixing of cable identification tags (9" X 4") at every 30 Mtrs, Laying of warning tape above 250mm of the docket, refilling the trench and ramming the surface & removal of malba if any, including watch and ward till charging of cable (This activity includes only labour jobs) for 66 KV three core cable Running Mtr	M	28000.00				
6	Fixing of Cable identification Tags	EA	1640.00				
7	providing/supply Sand for cable route as per BRPL specification	CUM	1722.00				
8	Installation of RCC Cable Cover	EA	16666.00				
9	Installation of Warning Tape as per the Specification of BRPL.	M	10000.00				
10	Laying of HDPE pipe of 225mm dia. of PN6 Class PE80 For crossing of roads by trenchless technology including required equipment, manpower & transport of equipment from one place to another.	M	8000.00				
11	Crossing of roads by trench-less technology by laying of HDPE pipe excluding supply of pipe .Laying by Pneumatic Jack Hammer Road Cutting. laying. 225 mm dia.	M	3600.00				
12	Installation of single 66KV STRAIGHT THROUGH JOINTING KITS 3X300 SQMM XLPE with OFC kit	NOS	96.00				
13	Installation of single 66KV END TERMINATION KITS - OUTDOOR 3X300 SQMM XLPE, with OFC kit	NOS	8.00				
14	Installation, testing and commissioning of RFID active Electronic ball markers (for 33kV and 66kV joint)	EA	96.00				
15	Installation, testing and commissioning of RFID passive Electronic ball markers (for 33kV and 66kV joint)	EA	140.00				
16	Laying of 8" O.D. GI/HDPE pipe for crossing small Nallas in the cable route.	M	400.00				
17	Charges for providing continuous steel barricade including cost of all material plant consumables	M	5000.00				

	transport and labour for shifting placing painting and regular maintenance. As per new specification.						
18	Survey and submission of Ground penetration report for entire Route.	M	7000.00				
19	Charges for carrying out Route survey and identification of underground utilities of various civic agencies before/ during execution of scheme involving cable laying work. Route length will be considered for payment. Route length will be specifically verified by DGM.	M	28000.00				
20	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work up to plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	CUM	5.00				
21	Fabrication of MS structure as well as galvanized for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's etc, cable supporting structure including supply of nuts and bolts, consumables , welding electrode, hacksaw blades etc. excluding supply of steel.	MT	9.00				
22	Erection of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.	MT	8.00				
23	Painting of any M.S. Structure with one coat of Red oxide and two coats of AL. Paint ISI marked including supply of paint by contractor.	KG	9000.00				
24	Digging of earth pit up to depth of 10 ft. in-rocky/ semi rocky as per feasibility at site of embedding 600x600mm earth plate with M.S Plate 50x8 mm running the same through 3/4 " dia G.I. grouting pipe. Earth Plate to be covered by charcoal 200kg. And 100 Kg. Sodium chloride in the earth pit and refilling etc. NOTE: Charcoal, common salt, earth plate, G.I. Pipe, MS flat, Badarpur, Cement and bricks to be supplied by the contractor	EA	28.00				
25	Making of civil goomitties around GI earthpipe as per standard design of BSES. Supply of necessary bricks, cement, badarpur, sand, C1 cover of size 1'x1' and providing the same at the top of goomitties.	EA	28.00				
26	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	4.00				
27	Fixing of wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115.00				

28	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand)	CUM	4.40				
29	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand)	Sqm	21.00				
30	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand)	Sqm	21.00				
31	Laying of MS flat in the excavated trench including risers, equipment earthing, overlapping of MS flat at the joints by twice of its width and welding of overlapping and cross joints including supply of electrodes, red oxide/bitumin compound , paint etc. and Laying of GI earth strip for equipment earthing, along the wall, trench, cable trays etc including fabrication of supports/cleats and fixing with wall bolts, welding works, painting of earth strip and riser with red oxide paint/bitumin compound and final. For 50X6 Sq.mm.	M	416.00				
32	Civil Foundation of 66 kV D/C Monopole PD (0-90deg) with BXA@20m,span of 200m for ACSR Goat Conductor, Suitable for Mounting of 1CX1000 SQMM XLPE Cable with arrangement of Installation of 66 kV Lightning Arrester.	EA	1.00				
33	Erection of 66 kV D/C Monopole PD (0-90deg) with BXA@20m,span of 200m for ACSR Goat Conductor, Suitable for Mounting of 1CX1000 SQMM XLPE Cable with arrangement of Installation of 66 kV Lightning Arrester.	EA	1.00				
34	Design Validation of Monopole from IIT.	EA	1.00				
35	Soil Investigation charges	EA	1.00				
36	Erection of 42' rails including digging , refilling, ramming of the foundation and including removal of malba ,grouting with cement concrete mortar to 16 cft. of 1:3:6 ratios (1 cement, 3 Badarpur, 6 Stone blast-Cement, Sand and Mortar to be supplied by the contractor).including transportation of pole from stacking site within 1kms.Painting of Rail with one coat of primer & two coat of Al (Paint to be supplied by the contractor).Including brick padding.	EA	8.00				
37	Stringing of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single	KM	0.10				

	Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)						
38	Erection of electrical equipment Including supply of T & P, all consumable items such as welding rods, hacksaw blades etc and minor modification in support structure for fixing as required. For 66 kV LA's with or without surge counter	EA	12.00				
39	Erection of Number plate	EA	4.00				
40	Erection of Danger Plate	EA	4.00				
41	Erection of Phase Plate in Set of red Blue & Yellow	EA	4.00				
42	Dismantling of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)	KM	6.40				
43	Dismantling of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	MT	12.00				
44	VLF High Voltage test as per IEEE 400.2	LS	1.00				

45	VLF Tan Delta as per IEEE 400.2	LS	1.00				
46	VLF Partial Discharge as per IEEE 400.2	LS	1.00				
47	Sheath integrity test as per IEEE 400.2	LS	1.00				

PRICE FORMAT

SCHEME 5

Partial conversion of 66 kV D/C O/H NJF - NWW & NILOTHI - NWW Ckt Tower line by laying of 3Cx300 sq.mm. XLPE Cables (4 nos cable) from 66 KV Nagloi water works Grid to Tower no 37 at Nilothi more having Route length-3000 M

SUPPLY

S. No.	Item Description	UOM	Qty	Basic (Rs)	Freight (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	CBL,PWR,300MM2;3C;66KV;AL (OFC embedded)	M	12000					
2	JNT KIT HS ST 66KV 3C 300MM2 XLPE (including OFC kit)	EA	40					
3	KIT,TERM,HS O/D;66KV;3CX300MM2 (including OFC kit)	EA	8					
4	ARRSTR,ELEC,OUTDR ELEC;60KV;10KA	EA	12					
5	CLMP,PARRL GROV,ACSR GOAT CNDCTR	EA	18.00					
6	POLE,RAIL,MS,105LBS	MT	5.4					
7	INSLTR,DISC;CER;11KV;ANTIFOG TYP;120KN	EA	36					
8	CNDCTR,ACSR GOAT UNINSUL	M	300					
9	Single Tension bolted type Fitting for ACSR Goat	EA	6.0					
10	ANGLE,STRCTL,65MM;65MM;6MM;MS	MT	1.0					
11	CHNL,STRCTL,ISMC100;100MM;50mm;7.7mm	MT	7.0					
12	STRIP,MTLC,EARTHNG;50X6MM;MS GALVANIZED	KG	1000.00					
13	Fixing of Cable identification Tags	EA	660					
14	RCC Slab (550X675) as per the specification of BRPL	EA	7166					

15	Warning Tape	M	4300					
16	PI,SPL PUR, 225MM; HDPE; PE80PN6; ROLLING	M	5600					
17	RFID Electronic Passive Ball Marker 3M Make	EA	60					
18	RFID Electronic Active Ball Marker 3M Make	EA	40					
19	RCC Coffin for joint as per the specification of BRPL	EA	40					
20	Cable Route Marker as per the specification of BRPL	EA	60					
21	wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115					
22	Cable Joint Marker as per the specification of BRPL	EA	10					

Erection, Testing & Commissioning

S. No.	Item Description	UOM	Qty	Basic (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	CUM	2970.00				
2	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BYPL/BRPL design. For Dense carpeted bituminous road.	Cum	360.00				
3	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Dense carpeted bituminous road	EA	30.00				
4	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	CUM	799.00				
5	Laying of underground cable in trench ,covering with RCC cable cover, covering with sand ,Sand cushion will be min 75mm below and 75mm above the cable, fixing of cable identification tags (9" X 4") at every 30 Mtrs,	M	12000.00				

	Laying of warning tape above 250mm of the docket, refilling the trench and ramming the surface & removal of malba if any, including watch and ward till charging of cable (This activity includes only labour jobs) for 66 KV three core cable Running Mtr						
6	Fixing of Cable identification Tags	EA	660.00				
7	providing/supply Sand for cable route as per BRPL specification	CUM	693.00				
8	Installation of RCC Cable Cover	EA	7166.00				
9	Installation of Warning Tape as per the Specification of BRPL	M	4300.00				
10	Laying of HDPE pipe of 225mm dia. of PN6 Class PE80 For crossing of roads by trenchless technology including required equipment, manpower & transport of equipment from one place to another.	M	3400.00				
11	Crossing of roads by trench-less technology by laying of HDPE pipe excluding supply of pipe .Laying by Pneumatic Jack Hammer Road Cutting. laying . 225 mm dia.	M	2000.00				
12	Installation of single 66KV STRAIGHT THROUGH JOINTING KITS 3X300 SQMM XLPE with OFC kit	NOS	40.00				
13	Installation of single 66KV END TERMINATION KITS - OUTDOOR 3X300 SQMM XLPE, with OFC kit	NOS	8.00				
14	Installation, testing and commissioning of RFID active Electronic ball markers (for 33kV and 66kV joint)	EA	40.00				
15	Installation, testing and commissioning of RFID passive Electronic ball markers (for 33kV and 66kV joint)	EA	60.00				
16	Laying of 8" O.D. GI/HDPE pipe for crossing small Nallas in the cable route.	M	200.00				
17	Charges for providing continuous steel barricade including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance. As per new specification.	M	2150.00				
18	Survey and submission of Ground penetration report for entire Route.	M	3000.00				
19	Charges for carrying out Route survey and identification of underground utilities of various civic agencies before/ during execution of scheme involving cable laying work. Route length will be considered for payment. Route length will be specifically verified by DGM.	M	12000.00				
20	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work up to plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	CUM	5.00				

21	Fabrication of MS structure as well as galvanized for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's etc, cable supporting structure including supply of nuts and bolts, consumables , welding electrode, hacksaw blades etc. excluding supply of steel.	MT	9.00				
22	Erection of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.	MT	8.00				
23	Painting of any M.S. Structure with one coat of Red oxide and two coats of AL. Paint ISI marked including supply of paint by contractor.	KG	9000.00				
24	Digging of earth pit up to depth of 10 ft. in-rocky/ semi rocky as per feasibility at site of embedding 600 x600mm earth plate with M.S Plate 50 x8 mm running the same through 3/4 " dia G.I. grouting pipe. Earth Plate to be covered by charcoal 200kg. And 100 Kg. Sodium chloride in the earth pit and refilling etc. NOTE: Charcoal, common salt, earth plate, G.I. Pipe, MS flat, Badarpur, Cement and bricks to be supplied by the contractor	EA	28.00				
25	Making of civil goomitties around GI earthpipe as per standard design of BSES. Supply of necessary bricks, cement, badarpur, sand, C1 cover of size 1'x1' and providing the same at the top of goomitties.	EA	28.00				
26	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	4.00				
27	Fixing of wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc. complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115.00				
28	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand)	CUM	4.40				
29	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand)	Sqm	21.00				
30	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand)	Sqm	21.00				
31	Laying of MS flat in the excavated trench including risers, equipment earthing, overlapping of MS flat at the joints by twice of its width and welding of overlapping and cross joints including supply of electrodes, red oxide/bitumin compound , paint etc. and Laying of GI earth strip for equipment earthing, along the wall, trench, cable trays etc including fabrication of	M	416.00				

	supports/cleats and fixing with wall bolts, welding works, painting of earth strip and riser with red oxide paint/bitumin compound and final. For 50X6 Sq.mm.						
32	Erection of 42' rails including digging, refilling, ramming of the foundation and including removal of malba ,grouting with cement concrete mortar to 16 cft. of 1:3:6 ratios (1 cement, 3 Badarpur, 6 Stone blast-Cement, Sand and Mortar to be supplied by the contractor).including transportation of pole from stacking site within 1kms.Painting of Rail with one coat of primer & two coat of Al (Paint to be supplied by the contractor).Including brick padding.	EA	8.00				
33	Stringing of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)	KM	0.10				
34	Erection of electrical equipment Including supply of T & P, all consumable items such as welding rods, hacksaw blades etc and minor modification in support structure for fixing as required. For 66 kV LA's with or without surge counter	EA	12.00				
35	Erection of Number plate	EA	4.00				
36	Erection of Danger Plate	EA	4.00				
37	Erection of Phase Plate in Set of red Blue & Yellow	EA	4.00				
38	Dismantling of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single	KM	1.20				

	Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)						
39	Dismantling of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	MT	12.00				
40	VLF High Voltage test as per IEEE 400.2	LS	1.00				
41	VLF Tan Delta as per IEEE 400.2	LS	1.00				
42	VLF Partial Discharge as per IEEE 400.2	LS	1.00				
43	Sheath integrity test as per IEEE 400.2	LS	1.00				

PRICE FORMAT

SCHEME 6

Partial conversion of 66 kV D/C O/H NJF - NWW & NILOTHI - NWW Ckt Tower line by laying of 3Cx300 sq.mm. XLPE Cables (4 nos cable) from 66 KV Nagloi water works Grid to Tower no 37 at Nilothi more having Route length-3000 M

SUPPLY

S. No.	Item Description	UOM	Qty	Basic (Rs)	Freight (Rs)	GST (Rs)	Unit Lande d (Rs)	Total Landed Cost (Rs)
1	CBL,PWR,300MM2;3C;66KV;AL (OFC embedded)	M	22000					
2	JNT KIT HS ST 66KV 3C 300MM2 XLPE (including OFC kit)	EA	80					
3	KIT,TERM,HS O/D;66KV;3CX300MM2 (including OFC kit)	EA	8					
4	ARRSTR,ELEC,OUTDR ELEC;60KV;10KA	EA	12					
5	CLMP,PARRL GROV,ACSR GOAT CNDCTR	EA	18					
6	POLE,RAIL,MS,105LBS	MT	5.4					
7	INSLTR,DISC;CER;11KV;ANTIFOG TYP;120KN	EA	36					
8	CNDCTR,ACSR GOAT UNINSUL	M	300					
9	Single Tension bolted type Fitting for ACSR Goat	EA	6.0					
10	ANGLE,STRCTL,65MM;65MM;6MM;MS	MT	1.0					
11	CHNL,STRCTL,ISMC100;100MM;50mm;7.7mm	MT	7.0					
12	STRIP,MTLC,EARTHNG;50X6MM;MS GALVANIZED	KG	1000.00					
13	Fixing of Cable identification Tags	EA	1240					
14	RCC Slab (550X675) as per the specification of BRPL	EA	12833					
15	Warning Tape	M	7700					

16	PI,SPL PUR, 225MM; HDPE; PE80PN6; ROLLING	M	10000					
17	RFID Electronic Passive Ball Marker 3M Make	EA	110					
18	RCC Coffin for joint as per the specification of BRPL	EA	80					
19	Cable Route Marker as per the specification of BRPL	EA	110					
20	Cable Joint Marker as per the specification of BRPL	EA	20					
21	wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115					
22	RFID Electronic Active Ball Marker 3M Make	EA	80					

Erection, Testing & Commissioning

S. No.	Item Description	UOM	Qty	Basic (Rs)	GST (Rs)	Unit Landed (Rs)	Total Landed Cost (Rs)
1	Digging of cable trench as per specification and drawings. Rate is inclusive of digging and backfilling. Measurement shall be as per actual depth excavated. For Dense Carpeted bituminous Road.	CUM	5580				
2	Digging of joint pit suitable for 33/66 KV cable joint box and covering the joint box with sand and providing protection as per BRPL design. For Dense carpeted bituminous road.	Cum	720				
3	Digging of test pits of required size (not less than 1/2 Mtr. Wide at site for identification of cable route). Relevant volume shall be deducted from quantities of same item of cable digging For Dense carpeted bituminous road	EA	110				
4	Removal of Malba including Loading / Unloading on own vehicle. The payment shall be restricted to the quantity of sand laid.	CUM	1466				
5	Laying of underground cable in trench ,covering with RCC cable cover, covering with sand ,Sand cushion will be min 75mm below and 75mm above the cable, fixing of cable identification tags (9" X 4") at every 30 Mtrs, Laying of warning tape above 250mm of the docket, refilling the trench and ramming the surface & removal of malba if any, including watch and ward till charging	M	22000				

	of cable (This activity includes only labour jobs) for 66 KV three core cable Running Mtr						
6	Fixing of Cable identification Tags	EA	1240				
7	Sand for cable route as per BRPL specification	CUM	1302				
8	Installation of RCC Cable Cover	EA	12833				
9	Installation of Warning Tape as per the Specification of BRPL	M	7700				
10	Laying of HDPE pipe of 225mm dia. of PN6 Class PE80 For crossing of roads by trenchless technology including required equipment, manpower & transport of equipment from one place to another.	M	6600				
11	Crossing of roads by trench-less technology by laying of HDPE pipe excluding supply of pipe .Laying by Pneumatic Jack Hammer Road Cutting. laying . 225 mm dia.	M	3000				
12	Installation of single 66KV STRAIGHT THROUGH JOINTING KITS 3X300 SQMM XLPE with OFC kit	NOS	80				
13	Installation of single 66KV END TERMINATION KITS - OUTDOOR 3X300 SQMM XLPE, with OFC kit	NOS	8				
14	Installation, testing and commissioning of RFID active Electronic ball markers (for 33kV and 66kV joint)	EA	80				
15	Installation, testing and commissioning of RFID passive Electronic ball markers (for 33kV and 66kV joint)	EA	110				
16	Laying of 8" O.D. GI/HDPE pipe for crossing small Nallas in the cable route.	M	400				
17	Charges for providing continuous steel barricade including cost of all material plant consumables transport and labour for shifting placing painting and regular maintenance. As per new specification.	M	3850				
18	Survey and submission of Ground penetration report for entire Route.	M	5500				
19	Charges for carrying out Route survey and identification of underground utilities of various civic agencies before/ during execution of scheme involving cable laying work. Route length will be considered for payment. Route length will be specifically verified by DGM.	M	22000				
20	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of shuttering, centring, finishing and reinforcement-All work up to plinth level : 1:2:4 (1cement :2 coarse sand :4 graded stone agg.20mm nominal size.)	CUM	5				
21	Fabrication of MS structure as well as galvanized for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's etc, cable supporting structure including supply of	MT	9				

	nuts and bolts, consumables , welding electrode, hacksaw blades etc. excluding supply of steel.						
22	Erection of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry structure , Tower Structure i/c consumables , welding electrode ,tack welding & hacksaw blades etc.	MT	8				
23	Painting of any M.S. Structure with one coat of Red oxide and two coats of AL. Paint ISI marked including supply of paint by contractor.	KG	9000				
24	Digging of earth pit up to depth of 10 ft. in-rocky/ semi rocky as per feasibility at site of embedding 600 x600mm earth plate with M.S Plate 50 x8 mm running the same through 3/4 " dia G.I. grouting pipe. Earth Plate to be covered by charcoal 200kg. And 100 Kg. Sodium chloride in the earth pit and refilling etc. NOTE: Charcoal, common salt, earth plate, G.I. Pipe, MS flat, Badarpur, Cement and bricks to be supplied by the contractor	EA	28				
25	Making of civil goomitties around GI earthpipe as per standard design of BSES. Supply of necessary bricks, cement, badarpur, sand, C1 cover of size 1'x1' and providing the same at the top of goomitties.	EA	28				
26	Grouting of cable mounting structure with cement concrete having ratio 1:3:6 including fixing with gantry structure. Badarpur, cement and stone ballast shall be supplied by contractor. Suitable for mounting 33/66 KV cable.	EA	4				
27	Fixing of wire mesh fencing 2.65 mtr height with gate frame of 3 mtr x 2.5 mtr with complete material e.g. angle, chain link, wire mesh and civil material etc. complete as per specification, drawing no. Angle iron size 50x50x6 mm & MS strip 50 x 3 mm wire mesh 1"x3", 8 SWG wire to be used for wire-mesh with providing support at 1.25 distance.	SQM	115				
28	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in cement mortar 1 : 6 (1 cement : 6 coarse sand)	CUM	4.4				
29	12 mm cement plaster of mix 1:4 (1 cement : 4 fine sand)	Sqm	21				
30	15 mm cement plaster on rough side of single or half brick wall of mix 1:4 (1 cement : 4 fine sand)	Sqm	21				
31	Laying of MS flat in the excavated trench including risers, equipment earthing, overlapping of MS flat at the joints by twice of its width and welding of overlapping and cross joints including supply of electrodes, red oxide/bitumin compound , paint etc. and Laying of GI earth strip for equipment earthing, along the wall, trench, cable trays etc including fabrication of supports/cleats and fixing with wall bolts, welding	M	416				

	works, painting of earth strip and riser with red oxide paint/bitumin compound and final. For 50X6 Sq.mm.						
32	Erection of 42' rails including digging, refilling, ramming of the foundation and including removal of malba ,grouting with cement concrete mortar to 16 cft. of 1:3:6 ratios (1 cement, 3 Badarpur, 6 Stone blast-Cement, Sand and Mortar to be supplied by the contractor).including transportation of pole from stacking site within 1kms.Painting of Rail with one coat of primer & two coat of Al (Paint to be supplied by the contractor).Including brick padding.	EA	8				
33	Stringing of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)	KM	0.1				
34	Erection of electrical equipment Including supply of T & P, all consumable items such as welding rods, hacksaw blades etc and minor modification in support structure for fixing as required. For 66 kV LA's with or without surge counter	EA	12				
35	Erection of Number plate	EA	4				
36	Erection of Danger Plate	EA	4				
37	Erection of Phase Plate in Set of red Blue & Yellow	EA	4				
38	Dismantling of ACSR GOAT Conductor , Earthwire, Insulator & Hardware Fittings i.e. Single Tension String Insulator fittings with single tension clamp for single GOAT conductor ,Single Tension String Insulator fittings with double tension clamp for twin GOAT conductor, Double Tension String Insulator fittings with single tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with single	KM	6				

	drop/tension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double drop/tension clamp for twin GOAT conductor, Single Suspension String Insulator fittings with single suspension clamp for single GOAT conductor, Single Suspension String Insulator fittings with double suspension clamp for twin GOAT conductor ,Bolted type 'T' Connector suitable for single GOAT conductor, Vibration Damper for GOAT Conductor, Repair Sleeve for GOAT, Mid span compression joint for ACSR GOAT, Rigid Type Spacers for twin GOAT PER CIRCUIT INCLUDING EARTH WIRE(PER CIRCUIT MEANS 3 CONDUCTORS AND ONE EARTH WIRE INCLUDING HARDWARE FITTINGS AND ACCESSORIES)						
39	Dismantling of MS as well as galvanized structure for different equipment like isolator, C.T.'s, P.T.'s, CVT, LA's , ISO etc, cable supporting structure, 33kV/66 kV GI gantry and tower structure including consumables , welding electrode & hacksaw blades etc.	MT	12				
40	VLF High Voltage test as per IEEE 400.2	LS	1				
41	VLF Tan Delta as per IEEE 400.2	LS	1				
42	VLF Partial Discharge as per IEEE 400.2	LS	1				
43	Sheath integrity test as per IEEE 400.2	LS	1				

ANNEXURE-II

TECHNICAL SPECIFICATIONS

CONSOLIDATED TECHNICAL REQUIREMENT

FOR

SUPPLY, ERECTION, TESTING & COMMISSIONING

OF

66kV CABLE LAYING WORK (IN-FEED)

Date	Revision	Pages
07.08.2025	R0	17

CONSOLIDATED TECHNICAL REQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)**Index**

S. No	Title	Page no
1.00.00	GLOSSARY LIST	3
2.00.00	GENERAL DESIGN CRITERIA	4
3.00.00	PACKAGE	9
3.01.00	<u>Project:</u> Scheme no-1: Conversion of 66kV D/C overhead Line from 220kV Mehraulli -Bijwasan-Palam by laying 04 Nos. 3Cx300sq.mm. XLPE cable from Vrindavan Greens Farms at NH-8 near Rajokari flyover to Bijwasan Grid substation (6300 M Scheme no-2: Partial conversion of 66kV D/C overhead NJF - Jafarpur ckt 1&2 Tower line by laying of 3Cx300mm2 XLPE Cables (4 nos cable) from 220kV Najafgarh Grid to Tower no 16 having Route length-3700 M Scheme no-3: Conversion of 66 kV D/C overhead NJF - Bodela-2 ckt 1&2 Tower line by laying of 3Cx300mm2 XLPE Cables (4 nos cable) from Gantry structure (inside crematorium) to Bodella -2 Grid on Nala Road having Route length-9000 M Scheme no-4: Conversion of Accessible O/H feeder into U/G by laying of 3x300 sq mm XLPE cable of 66 KV feeder Najafgarh - Nangloi and 66 KV feeder Nilothi – Nangloi ckts from tower no 37 to Nangloi Grid(7000 M) Scheme no-5: Conversion of Accessible O/H feeder into U/G by laying of 3x300 sq mm XLPE cable of 66 KV feeder Najafgarh - Nangloi WW and 66 KV feeder Nilothi - Nangloiwwckts from tower no 37 to Nangloi WW Grid(3000 M) Scheme no-6: Partial conversion of 66 kV D/C Overhead NJF - Nagloi / Nagloi WW Tower line by laying of 3Cx300mm2 XLPE Cables (4 nos cable) from T-18 to T-37 Nilothi more having Route length-5500 M.	
4.00.00	TECHNICAL SPECIFICATION	9
1.	Laying of 66kV / 33kV / 11kV / 1.1 kV grade PVC / XLPE cables	
2.	66 kV 3 Core cable (66kV 3CX300 sqmm cable)	
3.	66kV / 33kV /11kV Jointing Kit	
4.	66kV / 33kV /11kV Termination Kit	

CONSOLIDATED TECHNICAL REQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

5	33kV and 66kV LA- not provided/not required	
6	ACSR Conductors- not provided/not required	
7	RFID Active and Passive Markers	
8	Chemical Earthing- not provided/not required	
9	GI and Earthing pipe, GI strip	
10	C wedge Connectors- not provided/not required	
11	PPE Items	
12	1.1kV Power and Control cable- not provided/not required	
13	HDPE pipe	
14	Hardware RCC items & Steel items	
15	48 Fibre OFC cable	
5.00.00	SCHEDULES	9
Schedule-I	Deviation from Specification	
Schedule-II	Make of Major items	
6.00.00	Infeed route map, SLD and Layout	12

1.00.00 GLOSSARY LIST

S. No.	Abbreviation	Description
1	F.O. R.	Freight On Road
2	CT	Current Transformer
3	PT	Potential Transformer
4	kV	Kilo Volts
5	MVAR	Mega Volt Amperes Reactive
6	MVA	Mega Volt Amperes
7	kVA	Kilo Volt Amperes
8	O&M	Operation and Maintenance
9	LOA	Letter of Award
10	FO	Fiber Optic
11	MCD	Municipal Corporation of Delhi
12	DDA	Delhi Development Authority
13	PWD	Public Works Department
14	U/G	Underground
15	HT	High Tension
16	ACSR	Aluminum Conductor Steel Reinforced
17	BOQ	Bill of Quantity
18	GA	General Arrangement
19	RCC	Reinforced Cement Concrete
20	CPRI	Central Power Research Institute
21	ERDA	Electrical Research and Development Association
22	CRP	Control & Relay Panel
23	T&P	Tools & Plant

CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

24	IR	Insulation Resistance
25	OFC	Optical Fiber Cable
26	GAIL	Gas Authority of India Limited
27	IGL	Indraprastha Gas Limited
28	IOCL	Indian Oil Corporation Limited
29	DMRC	Delhi Metro Rail Corporation
30	PPE	Personal Protective Equipment
31	FRLS	Fire Retardant Low Smoke
32	GI	Galvanized Iron
33	GPR	Ground Penetration Radar
34	P/L	Providing and laying
35	P/F	Providing and fixing
36	TAC	Tariff Advisory Committee
37	IS	Indian Standard
38	IEC	International Electro technical Commission

2.00.00 GENERAL DESIGN CRITERIA**2.01.00 General Service condition**

- a) Maximum ambient temperature (Degree C): 50
- b) Minimum ambient temperature (Degree C): 0
- c) Relative Humidity (%): 100
- d) Maximum annual rainfall (mm): 750
- e) Maximum wind pressure (Kg/Sq.m): 150
- f) Maximum Altitude above mean sea level (Meters): 1000
- g) Seismic level Zone IV as per IS 1893
- h) Pollution Level: Heavy/Dry

2.02.00 Code and Standards

Contractor shall follow latest amendment Indian Standards or International Standards. Refer respective equipments specification for applicable standards.

2.03.00 Scope and Services

S.No.	Head	BRPL Scope	Contractor's Scope	Remarks
1	Road Cutting Permission	X	√	Statutory fees will be borne by BRPL

CONSOLIDATED TECHNICAL REQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

S.No.	Head	BRPL Scope	Contractor's Scope	Remarks
2	Supply, Laying, testing and commissioning of 66kV cable , Cable Jointing , Cable termination including laying , testing and commissioning of OFC joint and OFC termination.	X	X	NA
3	Supply, Laying, testing and commissioning of 33kV Bay consisting 33kV Circuit breaker, 33kV Isolator, 33kV CT & PT, 33kV LA, Bay marshalling kiosk etc.	X	√	NA
4	Permissions from relevant External and Internal Agencies regarding Cable Laying and Commissioning (Traffic Police, GAIL, IGL, IOCL, PWD, CPWD, Pollution Control Board, DMRC, Electrical inspector etc.)	X	√	Statutory fees will be borne by BRPL
5	Supply, Erection, Testing and commissioning of Equipments related to schemes like CT, CVT, CB, Isolator, LA etc. if any.	X	√	As per specifications and Standards
6	Supply and Erection of structure for mounting equipments in the bay like structure for CT, CVT, CB, Isolator, LA etc.	X	√	
7	GPR/Scanning of the whole route (before execution of project and after completion of project) shall be done and the same shall be submitted to BRPL. The report shall be submitted within 15 days after the issue of LOI HDD route depth shall be decided after submission of report	X	√	
8	<ul style="list-style-type: none"> Drawing Submissions-before execution of project As built drawing submission- after completion of project 	X	√	NA
9	Engineering Approvals	√	X	NA
10	Testing Equipments	X	√	NA
11	Lighting Arrangement	X	√	NA
12	Construction Power and Construction Water	X	√	NA
13	Safety , Security and insurance of Manpower(Labour, Engineers, Supervisors etc)	X	√	Labour should be provided with every safety gear like safety jacket, helmet etc.

CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

S.No.	Head	BRPL Scope	Contractor's Scope	Remarks
14	Various Tools and Tackles related to Job	X	√	NA
15	Transportation of Material and any other tender related work	X	√	NA
16	Cleanliness around project site	X	√	NA
17	Security and Safety of material until handing over the project to BRPL	X	√	NA
18	Providing of Various Machines e.g Crane, Hydra, JCB, Hammer , Cutting Machine etc to complete the project	X	√	NA
19	Providing of Trenchless Machine	X	√	NA
20	Loading and Unloading of material at site including scrap returning to BRPL site	X	√	NA
21	Electrical Inspector Clearance	X	√	Statutory fees will be borne by BRPL
22	Providing of Continuous Steel Barricading with Mobile no of project supervisor, sufficient traffic marshal, becon light, Fluorescent tape, PPE etc. (Mobile no shall be clearly visible on the barricading)	X	√	(Each plate- Height- 1.5 mtr and Length-1.5 Mtr minimum)
23	Permit to work requesting Agency in BRPL premises	X	√	Permit Should be applied to Engineer In-charge prior to work through proper procedure
24	Permit to work issuing agency inside BRPL Premises	√	X	NA
25	Temporary office and Material Store near work premises	X	√	NA
26	Storage of all kind of Material required for project	X	√	BRPL premises will not provide for any kind of material storage and issuance
27	Dismantling of material at project site, , Dismantled material loading, Unloading and transportation and deposit to BRPL store	X	√	Store location will be within BRPL premises
28	Preparation, up-dation and submission of PERT chart fortnightly to track activities	X	√	NA
29	Submission of final drawing showing layout of cable in Google map along with of cable joint location with GPS Coordinates	X	√	Approval will be done by BRPL Representative

CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

S.No.	Head	BRPL Scope	Contractor's Scope	Remarks
30	Removal and renaming of existing signboard of other utilities (if any) including painting as per their actual route	X	√	Painting colour and material should be in line with the existing ones for aesthetic look
31	Surface levelling, removal and disposal of excess earth (malwa) after back filling of trench. During execution excavated earth shall be covered with green mat to prevent dust pollution. Also regular Water Sprinkling is to be required at site.	X	√	NA
32	Supply, installation, testing and commissioning of Active and Passive ball markers	X	√	NA
33	Supply & installing of RCC cable route marker, RCC cable joint marker and RCC Coffin for joint. , RCC slab, warning tape etc.	X	√	Shall be designed as per tender document
34	Cable Route Tracer and Marker-supply, testing and commissioning (as applicable)	X	√	NA
35	Sheath Integrity test before Charging of 66kV Cable	X	√	Mandatory
36	All cable drum shall be returnable basis so immediate after laying of cable, empty cable drum shall be removed away from site at their risk and cost by respective bidder from time to time in line with project progress.	X	√	
37	Compliance of instructions/ orders issued by National Green Tribunal/ Central Pollution Control Board/ any other agency related to pollution.	X	√	Any kind of penalty shall be borne by the vendor
38	De-watering of pits	X	√	Scope shall be covered as per execution team requirement.
39	Civil works	X	√	Any kind of civil works related to the project
40	As built drawing	X	√	Page size- A1, 4 sets (CES, TRL, P&C, with final bill)

CONSOLIDATED TECHNICAL REQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

S.No.	Head	BRPL Scope	Contractor's Scope	Remarks
41	Handling of non- standard drum length	X	√	
42	Route survey, preparation of site plan and profile	X	√	
43	Cross bonding design	X	√	Based on offered cable design
44	ETC including supply of materials, design, consultancy etc of bridge/truss/structure for nallah crossing	X	√	
45	SCADA	X	√	Whole work if any

Special requirement

1. All jointing Kit shall have “Mechanical Connector” and not “Crimping”.
2. All the joints shall be covered with RCC coffin. Coffin shall be filled with sand. Each coffin or nos. of coffin shall fully cover the joint. Drawing provided only for constructional purpose not showing complete length of coffin. Bidder has to consider coffin length or numbers such that the complete joint shall be covered. Covering of one cable joint by one coffin or by multiple pieces coffins shall be considered as one no coffin in BOQ.
3. Delivery of cable at site and all other associate equipments/accessories have to be aligned as per site requirement and progress.
4. All kind of structural steel shall be GI unless otherwise specified.
5. Make of all kind of materials shall be as per BRPL approved make list, no deviation shall be allowed from make list.
6. The 66kV 3Cx300 sqmm is required with OFC embedded inside (OFC cable is of 48 fibre with 36 single mode and 12 multi mode). For OFC cable details please refer attached specification. All cable joint/termination kits shall be with OFC kit
7. Depth of HDD shall be decided jointly after submission of GPR report
8. GIS kit shall be suitable for OFC embedded cable if required
9. Link cable for cross bonding shall be copper, 3.3KV, Size as Mentioned in BoQ

CONSOLIDATED TECHNICAL REQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)**3.00.00 PACKAGE**

Scheme no-1: Conversion of 66kV D/C overhead Line from 220kV Mehraulli -Bijwasan-Palam by laying 04 Nos. 3Cx300sq.mm. XLPE cable from Vrindavan Greens Farms at NH-8 near Rajokari flyover to Bijwasan Grid substation -6300 M

Scheme no-2: Partial conversion of 66kV D/C overhead NJF - Jafarpur ckt 1&2 Tower line by laying of 3Cx300mm² XLPE Cables (4 nos cable) from 220kV Najafgarh Grid to Tower no 16 having Route length-3700 M

Scheme no-3: Conversion of 66 kV D/C overhead NJF - Bodela-2 ckt 1&2 Tower line by laying of 3Cx300mm² XLPE Cables (4 nos cable) from Gantry structure (inside crematorium) to Bodella -2 Grid on Nala Road having Route length-9000 M.

Scheme no-4: Conversion of Accessible O/H feeder into U/G by laying of 3x300 sq mm XLPE cable of 66 KV feeder Najafgarh - Nangloi and 66 KV feeder Nilothi – Nangloi ccts from tower no 37 to Nangloi Grid(7000 M)

Scheme no-5: Conversion of Accessible O/H feeder into U/G by laying of 3x300 sq mm XLPE cable of 66 KV feeder Najafgarh - Nangloi WW and 66 KV feeder Nilothi - Nangloiwwccts from tower no 37 to Nangloi WW Grid- 3000 M

Scheme no-6: Partial conversion of 66 kV D/C Overhead NJF - Nagloi / Nagloi WW Tower line by laying of 3Cx300mm² XLPE Cables (4 nos cable) from T-18 to T-37 Nilothi more having Route length-5500 M.

3.02.00 In-feed route map (attached below)

4.00.00 TECHNICAL SPECIFICATION

Please refer individual Technical Specification

5.00.00 SCHEDULES

SCHEDULE -1
TECHNICAL DEVIATION FROM THE SPECIFICATION
(This shall be part of Technical bid)

Technical deviation from specification if any, shall be listed out in below format

Sl no	Specification cl no	Deviation	Proposal	Benefit to BRF

CONSOLIDATED TECHNICAL REQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)**SCHEDULE -II
BRPL APPROVED MAKE LIST OF MAJOR ITEMS**

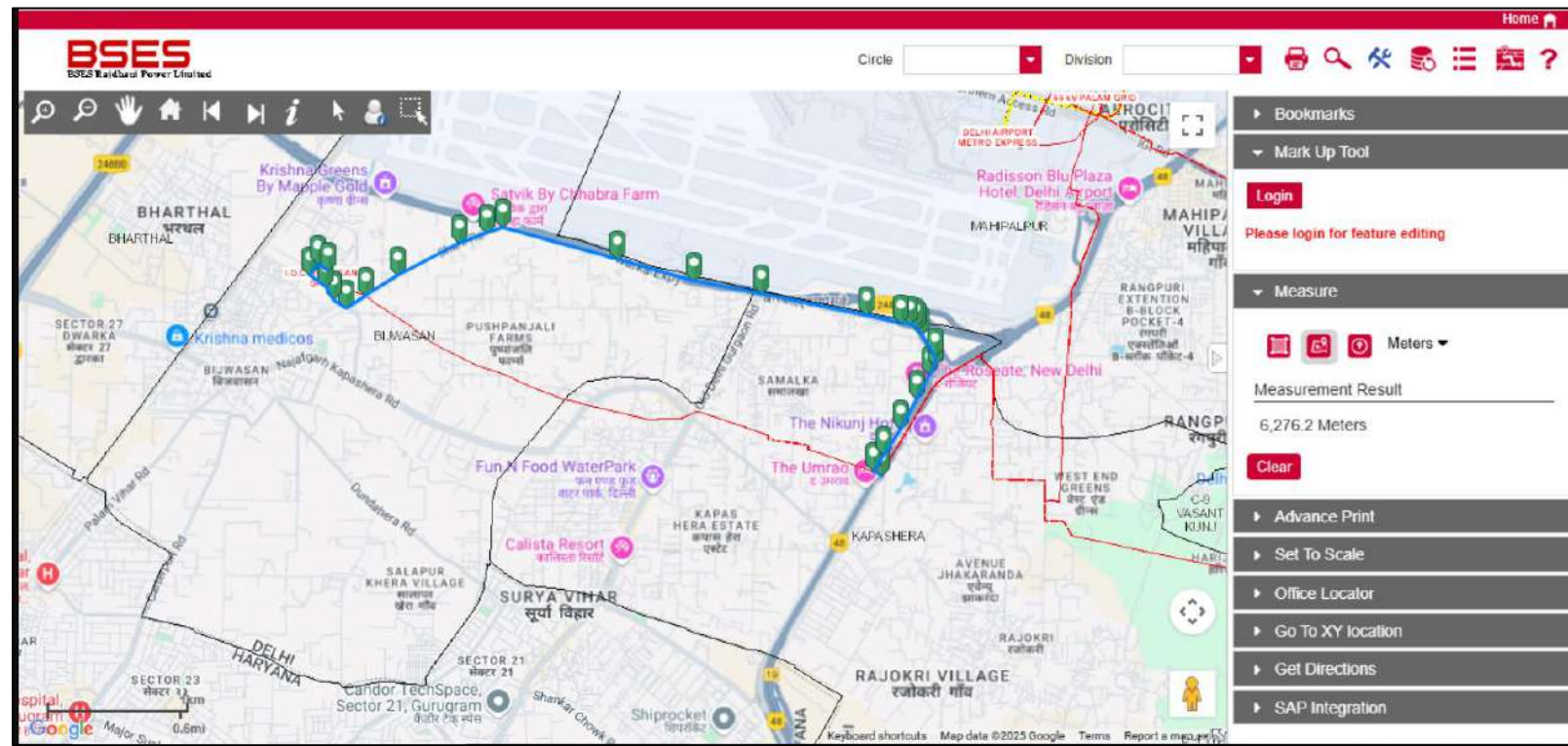
Sl no	Items Description	Approved Make
1	33kV outdoor Circuit Breaker	<ul style="list-style-type: none">• ABB Ltd.• Siemens Ltd.• GE• CGPISL
2	33kV Isolator	<ul style="list-style-type: none">• ABB LIMITED.• SIEMENS LIMITED.• CROMPTON GREAVES LIMITED.
3	33kV Lightning arrester	<ul style="list-style-type: none">• ALSTOM• OBLUM ELECTRICAL INDUSTRIES PVT. LIMITED.• LAMCO INDUSTRIES PVT. LIMITED.• ABB LIMITED• CROMPTON GREAVES LIMITED.• ELECTROLYTE• RAYCHEM
4	33kV Control and Relay Panel	<ul style="list-style-type: none">• ABB LIMITED.• SCHNEIDER ELECTRIC LIMITED.• SIEMENS LIMITED.
5	33kV outdoor CT and PT	<ul style="list-style-type: none">• CROMPTON GREAVES LIMITED• KAPCO ELECTRIC PVT. LIMITED• MEHRU ELECTRICAL & MECHANICAL ENGINEERS P LIMITED• GE• BHEL• ABB Ltd.
6	33 kV/66kV Jointing and Termination KIT	<ul style="list-style-type: none">• Raychem• 3M
7	HDPE Pipes (PN6, PE80)	<ul style="list-style-type: none">• Flow well• Tirupati• Narendra Polyplast• Flexi flow• Shivam Irrigation Works Pvt. Ltd. (Shivano)• Safal Polymer pvt ltd• Jindal Sanitations pvt ltd• Rajshree Technoplast pvt ltd.
8	Chemical Earthing	<ul style="list-style-type: none">• JMV• Pragati• True Power• Genius Protection• Axis Electrical component
9	33Kv/66kV Jointing and Termination KIT	<ul style="list-style-type: none">• Raychem• 3M

CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

10	LDR (RLY,NUMERICAL, 220VDC, ,DISTANCE ,MICOMP543	<ul style="list-style-type: none">• Not applicable
11	LDR	Not applicable
12	LDR for other projects	Not applicable

Route Map, SLD and Layout

Project: Scheme no-1: Conversion of 66kV D/C overhead Line from 220kV Mehrauli -Bijwasan-Palam by laying 04 Nos. 3Cx300sq.mm. XLPE cable from Vrindavan Greens Farms at NH-8 near Rajokari flyover to Bijwasan Grid substation -6300 M.



CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

Project: Scheme no-2: Partial conversion of 66kV D/C overhead NJF - Jafarpur ckt 1&2 Tower line by laying of 3Cx300mm² XLPE Cables (4 nos cable) from 220kV Najafgarh Grid to Tower no 16 having Route length-3700 M



CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

Project: Scheme no-3: Conversion of 66 kV D/C overhead NJF - Budela-2 ckt 1&2 Tower line by laying of 3Cx300mm² XLPE Cables (4 nos cable) from Gantry structure (inside crematorium) to Bodella -2 Grid on Nala Road having Route length-9000 M.



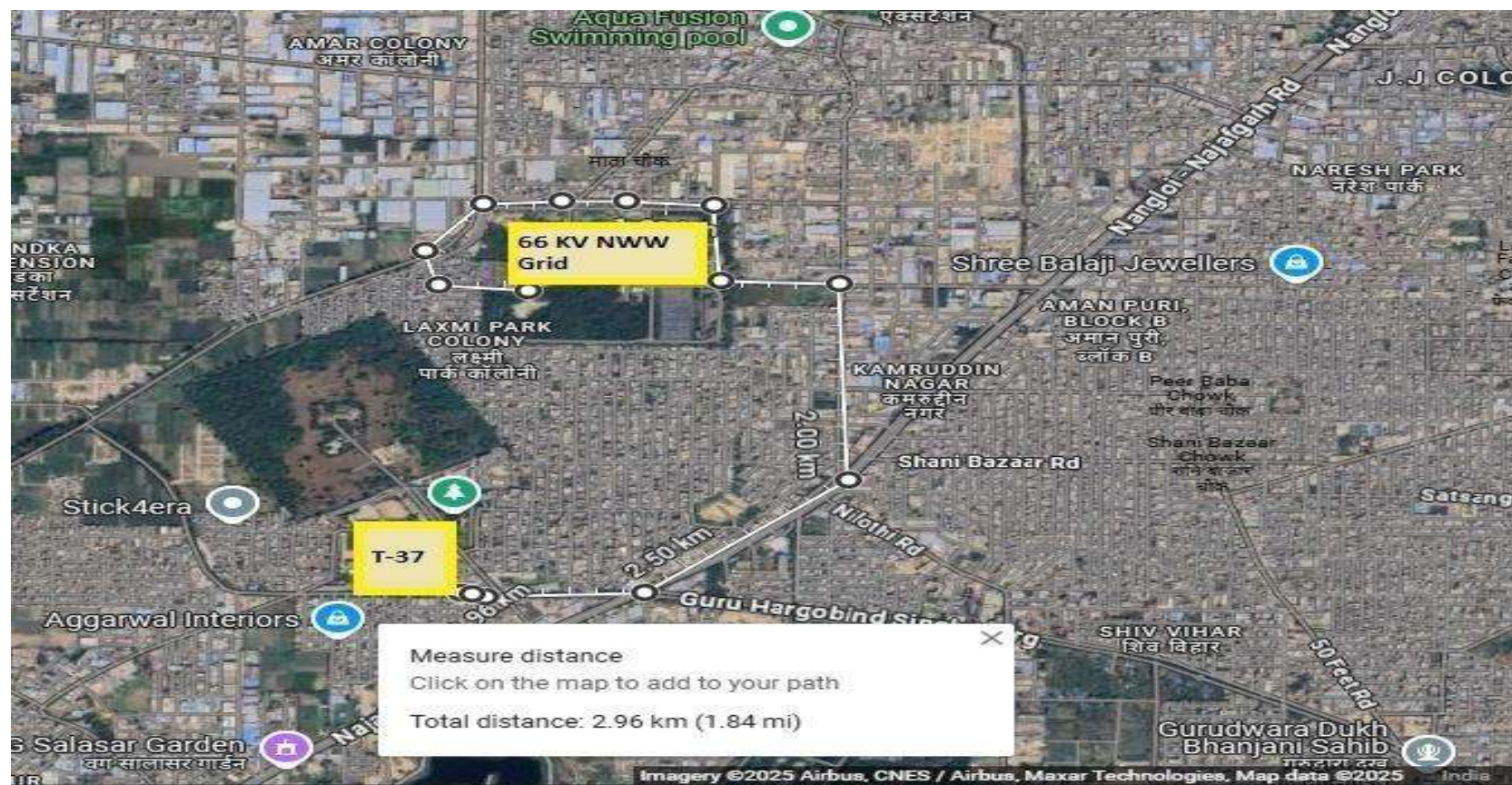
CONSOLIDATED TECHNICAL EQUIREMENT FOR 66KV CABLE LAYING WORK (IN-FEED)

Project: Scheme no-4: Conversion of Accessible O/H feeder into U/G by laying of 3x300 sq mm XLPE cable of 66 KV feeder Najafgarh - Nangloi and 66 KV feeder Nilothe – Nangloi ckts from tower no 37 to Nangloi Grid(7000 M)



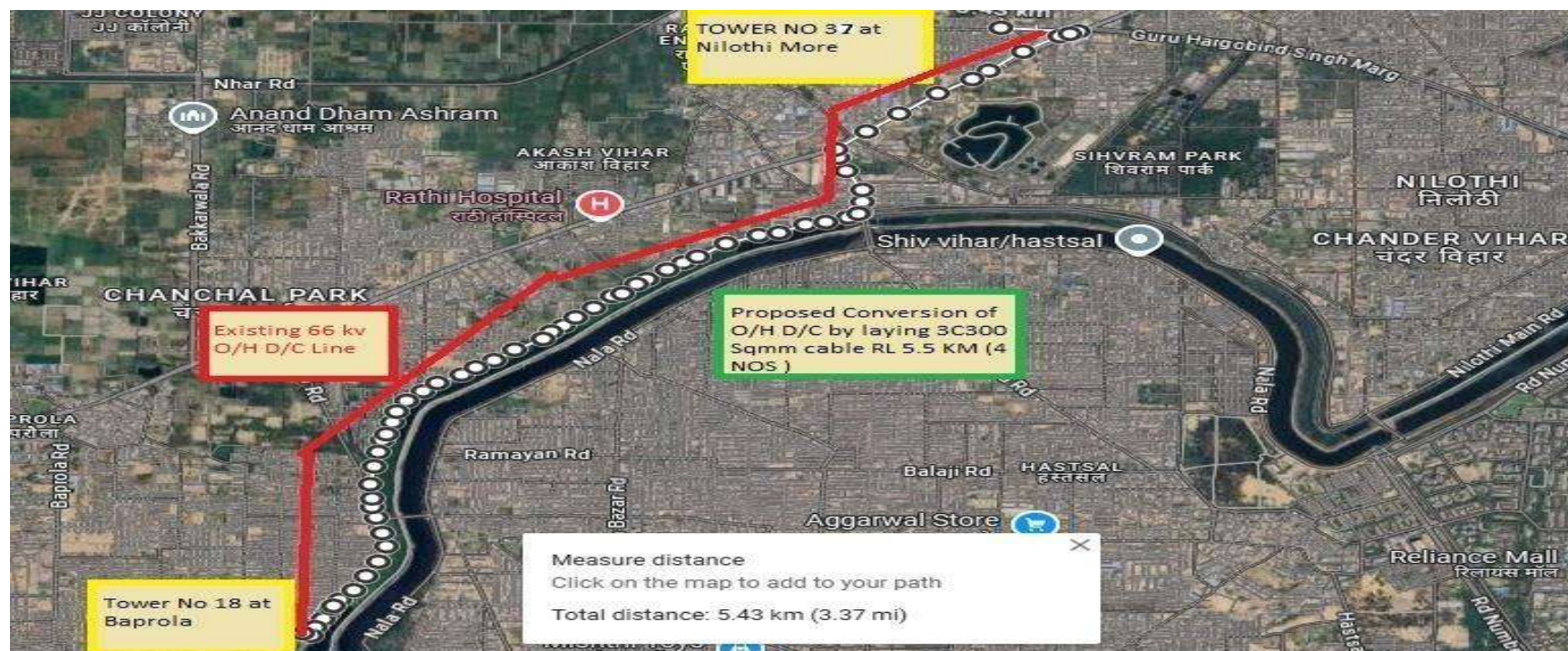
CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

Project: Scheme no-5: Conversion of Accessible O/H feeder into U/G by laying of 3x300 sq mm XLPE cable of 66 KV feeder Najafgarh - Nangloi WW and 66 KV feeder Niloti - Nangloi WW Grids from tower no 37 to Nangloi WW Grid- 3000 M



CONSOLIDATED TECHNICAL EQUIREMENT FOR 66kV CABLE LAYING WORK (IN-FEED)

Project: Scheme no-6: Partial conversion of 66 kV D/C Overhead NJF - Nagloi / Nagloi WW Tower line by laying of 3Cx300mm² XLPE Cables (4 nos cable) from T-18 to T-37 Niloti more having Route length-5500 M.



BSES

Technical Specification

For

66kV, 3CX300 sq mm Cable

Specification no – BSES-TS-39-3C66-R0

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

Index

SI no	Description	Page no
1	General Specification	3
2	Annexure A: Scope, Documentation and Delivery Schedule	11
3	Annexure B: Service Conditions	12
4	Annexure C: General Technical Particulars (GTP)	13
5	Annexure D : List of BSES approved Sub-Vendors	18
6	Annexure E: General Arrangement Drawing for End-sealing Cap	20
	Annexure F: General Arrangement for Cable pulling eye	21
7	Annexure G: BSES format (typical) for Quality Assurance Plan (QAP) for EHV Cables	22
8	Annexure H: Testing and manufacturing process requirements w. r. t. TR- XLPE insulation	30
9	Annexure I: Deviation format	30

General Specification

1.0 Scope

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

2.0 Applicable Standard

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

Indian Standards

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

IEC Standards

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

3.0 Cable Design Features

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

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

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

		<p>amendments.</p> <p>The armour wires shall be applied with minimum 90% coverage.</p> <p>The joints in the armour round wires shall be made by brazing or welding and the surface irregularities shall be removed. A joint in the wire shall be at least 300 mm from the nearest joint in any other armour wire in the completed cable.</p> <p>The short circuit capacity of armour shall be 26.3 kA for 3 second.</p>
3.19	Binder Tape	Rubberized cotton tape shall be wrapped with approx. 10% overlap over armour
3.20	Outer Sheath	<p>The outer sheath shall consist of extruded black colored HDPE type ST 7 as per IEC 60502-2 with anti termite protection. The minimum thickness shall be 3 mm at any point.</p> <p>Semi conductive layer either extruded or graphite coating shall be provided over the Outer Sheath.</p>
3.21	Cable Rating	The cable size shall be suitable to carry rated load current on 66 kV continuously without exceeding the maximum conductor temperature of 90 deg. C.
3.22	Drum Length	<p>300m \pm 5 % (short lengths not acceptable except the last length and minimum acceptable short length shall be 100m). The Overall tolerance - 2 % for the total cable length of the entire order</p> <p>Manufacturer shall not be allowed to put two cable pieces of different short length in same cable drum.</p>
3.23	Embossing	<p>The extruded outer sheath shall be embossed with meter marking at interval of 1 metre. The "A" end meter marking and "Z" end meter marking and the drum lengths shall be printed on the drum flange along with other markings. The outer sheath shall also be embossed with (min.)</p> <ul style="list-style-type: none"> a) Voltage designation b) Type of construction/cable code (i.e. A2XCEW2Y) c) Number of core and nominal cross sectional area. d) Type of cable "Electric Cable". e) Manufacturers name & trade mark f) Name of buyer (e.g. BSES) g) Month & year of manufacturing h) Batch no / Lot no. and Drum no i) Sequential length marking. i) Purchase Order Number and Date <p>Progressive length marking shall start from zero for each drum.</p>
3.24	Joints and Terminations	<p>The 3-Core Joints and Terminations to be used with the cable shall be with proven design and fully type tested as per IS 60840.</p> <p>The Joints and Terminations match or exceed all technical performance parameters of the specified cable.</p>

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

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

5.0 Inspection & testing

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

		of cable. This short circuit test shall be preceded and succeeded by high voltage, Partial Discharge, Armour Resistance and Conductor Resistance Test. Test report shall not be more than five (5) years old.
5.3	Acceptance Tests	Shall be conducted as per IEC: 60840: 2004 / IS: 7098-III: 1993 and approved QA plan for each lot of cable.
5.4	Special Tests	The following tests shall be carried out as special tests
		Conductor examination as per Clause 10.4 of IEC-60840 for conformance of IEC 60228/IS 8130.
		Measurement of thickness of insulation as per Clause 10.6 of IEC- 60840 and Clause 8 of IEC-60811-1-1./ IS 10810 part 6
		Measurement of thickness and overall dimensions of sheath as per Clause 8 of IEC-60811-1-1./ IS 10810 part 6
		Measurement of dimensions of Armour as per Clause 10.7 of IEC-60840/IS 10810 part 36
		Measurement of external diameter as per Clause 8.3 of IEC-60811-1-1
		Hot set test for TR-XLPE insulation as per Clause 10.9 of IEC-60840/ IS 10810 Part 30
		Degree of cross-linking as per ASTM D 2768-01, void and contamination as per 20.1 of IS 7098 (Part-3), abrasion resistance as per BS 7835
		Sheath Integrity Test
5.5	Inspection	The buyer reserves the right to witness all tests specified on completed cables
		The buyer reserves the right to inspect cables at the Seller's works at any time prior dispatch, to verify compliance with the specifications.
		In-process and final inspection call intimation shall be given in advance to purchaser.
		In the event of any discrepancy in the test reports i.e test reports not acceptable or any type tests(including special / assitional tests,if any) not carried out , same shall be carried out without any cost implication to BSES before dispatch of cable.
5.6	Test certificates	Three sets of complete test certificates shall be submitted along with the dispatch documents.

6.0 Drawings, Data & manuals

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

7.0 Shipping, Handling and Site support

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

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

8.0 Progress reporting

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

9.0 Deviations

9.0	Deviation from the Specification.	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed by the Buyer that the Seller complies fully with this specification.
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Type Test Required After Award of PO:

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

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

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

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

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

Annexure – B: Service Conditions

1.0.0	Delhi Atmospheric conditions	
a)	Average grade atmosphere :	Heavily polluted, dry
b)	Maximum altitude above sea Level	1000 M
c)	Ambient Air temperature	Highest 50 deg C, Average 40 deg C
d)	Minimum ambient air Temperature	Deg C
e)	Relative Humidity	90 % Max
f)	Thermal Resistivity of Soil	150 Deg.C cm/W
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

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

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

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

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

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

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

Annexure - D
List of Sub-Vendors

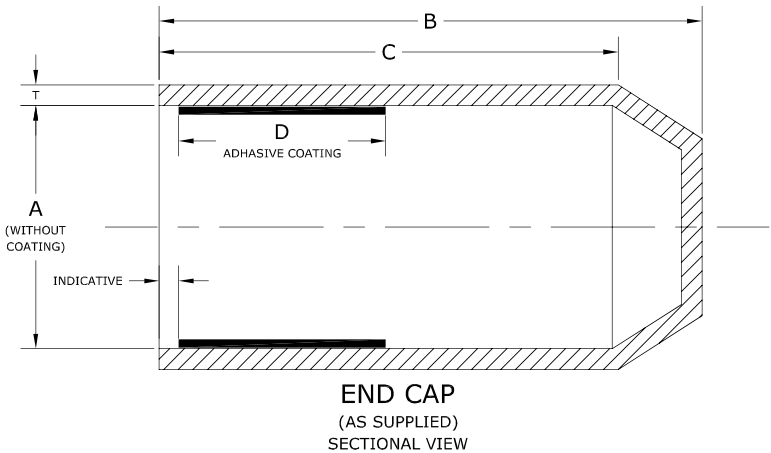
Ser. No.	Raw Materials		Name of the Suppliers
1.	XLPE Compound	1	Dow Chemicals , U.S.A.
		2	Borealis , Sweden
		3	Hanwha , South Korea
2.	Semi-Conducting Compound	1	Dow Chemicals, U.S.A.
		2	Borealis , Sweden
		3	Hanwha , South Korea
3.	Conductor Water-Blocking tapes / yarn / powder	1	Lantor
		2	Geca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

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

DIMENSIONS

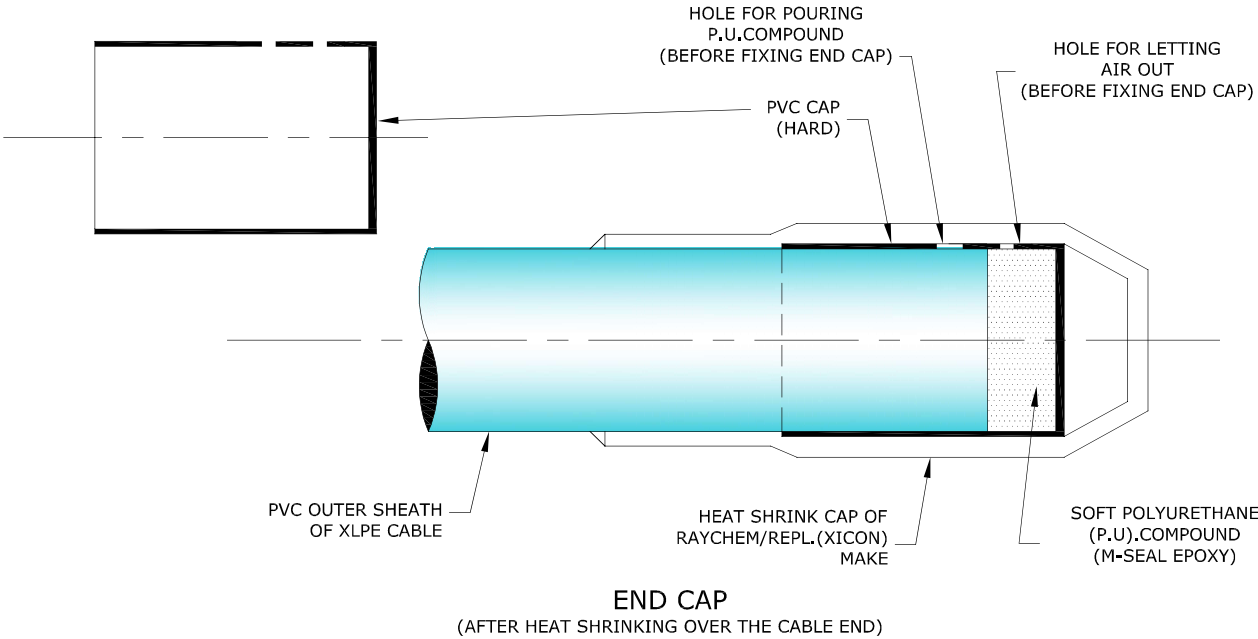
SIZE	A EXP.(Min.)	A REC.(Max.)	B EXP.(Min.)	C EXP.(Min.)	D EXP.(Min.)	LC %	T (WALL REC. ± 20 %)
EC 120/150	75	34	120	105	50	± 10	4.2
EC 240/300	100	62	130	110	70	± 10	3.5
EC 400	145	75	155	120	70	± 10	4.6

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



MATERIAL SPECIFICATIONS

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



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

BSES

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

SCALE :NOT TO SCALE

DATE: 09-05-2011

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

DRAWN BY:

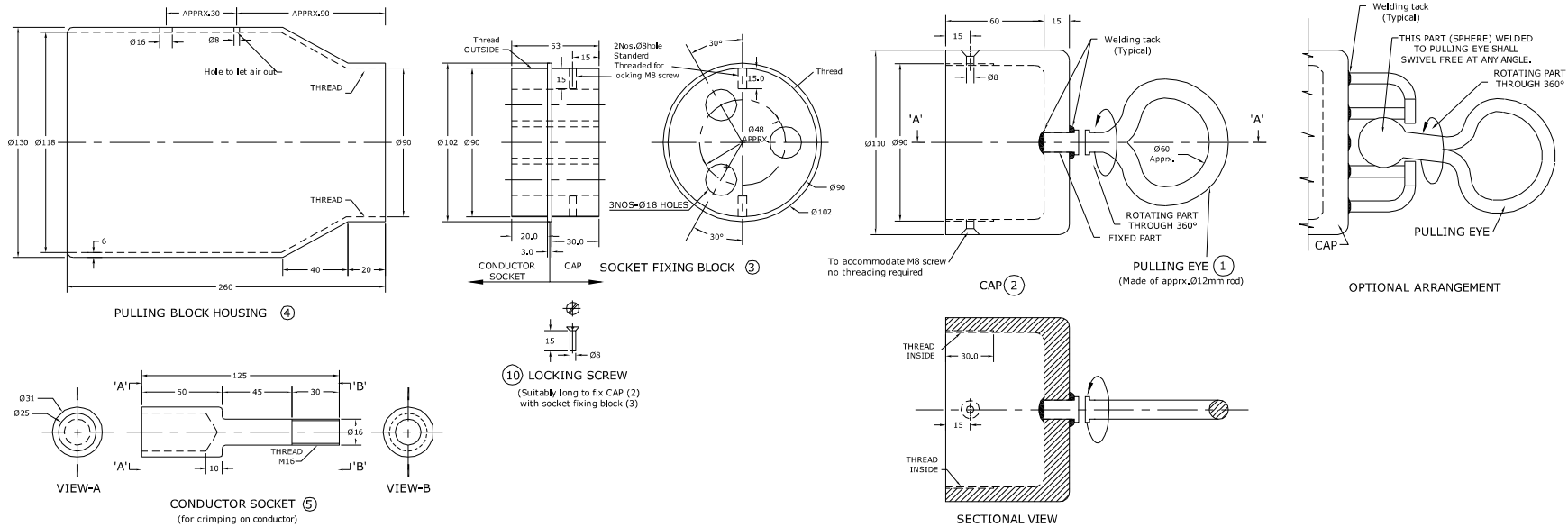
CHECKED BY:

APPROVED BY:

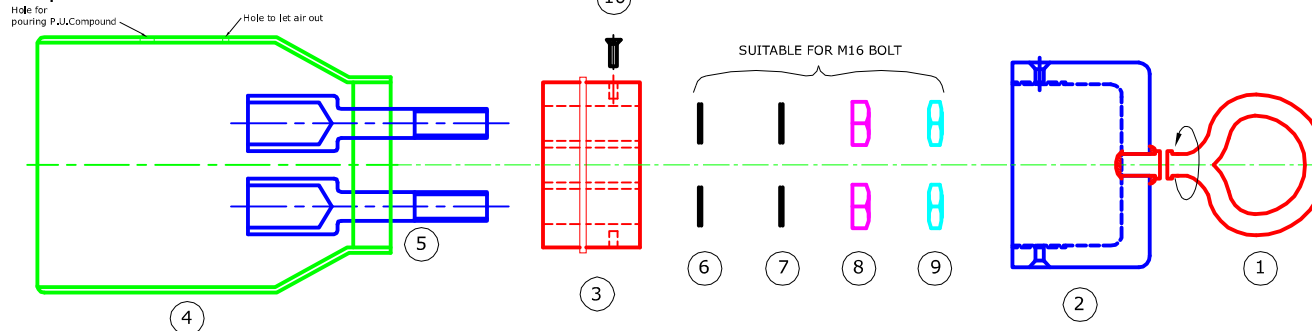
REVISIONS

Addl V.P.

ANNEXURE F



Exploded View



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

BSES

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

SCALE :NOT TO SCALE

DATE: 09-05-2011

CABLE PULLING EYE ASSEMBLY (TYPICAL)

DRAWN BY:

CHECKED BY:

APPROVED BY:

REVISIONS

Add V.P.

EXAMPLE:

- 1) For cable size 33kV, 3/C X 400sq mm Al XLPE.
- 2) Diameter over conductor : 23.8mm apprx.

Overall diameter : 108±3mm apprx.
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 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	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

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



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

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



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FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,												
P : Perform, W : Witness, V : Verification												
		b) Thickness	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Overall diameter	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		d) Surface finish & colour of sheath	Major	Visual	100 %	Surface smooth & free from defects. Colour as per Tech. Data Sheet		-	-	P	-	
		e) Cable length verification	Major	Visual	Each length	Manufacturing Plan	Manufacturing Plan	-	-	P	-	
		f) Marking	Major	Visual	Each length	As per approved GTP/cross sectiona drawing		Reg./Sheet	-	P	V	
C FINAL INSPECTION												
1	Routine tests	a) High Voltage	Critical	Electrical	100 %	IS 7098/III	IS 7098/III	Test Report	-	P	V	
		b) Conductor Resistance	Critical	Electrical	100 %	IS 8130/84	IS 8130/84	Test Report	-	P	V	
		c) Partial Discharge	Critical	Electrical	100 %	IS 7098/III	IS 7098/III	Test Report	-	P	V	
		d) Impulse	Critical	Electrical	One sample per lot			Test Report		P	V	
		e) Armour Coverage	Critical	Physical	One sample per lot			Test Report		P	V	
		f) Physiacal Dimensions	Critical	Physical	One sample per lot			Test Report		P	V	
		g) Freely Strippable insulation screen (Strippability Test)	Major	Physical	One sample per lot	Factory Standard	Factory Standard	Test Report	-	P	V	
2	Stage Inspection	Wire Drawing	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	Stage Inspection shall be conducted subject to BSES requirement
		Extrusion process	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Raw maerial inspection at factory	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Wrapping of Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Tensile test for Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		a) Annealing test for copper	Major	Physical	Appendix A to IS 7098/III, each lot sample basis	IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records.
		b) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		c) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Tests N/A on finished conductor.
		d) Conductor resistance test	Major	Electrical	Appendix A to IS 7098/III, each lot sample basis	IS 8130/84	IS 8130/84	Test Report	-	P	W	
		e) Test for thickness of insulation & sheath	Major	Physical		IS 7098/III & Tech. Data sheet	IS 7098/III & Tech. Data sheet	Test Report	-	P	W	
		f) Hot set test for insulation	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,												
P : Perform, W : Witness, V : Verification												
3	Acceptance tests	g) Tensile strength & Elongation at break of insulation & outer sheath	Major	Physical	Each Lot Sample Basis	IS 7098/III & IS 5831/84	IS 7098/III & IS 5831/84	Test Report	-	P	W	
		h) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		i) High voltage test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		j) Insulation resistance (Volume resistivity) test	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		k) Tests for dimension of armour wires/strips	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		l) Test for anti termite & anti rodent property of outer sheath	Major	Physical		Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	W	
		m) Rewinding of cable on drum	Major	Visual		To check cable appearance, drum appearance, cable winding, packing, embossing/printing/sequential marking		Reg./Sheet	-	P	W	
		n) Void & contamination test for insulation (Silicon Oil test)	Major	Physical				Reg./Sheet	-	P	W	
		o) Wafer boil test for extruded semi-conducting layers	Major	Physical				Reg./Sheet	-	P	W	
		p) Freely Strippable insulation screen	Major	Physical		Factory Standard	Factory Standard	Test Report	-	P	W	
		q) Water Penetration test (WPT) on core (i.e. Logitudinal Water Blocking Test)	Major	Physical		IEC:60502	IEC:60502	Test Report	-	P	W	Test shall be conducted for leakage of water through conductor.
		r) Armour coverage	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		s) Ovality	Major	Physical		As per data sheet	As per data sheet	Test Report	-	P	W	
		t) Eccentricity	Major	Physical		As per data sheet	As per data sheet	Test Report	-	P	W	
		u) Mass & uniformity & zinc coating on armour	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		v) Resistivity of Strip armour	Major	Electrical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		w) Swelling height of water swellable tape	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		x) Flammability test	Major	Physical		As per IS-78098/II/2011	As per IS-78098/II/2011	Test Report	-	P	W	
		y) Impulse withstand test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification, P : Perform, W : Witness, V : Verification											
		z) Ageing & Water absorption test(Gravimetric) on Insulation & Outer sheath	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		z1) Heating Cycle with Potential	Critical	Electrical	sample basis, once per PO			Test Report	-	P	W	
		z2) Raw Material Verification in all aspects	Major	Physical	Each Lot					P	W	
4	Type tests at vendor's works	a) Tests on conductor			One sample per Tender							
		i) Annealing test for copper	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records. Tests N/A on finished conductor.
		ii) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iii) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iv) Conductor resistance test	Major	Electrical		IS 8130/84	IS 8130/84	Test Report	-	P	V	
		b) Tests for armouring wires/strips										
		i) Dimensions of wire/strip	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		ii) Tensile strength & Elongation at break	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	Only for Steel wires/strips
		iii) Torsion test for wire	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		iv) Winding test for strip	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		v) Uniformity of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vi) Mass of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vii) Resistivity of wire/strip	Major	Electrical		IS 3975	IS 3975	Test Report	-	P	W	
		c) Test for thickness of insulation & sheath	Major	Physical		IS 7098/III & Tech. Data sheet	IS 7098/III & Tech. Data sheet	Test Report	-	P	W	
		d) Physical tests for insulation									W	
		i) Tensile strength & Elongation test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iii) Hot set test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iv) Shrinkage test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		v) Water absorption (gravimetric)	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		e) Physical tests for outer sheath									W	
		i) Tensile strength & Elongation test at break	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		iii) Shrinkage test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,											
	P : Perform, W : Witness, V : Verification											
		iv) Hot deformation test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		v) Loss of mass in air oven	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		v) Heat shock test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		vi) Thermal stability test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		f) Electrical tests in sequence									W	
		i) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ii) Bending test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iii) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iv) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		v) Dielectric power factor as a function of temperature	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		vi) Heating cycle test	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		vii) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		viii) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ix) Impulse withstand test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		x) High voltage test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		g) Insulation resistance (Volume resistivity test)	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		h) Flammability test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
D PACKING & MARKING												
1	Packing & Marking	a) Cable end sealing	Major	Visual	100 %	IS 7098/III/ Agreement	IS 7098/III/ Agreement	-	-	P	W/V	BSES representative may verify these characteristics on randomly selected drums.
		b) Pulling eye at leading end- removed from vendor scope, end cap shall be provided at both the end of cable	Major	Visual	100 %	As per agreement	As per agreement	-	-	P	W/V	
		b) Stencilling/Marking on drum	Minor	Visual	100 %	IS 7098(Part 2):2011/ Agreement	IS 7098(Part 2):2011/ Agreement	-	-	P	V	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,											
	P : Perform, W : Witness, V : Verification											
Note		1. Checks specified above for Raw Material, In-Process and Final Inspection shall be as relevant to the specific cable construction.										
		2. Number of samples shall be selected as per Factory Standard/Agreement wherever 'sample' is indicated for extent of check.										
		3. Plant standards shall be followed in case Technical Data Sheet does not include requirements for characteristics to be checked.										
		4. BSES may witness Raw material and in process inspection in addition to Routine/Acceptance tests at any time/stage of manufacturing.										
		5. BSES's Inspector may randomly select a cable drum for type testing at vendor's works.										
		6. For each of the offered lot for inspection, BSES may randomly select one cable drum for testing of end cap "Destructive testing" to verify adhesion of sealing cap to cable outer sheath. .										
		7. All factory Type Tests shall be Witnessed by BSES										

ANNEXURE-H

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

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

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

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

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

ANNEXURE-I

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



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
Pages	23
Date:	19 Apr 2022
Prepared by	Abhishek Vashistha
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Reviewed by	Puneet Duggal
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Approved by	Gaurav Sharma
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Index

1.0.0 Scope of work	3
2.0.0 Codes & standards	3
3.0.0 Cable Construction	4
4.0.0 Straight-Through Joints (STJ).....	5
5.0.0 Quality Assurance Plan (QAP)	11
6.0.0 Deviations	12
7.0.0 Delivery	12
Annexure - A: Guaranteed Technical Particulars (GTP)	13
Annexure - B: Kit Content Table (KCT)	15
Annexure - C: Routine and Acceptance Test.....	16
Annexure - D: Deviation Sheet.....	16
Annexure - E: Service Conditions	17
Annexure - F: Aluminium crimping-type Ferrule for compacted circular conductor only for Heat Shrink joints.....	18
Annexure – G: Strip type GI canister (V.B. Can) for joint protection only for Heat Shrink Joint.....	19
Annexure – H : Job card Details	20
Annexure – I : SOP for jointing work	21
Annexure – J Joint Marker	23

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 designation2) Cable section/Division3) Type of joint4) Size of Joint5) Make of joint6) Voltage class7) Serial no. of kit8) Vendor lot & batch no9) Month & year of manufacturing10) Date of installation11) Name of jointer12) Name of vendor supervisor13) Name of BSES supervisor14) 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 Compc. 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	<p>a) The earthed insulation screen of an XLPE cable is terminated at a suitable distance from the connector (Ferrule).</p> <p>b) The stress control 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 1×10^8 ohm-cm to 8×10^8 ohm-cm.</p> <p>d) The physical and electrical properties shall conform to EA TS 09-13.</p> <p>d) For single phase repairing joint-stress control tube shall be suitable for long barrel mechanical connector/ferrule</p>
4.2.1.1	Insulation build-up	<p>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.</p> <p>b) Outer-most tube shall be screened insulating tube (dual wall tube). This tube shall be manufactured by extrusion process.</p> <p>c) Physical and Electrical properties shall conform to EA TS 09-13.</p> <p>d) For single phase repairing joint-insulation build up shall be suitable for long barrel mechanical connector/ferrule</p>
4.2.2	Sealing end of tube	By means of Core end sealing sleeve with red mastic coating
4.2.3	Mechanical Protection	<p>a) For 3-core cable: By means of a rollable steel mat (with required protective coating against corrosion)</p> <p>b) For 1-core cable:</p> <p>i) Copper wire mesh</p> <p>ii) Adhesive coated medium wall tube</p> <p>iii) One more layer of copper wire mesh</p> <p>iv) Medium wall tube</p>
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 contract, vendor will be required to conduct type-testing on heat/cold -shrinkable and moulded components, stress grading mastic, etc., in line with EA TS 09-13 standard, at third party test laboratory once in 6 months on randomly selected sample of each voltage rating without any commercial implication to BSES. Also special test shall be done as per IS 13573.2.2011, Table-7 without any cost implication to BSES. Cable for type test may be provided by buyer at the cost of bidders.</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) Quantity5) a) Purchase Order no. & date b) Purchaser's name c) BSES's SAP code number6) Weights (kg) of each Cable Termination Kit and of each box containing kits.7) Manufacturer's name8) Month & Year of Manufacturing9) 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	

	BSES-TS-44-STTH-R0
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



BSES-TS-44-STTH-R0

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

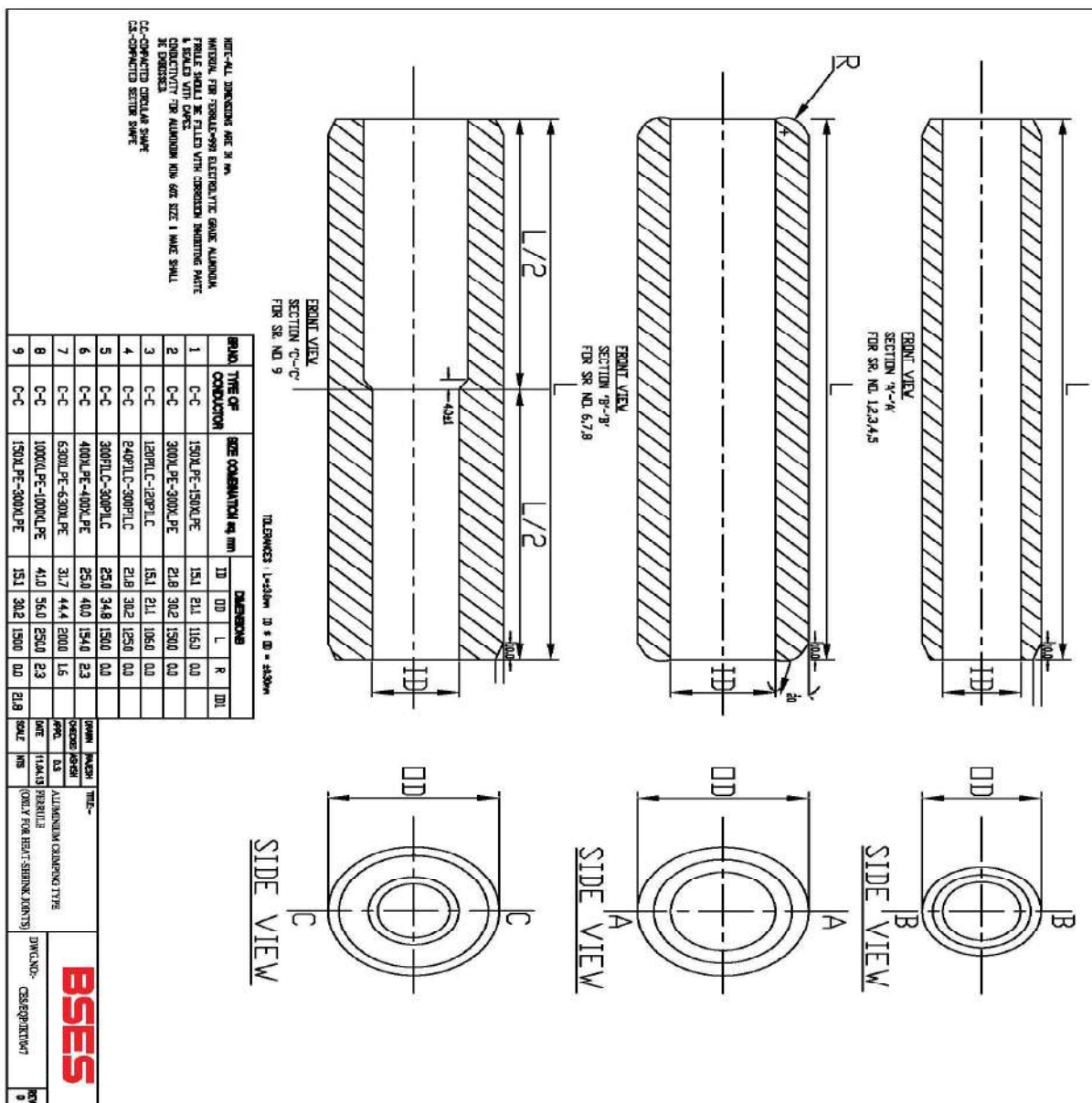
Annexure - E: Service Conditions

(Atmospheric conditions in Delhi)

a)	Average grade Soil Condition	
b)	Maximum altitude above sea level	1000 M
c)	Ambient Air temperature	Highest 50 Deg C, Average 40 Deg C
d)	Minimum ambient air temperature	0 Deg C
e)	Relative Humidity	100 % Max
f)	Thermal Resistivity of Soil	150 Deg C cm/W
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

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

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




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

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



GRNO	VOLTAGE	JOINT SIZE	NO. OF STRIPS	LENGTH (M)	WIDTH (M)
1	11kV	120PILC-120PILC	49	1450	400
2	11kV	240PILC-240PILC	46	1550	460
3	11kV	120PILC-150XL PE	40	1450	400
4	11kV	240PILC-300XL PE	46	1550	460
5	11kV	120PILC-300XL PE	46	1550	460
6	11kV	70PILC-300XL PE	46	1550	460
7	11kV	150XL PE-150XL PE	34	1260	340
8	11kV	300XL PE-300XL PE	36	1360	360
9	11kV	150XL PE-300XL PE	36	1360	360
10	33kV	300PILC-300PILC	50	1850	500
11	33kV	300PILC-400PILC	50	1850	500

PRINT NAME	TITLE		DWG. NO.	SPECIFICATIONS 0
CHECKED BY	STRIP TYPE & CANNISTER V.A.			
APPL. DS	(CAN) FOR JOINT PROTECTION			
DATE	(GENERAL ARRANGEMENT)			
SHEET NOS				



BSES-TS-44-STTH-R0

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

Annexure – H : Job card Details

BSES Annexure-H

Job Card For Cable Jointing Work

Job Card No: Date: Fault ID:

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

Contractor:

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

No. of cores: 3 5 3.5/4

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

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

Feeder Details: From: To:

Location: From: To:

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

Fault Occurance Date:

Job Allocated By: PWT Ref:

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

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

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

Contractor Supervisor: Signature: Date:

Jointer Details:

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

Scrap Details including Qty:

New Kit Details:

Old Kit Details:

Type of Fault:

Remark If any:

Job Certified By:

Shift Incharge: Name: Signature: Date:

IT 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



BSES-TS-44-STTH-R0

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

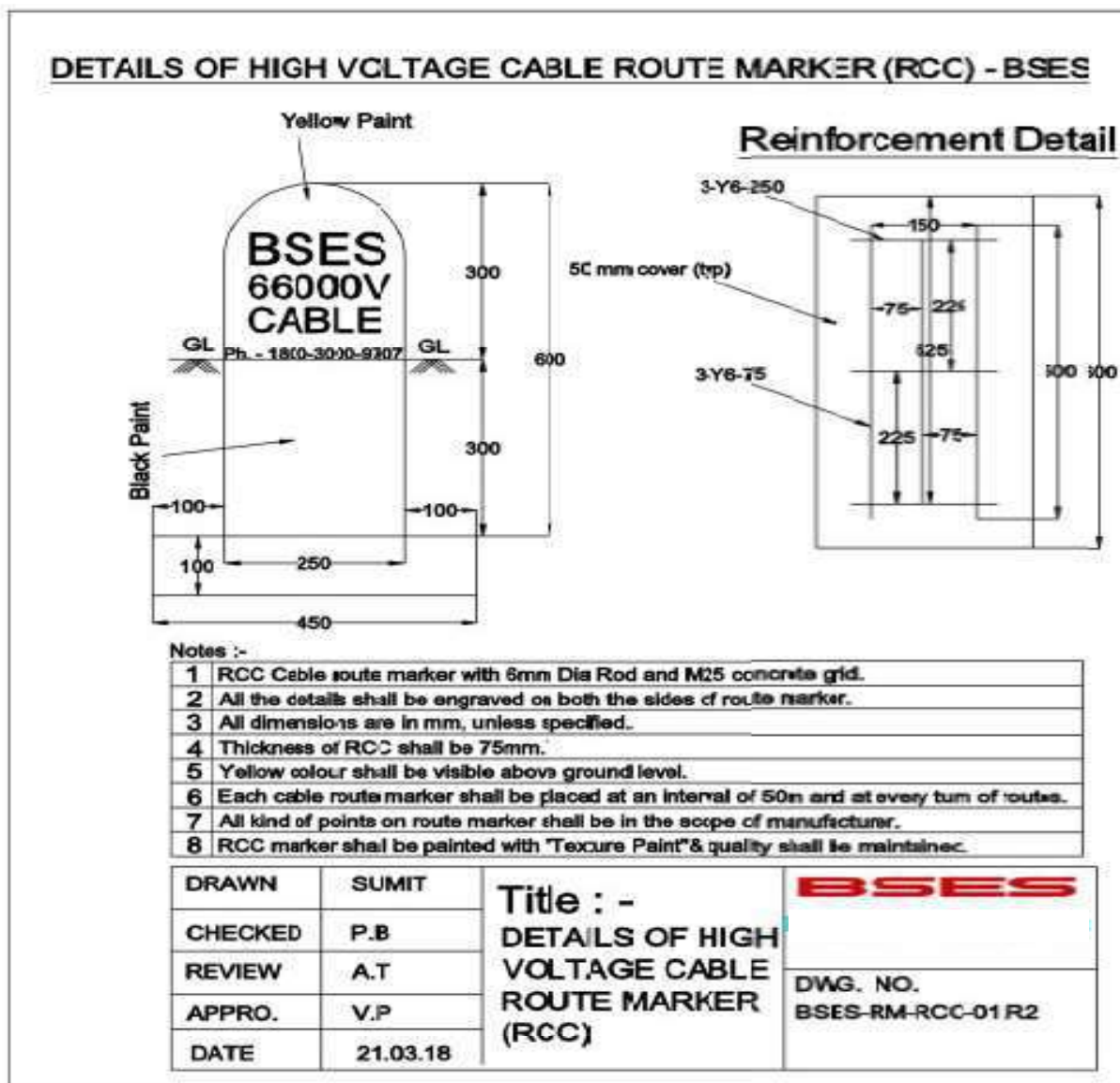
4	Backfilling, compaction of excavated soil and removing of excess earth from the site	Cable jointing contractor
5	Completion information in Job Card (Details of work done, material consumption, location, feeder name and joint tag no., date, supervisor name, jointer name) sent to SDO	Cable jointing contractor
6	Above information sent to GNIIT	SDO
7	Send information about GPS location of Cable fault to GIS	SDO
8	Daily report of cable jointing to CES	Division Head
9	Updating of information in OMS including supervisor name, jointer name, feeder name	GNIIT
10	Information to include GPS location of cable fault.	GNIIT

Special Note-

- 1) Joints to be done preferably during day. In case of constraints, DGM (O&M) to authorize for night time jointing with supervisor
- 2) Daily joint report to be shared with CES
- 3) Bi-monthly analysis of faulty joint for ensuring warranty compliance to be organized at circle level by contractor in presence of DGM (O&M) and CES
- 4) Certification of job card for payment by DGM (O&M) subject to OMS compliance CES to check any gaps.
- 5) After completion of jointing (33kV and 66kV), all the joints shall be covered with RCC coffin. Coffin shall be filled with white sand complete from the hole provided at the top of the coffin.

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

Annexure – J Joint Marker





Technical Specification of
Aluminum Lugs and Ferrules

Specification no – BSES-TS-11-ALF-R0

Rev:	0	
Date:	04 Apr 2022	
Pages:	11	
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INDEX

1.0	SCOPE OF SUPPLY	3
2.0	STANDARDS & CODES	3
3.0	SERVICE CONDITIONS	3
4.0	MAJOR DESIGN PARAMETERS	3
5.0	MATERIAL	5
6.0	MARKING	5
7.0	TESTING & INSPECTION	5
8.0	DEVIATION	5
9.0	PACKING & DELIVERY	6
10.0	DOCUMENTS SUBMISSION	6
11.0	DRAWINGS.....	7

TECHNICAL SPECIFICATION FOR ALUMINUM LUGS AND FERRULES**1.0 SCOPE OF SUPPLY**

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

2.0 STANDARDS & CODES

2.1	IS: 8308 -1993	Compression type tubular in-line connectors for Aluminum conductors of insulated cable
2.2	IS:5082 - 1998	Wrought Aluminum & Aluminum alloy bars, rods, tubes, sections, plates & sheets for electrical Applications
2.3	IEC: 61394	Overhead lines - Requirements for greases for aluminum, aluminum alloy and steel bare conductors
2.4	IS:8309 -1993	Compression type tubular terminal ends for aluminum conductors of Insulated cables
2.5	IS: 191- 2007	Specification for copper

3.0 SERVICE CONDITIONS

3.1	Location	Outdoor
3.2	Average grade atmosphere	Heavily polluted, Dry
3.3	Maximum altitude above sea level	1000M
3.4	Ambient air temperature	Highest 50Deg C Average 40Deg C
3.5	Minimum ambient air temperature	0 Deg C
3.6	Relative Humidity	100%
3.7	Rainy month	June to October
3.8	Maximum Rainfall (mm)	1450
3.9	Wind Pressure (Kg/Sq.m)	195
3.10	Seismic Zone	Zone IV as per IS : 1893

4.0 MAJOR DESIGN PARAMETERS

4.1	Ferrule	<p>An aluminum ferrule is an aluminum compression type tubular inline connector for aluminum conductors of insulated cables for rated voltages up to and including 1.1 kV.</p> <p>a) In-Line Connector - A connecting device accommodating two electrical conductors to form straight joint.</p> <p>b) Transition/Reducer Connector - A connecting device accommodating two electrical conductors of different sizes to form a transition joint.</p>
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TECHNICAL SPECIFICATION FOR ALUMINUM LUGS AND FERRULES

4.2	General Design Parameters of Ferrule	<ul style="list-style-type: none">a) Electrical conductivity: More than 60 % IACSCleaning after manufacturing: Caustic soda cleaningb) Ferrule should be filled with oxidation inhibiting paste & sealed with caps
4.3	LT Aluminum Ferrule	<ul style="list-style-type: none">a) Machine marking: Clear and distinct machine marking as specified in drawing on outer surface of ferrule to facilitate crimping. Total number of crimps should be as per drawing.b) No Knurling on inner surface of ferrule.c) Internal, external diameter & length of ferrule shall be as per drawing.d) Ferrule design suitable for conductor of type: Compacted Sector Shape
4.4	Lug	<p>A connecting device with barrel accommodating respective conductor. Size of electrical cables for rated voltages up to and including 1.1kV.</p> <p>Aluminum Lug: An aluminum lug is essentially a connecting device for connecting aluminum conductor with aluminum bus bars.</p>
4.5	General Design Parameters for Lug	<ul style="list-style-type: none">a) Cleaning after manufacturing: Caustic soda cleaning.b) Barrels of the Lugs should be filled with oxidation inhibition paste & sealed with caps.
4.6	Aluminum LT lug	<p>Size to be used for 10, 25, 50, 95, 150, 300, 630, 1000 sqmm:</p> <ul style="list-style-type: none">a) Machine Marking: Clear and distinct marking at specified distance on outer surface of lug to facilitate better crimping.b) No knurling on inner surface of the lugc) Internal diameter, external diameter, length of barrel, length of palm & other dimensions shall as per drawing.d) Electrical conductivity: Min. 60% IACSe) All corners shall be rounded off. <p>All dimensions are in mm. Refer Drawing for dimension and permissible tolerances.</p>

TECHNICAL SPECIFICATION FOR ALUMINUM LUGS AND FERRULES**5.0 MATERIAL**

5.1	Material for Lug and ferrule	a) Material of Lug and Ferrule shall be 99% Electrolytic grade Aluminum conforming to Aluminum of grade 19501 (Temper Designation-M) of IS 5082/1981. b) Hardness of the material used shall be between 18-21 Vickers Hardness Numbers.
5.2	Make	Raw Material make shall be Hindalco/Banco/Jindal Aluminum/BSES approved Reputed make

6.0 MARKING

6.1	Identification	<u>For Ferrule:</u> Type of cable to be connected, size and make shall be engraved on each ferrule. <u>For aluminum Lug:</u> Size of cable and make shall be engraved on each lug for Aluminum lug/Street light lug.
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7.0 TESTING & INSPECTION

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

7.1	Visual Check	The Ferrule & lug shall be visually checked and shall free from external defects.
7.2	Dimensional Check	The dimensional requirements shall be checked for Ferrule & Lug as per the drawing.
7.3	Acceptance Test	Following tests needs to be conducted by the vendor during inspection (value shall be followed as per IS/IEC) 1. Flattening 2. Electrical Conductivity 3. Resistivity 4. Physical properties (Tensile Strength and Hardness) 5. Two samples of similar size to be sampled for Temperature Rise test and chemical composition from the offered lot and shall be carried out from NABL approved Lab.

8.0 DEVIATION

Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, requirements of the Specification shall be met without exception.

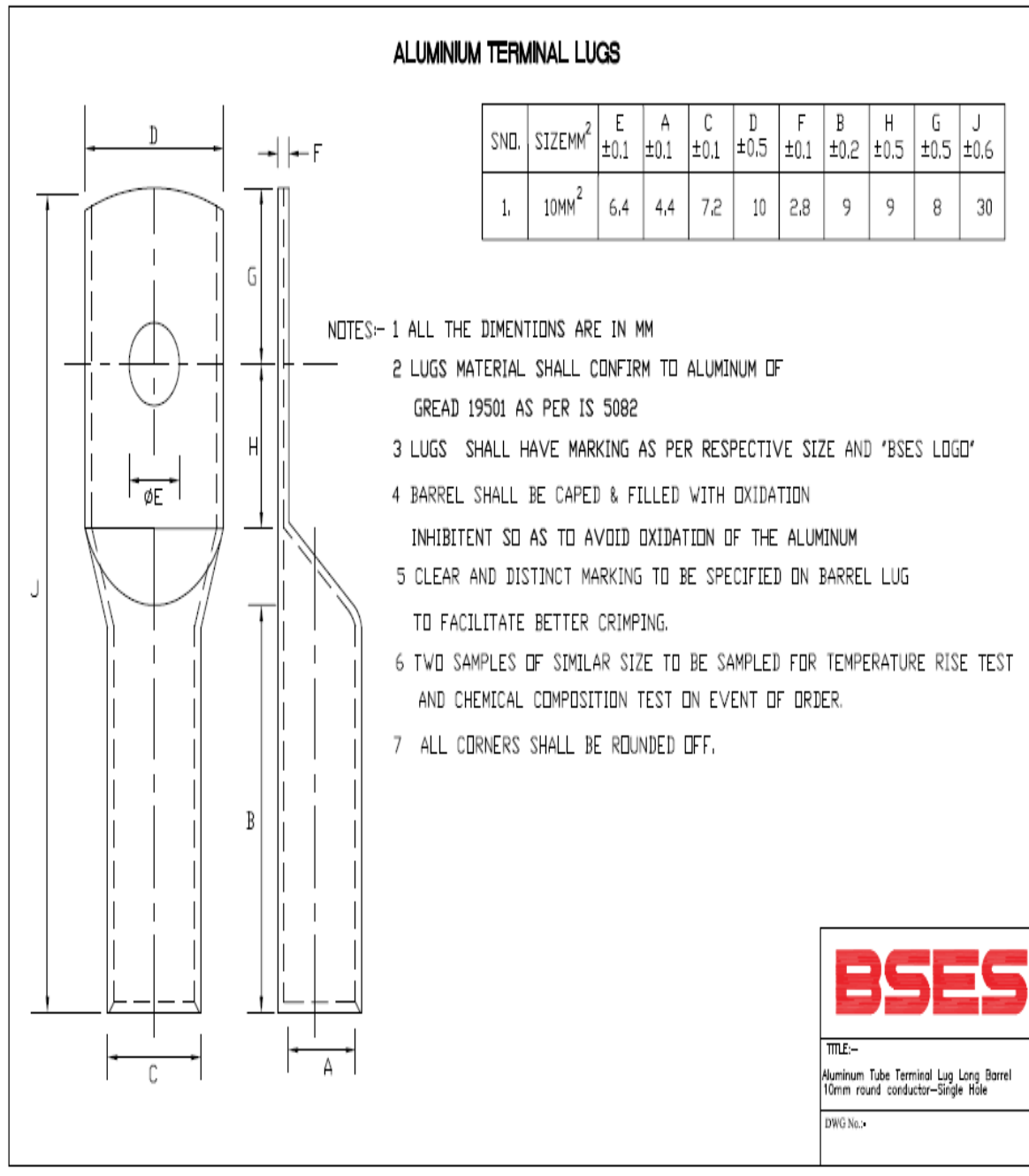
TECHNICAL SPECIFICATION FOR ALUMINUM LUGS AND FERRULES**9.0 PACKING & DELIVERY**

9.1	Packing	Packing to be done in transparent polythene bags of min.150 micron thickness so as to not get torn due to handling during packing/transit of lugs. Sealing should be done essentially with Heat sealers only.
9.2	Identification Labels	The pack should have a label indicating the a) Manufacturer's name b) SAP code number & PO. No. with date c) Month & year of manufacturing d) Size of Ferrule/lug with type e) Number of items f) "BSES Yamuna Power Ltd."

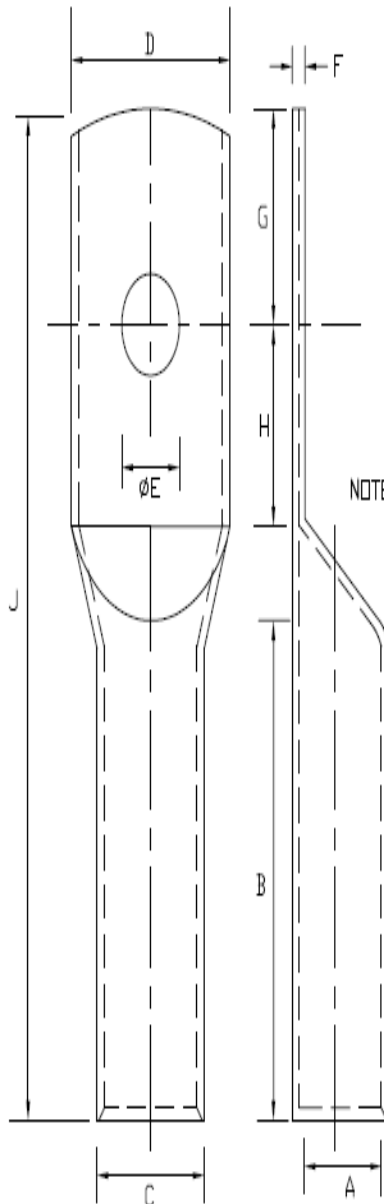
10.0 DOCUMENTS SUBMISSION

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

S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
10.1	Guaranteed Technical Particulars (GTP)	Required	Required	Required
10.2	Deviation Sheet, if any	Required	Required	Required
10.3	GA and Dimensional Drawing	Required	Required	Required
10.4	Manufacturer's quality assurance plan and certification for quality standards		Required	Required
10.5	Make of Raw Materials	Required	Required	Required
10.6	Inspection and test reports, carried out in manufacturer's works			Required
10.7	Routine Test Certificates			Required
10.8	Test certificates of all the raw materials			Required

11.0 DRAWINGS

ALUMINIUM TERMINAL LUGS



SNO.	SIZE ^{MM} ²	E ±0.1	A ±0.2	C ±0.2	D ±1	F ±0.1	B ±1	H ±0.5	G ±0.5	J ±1
1.	25 ^{MM} ²	8.4	6.8	12	18	5	32	12	9.5	60
2.	50 ^{MM} ²	10.5	10	16	25	6	42	14.5	14	80
3.	95 ^{MM} ²	13	13.5	22	32	8	56	18	15.5	102
4.	150 ^{MM} ²	13	16.5	25	35	8	65	25	25	125

NOTES:- 1 ALL THE DIMENTIONS ARE IN MM

2 LUGS MATERIAL SHALL CONFIRM TO ALUMINUM OF
GREAD 19501 AS PER IS 5082

3 LUGS SHALL HAVE MARKING AS PER RESPECTIVE SIZE AND 'BSES LOGO'

4 BARREL SHALL BE CAPED & FILLED WITH OXIDATION
INHIBITENT SO AS TO AVOID OXIDATION OF THE ALUMINUM
5 CLEAR AND DISTINCT MARKING TO BE SPECIFIED ON BARREL LUG
TO FACILITATE BETTER CRIMPING.

6 TWO SAMPLES OF SIMILAR SIZE TO BE SAMPLED FOR TEMPERATURE RISE TEST
AND CHEMICAL COMPOSITION TEST ON EVENT OF ORDER.

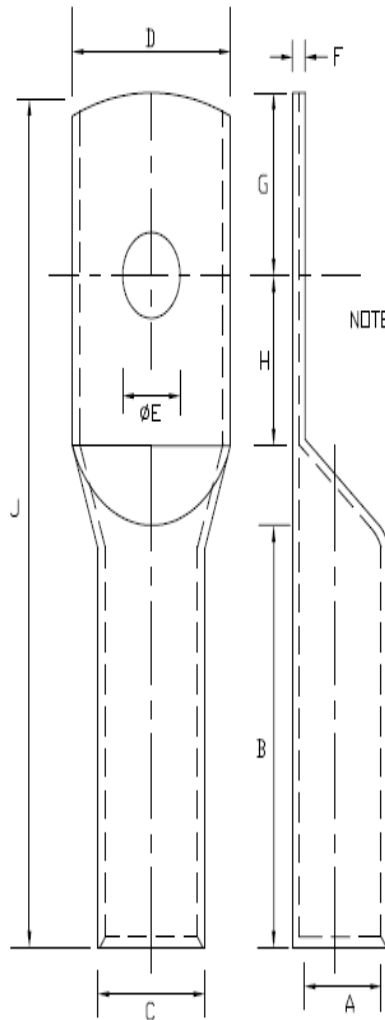
7 ALL CORNERS SHALL BE ROUNDED OFF.

BSES

TITLE:-
Aluminum Tube Terminal Lug Long Barrel
For Round conductor-Single Hole

DWG No.▶

ALUMINUM TERMINAL LUGS



SNO.	SIZE ^{MM²}	E ±0.1	A	C	D	F ±0.2	B	H	G	J ±1
1.	1CX 300MM ²	17	21.5- 22	32- 32.5	47.5- 48	10	79- 80	39.5- 40	29.5- 30	165
2.	4CX 300MM ²	17	24.3- 24.7	33.8- 34.2	47.5- 48	10	79- 80	39.5- 40	29.5- 30	165
3.	400MM ²	17	26- 26.4	38.5 -39	53.5 -54	125	115	39.5 -40	29.5 -30	200

NOTES:- 1 ALL THE DIMENSIONS ARE IN MM

2 LUGS MATERIAL SHALL CONFIRM TO ALUMINUM OF
GREAD 19501 AS PER IS 5082

3 LUGS SHALL HAVE MARKING AS PER RESPECTIVE SIZE AND 'BSES LOGO'

4 BARREL SHALL BE CAPED & FILLED WITH OXIDATION
INHIBITENT SO AS TO AVOID OXIDATION OF THE ALUMINUM
5 CLEAR AND DISTINCT MARKING TO BE SPECIFIED ON BARREL LUG
TO FACILITATE BETTER CRIMPING.

6 TWO SAMPLES OF SIMILAR SIZE TO BE SAMPLED FOR TEMPERATURE RISE TEST
AND CHEMICAL COMPOSITION TEST ON EVENT OF ORDER.

7 ALL CORNERS SHALL BE ROUNDED OFF.

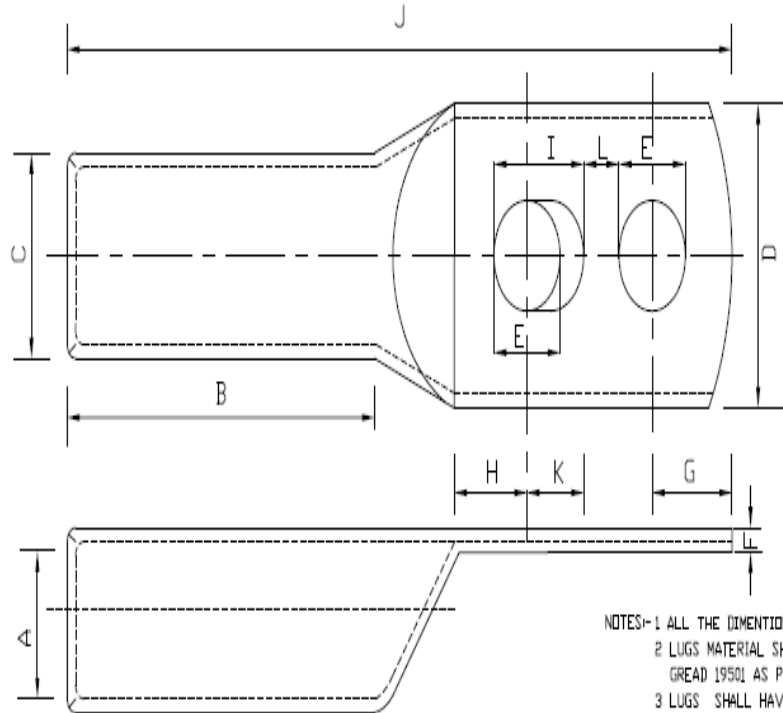
BSES

TITLE:-

Aluminum Tube Terminal Lug Long Barrel for 300sqmm
& 400sqmm cable round and sector-Single Hole

DWG No. >

ALUMINIUM DIN TYPE TERMINAL LUGS



- NOTES:-
1. ALL THE DIMENSIONS ARE IN MM
 2. LUGS MATERIAL SHALL CONFIRM TO ALUMINUM OF GRADE 19501 AS PER IS 5082
 3. LUGS SHALL HAVE MARKING AS PER RESPECTIVE SIZE AND 'BSES LOGO'
 4. BARREL SHALL BE CAPED & FILLED WITH OXIDATION INHIBITOR SO AS TO AVOID OXIDATION OF THE ALUMINUM
 5. CLEAR AND DISTINCT MARKING TO BE SPECIFIED ON BARREL LUG TO FACILITATE BETTER CRIMPING
 6. TWO SAMPLES OF SIMILAR SIZE TO BE SAMPLED FOR TEMPERATURE RISE TEST AND CHEMICAL COMPOSITION TEST ON EVENT OF ORDER.
 7. ALL CORNERS SHALL BE ROUNDED OFF.

SNO.	SIZE MM^2	E ± 0.1	A	C	D	B ± 1	H	K	I	L	G	J ± 1	F ± 0.2
1.	630 MM^2	18	31.5- 32	44.5- 45	63- 63.5	120	36- 36.2	25- 25.2	34- 34.2	16- 16.2	24- 24.2	245	12.5
2.	1000 MM^2	20	43- 43.5	56- 56.5	77- 77.5	140	38	26- 26.2	36- 36.2	16- 16.2	25	270	13

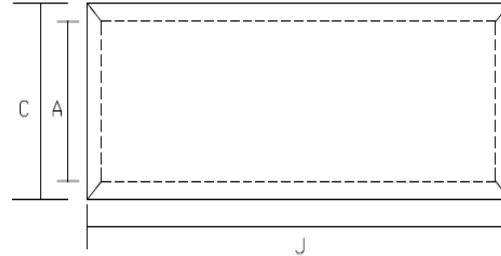
BSES

TITLE:-
Aluminum Tube Terminal Lug Long Barrel-
for 630 & 1000 sqmm round conductor-Double holes

DWG No.:-

COMPRESSION TYPE ALUMINIUM TUBULAR IN-LINE CONNECTORS FOR NON TENSION CONNECTORS OF ALUMINIUM CONDUCTORS

SIZE	A	C	J
25	6.8-7.1	12.0-12.5	65-75
50	9.3-9.6	16-16.5	80-90
95	13.2-13.6	22-22.5	100-110
150	16.3-16.7	25-25.5	120-130
300	23.3-23.7	34-34.5	140-150
400	26-26.4	38.5-39	205-215
630	34-34.4	50-50.5	235-245

**NOTES:-**

1. ALL THE DIMENTIONS ARE IN MM
2. REFERENCE : SPECIFICATION AS PER TABLE 2 OF IS-8308
3. MATERIAL : ELECTROLYTIC GRADE ALUMINIUM AS PER IS: 5082
4. FINISH : NATURAL




Technical Specification

For

66kV, Single core Cable

Specification no – BSES-TS-40-1C66-R0

Rev.	0
No. of Pages	31
Date	28 Apr 2022
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	BSES-TS-40-1C66-R0
TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE	

INDEX

1.0	SCOPE.....	3
2.0	STANDARDS & CODES.....	3
3.0	SERVICE CONDITIONS.....	3
4.0	DESIGN FEATURES.....	4
5.0	INSPECTION & TESTING.....	7
6.0	SHIPPING, HANDLING & SITE SUPPORT	8
7.0	DEVIATIONS.....	9
	Annexure – A Scope, Documentation and Delivery schedule	10
	Annexure–B: Guaranteed Technical Particulars (Data by Supplier)	11
	Annexure–C: List of Subvendor.....	18
	Annexure–D: Drawing of Sealing End Cap.....	21
	Annexure–E: Drawing of Cable pulling eye	22
	Annexure–F: BSES format (typical) for Quality Assurance Plan QAP	23
	Annexure–G: Testing and manufacturing process requirements w. r. t. TR- XLPE insulation	31
	Annexure–F: Deviation format	31

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE**1.0 SCOPE**

The scope of supply includes Design, Manufacture, testing at manufacturer's works before dispatch, packing, delivery including unloading and stacking of 66kV Single Core cable complete with all accessories at site/store.

2.0 STANDARDS & CODES

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

S No.	STANDARD	DESCRIPTION
2.1	IS-8130	Conductor for insulated electric cables & flexible cords
2.2	IS-5831	PVC insulation and sheath of electric cables
2.3	IS-3975	Mild steel wires strips and tapes for armoring cables
2.4	IS-5216	Guide for safety procedures and practices in electrical works
2.5	IS-7098 (Part – III)	Cross-linked polyethylene insulated thermoplastic sheathed cables specification.
2.6	IS – 10810	Methods of test of cables
2.7	IEC-60811	Common test methods for insulating and sheathing materials of electric cables and optical cables
2.8	IEC-60228	Conductor for insulated cables
2.9	IEC-60840	Power cable with extruded insulation and their accessories for rated voltage above 30kV up to 150kV- Test methods and requirements

3.0 SERVICE CONDITIONS

Cables to be supplied against this specification shall be suitable for satisfactory operation under the following service conditions-

3.1	Average grade atmosphere	Heavily polluted, Dry
3.2	Maximum altitude above sea level	1000M
3.3	Relative Humidity	100%
3.4	Ambient air temperature	Highest 50 Deg C Average 40 Deg C Minimum 0 Deg C
3.5	Operating temperature	0 Deg C - 50 Deg C
3.6	Rainfall	750mm concentrated in four months

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE**4.0 DESIGN FEATURES**

S No.	Parameters	Technical Requirements	Offered by Vendor
4.1.0	Manufacturing process	The cable shall be manufactured by “Triple head extrusion process”. The conductor screen, Insulation & Insulation screen shall be co-extruded by onetime process to ensure homogeneity and reduction of voids in the insulation and the screening system of the cable, whereby enhancing the life of the cable. The cable shall be strictly manufactured by “DRY CURE and DRY COOLING ” process.	
4.2.0	Conductor	Electrolytic grade aluminum conductor shall consist of flexibility class-2 in accordance with IS 8130/IEC 60228. The shape of conductor shall be compacted, stranded, and circular.	
4.3.0	Longitudinal water sealing of conductor	Shall be achieved by water swelling fibers in the interstices of the conductor. The fibers shall turn into jelly/swell, when in contact with water making the conductor water tight.	
4.4.0	Semi conducting separator tape	Semi-conducting separator tapes shall be applied over the conductor, suitable for continuous operating conductor temperature of 90°C.	
4.5.0	Conductor screen	The conductor screen shall consist of extruded semi-conducting compound which shall be fully compatible with the conductor and extruded insulation. Outer surface of semiconductor screen shall be super smooth, cylindrical and firmly bonded to the overlaying insulation.	
4.6.0	Insulation	The extruded WTR - XLPE insulation shall be of very high degree of purity. The average thickness shall not be less than nominal value as given in annexure “B”. The minimum thickness at any point shall not be less by more than 10% of the nominal value. Percentage eccentricity of the insulation shall not be more than 10%.	
4.7.0	Insulation Screen	The insulation screen shall consist of extruded semi-conducting compound which shall be fully compatible with extruded insulation. Insulation screen shall be firmly bonded to the insulation.	

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

S No.	Parameters	Technical Requirements	Offered by Vendor
4.8.0	Make of insulation and semi conducting screen	For Insulation: WTR-XLPE of Dow/Borealis/Hanwa For Conductor & Insulation Screen: Semiconducting compound of Dow/Borealis/Hanwa Any deviation to above shall not be acceptable.	
4.9.0	Core	The ovality of the core shall not be more than 5%.	
4.10.0	Inner Longitudinal water sealing bedding	Semi-conducting water swell-able tapes shall be applied over the extruded semi-conducting insulation screening with a minimum overlap of 10%.	
4.11.0	Metal screening (if required to meet the short circuit rating)	The metallic screen shall consist of a layer of copper tape applied in helical form. Copper tape overlap: Minimum 10%	
4.12.0	Outer Longitudinal water sealing bedding (if metallic screening is provided)	Semi-conducting water swell-able tapes shall be applied over the metallic screen again with a minimum overlap of 10%.	
4.13.0	Metallic sheath	The metallic sheath shall be made of Corrugated aluminum sheathing with minimum thickness of 1.75mm and nominal thickness of 1.8mm, provided with high-viscosity bitumen-based compound coating, in conjunction with textile tape as carrier material for corrosion protection of the outer surface of corrugated aluminium sheathing. Further the corrugations shall be filled with compatible filler material to provide smooth round surface over the aluminium corrugated sheathing, so as to prevent ingress / traveling of water along the corrugations	
4.14.0	Outer Sheath	The outer sheath shall consist of extruded black colored HDPE type ST-7 with anti-termite protection. The Minimum thickness shall be 3.3 mm at any point. Nominal Thickness shall be 4 mm. Carbon black content shall be 2.5 ±0.5%	
4.15.0	Semi conductive layer over the	Extruded Semi conductive layer shall be either extruded or graphite coating.	

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

	outer sheath		
4.16.0	Cable Rating	The cable size shall be suitable to carry rated load current on 66 kV continuously without exceeding the maximum conductor temperature of 90 ⁰ C.	
4.17.0	Drum Length	500 meter +/- 5% (short lengths not acceptable except the last length and minimum acceptable short length shall be 250 meters.). The Overall tolerance - 2 % for the total cable length of the entire order Manufacturer shall not be allowed to put two cable pieces of different short length in same cable drum.	
4.18.0	Embossing	<p>The extruded outer sheath shall be embossed with meter marking at interval of 1 meter. Meter marking shall start from zero in every drum.</p> <p>The "A" end meter marking and "Z" end meter marking and the drum lengths shall be printed on the drum flange along with other markings.</p> <p>The outer sheath shall also be embossed with (min.)</p> <ul style="list-style-type: none">a) Voltage designationb) Type of construction/cable code (e.g.A2X2Y)c) Number of core and nominal cross sectional area.d) Type of cable "Electric Cable"e) Manufacturers name & trademarkf) Name of buyer (e.g.BSES)g) Month & year of manufacturingh) Batch no / Lot no.i) Sequential length markingj) Purchase order number & datek) ISI markl) Individual Drum number <p>Progressive sequential marking shall be start at zero for each drum</p>	
4.19.0	Joints and Terminations	The Joints and Terminations to be offered with the cable shall be fully type tested as per IS 60840. The Joints and Terminations shall match all technical performance parameters of the specified cable. The Joints and Terminations would be either Heat Shrink or Cold-Shrink.	

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE**5.0 INSPECTION & TESTING**

S No.	Parameters	Technical Requirements	Offered by Vendor
5.1.0	Type test	<p>The cable and the associated accessories like Joints and terminations of same voltage, design and number of cores shall be Type Tested from CPRI/ERDA as per IEC 60840/IS7098 (part-3) with latest amendments.</p> <p>Type test report (from CPRI/ERDA only) of not more than five (5) years old shall be submitted for the same type, size and voltage rating of the cable offered, along with the bid to qualify in the tender.</p> <p>All type tests shall be carried out in accordance with IEC-60840 / IS 7098 (part-3) and in accordance with the sequence prescribed therein.</p> <p><u>Type Test Required After Award of PO:</u></p> <p>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>	
5.2.0	Routine test	<p>a) Each drum length of cable shall be subjected to the tests as mentioned in IEC 60840, IS 7098 (Part-3), IEC 60229 and IS 10810</p> <p>b) Impulse voltage test of one drum and Physical dimension of each and every layer along with component.</p>	
5.3.0	Acceptance Tests	<p>The sampling & acceptance tests shall be conducted as per IEC: 60840 / IS: 7098 (Part-3) and approved BSES QA plan for each lot of cable during the inspection of lot at manufacturer's works.</p>	

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

5.4.0	Special tests	The following tests shall be carried out as special tests a) Conductor examination as per IEC-60840 for conformance of IEC 60228/IS 8130. b) Measurement of thickness of insulation as per Clause 10.6 of IEC- 60840 and Clause 8 of IEC- 60811-1-1./ IS 10810 part 6 c) Void and contamination as per IS 7098 (Part-3) d) Sheath Integrity Test e) Carbon black content test in Inner sheath & Outer Sheath f) Hot set test for TR-XLPE insulation as per Clause 10.9 of IEC-60840/ IS 10810 Part 30	
5.5.0	Inspection	The buyer reserves the right to inspect cables at the Seller's works at any time prior dispatch, to verify compliance with the specifications. In-process and final inspection call intimation shall be given in 10 days advance to purchaser. In the event of any discrepancy in the test reports i.e. test reports not acceptable or any type tests(including special /additional tests, if any) not carried out , same shall be carried out without any cost implication to BSES before dispatch of cable.	
5.6.0	Test certificates	Three sets of complete test certificates shall be submitted along with the dispatch documents.	

6.0 SHIPPING, HANDLING & SITE SUPPORT

6.1.0	Packing	The cable shall be wound on non-returnable steel drums of suitable size of minimum hub diameter of 20D (where D is the overall diameter of the cable) and packed conforming to international standards. The drum shall be fully enclosed by suitable packing preferably PP sheeting. Cable shall have sea worthy packing in case cables are dispatched by shipping lines.
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TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

6.2.0	Pulling eye & sealing of Cable ends	A cable pulling eye shall be provided at “Z” end of cable on each drum. Suitable fillings/putty shall be used for sealing gap between outer sheath and pulling eye. Heat shrinkable sleeves with the pulling eye shall also be provided. The pulling eye shall be directly connected to the conductor and be capable to withstand a tensile load of 30N/mm ² of conductor area. The “A” end of the cable shall be sealed with filling material/putty and heat shrinkable cap. Drawing of the pulling eye shall be submitted along with the bid for review.
6.3.0	Drum identification label	<p>The following information shall be marked on the drum:</p> <p>The following information shall be marked on the drum:</p> <ul style="list-style-type: none">a) Drum identification numberb) Trade name or trade mark; if anyc) Name of manufacturerd) Name of buyer i.e. BSESe) Nominal sectional area of the conductor of the cablef) Type of cable and voltage for which it is suitableg) Length of the cable on the drum, with “A” end and “Z” end markingsh) Purchase order number with SAP item codei) Year and month of manufacturingj) Direction of rotation of drum (an arrow)k) Net weight of cable in drum and gross weight of cable with druml) Batch no or Lot no.
6.4.0	Shipping	The seller shall give complete shipping information concerning the gross weight, size of each packing.
6.5.0	Handling & Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet/manual needs to be furnished before commencement of supply.
6.6.0	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

7.0 DEVIATIONS

7.1	Deviation	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.
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TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE**Annexure – A****Scope, Documentation and Delivery schedule**

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

- i. All documents/drawings shall be provided in soft copy only in returnable Pen drives
- ii. Language of the documents shall be English only.
- iii. Incomplete submission shall be liable for rejection.
- iv. Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch.
- v. No submission is acceptable without check list compliance.
- vi. Deficient/ improper document/ drawing submission shall be liable for rejection.
- vii. Order of documents shall be strictly as per the check list.
- viii. Any drawing not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope.

S No.	Description	Bid	Approval	Pre Dispatch
8.1	Guaranteed Technical Particulars (GTP)	required	required	
8.2	Deviation Sheet, if any	required	required	
8.3	Detailed cross sectional drawing of cable	required	required	
8.4	Type test reports for the offered type and rating of cable and joints & terminations	required	required	
8.5	Complete product catalogue and Manual	required	required	
8.6	Certification for quality standards	required		
8.7	Make of Raw Materials	required	required	
8.8	Cable de-rating factors	required	required	
8.9	Dimensional drawing for pulling eye & End cap		required	
8.10	Manufacturer's Quality Assurance Plan		required	
8.11	Program for production and testing		required	
8.12	Detailed installation & commissioning instructions		required	
8.13	Test certificates of all raw materials			required
8.14	Inspection and routine test reports, carried out in manufacturer's works			required

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE**Annexure–B: Guaranteed Technical Particulars (Data by Supplier)**

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
1	Name of Manufacturer			
2	Country of manufacturer			
3	Type of cable			
4	Standard according to which cable is manufactured			
5	Rated voltage	kV	38/66	
6	Highest system voltage	kV	72.5	
7	System frequency	Hz	50	
8	No of phases per circuit	Nos	3	
9	System earthing		Solidly grounded	
10	Rated short time current of conductor	kA		
11	Rated short time current of metal sheath (alone)	kA		
12	Rated short time current of metal screen (if provided)	kA		
13	Rated short time current of metal sheath and screen	kA	19	
14	Duration of short circuit current	Sec	1	
15	Impulse withstand voltage 1.2/50 micro sec wave	kVp	325	
16	Power frequency withstand voltage	kV(rms)	140	
17	Conductor			
a)	Nominal cross sectional area	mm ²	1000 / 630	
b)	Type class of conductor		Compacted Stranded Circular	
c)	Material of conductor		Aluminum	
d)	Flexibility class of conductor		Class -2	
e)	Minimum numbers of strands	No.		
f)	Diameter of strands before compaction. (nominal / Minimum)	mm / mm		
g)	Material of longitudinal water sealing filling of conductor			

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
18	Details of semi conducting tape over the conductor			
19	Conductor Screen			
a)	Material and type			
b)	Minimum thickness	mm	0.8	
c)	Make and grade of semi conducting compound.			
20	Insulation			
a)	Material of Insulation		TR-XLPE	
b)	Nominal thickness	mm	11	
c)	Minimum thickness		9.9	
d)	Make and grade of insulation compound			
e)	Maximum dielectric stress at the conductor surface	kV/mm		
21	Insulation screen			
a)	Material and type			
b)	Minimum thickness	mm	0.8	
c)	Make and grade of semi conducting compound.			
22	Inner water swellable tape			
a)	Nominal thickness	mm	0.3	
b)	Minimum swell height in one minute.	mm	12 mm in one minute	
c)	Water swallable tape overlap	%	min 10%	
23	Copper tape required to meet the short circuit rating (if provided)			
a)	Thickness and width of copper tape	mm / mm		
24	Outer water swellable tape	mm		
a)	Nominal thickness	mm	0.3	

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
b)	Minimum swell height in one minute.	mm	12 mm in one minute	
c)	Overlap	%	10% min	
25	Nominal diameter under metal sheath	mm		
26	Material of the metal sheath		Corrugated aluminum(with corrosion protection& corrugation filling)	
27	Minimum thickness of Corrugated Aluminum sheath	mm	1.75	
28	Nominal radial clearance allowed under metal sheath (in case of corrugated aluminum sheathing)	mm	Vendor to provide	
29	Nominal diameter over metal sheath	mm		
30	Outer Sheath			
a)	Material and type		HDPE type ST 7	
b)	Minimum thickness	mm	3.3	
c)	Nominal thickness	mm	4	
d)	Anti termite treated?		Yes / No	
e)	Color		Black	
31	Material of semi-conductive coating/extrusion over the outer jacket			
32	AC test voltage at works for insulation.	KV(rms)	90	
33	DC test voltage at works for outer jacket.	KV (DC)	25	
34	Overall dia of completed single core cable	mm		
35	Weight per meter of complete cable	kg/m		

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
36	Short circuit capacities with maximum conductor temperature of 250Deg C : (conductor temperature of 90 Deg C at the commencement of short circuit) a) 0.5 second duration b) 1 second duration c) 2 second duration d) 3 second duration	kA		
37	Minimum radius of bend round: which cable can be laid a) Direct burial inground b) Inducts	mm		
38	Maximum D.C. resistance of conductor per KM at 20 ⁰ C	Ohm/km	0.0469 for 630 mm ² cable 0.0291 for 1000 mm ² cable.	
39	Maximum AC resistance of conductor per KM at 90 deg. C	Ohm		
40	Equivalent star reactance per KM of 3 phase circuit at 50 Hz	Ohm		
41	Maximum electrostatic capacitance per KM of cable	pf		
42	Maximum continuous current carrying capacity per circuit when laid in ground as per the following parameters (with screens cross bonded) -Maximum continuous conductor temperature of 90 ⁰ C -Maximum conductor temperature during short circuit of 250 ⁰ C -Ground temperature of 30 ⁰ C -Soil resistivity of 1500C- cm/Watt -Depth of laying of 150cm	Amp		
43	Maximum continuous current carrying capacity per cable when laid in air with ambient temperature of 40 ⁰ C and other	Amp		

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
	parameters as per S no 42 (with screens cross bonded)			
44	Rating factors for ambient air temperature attached	Yes/No		
45	Rating factors for ground temperature attached	Yes/No		
46	Rating factors for phase spacing in flat formation attached	Yes/No		
47	Rating factors for grouping of cable laid in ground in horizontal formation attached	Yes/No		
48	Rating factors for grouping of cable laid in ground in tri-foil touching formation attached	Yes/No		
49	Rating factors for thermal resistivity of soil attached	Yes/No		
50	Rating factors for depth of laying attached	Yes/No		
51	Max.power factor of charging KVA of cable when laid direct in the ground at normal voltage frequency at conductor temperature at 90°C			
52	Max.dielectric power loss of cable per km of 3 phase circuit laid direct in ground at normal voltage, frequency and maximum conductor temperature of 90°C	Watt /km		
53	Sheath loss of cable per KM of 3 phase circuit at normal voltage frequency at maximum continuous current rating. a) Laid direct inground b) Drawn into ducts c) Installed in air	Watt/km		
54	Impedance per KM of 3phase circuit at 50 C/s and maximum conductor temperature. a. Impedance	Ohm		

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
	b. Reactance c. Positive and negative sequence d. Zero sequence e. Capacitance f. Conductance g. Inductive susceptance h. Conductive susceptance			
55	Standard drum length of cable	meters	500 +/- 5% (short lengths not acceptable except the last length)	
56	The overall quantity tolerance	%		
57	Cable to be wound on non returnable steel drum.	Yes/No	Yes	
58	Normal delivery length	meters		
59	Cable pulling Eye to be provided at "Z" end A End shall be provided with sealing end cap	Yes		
60	Tensile load withstand capacity for pulling eye		30 N / mm ²	
61	Approximate shipping weight for the normal deliver length with the drum size (flange dia. in mm and width in mm)	kg		
62	Drum size and weight (Flange dia X flange width X hub dia)			
63	Embossing details on outer sheath			
64	Sequential marking at every meter		Provided	
65	Process of cross linking of polyethylene.			
66	Induced Voltage in sheath, cable			
a)	In trefoil formation	V/km		
b)	In flat formation with D+70	V/km		

BSES	BSES-TS-40-1C66-R0
TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE	

S No.	Description	Unit	Data specified by the purchaser	Data to be filled by the manufacturer
67	Cross Sectional Drawing of offered cable design with layer wise component details		To be provided by bidder	

BSES	BSES-TS-40-1C66-R0
TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE	

Annexure - C

List of Sub-Vendors for critical items

Vendor/Bidder to state sub-vendors' names for other items, wherever approved names are not mentioned, for purchaser's approval during tendering stage else purchaser shall impose as per their requirement and bidder to follow the same in post-order stages.

Ser. No.	Raw Materials		Name of the Make
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	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

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

Ser. No.	Raw Materials		Name of the Make
5.	Aluminium Rod	1	Bharat Aluminium Co. Ltd. (BALCO)
		2	Hindustan Aluminium Co. Ltd. (HINDALCO)
		3	National Aluminium Co. Ltd. (NALCO)
		4	Vedanta (Sesa Sterlite)
6.	Copper Tape	1	Aggarwal Metal
		2	Indian Smelting
		3	Luvata Swedan
		4	Outokumpu Copper Strip AB, Swedan
7	Galvanised 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



BSES-TS-40-1C66-R0

TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE

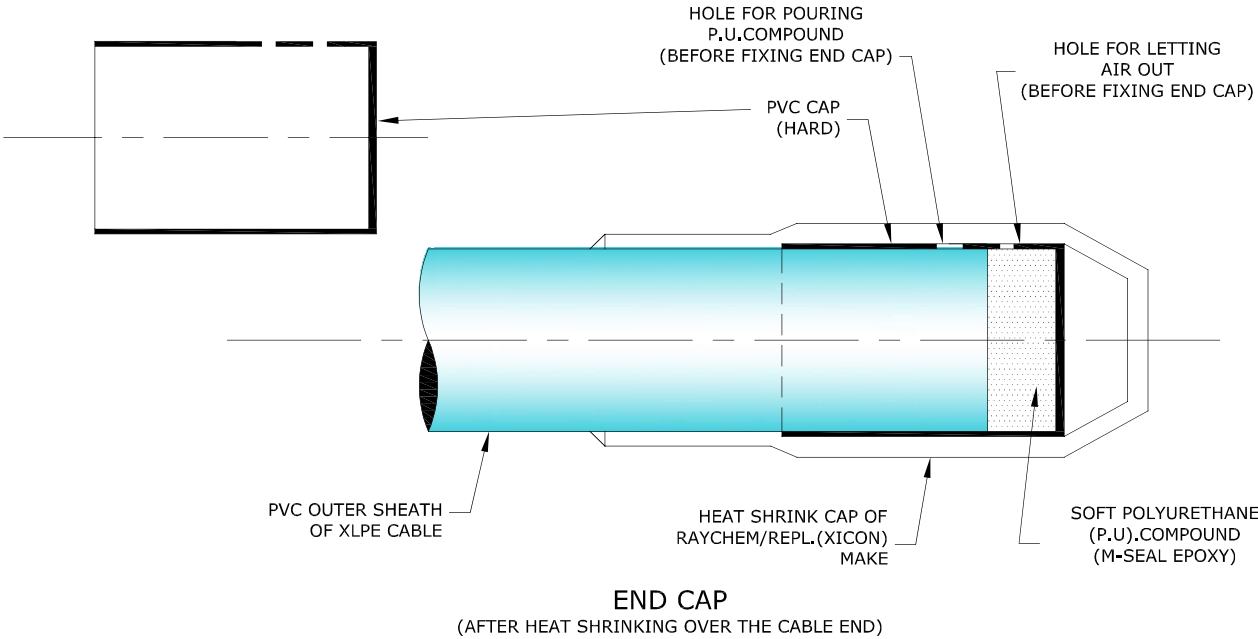
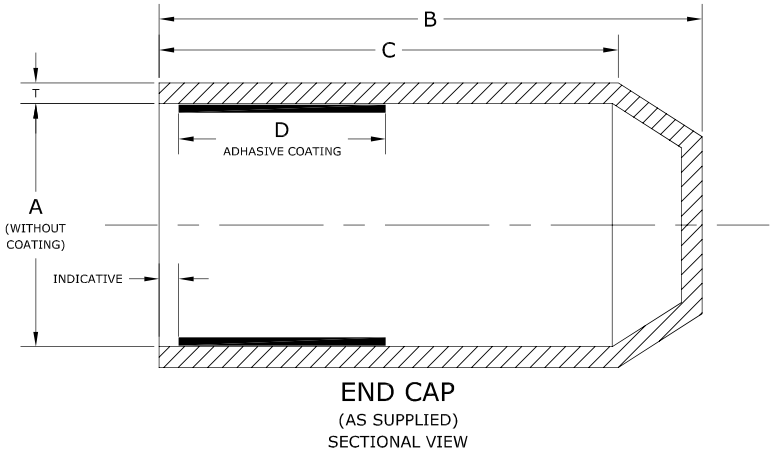
Ser. No.	Raw Materials		Name of the Make
		3	Vijoy Polymers
11	PE Compound	1	Borealis
		3	Shakun
		4	Kalpana

ANNEXURE -D

DIMENSIONS

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

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



MATERIAL SPECIFICATIONS

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

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

BSES

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

SCALE :NOT TO SCALE

DATE: 09-05-2011

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

DRAWN BY:

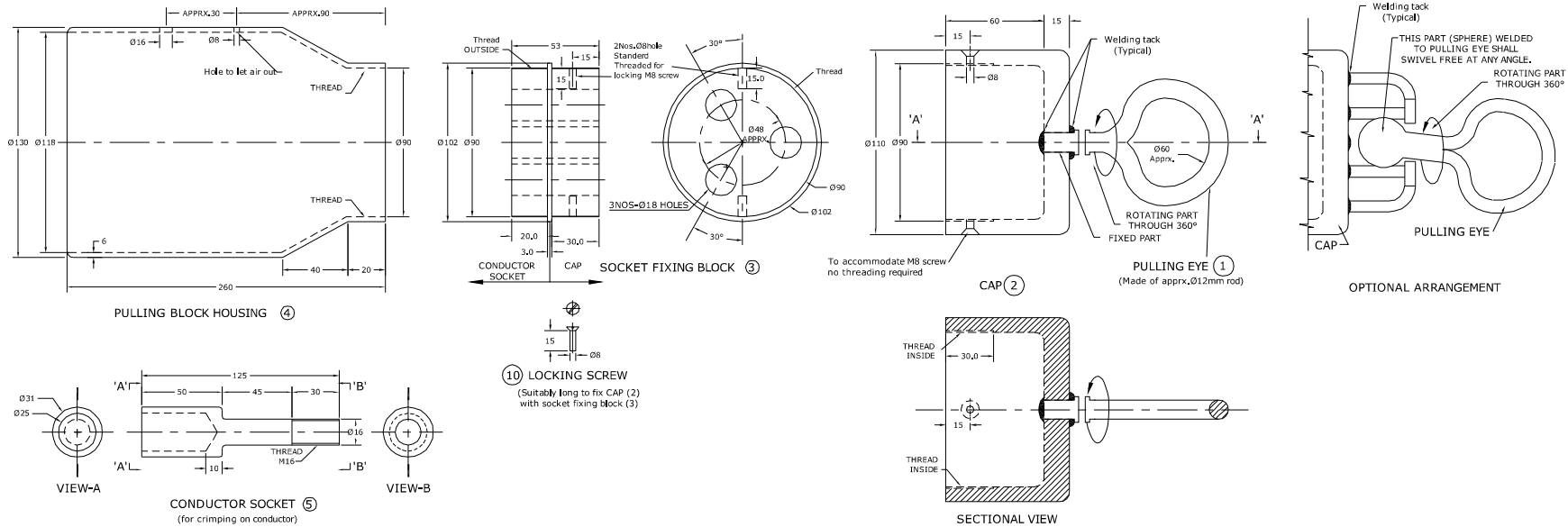
CHECKED BY:

APPROVED BY:

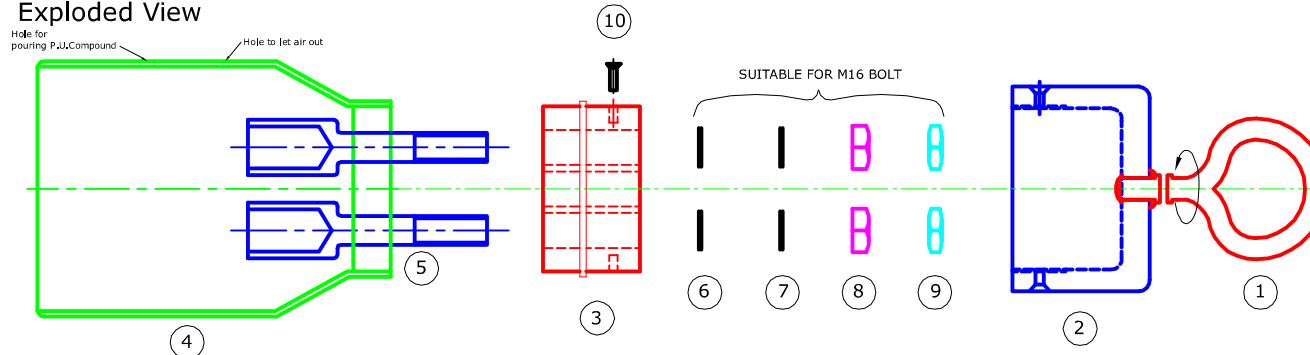
REVISIONS

Addl V.P.

ANNEXURE -E



Exploded View



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

BSES

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

SCALE :NOT TO SCALE

DATE: 09-05-2011

CABLE PULLING EYE ASSEMBLY (TYPICAL)

DRAWN BY:

CHECKED BY:

APPROVED BY:

REVISIONS

Addl V.P.

EXAMPLE:

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

NOTE:

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

Final Assembly

ANNEXURE-F



QUALITY ASSURANCE PLAN (QAP) FOR 66 kV EHV CABLES

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



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

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



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

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



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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/III	IS 7098/III	Test Report	-	P	V	
		b) Conductor Resistance	Critical	Electrical	100 %	IS 8130/84	IS 8130/84	Test Report	-	P	V	
		c) Partial Discharge	Critical	Electrical	100 %	IS 7098/III	IS 7098/III	Test Report	-	P	V	
		d) Impulse	Critical	Electrical	One sample per lot			Test Report		P	V	
		e) Armour Coverage	Critical	Physical	One sample per lot			Test Report		P	V	
		f) Physiacal Dimensions	Critical	Physical	One sample per lot			Test Report		P	V	
		g) Freely Strippable insulation screen (Strippability Test)	Major	Physical	One sample per lot	Factory Standard	Factory Standard	Test Report	-	P	V	
2	Stage Inspection	Wire Drawing	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	Stage Inspection shall be conducted subject to BSES requirement
		Extrusion process	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Raw maerial inspection at factory	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Wrapping of Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Tensile test for Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		a) Annealing test for copper	Major	Physical	Appendix A to IS 7098/III, each lot sample basis	IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records.
		b) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		c) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Tests N/A on finished conductor.
		d) Conductor resistance test	Major	Electrical	Appendix A to IS 7098/III, each lot sample basis	IS 8130/84	IS 8130/84	Test Report	-	P	W	
		e) Test for thickness of insulation & sheath	Major	Physical		IS 7098/III & Tech. Data sheet	IS 7098/III & Tech. Data sheet	Test Report	-	P	W	
		f) Hot set test for insulation	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,												
P : Perform, W : Witness, V : Verification												
3	Acceptance tests	g) Tensile strength & Elongation at break of insulation & outer sheath	Major	Physical		IS 7098/III & IS 5831/84	IS 7098/III & IS 5831/84	Test Report	-	P	W	
		h) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		i) High voltage test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		j) Insulation resistance (Volume resistivity) test	Major	Electrical	Each Lot Sample Basis	IS 7098/III	IS 7098/III	Test Report	-	P	W	
		k) Tests for dimension of armour wires/strips	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		l) Test for anti termite & anti rodent property of outer sheath	Major	Physical		Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	W	
		m) Rewinding of cable on drum	Major	Visual		To check cable appearance, drum appearance, cable winding, packing, embossing/printing/sequential marking		Reg./Sheet	-	P	W	
		n) Void & contamination test for insulation (Silicon Oil test)	Major	Physical				Reg./Sheet	-	P	W	
		o) Wafer boil test for extruded semi-conducting layers	Major	Physical				Reg./Sheet	-	P	W	
		p) Freely Strippable insulation screen	Major	Physical		Factory Standard	Factory Standard	Test Report	-	P	W	
		q) Water Penetration test (WPT) on core (i.e. Logitudinal Water Blocking Test)	Major	Physical		IEC:60502	IEC:60502	Test Report	-	P	W	Test shall be conducted for leakage of water through conductor.
		r) Armour coverage	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		s) Ovality	Major	Physical		As per data sheet	As per data sheet	Test Report	-	P	W	
		t) Eccentricity	Major	Physical		As per data sheet	As per data sheet	Test Report	-	P	W	
		u) Mass & uniformity & zinc coating on armour	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		v) Resistivity of Strip armour	Major	Electrical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		w) Swelling height of water swellable tape	Major	Physical		As per data sheet & FS	As per data sheet & FS	Test Report	-	P	W	
		x) Flammability test	Major	Physical		As per IS-78098/II/2011	As per IS-78098/II/2011	Test Report	-	P	W	
		y) Impulse withstand test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification, P : Perform, W : Witness, V : Verification											
		z) Ageing & Water absorption test(Gravimetric) on Insulation & Outer sheath	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		z1) Heating Cycle with Potential	Critical	Electrical	sample basis, once per PO			Test Report	-	P	W	
		z2) Raw Material Verification in all aspects	Major	Physical	Each Lot					P	W	
4	Type tests at vendor's works	a) Tests on conductor			One sample per Tender							
		i) Annealing test for copper	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records. Tests N/A on finished conductor.
		ii) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iii) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iv) Conductor resistance test	Major	Electrical		IS 8130/84	IS 8130/84	Test Report	-	P	V	
		b) Tests for armouring wires/strips										
		i) Dimensions of wire/strip	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		ii) Tensile strength & Elongation at break	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	Only for Steel wires/strips
		iii) Torsion test for wire	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		iv) Winding test for strip	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		v) Uniformity of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vi) Mass of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vii) Resistivity of wire/strip	Major	Electrical		IS 3975	IS 3975	Test Report	-	P	W	
		c) Test for thickness of insulation & sheath	Major	Physical		IS 7098/III & Tech. Data sheet	IS 7098/III & Tech. Data sheet	Test Report	-	P	W	
		d) Physical tests for insulation									W	
		i) Tensile strength & Elongation test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iii) Hot set test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iv) Shrinkage test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		v) Water absorption (gravimetric)	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		e) Physical tests for outer sheath									W	
		i) Tensile strength & Elongation test at break	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		iii) Shrinkage test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	



**QUALITY ASSURANCE PLAN (QAP)
FOR 66 kV EHV CABLES**

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,											
	P : Perform, W : Witness, V : Verification											
		iv) Hot deformation test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		v) Loss of mass in air oven	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		v) Heat shock test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		vi) Thermal stability test	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		f) Electrical tests in sequence									W	
		i) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ii) Bending test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iii) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		iv) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		v) Dielectric power factor as a function of temperature	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		vi) Heating cycle test	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		vii) Dielectric power factor as a function of voltage	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		viii) Partial discharge test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		ix) Impulse withstand test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		x) High voltage test	Critical	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		g) Insulation resistance (Volume resistivity test)	Major	Electrical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
		h) Flammability test	Major	Physical		IS 7098/III	IS 7098/III	Test Report	-	P	W	
D PACKING & MARKING												
1	Packing & Marking	a) Cable end sealing	Major	Visual	100 %	IS 7098/III/ Agreement	IS 7098/III/ Agreement	-	-	P	W/V	BSES representative may verify these characteristics on randomly selected drums.
		b) Pulling eye at leading end- removed from vendor scope, end cap shall be provided at both the end of cable	Major	Visual	100 %	As per agreement	As per agreement	-	-	P	W/V	
		b) Stencilling/Marking on drum	Minor	Visual	100 %	IS 7098(Part 2):2011/ Agreement	IS 7098(Part 2):2011/ Agreement	-	-	P	V	



QUALITY ASSURANCE PLAN (QAP)

FOR 66 kV EHV CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BSES	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,											
	P : Perform, W : Witness, V : Verification											
Note		1. Checks specified above for Raw Material, In-Process and Final Inspection shall be as relevant to the specific cable construction.										
		2. Number of samples shall be selected as per Factory Standard/Agreement wherever 'sample' is indicated for extent of check.										
		3. Plant standards shall be followed in case Technical Data Sheet does not include requirements for characteristics to be checked.										
		4. BSES may witness Raw material and in process inspection in addition to Routine/Acceptance tests at any time/stage of manufacturing.										
		5. BSES's Inspector may randomly select a cable drum for type testing at vendor's works.										
		6. For each of the offered lot for inspection, BSES may randomly select one cable drum for testing of end cap "Destructive testing" to verify adhesion of sealing cap to cable outer sheath.										
		7. All factory Type Tests shall be Witnessed by BSES										

BSES	BSES-TS-40-1C66-R0
TECHNICAL SPECIFICATION FOR 66KV SINGLE CORE CABLE	

Annexure- G

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-H: Deviation Format

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



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

Specification no – BSES-TS-45-TERM-R0

Rev:	0
Pages	22
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Index

Record of Revision	3
1.0.0 Scope of work	4
2.0.0 Codes & standards	4
3.0.0 Cable Construction	5
4.0.0 Cable Termination Kits	7
5.0.0 Quality Assurance (QA)	12
6.0.0 Deviations	13
7.0.0 Delivery	13
8.0.0 Inspection Expenses	13
9.0.0 Penalty	13
Annexure – A: Guaranteed Technical Particulars (GTP)	14
Annexure – B: Kit Content Table (KCT)	16
Annexure – C: Routine and Acceptance Test	17
Annexure – D: Technical Deviation Sheet	17
Annexure – E: Service Conditions	18
Annexure – F: Bimetallic Aluminium / Copper Lug	19
Annexure – G: Aluminum/Copper Lug For XLPE Cable	20
Annexure – H: SOP	21



BSES-TS-45-TERM-R0

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

Record of Revision

Item/Clause No.	Change in Specification	Approved By	Rev

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 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	Voltage Grade	Cable Size	Application	Material of Lug	Connection Method
		11 kV	3Cx150, 3Cx300 and 3Cx400 sq mm	Indoor	Bi-Metal	Crimping
				Outdoor	Bi-Metal/ Aluminium as per tender requirement	Crimping
			1Cx1000 sq mm	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
		HTAB (indoor not required)	1Cx95	Outdoor	Aluminium	Crimping
			1Cx150	Outdoor	Aluminium	Crimping
		33 kV	3Cx400 sq mm	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
			1Cx1000 sq mm	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
		66 kV	3Cx300	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
			1Cx630, 1Cx1000 sq mm	Indoor	Aluminium	Crimping
				Outdoor	Aluminium	Crimping
* For Bimetallic Lug Copper portion shall be tinned						

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

		<p>a) For GIS cable termination kits: Plug in type, Conductor connection assembly shall be by standard method of split, silver-plated copper cone and pressure-fit contact assembly or as per manufacturer's standard.</p> <p>b) Top corners of all lugs shall be circular shape not rectangular. Refer Annexure F for details.(Except GIS kit)</p>			
4.2.2	Stress Control System	<p>a) The earthed insulation screen of an XLPE cable is terminated at a suitable distance from the conductor.</p> <p>b) The tube is in electrical contact with insulation screen.</p> <p>c) Impedance of the tube shall be constant up to an operating temperature and shall be within the range 1×10^{08} ohm-cm to 8×10^{08} ohm-cm.</p> <p>d) Length of stress control tube for 11 kV and 33 kV shall be 130 mm and 260 mm respectively or according to insulation tube length. For 66kV termination kits, stress control tube shall be as per type tested design.</p> <p>e) The physical and electrical properties shall conform to ESI 09: 13.</p> <p>f) For GIS cable termination kits Stress control shall be by means of a polymeric stress cone. External profile of the cone shall match inner profile of GIS epoxy bushing. Vendor shall specify the material (EPDM / Silicone) of the cone.</p>			
4.2.3	Insulation Protection	<p>a) XLPE insulation shall be protected by means of an outer tube, resistant to tracking and weathering.</p> <p>b) One end of the tube shall be coated internally with red sealant mastic for a length of 50 mm.</p> <p>c) Physical and Electrical properties shall conform to ESI 09: 13.</p> <p>d) Insulation Tube length for termination- shall be 650 mm for both Indoor and Outdoor Termination kits of 11kV, 3CX150, 3CX300 and 3CX400 sqmm cable. All other accessories related to termination shall be according to 650mm insulation tube length.</p>			
4.2.3.1	Outer Anti-tracking Tube	<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 cbles is as following: 11 kV U/G Cable – 11 kA for 1 sec 33 kV Cable – 31.5 kA for 1 sec 66 kV Cable – 31.5 kA for 1 sec 11 kV HTAB Cable – 11 kA for 1 sec</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.</p> <p>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.</p> <p>b) This tag is required to be tied over the cable at one side of the joint.</p> <p>c) The paper tag shall give following information</p> <ol style="list-style-type: none">1) Vendor kit designation2) Division3) Breakdown ID/Shutdown ID/Scheme No.4) Cable section5) Type of joint6) Size of Joint7) Make of joint8) Voltage class

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

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

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

4.6.1	Along with the Bid	Vendor shall submit signed 3 sets (plus 1 set of soft copy) of following documents: a) GTP (duly filled-in) (as per Annexure - A). b) Cross-sectional drawings for components Assembly c) Type Test Certificates d) Complete Catalogue and Instructions. e) Any other document.
4.6.2	After Award of Contract	Vendor shall submit signed 2 sets (plus 1 set of soft copy) of above mentioned documents within 15 days, for Purchaser's approval.
4.6.3	"As-Built" documents	Final signed "As-built" documents for the equipment in 3 sets (hard copy), 1 no. soft copy and 1 no. CD. These documents shall include signed Routine & Acceptance Test Certificates also.
4.7.0	Packing, Marking, Shipping, Handling and Storage	Every component/kit/box shall be properly sealed/ packed for protection against damage.
a)	Identification Labels:	Markings / Labels shall be on both sides of every packed box. 1) Identification number/type designation (as per manufacturer's standard) 2) Voltage grade, size, description of the Kit (including the voltage grade, size, type of the cables, for which it is to be used) 3) Batch no., lot no., etc. 4) Quantity 5) a) Purchase Order no. & date b) Purchaser's name c) BSES's SAP code number 6) Weight (kg) of each Cable Termination Kit and of each box containing kits. 7) Manufacturer's name 8) Month & Year of Manufacturing 9) Date of packing, Shelf life (if applicable) 10) In case, the termination kit is for RMU, following text shall be written in bold letters, with higher font size : "For RMU Application".
b)	Transit damage	The seller shall be responsible for any transit damage due to improper packing.

5.0.0 Quality Assurance (QA)

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

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

6.1.0.	Deviations	<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.


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)

[illegible]

	BSES-TS-45-TERM-R0
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)	

18	Printing details on each of the Heat- shrinkable and Moulded components	(Mention the text, presently printed on each of the component)	
19	OFC kit (For OFC embedded cable only 66Kv, 3CX300 sqmm, 33Kv, 3cx400 sqmm and 11kv, 3cx400 sqmm)	Yes/no	

Annexure – B: Kit Content Table (KCT)

Vendor shall submit KCT as a consolidated table, consisting of all data, such as:

A. Heading

1. Voltage grade, size, description of the Kit
(Including the voltage grade, size, type of the cables, for which it is to be used)
2. Type designation (as per manufacturer's standard)

B. Details / Parameters

(For each component/item of the KCT)

1. Lot no. /Batch no., etc.
2. Item number (manufacturer's standard)
3. Description
 - a) Material, type, make and grade
 - b) Dimensions cross sectional area
 - c) Colour,
 - d) Other description, if any
4. Function of the item
5. Quantity
6. Make/Name/Location of manufacturer/sub-vendor
7. a) Minimum supplied (or in expanded form) diameter
 - b) Maximum freely recovered diameter
8. a) Minimum supplied (or in expanded form) thickness
 - b) Maximum freely recovered thickness

C. Notes on the KCT

Markings, printings, other details for individual/group of components are to be mentioned on KCT. For example:

- a) Printing of item code, size, batch no., etc.
- b) Printing on components
- c) Other embossing or engraving, if any.

(Note: Vendor may attach an Annexure, for any additional information, if required.)

Annexure – C: Routine and Acceptance Test**A. Visual Examination**

Condition of selected items / components, as per sampling method, shall be recorded. Some of the normal check-points can be as follows:

1. Every component shall be verified in quantity and description as per KCT.
2. All items shall be free from any defects, pin holes, cracks, etc.
3. Metallic components to be free from sharp edges.

B. Measurements of Dimensions

(Required / observed dimension — length, diameter, etc.)

1. Supplied dimensions
2. Recovered dimensions

C. Destructive Testing

On various heat-shrinkable / moulded components of ready Kits

(Items 3 and 4 are applicable only for heat-shrinkable components)

1. Tensile Strength
2. Wall Thickness Ratio
3. Heat Shock
4. Longitudinal Change, after full recovery
5. Ultimate Elongation
6. Low Temperature Flexibility
7. Dielectric Strength
8. Volume Resistivity

D. Routine Test Reports (RTR)

(Typical)

Each RTR shall clearly indicate P.O. no. & date and also BSES's SAP code no. RTR shall record the serial numbers of the kits selected, as per vendor's sampling method. Following details, besides vendor's/manufacturers standard check-points, shall appear in every RTR.

Annexure – D: Technical Deviation Sheet

Sr No.	Clause No.	Deviation

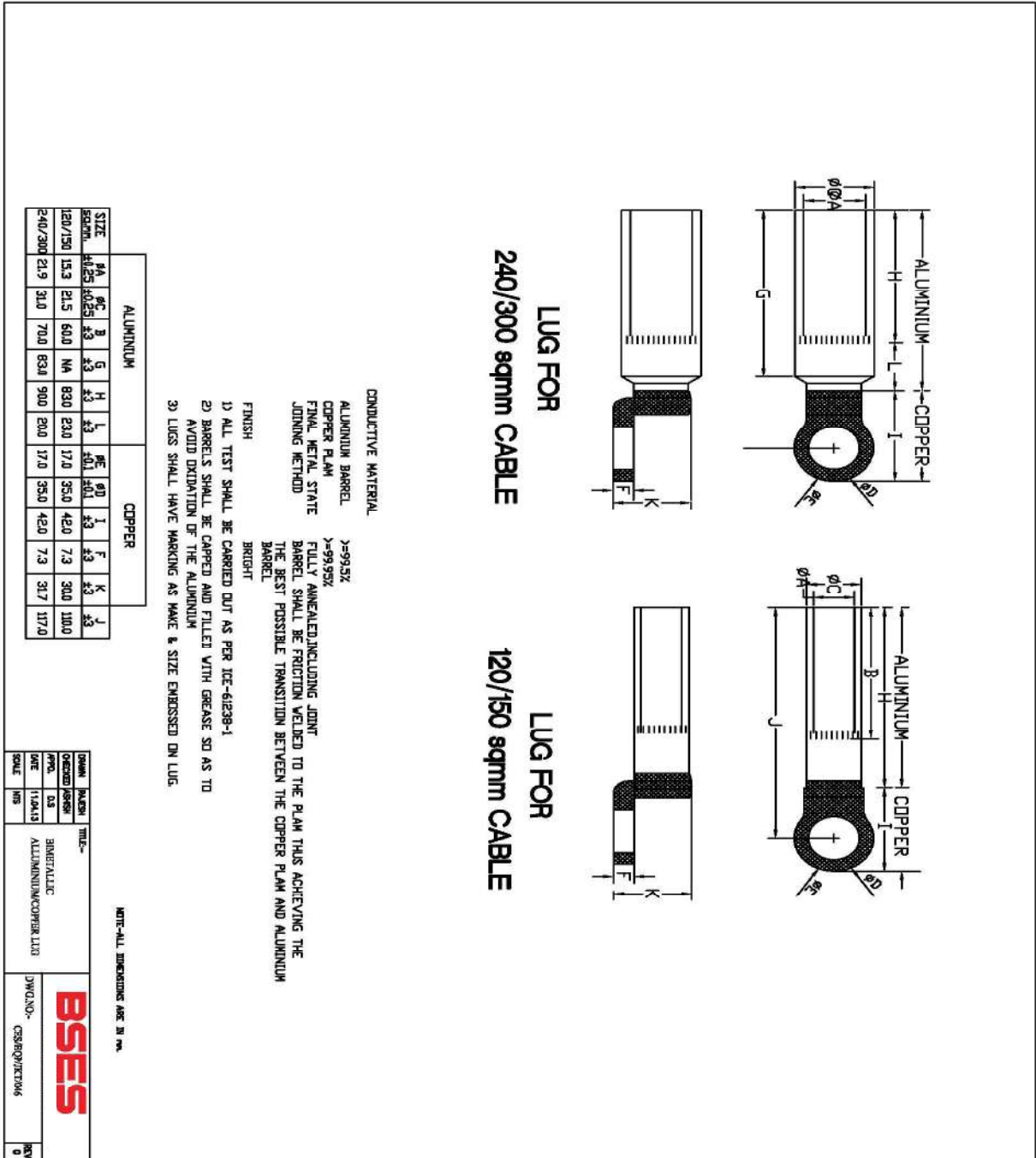
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)**Annexure – E: Service Conditions**

(Atmospheric conditions at Site)

1	Delhi	
a)	Average grade Atmospheric Condition:	Heavily Polluted, Dry
b)	Maximum altitude above sea level	1000 M
c)	Ambient Air temperature	Highest 50 deg C, Average 40 deg C
d)	Minimum ambient air temperature	0 deg C
e)	Relative Humidity	90 % Max
f)	Thermal Resistivity of Soil	150 Deg. C cmm
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

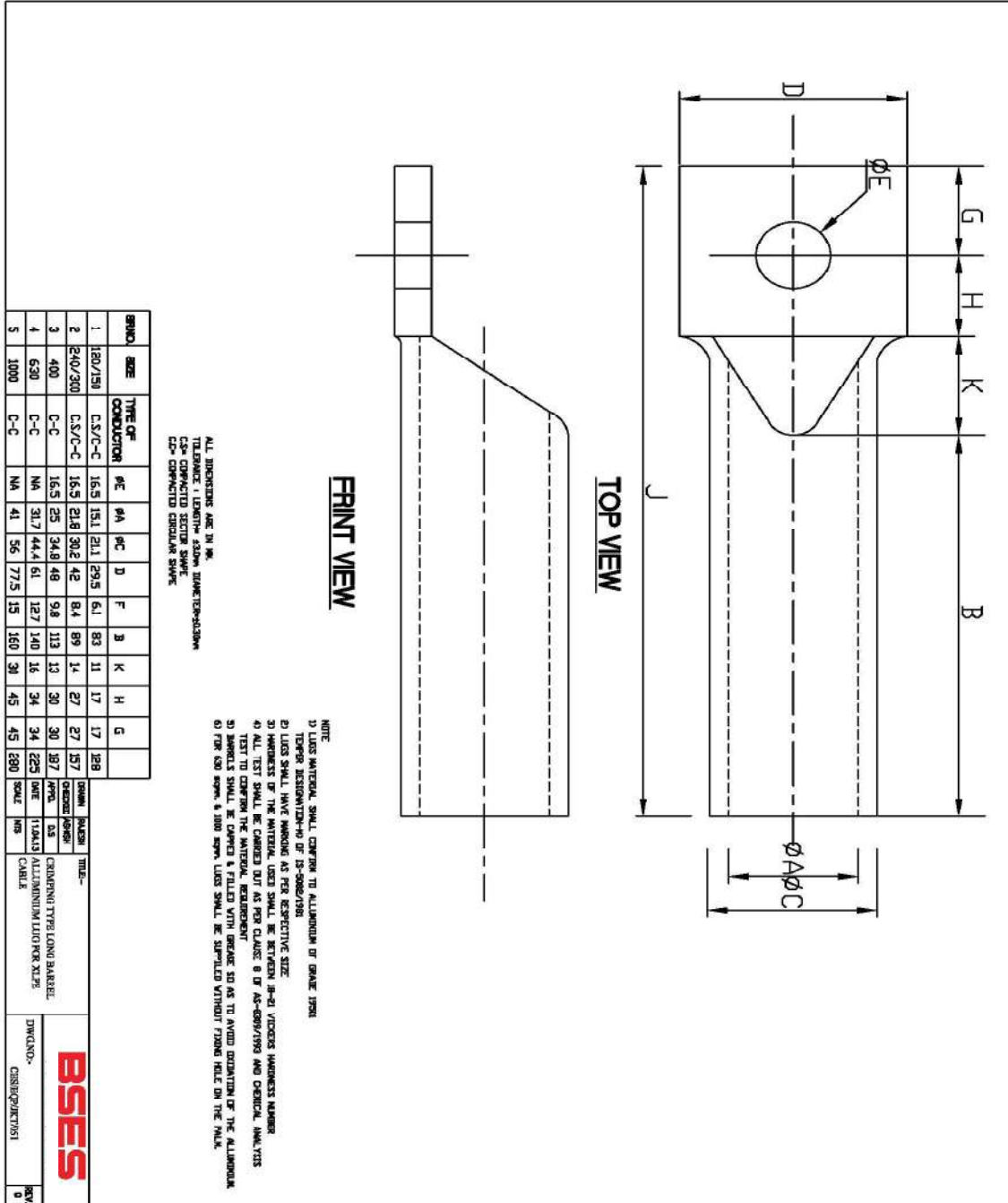
Technical Specification For Heat Shrinkable And GIS Cable Termination Kit (11 kV, 33 kV, 66 kV Cables)

Annexure – F: Bimetallic Aluminium / Copper Lug



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

Annexure – G: Aluminum/Copper Lug For XLPE Cable



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

SOP FOR REPAIRING OF CABLE FAULT (Shall be part of PO)		
Sl. No	Activity	Responsibility
Initiation		
1	Identify and isolate fault and inform GNIIT in case of cable fault	Break down team
2	Updation of the details in OMS against respective feeder tripping event.	GNIIT
Fault Location		
1	Information sent to FLC team and SDO.	GNIIT
2	Mobilize FLC team and cable jointing contractor.	SDO
3	Identification of fault location	FLC Team
Preparation for Jointing		
1	Seeking permission from road owning agency	SDO
2	Payment of RR charges to Road owning agency	Finance
3	Digging	Cable jointing contractor
4	Cut faulty section and Pre-test (HV test) cable for multiple fault	Cable jointing contractor
5	BOQ estimation for jointing work (type, size and length of cable, type of jointing kit)	Cable jointing contractor
6	Filling material reservation slip (MRS) in SAP	SDO
7	Issuing and transporting material from store.	Cable jointing contractor
Jointing		
1	Cable preparation (overlap length of cable, slide of armour, build up with inner sheath etc)	Cable jointing contractor (for jointing details refer to manufacturer instruction manual)
2	Copper tape shields	
3	Core preparation	
4	Location of parts in completed joints	
5	Earthing of connection	
6	Completion of joints	
7	Take Photographs before, during and after jointing and send to CES	SDO
8	Supervision during jointing	SDO
9	Sending failed joint to Division store	Cable jointing contractor
Completion and reporting		
1	Intimate to breakdown team about joint completion.	Cable jointing contractor
2	Conduct HV test	Break down team
3	Restore of Supply through jointed cable	Break down team
4	Backfilling, compaction of excavated soil and removing of excess earth from the site	Cable jointing contractor



BSES-TS-45-TERM-R0

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

5	Completion information in Job Card (Details of work done, material consumption, location, feeder name and joint tag no., date, supervisor name, jointer name) sent to SDO	Cable jointing contractor
6	Above information sent to GNIIT	SDO
7	Send information about GPS location of Cable fault to GIS	SDO
8	Daily report of cable jointing to CES	Division Head
9	Updating of information in OMS including supervisor name, jointer name, feeder name	GNIIT
10	Information to include GPS location of cable fault.	GNIIT

Special Note-

- 1) Joints to be done preferably during day. In case of constraints, DGM (O&M) to authorize for night time jointing with supervisor
- 2) Daily joint report to be shared with CES
- 3) Bi-monthly analysis of faulty joint for ensuring warranty compliance to be organized at circle level by contractor in presence of DGM (O&M) and CES
- 4) Certification of job card for payment by DGM (O&M) subject to OMS compliance CES to check any gaps.
- 5) After completion of jointing (33kV and 66kV), all the joints shall be covered with RCC coffin. Coffin shall be filled with white sand complete from the hole provided at the top of the coffin.



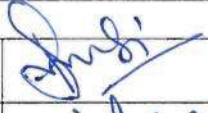
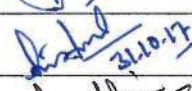

TECHNICAL SPECIFICATION

FOR

LAYING OF 66 kV / 33 kV / 11 kV / 1.1 KV GRADE
PVC / XLPE CABLES

Specification no: GN101-03-SP-06-03

BSES RAJDHANI POWER LTD

Prepared by	Pronab Bairagi		Rev : 03
Reviewed by	Amit Tomar	 31.10.17	Date : 31.10.2017
Approved by	Vijay Panpalia		Pages : 44

Registered Office: BSES Bhavan, Nehru Place, Delhi - 110019

Index

General Specification	3
1.0.0 Codes & standards	3
2.0.0 Design Guidelines & Parameters for Cable laying.....	3
3.0.0 General Guidelines for Laying Cables.....	7
4.0.0 Testing	14
5.0.0 Progress Reporting	15
6.0.0 Drawing, Data & manuals.....	15
7.0.0 Deviations.....	16
Annexure # 1 – DEVIATION REPORT FORMAT.....	16
Annexure # 2 – DC HIGH VOLTAGE TEST	16
Annexure # 3 – CABLE TRENCH DETAILS	17
Annexure # 4 – STANDARD ROAD PROFILE	18
Annexure # 5 – ROAD RESTORATION SECTIONAL DRAWINGS.....	20
Annexure # 6 – DRAWINGS (CABLE TRENCH AND RCC CABLE COVER).....	23
Annexure # 7 – BARRICADING AND SAFETY.....	38
Annexure # 8 – ROUTE MARKER AND BARRICADING DRAWING.....	38
Annexure # 9- NOTE FOR HDPE PIPE DIAMETER IN CABLE LAYING.....	43

General Specification**1.0 Codes & standards**

Materials, equipment and methods used in the Laying of 11/33/66KV Cable shall conform to the latest edition of following –

S. No.	Reference No.	Name of Standard
1		Indian Electricity Rules, 1956
2		Indian Electricity Act, 1910
3		Indian Electricity Supply Act, 1948
4		Electricity Laws Act, 1991
5		National Electrical Code (Indian standards Institution)
6	IS 1255	Code of practice for installation and maintenance of Power Cable upto and Including 33KV rating.
7	IS 1554	PVC Insulated Electrical Cables upto 11KV
8	IS 2274	Code of Practice for electrical wiring installation – system voltage exceeding 650V
9	IS 7098 Part II	Crosslinked Polyethylene Insulated PVC sheathed cables for working voltages from 3.3KV upto and including 33KV
10	IS 7098 Part III	Crosslinked Polyethylene Insulated PVC sheathed cables for working voltages from 66KV upto and including 220KV
11	IS 5820	Specification of precast concrete Cable cover.

2.0 Design guidelines and Parameter for cable laying-

S. No.	Parameter	Details
2.1	Selection of Cable Route	<p>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:</p> <ul style="list-style-type: none">-The side of road which presents the least obstacles and the fewest roadways crossings.-The future consumers and existing cables in the route may influence the cable route.-Railway, road crossings, MCD and other government agencies may also influence in selection of cable route.-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	Site Preparation	<ul style="list-style-type: none">a) Barricading:<ul style="list-style-type: none">• The identified cable route shall be barricaded continually before excavation.• Barricading shall be as drawing laid• Open Trench method shall be adopted as far as possible for trench preparation.b) Excavated Earth:

		<ul style="list-style-type: none"> The excavated earth shall be so stored at site, that it shall not cause trouble to running traffic All excavated earth shall be stored within the barricaded area. <p>c) 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. Same the way barricades protect the road users from the danger due to construction equipment and temporary structures.</p> <p>d) The structure dimensions of the barricades , material and composition, its colour scheme, BSES logo and details shall be in accordance with specification and drawing laid down in the tender documents.</p> <p>e) All the barricades shall be erected as per the design requirements of employer, numbered painted and maintained in good condition and also barricade in charge maintain a barricade register at site.</p> <p>f) All barricades shall be conspicuously seen in the dark/night time by the road users so that no vehicle hits the barricades. Conspicuity 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 should be placed at the top of each barricade.</p> <p>g) PPP to be provided by vendor to all workers and engineers.</p> <p>h) Also refer Annexure- 7: Barricading and Safety</p>
2.3	Clearance	<p>The desired minimum clearances are as follows –</p> <ul style="list-style-type: none"> - Power cable to power cable – A minimum clearance equal to diameter shall be maintained. Trench drawings shall be referred to for guidance. - Power Cable to control cables – 0.2 M - Power cable to communication cable – 0.3M - Power cable to gas/water main – 0.3 M
2.4	Depth of Cable Laying	<p>The desired minimum depth of laying from ground surface to the top of cable shall be:</p> <p>650 / 1100V grade XLPE Cables – 75 cm</p> <p>6.35 / 11KV grade XLPE Cables – 90 cm</p> <p>Low voltage and Control cable - 75 cm</p> <p>19 / 33KV grade XLPE Cables - 1.2 M</p> <p>38 / 66KV grade XLPE Cables - 1.5 M</p> <p>Cables at Road crossing - 1.0 M (min.)</p> <p>Cables at railways level crossings (measured from bottom of sleepers to the top of Pipe) - 1.0 M (min.)</p> <p>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.</p>
2.5	Width of Cable	The width and depth of Cable Trenches shall depend upon number of

	trenches	circuits and Voltage Grade. Annexure # 3 and drawings of this specification shall be followed.
2.6	Bending Radius of Cables	<p>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 –</p> <p>A) Single Core Cables (PVC & XLPE) Upto 1.1KV grade – 15 X D Above 11KV grade - 20 X D</p> <p>B) Multi Core Cables (PVC & XLPE) Upto 1.1KV grade - 12 X D Above 1.1KV grade – 15 X D</p> <p>Where 'D' is overall diameter of the cable.</p>
2.7	Maximum permissible Tensile Strength for Cables	<p>For cables pulled with Stocking PVC and XLPE SWA Armoured cables $P = 30 \times D$ PVC and XLPE AWA Armoured cables $P = 20 \times D$ Where P= pulling force in Kgrm, D= Diameter of Cable in mm</p> <p>For Cables pulled by Cable eyes Aluminium conductor – $30 \text{ N/mm}^2 = 3 \text{ Kg/sq. mm}$ Copper conductors - $50 \text{ N/mm}^2 = 5 \text{ Kg/sq. mm}$</p> <p>Permissible force is calculated by multiplying the above values by cross sectional area (CSA) of conductor of each core and then number of cores.</p>
2.8	Methods of Laying	<p>a) 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.</p> <p>b) HDPE (PN6,PE80) or RCC ducts 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 upto the edge of road, where there is no footpath, to permit smooth entry of cable without undue 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.</p> <p>c) The contractor shall lay cable by Horizontal direct drilling (HDD) in main roads and highway with heavy traffic, passage to public 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</p>

		<p>minimized so that it doesn't exceed by 12% of total route length. This is to avoid De-rating of Cables.</p> <p>d) 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.</p> <p>e) 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.</p> <p>f) 75 mm of the sand bed shall be placed at the bottom of cable trench.</p> <p>g) 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.</p> <p>h) To protect the cables against external mechanical damage, which may be caused by other agencies, the cable shall be protected by suitable cover. (for drawing of RCC cable cover refer annexure VI).</p> <p>i) The type of the covers shall be as under</p> <ul style="list-style-type: none"> - 1.1KV Cables – Single layer of brick thickness not less than 75 mm (3 inch) - 11KV Cables – sand stone of thickness not less than 75mm (3 inch). - 33KV Cables shall be protected by reinforced concrete cover of width 300 mm as per attached drawing with thickness not less than 50mm. - 66KV Cables shall be protected by reinforced concrete cover as per attached drawing with thickness not less than 50mm. <p>The RCC cable cover shall be embossed as "BSES EHV CABLE".</p> <p>j) 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.</p> <p>k) The trench shall be filled-up by loose soft soil (300mm) and Excavated soil as indicated in drawings.</p>
2.9	Cable over	On Bridges the cables are generally supported on wooden cleats and

	Bridges	clamped on steel supports at regular intervals. The cables laid on bridges shall be provided with Sun shield. Approval from appropriate authorities (PWD/railways) as applicable shall be taken by contractor.
2.10	Laying of Single Core Cables	<ul style="list-style-type: none"> a) The single core cables shall be laid in trefoil formation. Single core cables can be laid individually in HDPE pipe in case of HDD only. (Details of HDPE Pipe as per Annexure-9) 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 balance the inductance, the phase sequence in trefoil format shall be maintained by vendor (for double circuit) d) To prevent magnetic losses (eddy current and hysteresis losses), the base plate of the panels or the terminal box of the equipments, shall have aluminium 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.
2.11	Earthing of Single Core Cables	<ul style="list-style-type: none"> a) 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. b) For feeder length more than 2 KM, mid point earthing shall be provided.
2.12	Violation of barricading guideline and safety norms	On violation of barricading guideline and safety norms, a fine of Rs.5000 /day shall be imposed. BRPL inspector/engineer in-charge shall be empowered to impose the above penalty.

3.0 General guidelines for Laying Cables

S. No.	Parameter	Details
3.1	General	<ul style="list-style-type: none"> a) 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. b) The contractor shall be responsible for all the route survey, establishment of the position of the joints as per the site exigencies 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 c) The contractor shall submit a drawing for the complete scheme

		<p>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, these drawings shall be approved by BSES, prior to commencement of work.</p> <p>d) BSES 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. All civil works, structural work, clamping and earthing shall be carried out by the contractor, so that the cables and accessories perform satisfactorily during the entire life time.</p> <p>e) 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.</p>
3.2	Handling and Storage of Cable drums (All empty drums are returnable)	<p>a) 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.</p> <p>b) 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.</p> <p>c) 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.</p> <p>d) After cable laying, empty cable drums shall be taken return back by vendor from site at their own risk and cost. Cost of empty drums shall be deducted from vendor account during final settlement.</p>
3.3	Cable Laying	<p>a) The ground over which the drum is positioned at site should be</p>

		<p>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.</p> <p>b) The cable should always be paved 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.</p> <p>c) 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.</p> <p>d) The pulling method to be used shall be approved by BSES. Cable supplier's recommended maximum pulling tension shall not be exceeded.</p> <p>e) 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 side wall friction. The contractor shall ensure that PVC/HDPE sheath of cable is free from damage due to abrasion.</p> <p>f) 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.</p> <p>g) 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.</p>
3.4	Excavation of the Trenches	<p>a) The excavation of the trenches shall be commenced, with proper co-ordination with BSES, so that all the necessary clearances for the route are already obtained from the competent authorities, well in time.</p> <p>b) 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.</p> <p>c) 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 adequately shored by wooden planks and bracing to avoid trench cave-ins which would cause injury to the persons and also damage the cables laid.</p> <p>d) 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.</p> <p>e) The trench excavation and filling in shall be so executed that all</p>

		<p>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.</p> <p>f) 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.</p> <p>g) 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.</p> <p>h) 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.</p>
3.5	Excavated material	<p>a) 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.</p> <p>b) 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.</p>
3.6	Pipes and Ducts	<p>a) 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.</p> <p>b) 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)</p> <p>c) 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).</p> <p>d) 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.</p> <p>e) 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.</p>

		<p>f) 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 and ducts shall be cleaned again immediately before the cables are drawn in.</p> <p>g) 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.</p>
3.7	Joint Bays	The contractor shall provide all help so as to enable jointers to carry out their work efficiently and expeditiously. The method of securing and supporting cable joints and cables also the bonding and earthing thereof, shall be detailed on the drawing. The details shall be approved by BSES prior to commencement of work. The joint position should be staggered.
3.8	Back filling of trenches	<p>a) Filling in of trenches shall not be commenced until BSES has inspected and approved the cables and accessories at site. The inspection should be got done on daily basis so that the trenches do not remain open unnecessarily, to avoid inconvenience to public.</p> <p>b) The trench shall be backfilled after putting all protections for cables.</p> <p>c) Soft soil shall be backfilled for 300 mm above the cable protection cover.</p> <p>d) Caution Tape shall be laid all along the cable route above the soft soil filling.</p> <p>e) Complete backfilling shall be done above the caution tape.</p>
3.9	temporary Reinstatement	<p>a) 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.</p> <p>b) 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.</p> <p>c) 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.</p>
3.10	Permanent Reinstatement of Public Road,	<p>a) 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.</p> <p>b) 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.</p>

3.11	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.
3.12	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.
3.13	Cable supports / Clamps	<ul style="list-style-type: none"> a) 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 b) Every cable shall be supported at a point not more than 500 mm from its termination.
3.14	Installation of Cables in tunnels / basement / below the panels etc	<ul style="list-style-type: none"> a) 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. b) 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. c) 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. d) 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.

3.15	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 if required to be installed shall be provided as free issue item to the contractor, however the erection and steel structure required shall be in scope of the contractor.
3.16	Sun Shades	All cables shall be protected from direct solar radiation by ventilated sun shields as approved by BSES.
3.17	Route Plan	<ul style="list-style-type: none"> a) BSES intends to show all the cable routes, location of joints and other underground obstructions on a GPS map. b) During the progress of the contract works the contractor shall record on a set of route plans and cross section drawings of an approved 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. The final bill shall not be processed by BSES unless this activity has been completed to the entire satisfaction of BSES
3.18	Site Facilities to be maintained by the Contractor	<ul style="list-style-type: none"> a) The contractor shall arrange for all the tools and tackles required for cable laying as per this specification. BSES shall arrange for all the material and manpower required for jointing and end termination. b) Illumination and Power supply shall be arranged by the contractor so that the work can be carried out round the clock. c) 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 d) The contractor shall make arrangement to provide suitable scaffolding arrangement to carry out the termination work e) 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 f) Also refer Annexure-7: Barricading and Safety.
3.19	Type of Roads and guidelines for road restoration	<p>The typical section of type of Roads (based on width) under PWD and MCD are :-</p> <ul style="list-style-type: none"> - 20 Feet Wide road - 30 Feet wide road - 40 to 60 Feet Road - Other (which include Kota stone, Agra stone, Cement concrete, interlocking paving tiles, brick road, chequered tiles

		<p>and asphalted road)</p> <p>The drawing are shown in annexure IV</p> <p>The guidelines for road restoration for various type of roads and surfaces are indicated in annexure V as :-</p> <ul style="list-style-type: none"> - Bituminous road Type I (category I & II) - Bituminous road Type II (category III) - Cement concrete road - Kota/Rajasthan stone Road - Brick Road - Interlocking paving tiles. - Agra stone road - Chequered tiles road - Asphalted road
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4.0 Testing

S. No.	Parameter	Details
4.1	Tests to be carried out during and after completion of Cable Laying	<p>Testing of cable before jointing –</p> <ul style="list-style-type: none"> - Cable shall be tested for Insulation Resistance prior to laying by opening the end and resealing end properly. <p>Testing on complete Cable Installation –</p> <ol style="list-style-type: none"> 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) DC High voltage. For old cables test voltage shall be 1.5 times rated voltage or less depending on age of cable.(refer annexure # 2 for values) d) Charging of Cable at No-Load at Nominal working voltage for 24 Hours. e) After laying and before termination of cable a sheath test shall be conducted for 66KV Single core Cable as under :- <p>At both ends the cable shall be raised from ground. From the end graphite coat applied 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 jacket shall be measured between the aluminium wire armour and the spike with a 500/1000V insulation tester. Measured resistance shall not be less than 2.5M OHM per 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.</p>
4.2	Statutory	<ol style="list-style-type: none"> a) Road cutting permission

	clearance	Road cutting permission shall be taken from competent authority by vendor. How ever official fees shall be paid by BRPL. b) Electrical inspector clearance Electrical Inspector clearance shall be in vendor scope. How ever official fees shall be paid by BRPL.
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5.0 Progress Reporting:

S. No.	Parameter	Details
5.1	Detailed Progress report	Progress report to be submitted by Contractor to BSES once in a Week containing i) Excavation status ii) Cable laying status iii) Status of preparedness for Jointing iv) Reason for any delay in total programme v) Details of damage to cable during laying. vi) Progress on final completion / Constraints / Forward path

6.0 Drawing, Data & Manuals:

S. No.	Parameter	Details
6.1	To be submitted After Completion of the Job	As the works is completed the following reports in quadruplicate shall be submitted to BSES for record purpose and shall be incorporated in the 'As constructed Records'. a) Feeder details (sending end, receiving end, SAP number of project etc) - Type of cables, cross section area, rated voltage. Details of construction, cable number & drum number. - Year and month of laying. - Actual total route length, cable length, length between joint to joints or end. - Location of cables and joints in relation to certain fixed reference points, for example buildings, hydrant, boundary stones etc. - Jointing reports detailing the date, weather conditions, jointers and supervising Engineers names, details of type of cable and type of joint or termination, location and joint bay number, ambient temperature. - Results of original electrical measurements and testing on cable installation. - Full written reports will be required of any damage occurring to cable or equipment together with remedial action proposed which will be subject to the approval of BSES.
6.2	Drawing and document sizes	Standard size paper A0, A1, A2, A3, A4

7.0.0 Deviations

Deviations from this Specification shall be stated in writing by the contractor. Written approval shall be obtained from BSES by the contractor. In absence of such a statement, it will be assumed by BSES that the Contractor complies fully with this specification during execution of the job.

Deviation mentioned in any other submitted tender docs like in GTP, QAP, Old PO, old WO, BRPL Standard, vendor standards etc. shall not be considered as a deviation at any stage of contract.

The format for approval of deviation attached in annexure # 1

Annexure # 1 – DEVIATION REPORT FORMAT

S. NO.	Clause No. of Specification	Details about deviation	Reason for deviation	Approved by (Sign & Name)

Annexure # 2 – DC HIGH VOLTAGE TEST

Rated Voltage of cable in KV	Test Voltage Between		Duration in Min.
	Any conductor and metallic sheath / Screen / armour	Conductor to conductor (for unscreened Cables)	
0.65 / 1.1	3	3	15 Min
6.35 / 11	18	30	
19 / 33	60	----	
38 / 66	90	----	

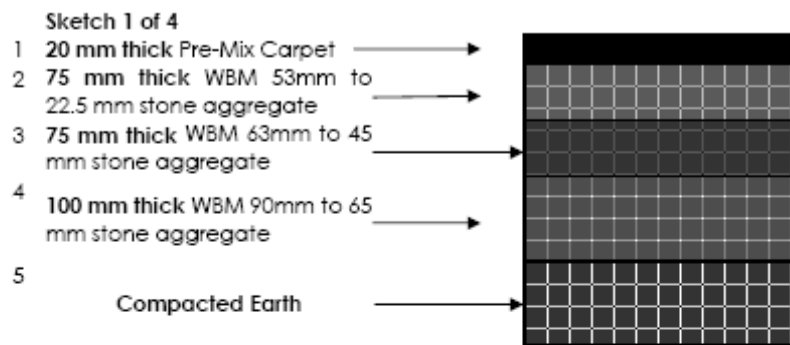
Reference value for DC High voltage Test.

Annexure # 3 – CABLE TRENCH DETAILS

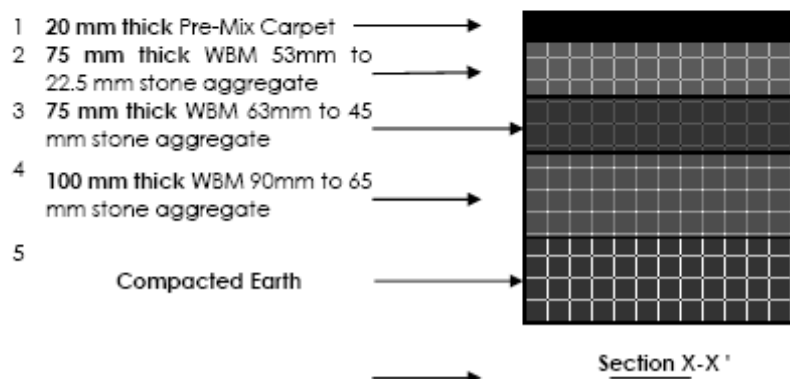
S. No.	Cable Size	Trench		Cable Trench drawing reference
		Width (mm)	Depth (mm)	
1	1.1 kV LT Cables			
a	3.5Cx150 mm ² - Single Circuit	400	875	A – 1 (Drg. # 9)
b	3.5Cx150 mm ² - Double Circuit	400	875	A – 1 (Drg. # 9)
c	3.5Cx150 mm ² - Triple Circuit	400	875	A – 1 (Drg. # 9)
d	3.5Cx300 mm ² - Single Circuit	400	875	A – 1 (Drg. # 8)
e	3.5Cx300 mm ² - Double Circuit	400	875	A – 1 (Drg. # 8)
f	3.5Cx300 mm ² - Triple Circuit	400	875	A – 1 (Drg. # 8)
2	11 KV Cables			
a	3Cx150 / 300 mm ² - Single Circuit	400	1055	A – 2 (Drg. # 6)
b	3Cx150 / 300 mm ² -Double Circuit	650	1055	B – 1 (Drg. # 7)
3	33 kV Cables			
a	3Cx400 mm ² - Single Circuit	400	1235	A – 3 (Drg. # 3)
b	3Cx400 mm ² - Double Circuit	650	1235	B – 2 (Drg. # 4)
c	3Cx400 mm ² - Quadruple Circuit	650	1235	B – 2 (Drg. # 5A)
d	3Cx400 mm ² - Quadruple Circuit	650	1545	B – 3 (Drg. # 5B)
e	3Cx400 mm ² - Quadruple Circuit	1200	1235	C – 1 (Drg. # 5C)
4	66 kV Cables			
a	1Cx630/1000 mm ² - Single Circuit	650	1445	B – 4 (Drg. # 1)
b	1Cx630/1000 mm ² - Double circuit	1200	1445	C – 2 (Drg. # 2)
c	3Cx300 mm ² - Double circuit	1200	1445	C – 2 (Drg. # 2A)

Annexure # 4 – Standard Road Profile

STANDARD ROAD PROFILE 20' - 00" FEET WIDE ROAD (Road type 1)

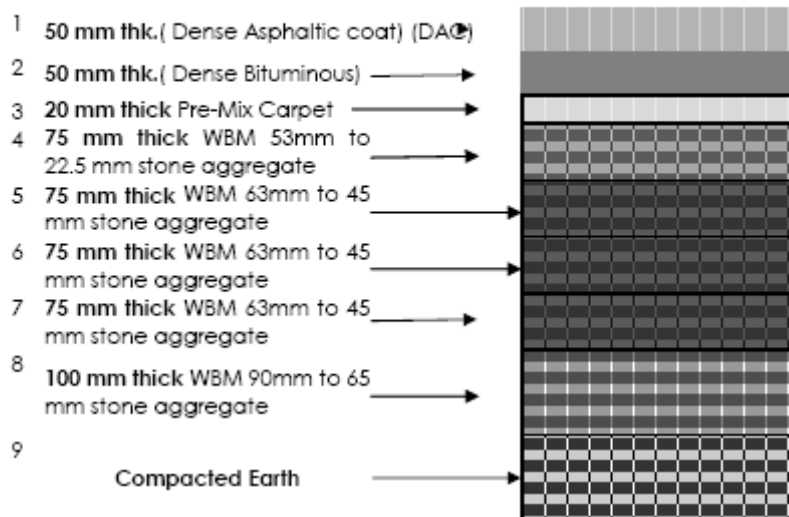


Sketch 2 of 4 30' - 00" FEET WIDE ROAD (ROAD TYPE II)



Sketch 3 of 4

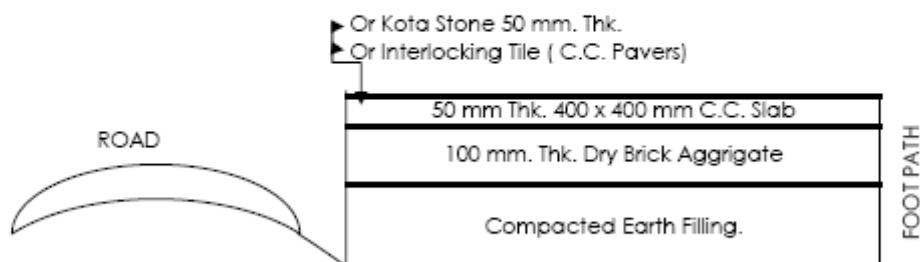
40'-00" TO 60'-00" FEET WIDE ROAD



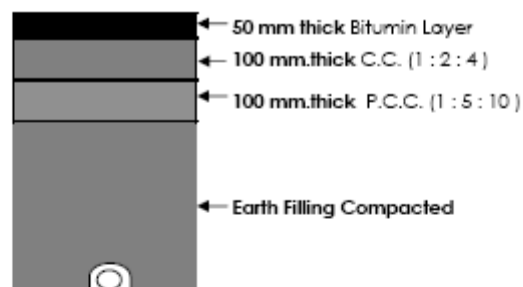
Section A-A'

Sketch 4 of 4

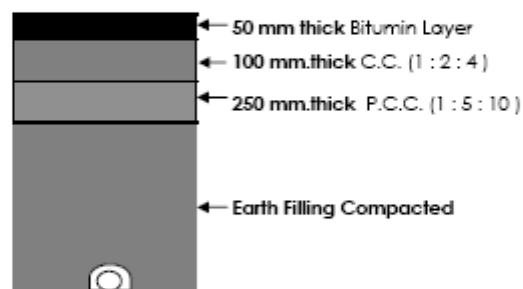
General drawing for cases other than roads.



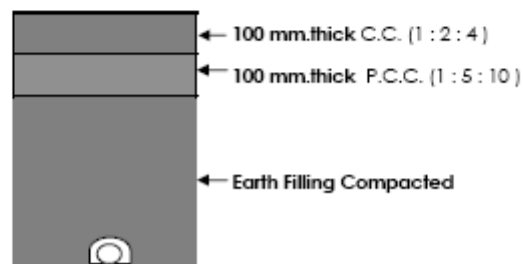
Details of Foot Path Along roads under PWD & MCD.

Annexure # 5 – Road Restoration Sectional Drawing**ROAD RESTORATION SECTIONAL DRAWINGS**

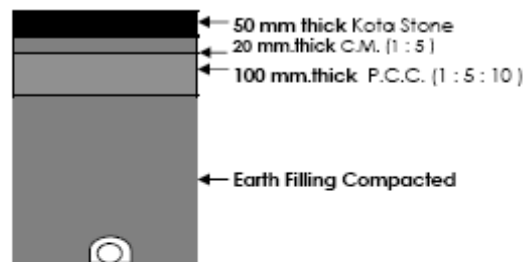
Bituminous Road Type - I (Category 1 & 2) Road width 20 to 30 feet and 30 to 40 feet.



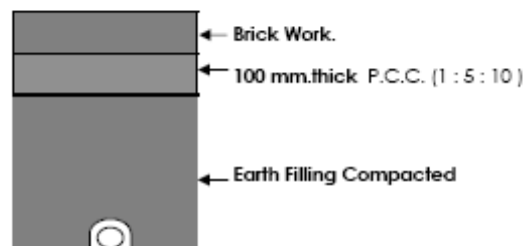
Bituminous Road Type - II (Category 3)



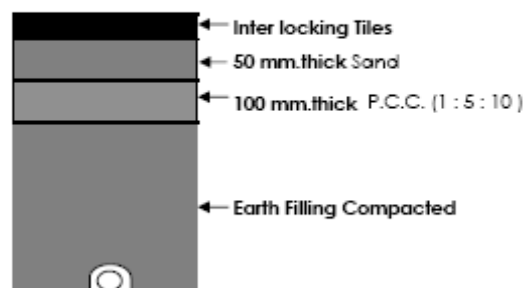
Cement Concrete Road



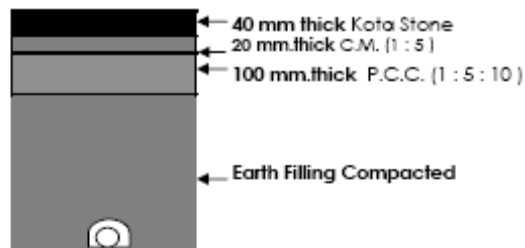
Kota / Rajasthan stone Road



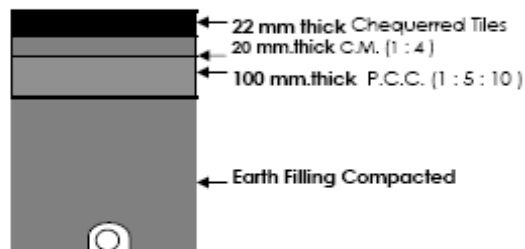
Brick Road



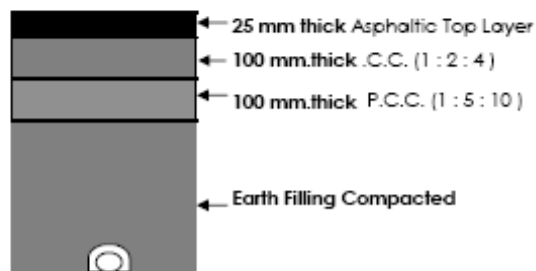
Interlocking Paving Tiles



Agra stone Road .



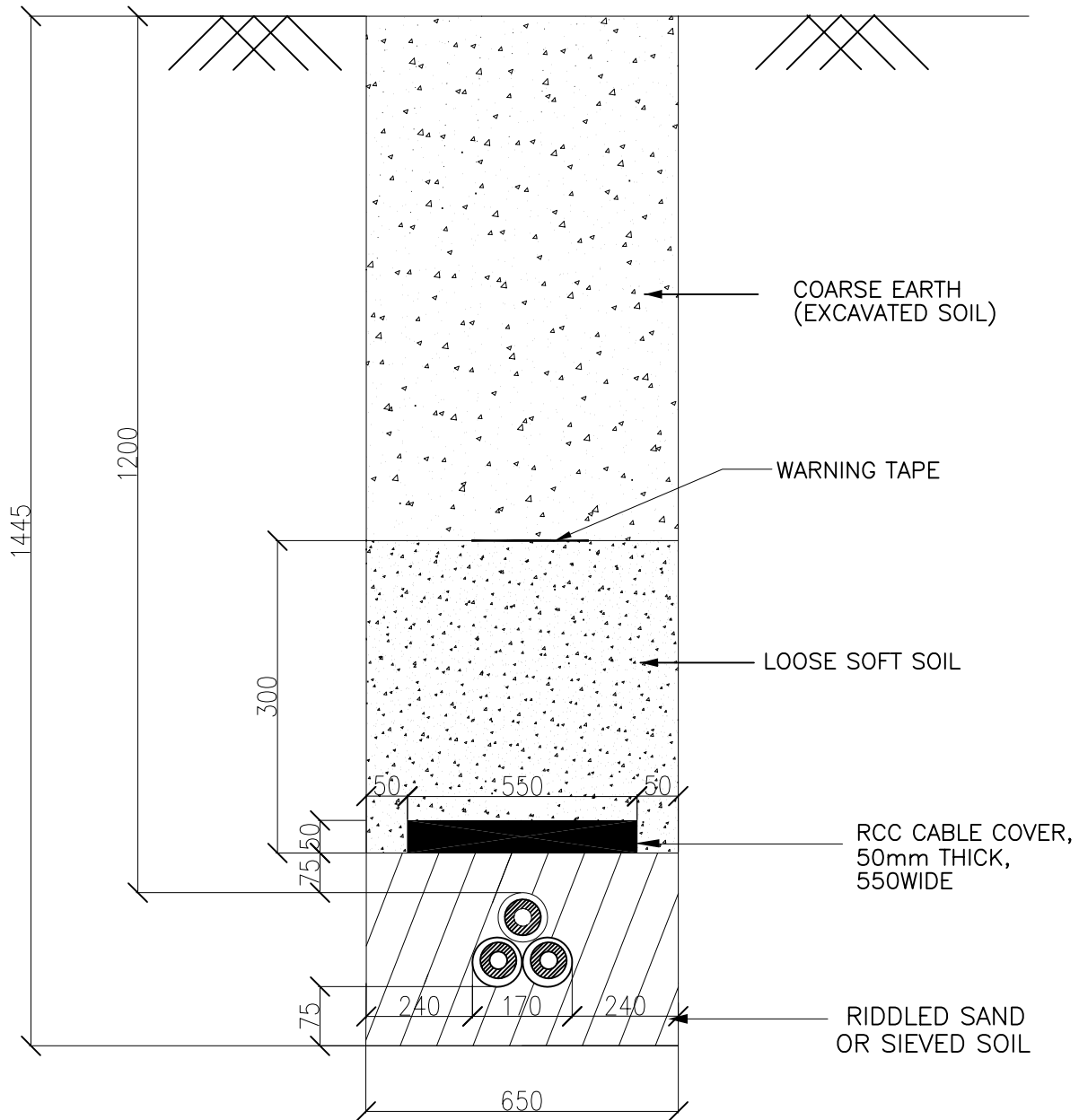
Chequerred Tiles .



Asphaltic Road .

Annexure # 6 – DRAWINGS (CABLE TRENCH AND RCC CABLE COVER)

DRAWING # 1



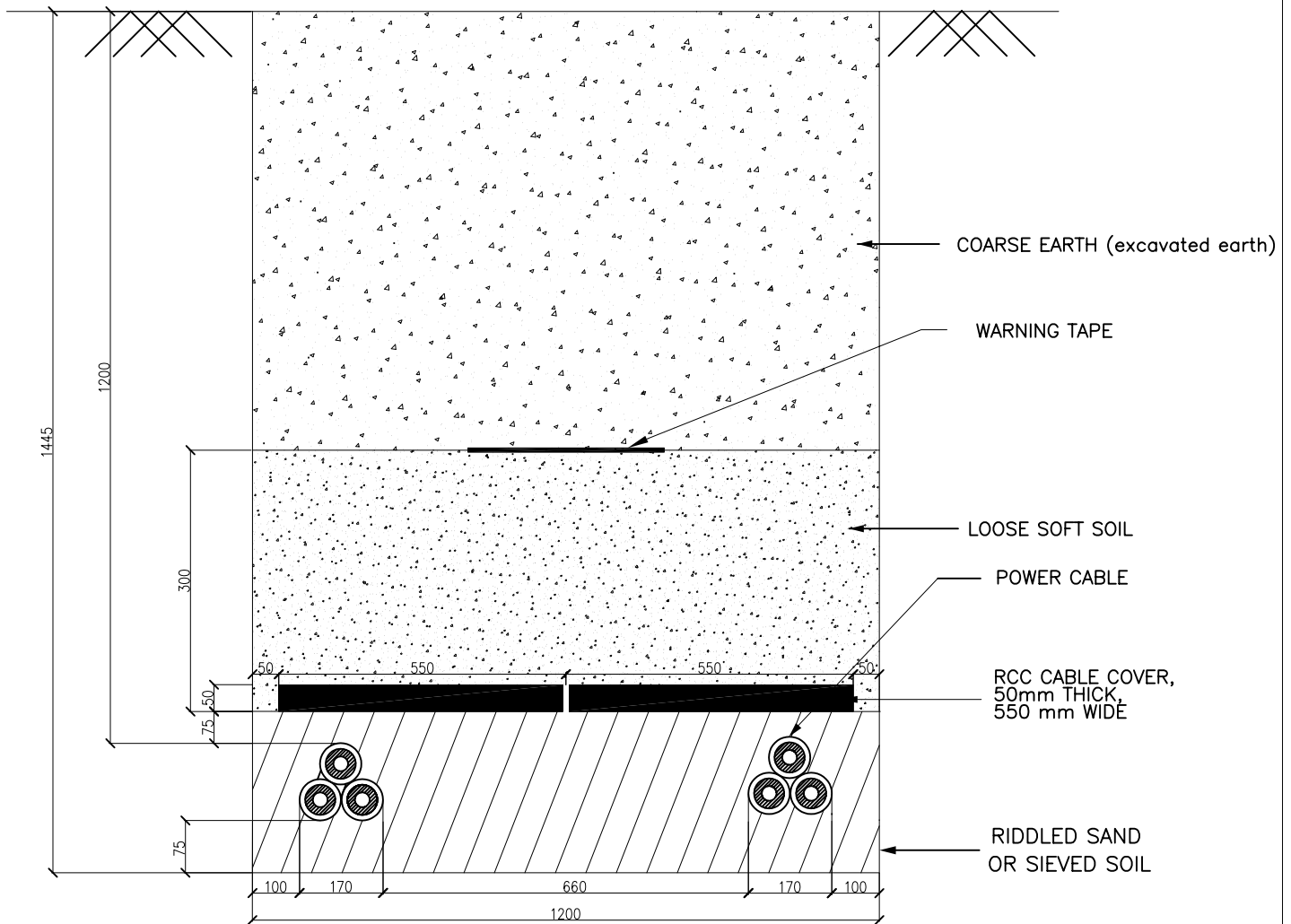
TYPICAL DETAILS FOR 66KV BURIED CABLE FOR SINGLE CIRCUIT
TYPE – B 4

DRAWN	DS	TITLE:—
CHECKED	SGD	TRENCH DRAWING FOR
APPD.	D.GUHA	1C X 630 Sq. mm
DATE		66KV SINGLE CIRCUIT
SCALE		XLPE CABLE

BSES

REV.
00

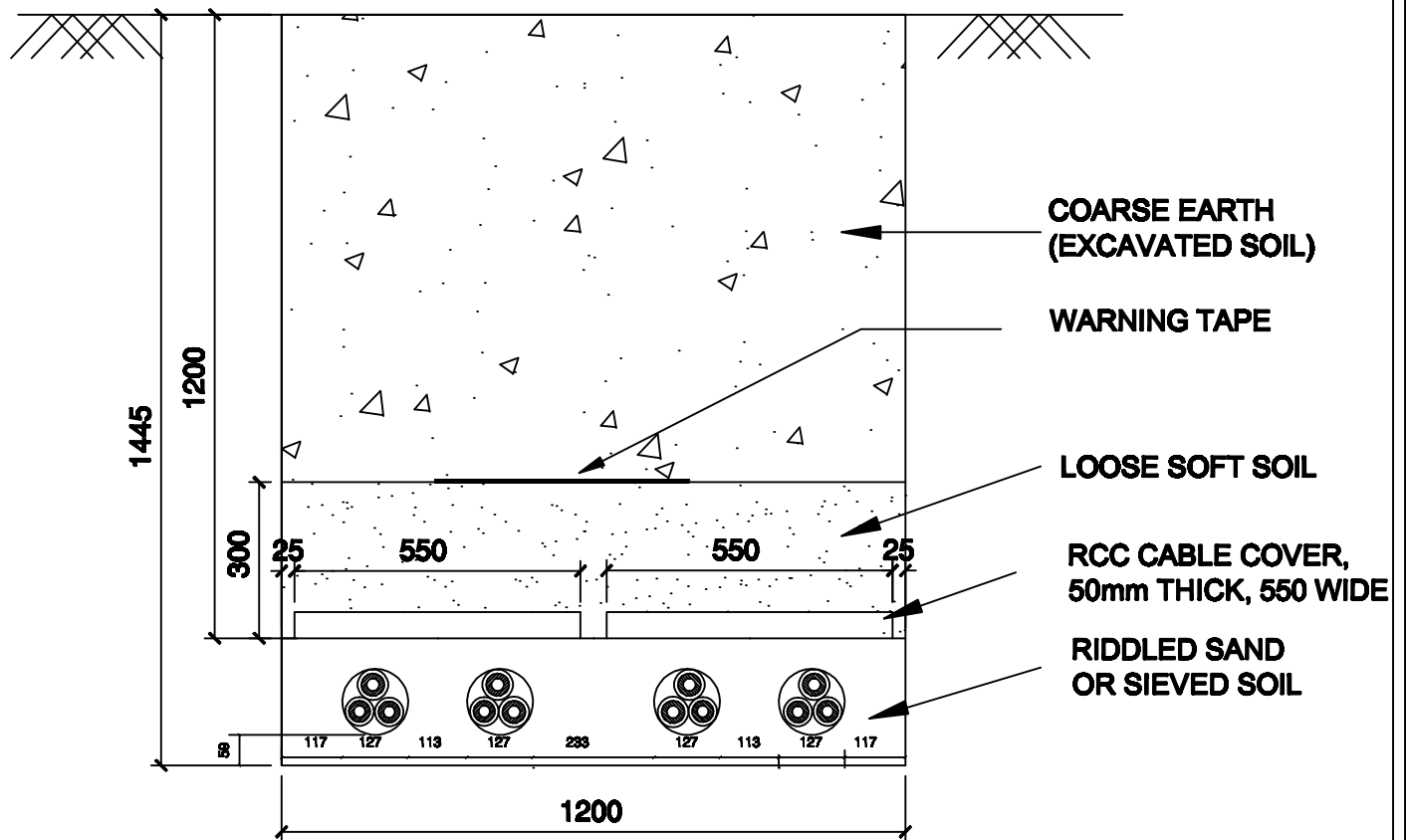
DRAWING # 2



TYPICAL DETAILS FOR 66KV BURIED CABLE FOR TWO CIRCUIT
TYPE – C 2


DRAWN	DS	TITLE:—	<h1 style="margin: 0;">BSES</h1>
CHECKED	SGD	TRENCH DRAWING FOR	
APPD.	D.GUHA	1C X 630 Sq. mm	
DATE		66KV DOUBLE CIRCUIT	
SCALE		XLPE CABLE	
			REV. 00

DRAWING # 2 A

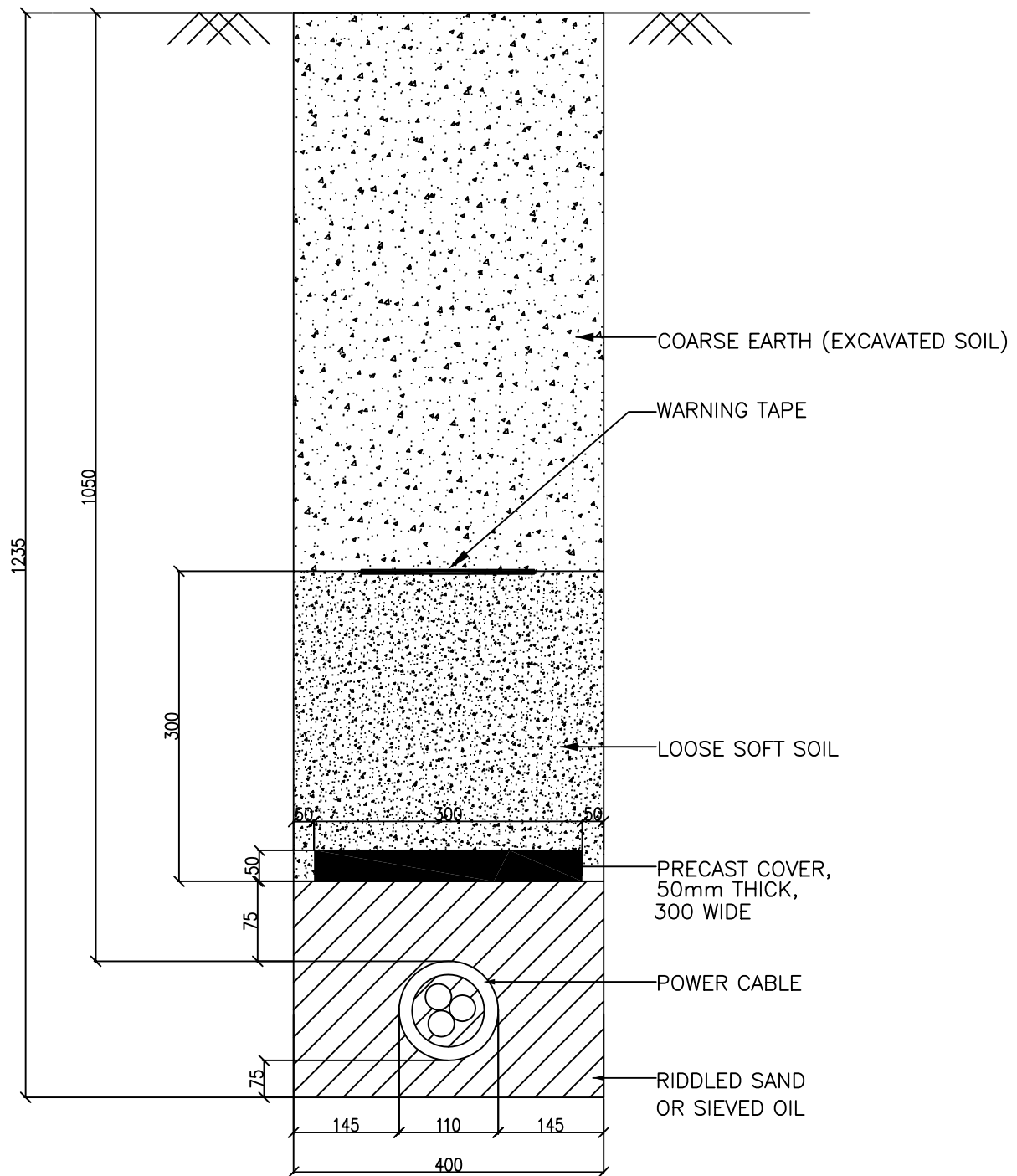


**TYPICAL TRENCH SECTION DETAILS FOR 66KV SINGLE
CORE 300 Sq. mm. BURIED CABLE FOR DOUBLE CIRCUIT**

TYPE - C 2

DRAWN	SAURABH	TITLE:--	
CHECKED	A.S	TYPICAL TRENCH SECTION DETAILS	
APPD.	K.S	FOR 66KV SINGLE CORE 200 mm	
DATE	09.01.15	BURNED CABLE FOR DOUBLE CIRCUIT	
SCALE			
			BSES Rajdhani Power Limited
			<div>REV. 00</div>

DRAWING # 3



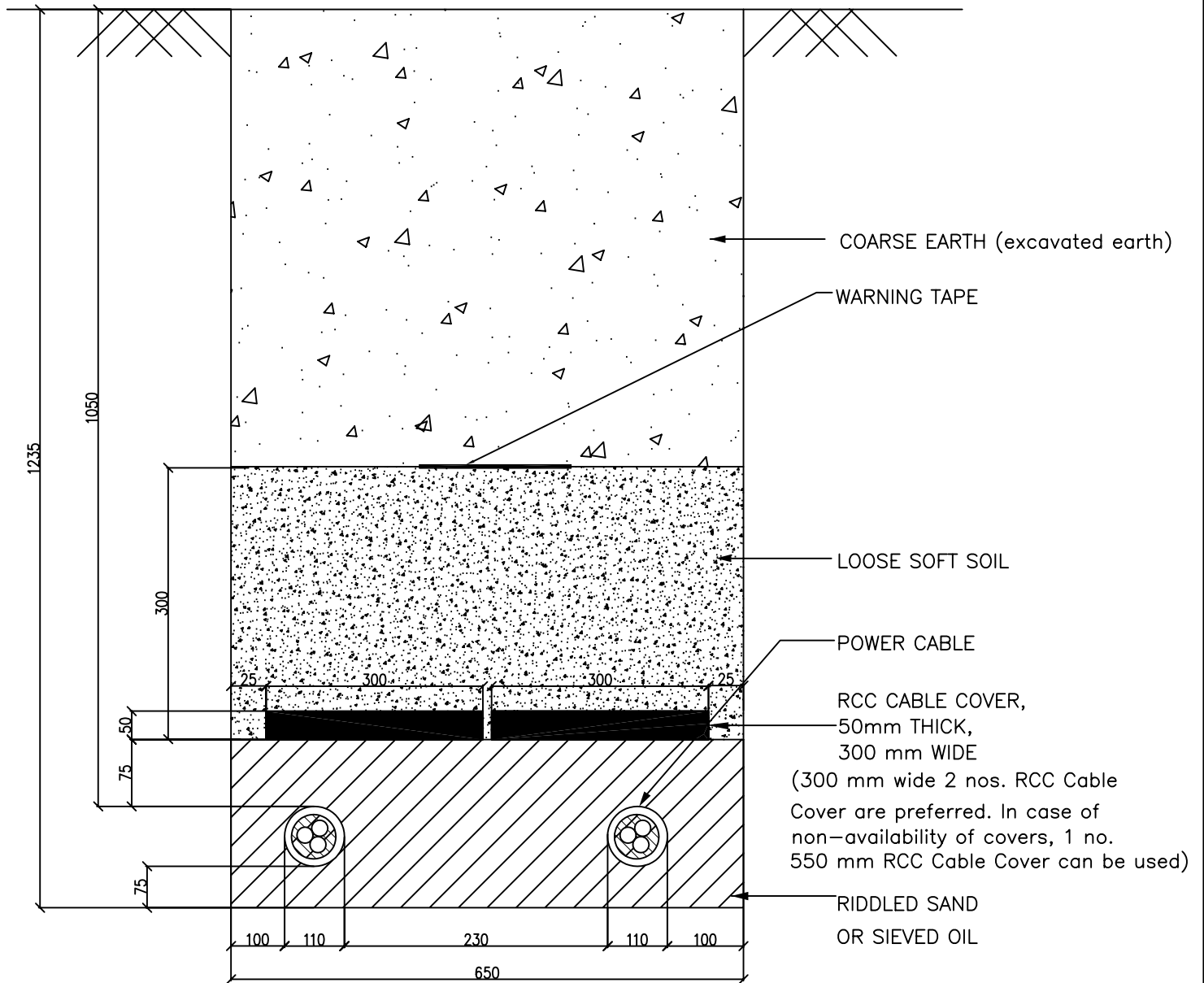
TYPICAL DETAILS FOR 33KV BURRIED CABLE FOR SINGLE CIRCUIT
TYPE – A 3

DRAWN	DS	TITLE:– TRENCH DRAWING FOR 33KV 3CX 400 mm sq. SINGLE CIRCUIT XLPE CABLE
CHECKED	SGD	
APPD.	D.GUHA	
DATE		
SCALE		

BSES

REV.
00

DRAWING # 4

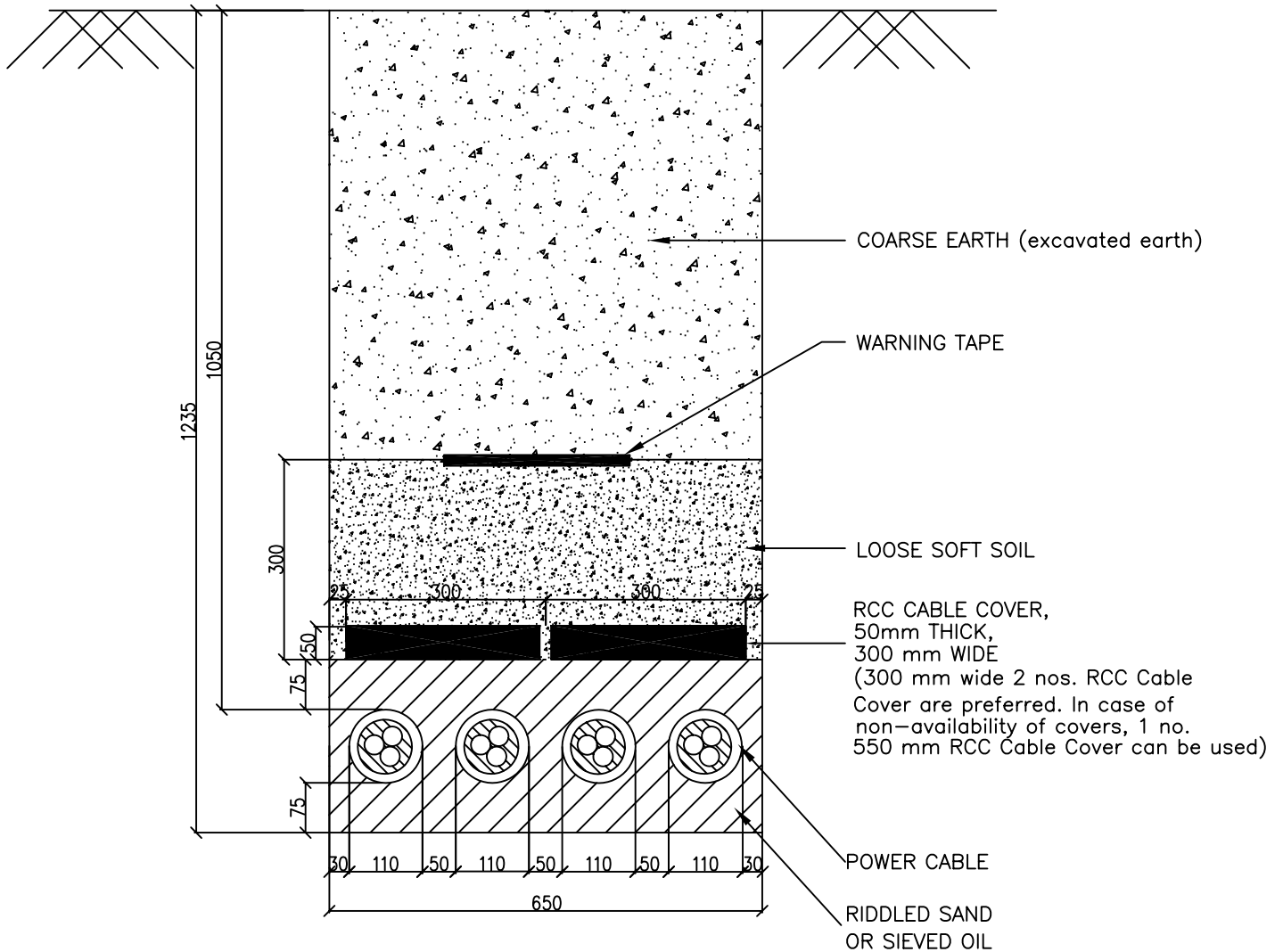


TYPICAL DETAILS FOR 33KV BURRIED CABLE FOR TWO CIRCUIT
TYPE – B-2

DRAWN	DS	TITLE:-- TRENCH DRAWING FOR 3C X 400MM2, 33KV DOUBLE CIRCUIT XLPE CABLE
CHECKED	SGD	
APPD.	D.GUHA	
DATE		
SCALE		

BSES

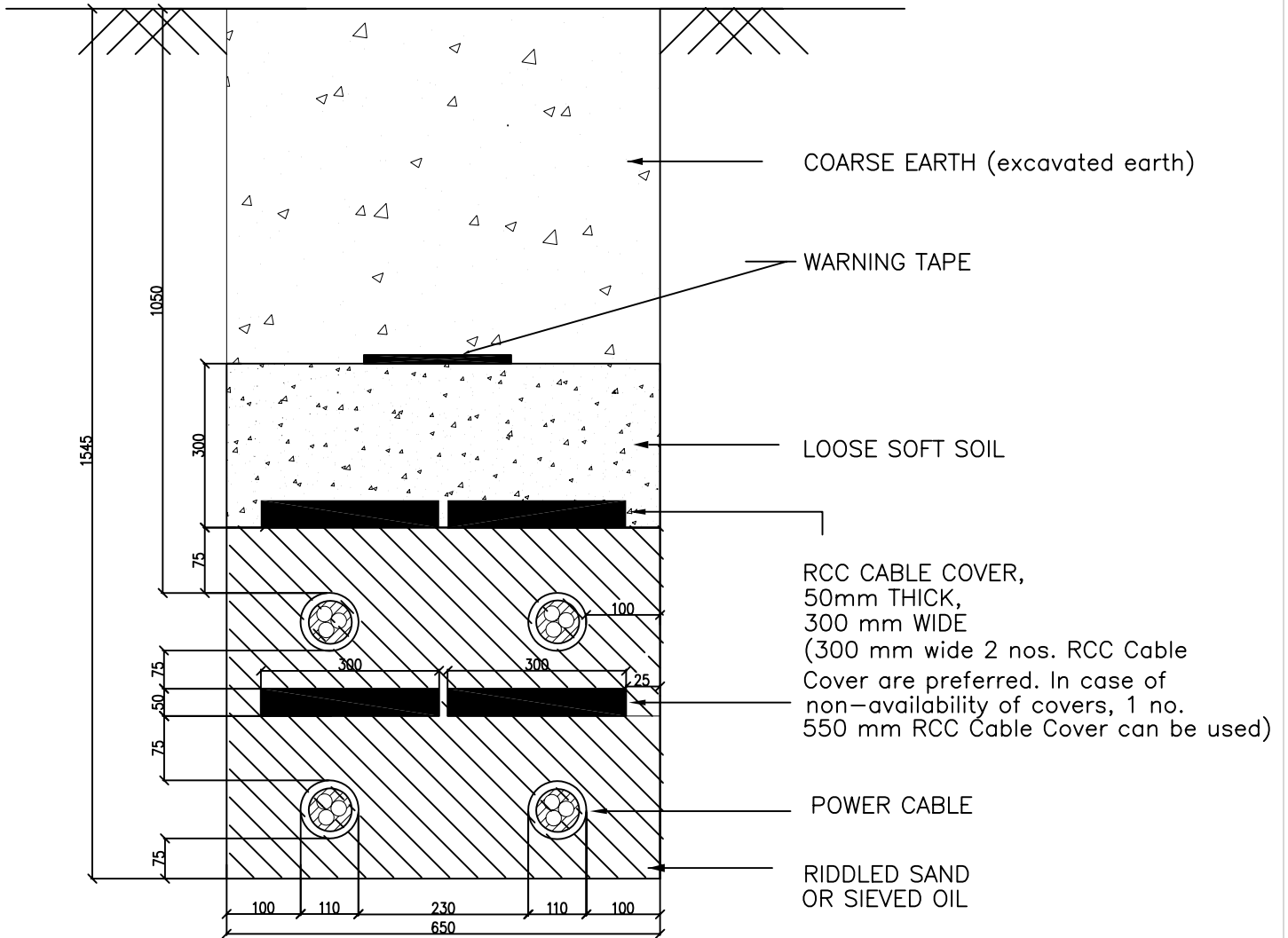
DRAWING # 5 A



TYPICAL DETAILS FOR 33KV BURIED CABLE FOR FOUR CIRCUIT
TYPE – B 2

DRAWN	DS	TITLE:– TRENCH DRAWING FOR 3C X 400MM ² , 33KV FOUR CIRCUIT XLPE CABLE	BSES	
CHECKED	SGD			
APPD.	D.GUHA			
DATE				
SCALE				
				REV. 00

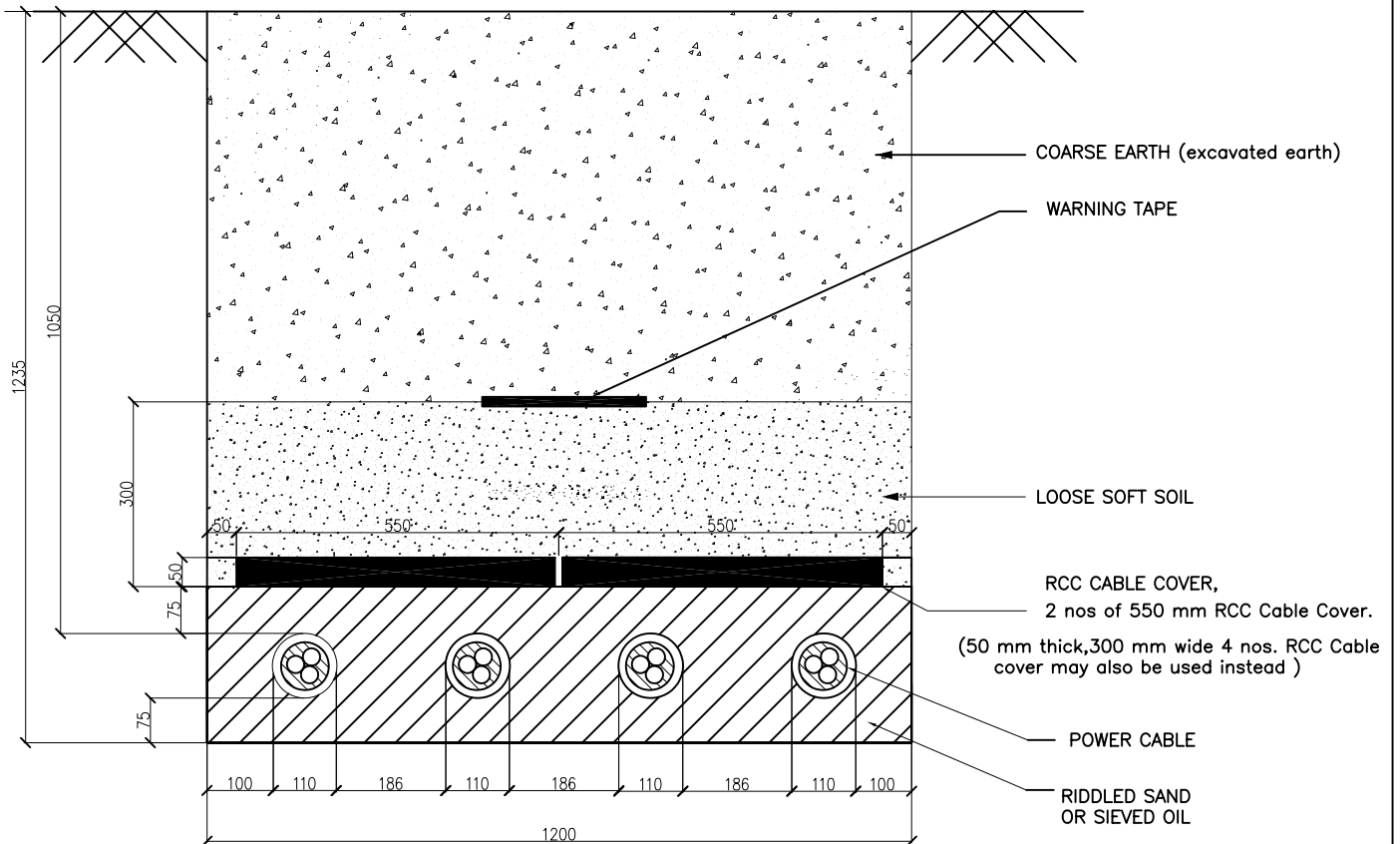
DRAWING # 5 B



TYPICAL DETAILS FOR 33KV BURRIED CABLE FOR FOUR CIRCUIT
TYPE – B 3

DRAWN	DS	TITLE:–	<div>BSSES</div>
CHECKED	SGD	TRENCH DRAWING FOR	
APPD.	D.GUHA	3C X 400MM2, 33KV	
DATE		FOUR CIRCUIT	
SCALE		XLPE CABLE	
			REV. 00

DRAWING # 5 C



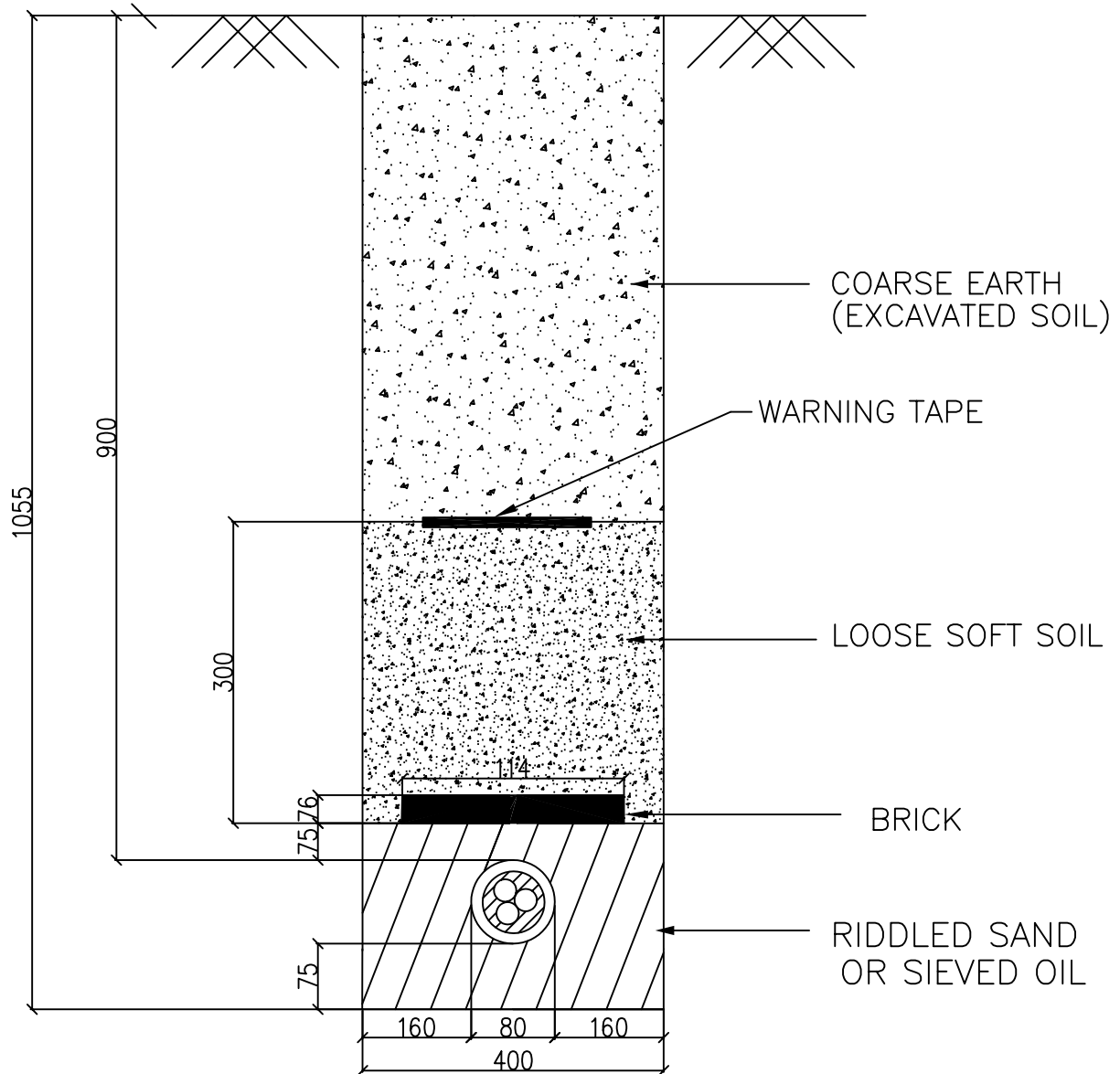
TYPICAL DETAILS FOR 33KV BURIED CABLE FOR FOUR CIRCUIT
TYPE – C 1

DRAWN	DS	TITLE:–
CHECKED	SGD	TRENCH DRAWING FOR
APPD.	D.GUHA	3C X 400MM2, 33KV
DATE		FOUR CIRCUIT
SCALE		XLPE CABLE

BSES

REV.
00

DRAWING # 6



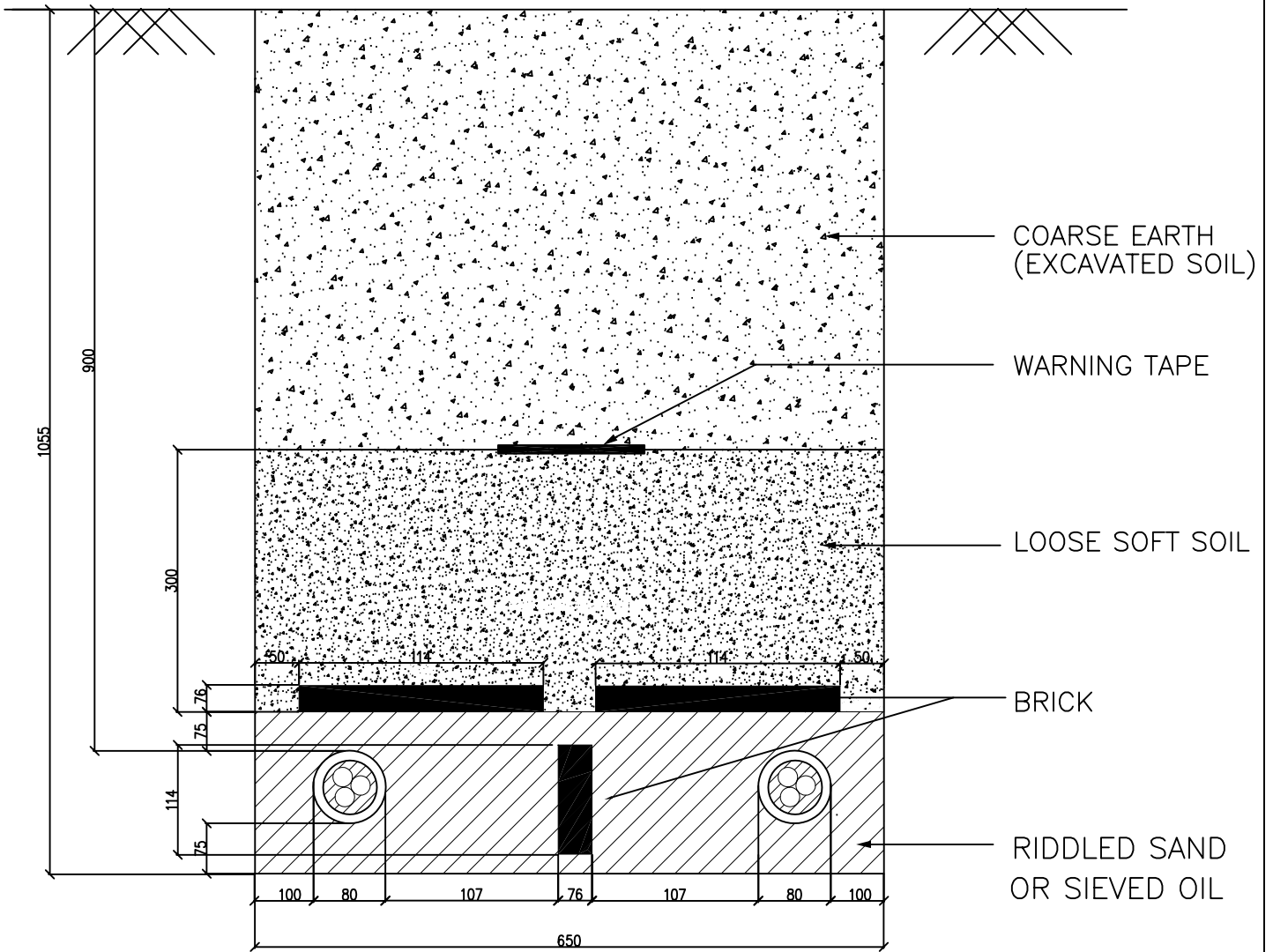
TYPICAL DETAILS FOR 11KV BURIED CABLE FOR SINGLE CIRCUIT
TYPE – A 2

DRAWN	DS	TITLE:-
CHECKED	SGD	TRENCH DRAWING FOR
APPD.	D.GUHA	3C X 300 Sq. mm
DATE		11KV SINGLE CIRCUIT
SCALE		XLPE CABLE

BSES

REV.
00

DRAWING # 7



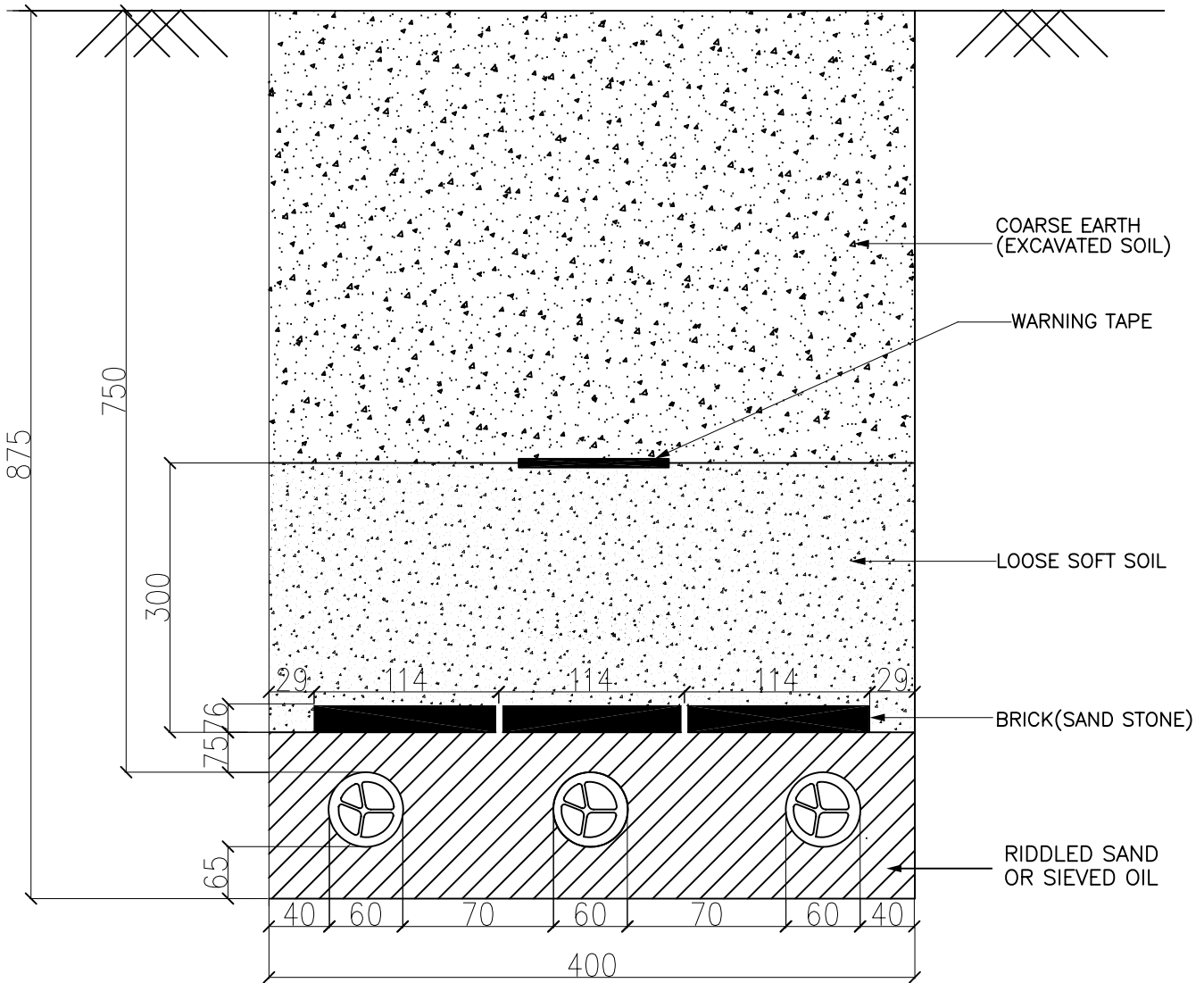
TYPICAL DETAILS FOR 11KV BURRIED CABLE FOR TWO CIRCUIT
TYPE – B 1

DRAWN	DS	TITLE:-
CHECKED	SGD	TRENCH DRAWING FOR
APPD.	D.GUHA	3C X 300 mm Sq. or
DATE		3C X 150 mm sq
SCALE		11 KV DOUBLE CIRCUIT
		XLPE CABLE

BSES

REV.
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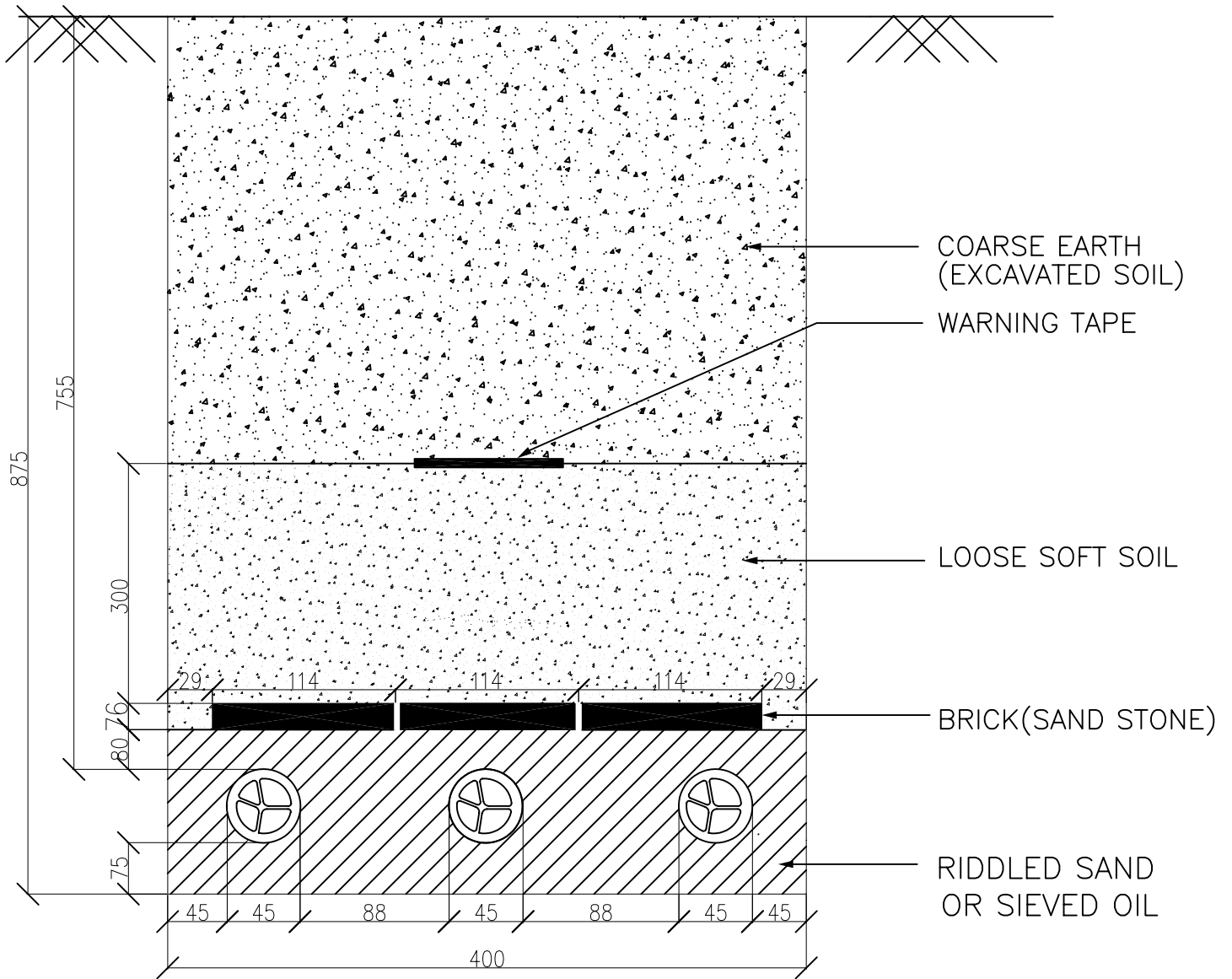
DRAWING # 8



TYPICAL DETAILS FOR 1.1KV BURIED CABLE
TYPE – A 1

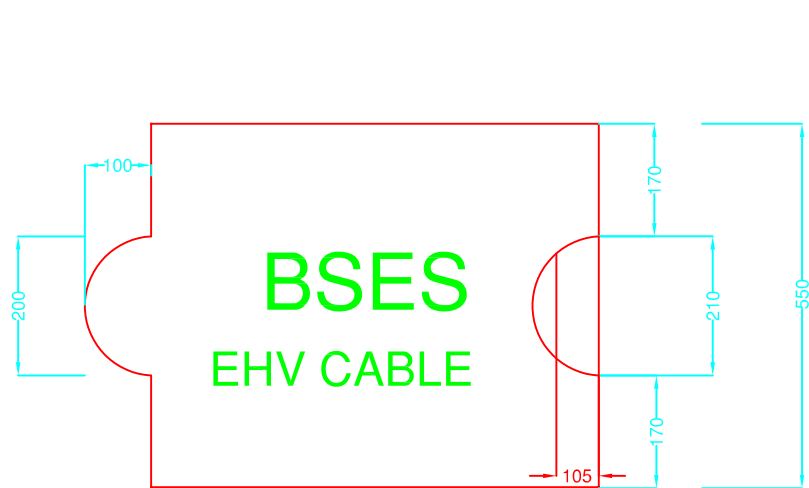
DRAWN	DS	TITLE:–	<div>BSES</div> <div>REV. 00</div>
CHECKED	SGD	TRENCH DRAWING FOR	
APPD.	D.GUHA	3.5Cx300Sqmm 1.1 KV	
DATE		XLPE CABLE	
SCALE			

DRAWING # 9

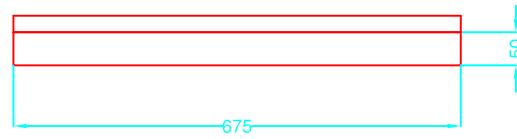


TYPICAL DETAILS FOR 1.1KV BURRIED CABLE
TYPE – A 1

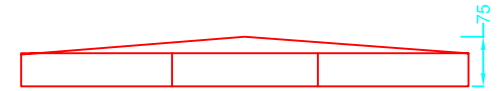
DRAWN	DS	TITLE:–	<div>BSES</div> <div>REV. 00</div>
CHECKED	SGD	TRENCH DRAWING FOR	
APPD.	D.GUHA	3.5Cx150Sqmm 1.1 KV	
DATE		XLPE CABLE	
SCALE			



PLAN



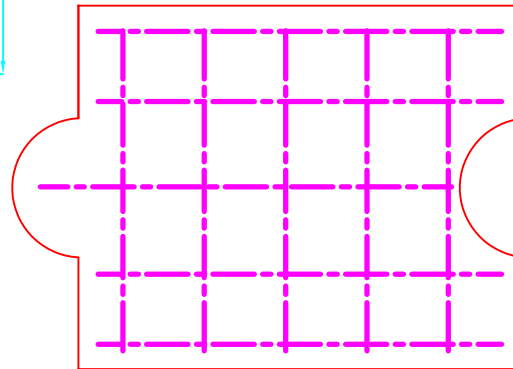
ELEVATION



SIDE VIEW

NOTE -

- (i) All dimensions are in MM.
- (ii) Concrete Mix 1 : 2 : 4
- (iii) MS rod - 6 MM Ø



CABLE COVER FOR EHV CABLES TYPE - A.

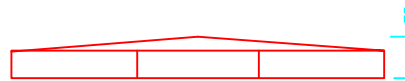
1. STEEL ROD - AS PER IS 432/1139
2. CONCRETE MIX SHALL BE NOT LESS THAN M200 GRADE AS PER IS 456.
3. MOULDING SHALL BE WITH COMPACTION NOT LESS THAN 7 MN/Sq.m.(70 kgf/Sqcm)



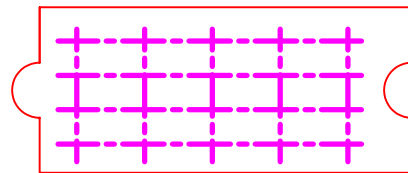
PLAN



ELEVATION



SIDE VIEW



NOTE -

- (i) All dimensions are in MM.
- (ii) Concrete Mix 1 : 2 : 4
- (iii) MS rod - 6 MM Ø

- 1. STEEL ROD - AS PER IS 432/1139
- 2. CONCRETE MIX SHALL BE NOT LESS THAN M200 GRADE AS PER IS 456.
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CABLE COVER FOR EHV CABLES TYPE B.

Annexure-7: Barricading and Safety

1. Dimensions of barricading- Height- 2 mtr, Length- 1.5 mtr. Refer drawing enclosed with tech spec for more details.
2. There shall not have any gap in between two barricades. Edge to edge shall be intact.
3. LED Bacon light shall be placed at 1st and 4th barricade and same shall be continue
4. Name, painting, colour, clean ness etc. shall be done on regular basis.
5. 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 and encroachment of existing roads by the contactor applying the excuse of work execution.
6. 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. Same the way barricades protect the road users from the danger due to construction equipment and temporary structures.
7. The structure dimensions of the barricades , material and composition, its colour scheme, BSES logo and details shall be in accordance with specification and drawing laid down in the tender documents.
8. All the barricades shall be erected as per the design requirements of employer, numbered painted and maintained in good condition and also barricade in charge maintain a barricade register at site
9. All barricades shall be conspicuously seen in the dark/night time by the road users so that no vehicle hits the barricades. Conspicuity 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 should be placed at the top of each barricade.
10. No dust deposit at the front side of barricades.
11. Cable drum shall be returnable and vendor shall take it back (by bye back process) from site at their own risk and cost.
12. Once cable lying complete of a drum, within two days empty drum shall be removed from site by bye back process.
13. Trained traffic marshal with all PPE and traffic control light (Red and Green) shall be placed at site for 24x7.
14. No excuse of theft (beyond 6 hrs. of FIR) shall be acceptable.
15. 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 recover, repair etc.
16. 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 with in 24 hrs. after completion of job.
17. During non working hrs. vendor to ensure presence of supervisor for controlling any event from locals.
18. PPEs

- Helmets

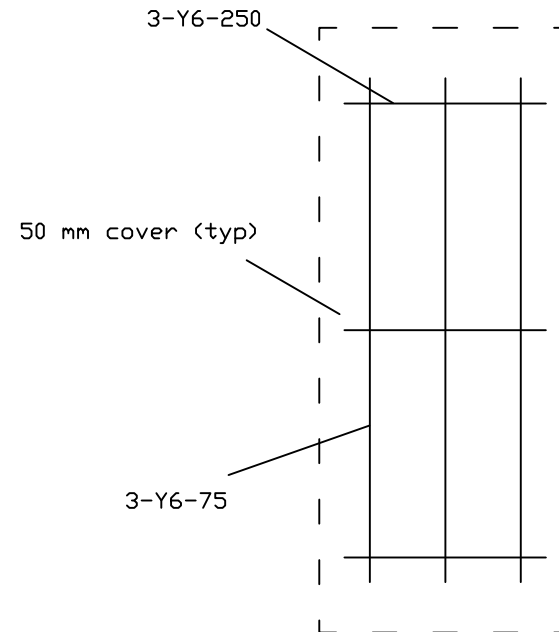
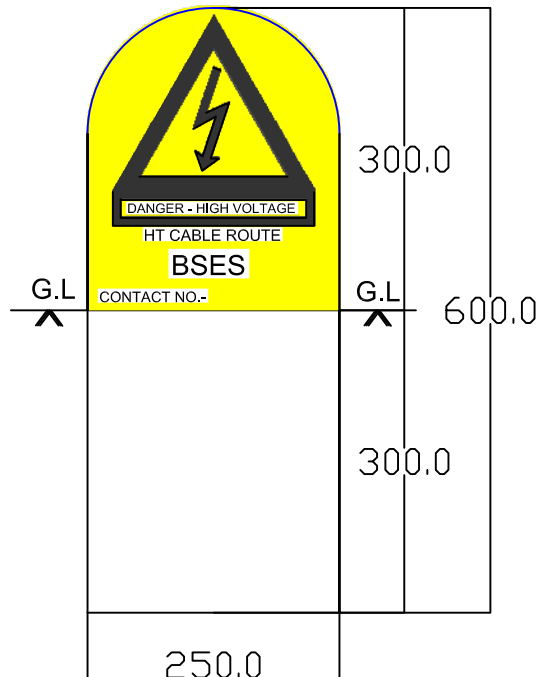
- Mask
- Jacket
- Shoes
- First Aid Box etc.

Shall be available at site 24x7. Zero tolerance on absence of PPEs to the working personnel. No excuse shall be acceptable in this regards.

19. GPR/Scanning shall be done by vendor of whole the route and same shall be submitted to BRPL. This work shall be done by vendor before execution of job.
20. Jointing TAT- Jointing to start within 48 hrs. and shall be completed by 96 hrs.+1 day.
21. Lifting of cable drums with hydraulic machine, pulling of cable from top end of drum with pulling machine (hydraulic winch) is mandatory.
22. Violation on barricading guideline and safety norms, a fine of Rs.5000 /day shall be imposed. BRPL inspector/engineer in-charge shall be empowered to impose the above penalty.


Annexure # 8 – ROUTE MARKER AND BARRICADING DRAWING

DETAIL OF HT CABLE ROUTE MARKER (RCC) - BSES



Notes:-

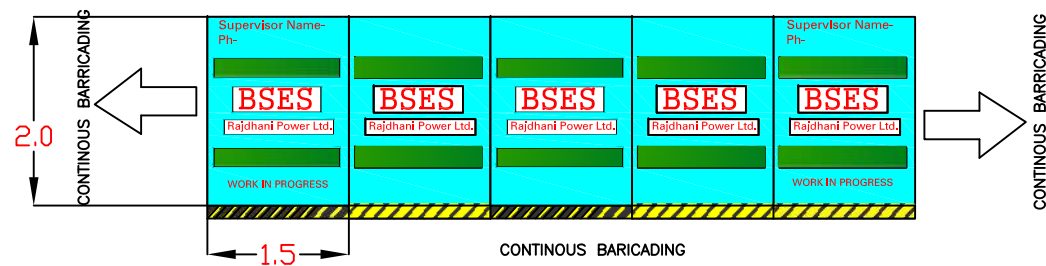
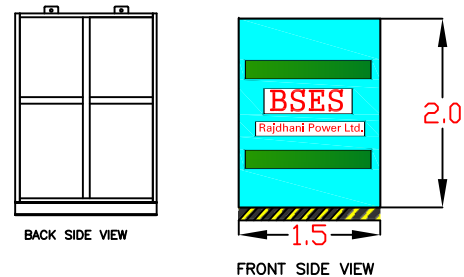
1	RCC Cable route marker with 6 mm Dia. Road and M25 concrete grade.
2	The litter/number shall be engraved on both the side route marker.
3	All dimentions are in mm unless specified.
4	Thickness of RCC shall be 75mm.
5	Yellow colour shall be visible above ground level.
6	Each route marker to be placed at an internal 50 mtr. and at every turn of route.
7	All kind of paint on route marker shall be in the scope of manufacturer.


DRAWN	R.K.JANA	TITLE:- DETAIL OF HT CABLE ROUTE MAKER (RCC).	 BSES BSES Rajdhani Power Ltd.
CHECKED	P.B		
REVIEWED	M.B		
APPO.	K.A		
DATE	16.08.16		
			DWG. NO. BSES-RM-RCC-01, R0

BARRICADING FOR CABLE LAYING WORK

NOTE:

1. Barricading shall provided through out the route length as well as project location.
2. Plate shall be MS
3. Supervisor name, ph no, work in progress, shall be mentioned at every 1st and 4th plate of barricading through out the route.
4. Beacon Light shall be provided through out the length.
5. Traffic marshal shall be Provided for traffic control by vendor.
6. Violation of safety norms and barricading shall be reviewed by BRPL and shall impose fine of Rs.5000/day as well as termination of work and short close of award.
7. After finishing of job vendor shall take return all the plate at their own risk and cost.
8. PPE's like Helmet, Mask, Jacket, safety boot etc. shall be provided vendor to all worker.



DRAWN	R.K.JANA	TITLE:— DRAWING—BARRICADING FOR CABLE LAYING WORK	 BSES Rajdhani Power Limited	
CHECKED	P.B.			
REVIEWED	A.S.			
APPD.	V.P.			
DATE	29.06.17			

Annexure#9-Note for HDPE Pipe Diameter in Cable Laying

- 1) Primarily our intent for laying cable will be through open trench only.
- 2) Trench dimensions shall be as per the standards which mentioned as below table

Sl. no.	Cable	Trench Details (mm)		
		Depth (single and double run)	Width (Single Run)	Width (Double Run)
1	LT Cable	875	400	400
2	11 kv	1055	400	650
3	33 kv	1235	400	650
4	66 Kv	1445	650	1200

- 3) QC team will do stage inspection after completion of digging to validate the depth of trench and will give approval for issuing of cable.
- 4) Execution in charge to ensure the cable laying work.
- 5) QC team will also inspection the laying work to validate the laying as per standards before back filling.
- 6) In case of site constraints, trench less cable laying shall be allowed as per the followings-
 - a) Cable laying up to 50 mtr through trenchless will be allowed with approval of circle head (O&M) for road crossing or site constraints. Site photos of constraints shall be reviewed before approval by circle head.
 - b) Absence of permission for digging- written disapproval by road owing agency and appropriate approval by circle head (for O&M Jobs), by O&M head (for 11kV, P&C job) and by EHV head (for EHV Jobs)
 - c) The size of HDPE (PN6, PE80) pipe shall be as per the guidelines of IS-1255, 1983, clause no-6.3.4.3. Details mentioned below in below table-

Sl. No	Cable	Recommended Dia of HDPE pipe (mm)
1	66kV, 3CX300	225
2	66kV, 1CX630	180
3	66kV, 1CX1000	180
4	33kV, 3CX400	180
5	11kV, 3CX300	160
6	11kV, 3CX150	160

- d) In-case of using lower size of HDPE pipe due to site conditions, the deviation for using lower HDPE pipe from above table, written approval must be taken through technical committee. Photos of the challenges while apparently the same will be reviewed by technical committee.

(However, HDPE pipe size with less than 1.5XOD of cable shall not be allowed at any stage)



Technical Specification of Various Types of Structural Steel Items

Specification no – BSES-TS-17-SSI-R0

Rev:	0	
Date:	05 Apr 2022	
Pages:	07	
Prepared by	Jeena Borana	<i>Jeena</i>
	Vani Sood/ Pronab Bairagi	<i>Vani Sood</i> 05/04/22 <i>Pronab</i> 05/04/22
Reviewed by	Srinivas Gopu	<i>\$G</i>
	Amit Tomar	<i>Amit</i> 05/04/22
Approved by	Gaurav Sharma	<i>Gaurav</i>
	K. Sheshadri	<i>K. Sheshadri</i> 05/04/22

INDEX

1.0 SCOPE OF SUPPLY	3
2.0 SERVICE CONDITION	3
3.0 CODES & STANDARDS	3
4.0 ELECTRICAL DATA	4
5.0 DESIGN PARAMETERS	4
6.0 MATERIAL	5
7.0 TESTING & INSPECTION	5
8.0 MARKING	6
9.0 DEVIATION	6
10.0 GUARANTEE CERTIFICATE.....	6
11.0 DOCUMENTS SUBMISSION	6

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

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

2.0 SERVICE CONDITION

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

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

3.0 CODES & STANDARDS

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

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

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

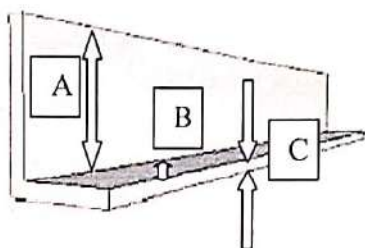
5.0 DESIGN PARAMETERS

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

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

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

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

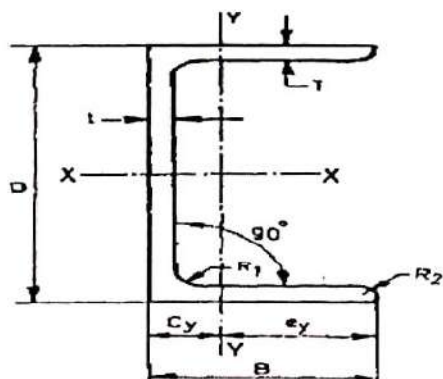


For MS Angle reference drawing (a, b & c)

Technical Specification of Various Types Of Structural Steel Items

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

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



For MS Channel reference drawing (g & h)

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

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

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

6.0 MATERIAL

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

7.0 TESTING & INSPECTION

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

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

Technical Specification of Various Types Of Structural Steel Items

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

8.0 MARKING

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

9.0 DEVIATION

Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, requirements of the Specification shall be met without exception.

10.0 GUARANTEE CERTIFICATE

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

11.0 DOCUMENTS SUBMISSION

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

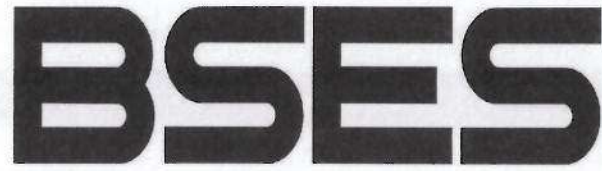
S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
11.1	Deviation Sheet, if any	Required	Required	Required
11.2	GA and Dimensional	Required	Required	Required



BSES-TS-17-SSI-R0

Technical Specification of Various Types Of Structural Steel Items

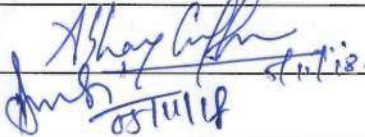
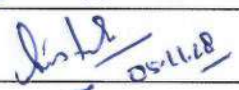
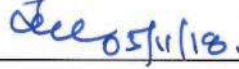
S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
	Drawing			
11.3	Manufacturer's quality assurance plan and certification for quality standards		Required	Required
11.4	Make of Raw Materials	Required	Required	Required
11.5	Inspection and test reports, carried out in manufacturer's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



**TECHNICAL SPECIFICATION
OF
GI STRIP**

Specification No- GN101-03-SP-150-00

BSES RAJDHANI POWER LTD

Prepared by	Abhay Gupta	 05/11/18	Rev : 00
	Pronab Bairagi		
Reviewed by	Amit Tomar	 05/11/18	Date : 5-Nov-18
Approved by	K. Sheshadri	 05/11/18	Page : 1 of 13
Registered Office: BSES Bhawan, Nehru Place, Delhi - 110019			

TECHNICAL SPECIFICATION OF GI STRIP**TABLE OF CONTENTS**

REVISION RECORD.....	3
1.0 SCOPE.....	4
2.0 STANDARDS	4
3.0 CLIMATIC CONDITIONS.....	5
4.0 GENERAL TECHNICAL REQUIREMENT	5
4.1 GENERAL REQUIREMENTS.....	5
4.2 PHYSICAL AND CHEMICAL PROPERTIES.....	6
4.3 METHODS OF GALVANIZING.....	7
4.4 MARKING.....	8
4.5 DIMENSIONS TOLERANCE.....	8
5.0 TESTING.....	8
6.0 INSPECTION.....	10
7.0 STORING, PACKING AND HANDLING	10
8.0 DOCUMENTATION	11
8.1DRAWING, DATA AND MANUALS	11
8.2 DOCUMENTS TO BE SUBMITTED ALONG WITHBID FOR TECHNICAL JUSTIFICATION.....	11
8.3 WARRANTY	12
9.0 DEVIATIONS.....	13



BSES Rajdhani Power Ltd

GN101-03-SP-150-00

TECHNICAL SPECIFICATION OF GI STRIP

REVISION RECORD

Rev. No.	Revision Date	Item/ clause no:	Page No.	Nature of Change	Approved by

TECHNICAL SPECIFICATION OF GI STRIP**1.0 SCOPE**

This specification covers design, manufacture, testing, inspection and supply of GI strip for earthing (50X6mm and 25X6mm) (Heavy duty) for satisfactory operations in Sub-station / Project site at different locations under BSES Rajdhani Power Ltd, New Delhi.

2.0 STANDARDS

Material shall conform to the latest applicable Indian standards (IS) which shall mean latest revisions, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification.

S. No.	International/ Indian Standard	Title
1	IS:2629 (1966)	Recommended practice for hot dip galvanized iron Earthing strips
2	IS:2633 (1986)	Methods of testing uniformity of coating on Zinc coated articles
3	IS:5358 (1969)	Specification for hot dip galvanized coating on fasteners
4	IS:3203	Specification for electroplating
5	IS:4759 (1968)	Specification for hot dip Zinc coating on structural & other allied products
6	IS:2062 Grade 'A' quality	Specification for MS channel and MS flat
7	IS:2062	Chemical and physical composition material
8	IS:1852	Rolling and cutting tolerances for Hot rolled steel products
9	IS:6745	Specification for methods for the determination of the mass of Zn coated Iron and steel articles

TECHNICAL SPECIFICATION OF GI STRIP**3.0 CLIMATIC CONDITIONS**

a)	Average grade atmospheric condition	Heavily polluted, dry
b)	Maximum altitude above sea level	1000 M
c)	Air temperature Ambient	i) Highest : 50°C ii) Average : 30°C iii) Minimum : 0°C
e)	Relative Humidity	100 % max
f)	Thermal Resistivity of Soil	150°C. cm / W (max.)
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

4.0 GENERAL TECHNICAL REQUIREMENT**4.1 GENERAL REQUIREMENTS**

- The specification is for the sizes 50X6 mm and 25X6 mm GI Strip
- Fully galvanized iron strips shall be used in switchyard. Galvanized Iron strips shall confirm to IS: 2629 (1966). The Zinc deposition should not be more than 610 g / m² of the galvanized surface area of the MS strip.
- All galvanized materials shall withstand test as per IS: 2633 (1972). The weight of zinc coating shall be determined as per the method stipulated in IS: 2633(1964).
- The standard length of Galvanized Iron Earthing Strip shall be minimum 7 Meters and not exceeding 10 Meters.

TECHNICAL SPECIFICATION OF GI STRIP

- Uniform Zinc coating is required.

4.2 PHYSICAL AND CHEMICAL PROPERTIES**Physical-**

The GI flat shall be supplied in 7m to 10m lengths.

The weight of GI flat shall be witnessed by BRPL at the time of taking delivery. The weight recorded in the material receipt certificate issued by BRPL shall be final.

Mechanical Properties (minimum requirement)		
1	Tensile strength (kgf/mm ²)	410 kgf/mm ²
2	Yield stress (min.) for thickness <20mm	26 kgf/mm ² or 250 N/mm ²
3	Elongation (%)	23%
4	Bend test	Minimum 3 times the thickness of material
5	Zinc coat thickness	70 microns

Chemical-

Chemical Properties		
S.No	Element	%
1	Iron	98.32
2	Carbon	0.204
3	Silicon	0.158
4	Manganese	0.510
5	Sulphur	0.028

TECHNICAL SPECIFICATION OF GI STRIP**Chemical Properties**

S.No	Element	%
6	Phosphorous	0.0320
7	Nickel	0.040
8	Chromium	0.086
9	Molybdenum	<0.01
10	Aluminium	<0.01
11	Copper	<0.104
12	Titanium	<0.005
13	Niobium	<0.01
14	Cobalt	<0.01
15	Boron	<0.0005
16	Lead	<0.01
17	Vanadium	<0.01
18	Zirconium	<0.006

4.3 METHODS OF GALVANIZING

S.No	Tests	For GI Flat
1	Dip test	4 dips of 1 min each
2	Mass of Zinc coating	610 g/m ² (minimum)

TECHNICAL SPECIFICATION OF GI STRIP

- Pre dispatch inspection shall be performed to witness following tests:
 - Freedom from defects
 - Verification of dimensions
 - Galvanization tests
 - Mechanical tests
 - Chemical composition tests
- These tests are to be performed and certified at NABL accredited third party laboratory.
- MS Flat shall conform to IS 2062 and its latest amendments for steel and galvanization as per IS 4759 and its latest amendments.
- The flat shall be coated with Zn 98- Zinc grade
- The minimum Zn coating shall be 610 g/m² for thickness more than 5mm

4.4 MARKING

The bidder shall put his identification marks on the finished materials along with ISI mark, Manufacturer's name, PO No. and BRPL name. This mark shall be in "legible English letters".

4.5 DIMENSIONS TOLERANCE

Width = $\pm 2.5\%$

Thickness = $\pm 0.5\%$

5.0 TESTING**Type Test**

Product shall be type tested from NABL accredited lab and same shall be submitted to BRPL. Type test report should not be older than 5 years old. Vendor shall conduct the type test (as per the relevant IS (Refer Clause 2.0 of this technical specification)) from BRPL sample from NABL accredited lab if type test report is older than 5 years without any cost implications to BRPL. Following type tests shall be conducted mandatorily-

- i. Uniformity in thickness
- ii. Mass of Zn coating
- iii. Adhesion test
- iv. Knife test for Zn coated hardware and assembled Steel products
- v. Bend and wrapping test

TECHNICAL SPECIFICATION OF GI STRIP

- vi. Tensile test
- vii. Chemical composition test
- viii. Freedom from defects

BRPL reserve the right to seal the sample once per PO for type testing from NABL accredited lab if required. Bidder has to conduct the type test on BRPL requirement. Expenses for type testing shall be borne by bidder.

Acceptance test**i. Freedom from defects**

The Zinc coating shall be adherent, smooth, reasonably bright, continuous and free from imperfections as flux, ash and dross inclusions, bare and black spots, lumpiness and runs, rust stuns, bulky white deposits and blisters.

ii. Uniformity in thickness

Galvanized articles shall be tested for uniformity in thickness of coating in accordance with Preece test given in IS 2633- 1986.

iii. Mass of Zn Coating

Mass of Zinc coating shall be determined in accordance with IS 6745- 1972.

iv. Adhesion test

The adherence of the Zinc coat on steel shall be determined by the pivoted hammer test. The hammer shall be made of normalized 0.3 – 0.4 percent carbon steel (Shall be in accordance with IS: 2629 – 1985).

v. Knife test for Zn coated hardware and assembled Steel products

When the coating is cut or pried into, such as with a stout knife applied with considerable pressure in a manner tending to remove a portion of the coating, it shall only be possible to remove small particles of the coating and it shall not be possible to peel any portion of the coating so as to expose the underlying iron or steel (Shall be in accordance with IS: 2629 – 1985).

- vi. Bend and wrapping test
- vii. Tensile test
- viii. Chemical composition test

TECHNICAL SPECIFICATION OF GI STRIP**6.0 INSPECTION**

- The representative of Purchaser shall pick up samples at random from the GI strips offered for carrying out routine tests as per specified IS.
- The materials to be supplied will be subject to inspection and approval by BRPL's representative before dispatch and / or on arrival at the destination.
- Inspection before dispatch shall not relieve the bidder of their responsibility to supply the steel section strictly in accordance with the specification.
- The bidders shall abide by all the statutory provisions, acts such as the Indian Electricity Act, Indian factory Act, Indian Boiler Act etc. and corresponding rules and regulations as may be applicable and as amended from time to time.
- BRPLs representative shall be entitled at all reasonable time during manufacturing to inspect, examine and test at the bidders premises the materials and workmanship of the steel section to be supplied.
- As soon as the steel section is ready for testing, the bidder shall intimate BRPL well in advance.
- The material shall not be dispatched unless waiver of inspection is obtained or inspected by BRPL's authorized representative.
- The test certificate shall be in accordance with the latest version of the relevant Indian Standard or any equivalent International standards.
- The acceptance of any batch /lot shall in no way relieve the bidder of any of his responsibilities for meeting all the requirements of the specification and shall not prevent subsequent rejection of any item if the same later found defective.
- The purchaser reserves the right to reject on inspection after the same is received at destination.

7.0 STORING, PACKING AND HANDLING

Sufficient care shall be exercised while storing, packing and handling of galvanized products. While storing and transporting them, adequate ventilation shall be provided as otherwise 'rust' or 'wet storage stain' may result when galvanized coatings reacts with humidity and atmospheric gases. Galvanized articles can also be stored with spacers in between them, they shall also be kept at an inclination to facilitate drainage of water if collected on the articles. Post treatment like chromating shall be provided to minimize the chances of formation of white rust.

TECHNICAL SPECIFICATION OF GI STRIP**8.0 DOCUMENTATION**

Submission of drawings, calculations, catalogues, manuals, test reports shall be as mentioned below:

8.1 DRAWING, DATA AND MANUALS

Cross-Sectional drawing shall show every feature of construction. This drawing shall also state the text to be printed over the GI Strip, font sizes to be used, additional text if any etc.

8.2 DOCUMENTS TO BE SUBMITTED ALONG WITH BID FOR TECHNICAL JUSTIFICATION

The vendor shall submit-

- Cross sectional drawing
- GTP (all data to appear)
- Type test certificates

Document Submission

Submission of drawings, calculations, catalogues, manuals, test reports shall be as follows.

Legend:

GTP : Guaranteed Technical Particulars

TTR : Type Test Report

RTR : Routine Test Report

TECHNICAL SPECIFICATION OF GI STRIP

	Documents Along with offer	After award of contract- for Approval	Final documents(after Approval)
GTP	1 copies	** 1 soft copy	** 1 soft copy + CD
Drawings	1 copies	** 1 soft copy	** 1 soft copy + CD
Calculations	1copies	** 1 soft copy	** 1 soft copy + CD
Catalogues & Manual	1 copy each		** 1 soft copy + CD
Test Report	1 copy each of TTR and sample RTR		** 1 soft copy + CD

** Soft copy and CD shall contain documents duly approved, signed and scanned

- The manufacturing of the GI Strip shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the BRPL. All manufacturing and fabrication work in connection with the GI Strip prior to the approval of the drawing shall be at manufacturer's risk.
- Approval of drawing etc. by the BRPL shall not relieve the Manufacturer of his responsibility and liability for ensuring correctness and correct interpretation of the latest revision of applicable standards, rules and codes of practices. The GI Strip shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and BRPL shall have the power to reject any work or material which in his judgment is not in full accordance therewith.

8.3 WARRANTY

Warranty shall be 5 years minimum. All the relevant documents shall be submitted by the bidder in support to warranty terms and conditions.



BSES Rajdhani Power Ltd

GN101-03-SP-150-00

TECHNICAL SPECIFICATION OF GI STRIP

9.0 DEVIATIONS

- a) Deviations from this specification shall be listed separately by bidder clause wise (format given below) along with optional offer and has to submit the list along with bid/quotation. BRPL will review the deviations and if BRPL is agreed with the deviation, seller has to take written confirmation from BRPL on deviation during tender evaluation.
- a) In the absence of any separate list of deviations from the bidders with bid as well as written confirmation from BRPL on deviations, it will be assumed by the Buyer that the Seller complies with the Specification fully.
- b) Any deviations mentioned in any other submitted bid documents (i.e. in filled GTP, Catalog, BRPL 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.

Deviation Sheet Format-

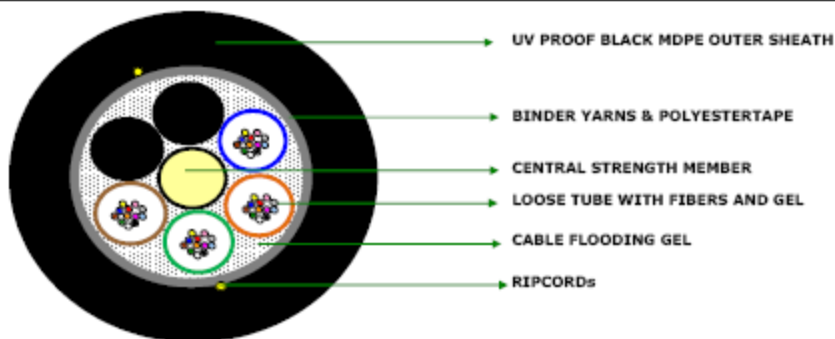
S.No	Document Name	Clause No.	Deviation	Reason	Merits to BRPL

48F Composite Fiber Multitube (MDPE) Single Sheath Duct Lite Optical Fiber Cable

PRODUCT INFORMATION

Fiber			
Single Mode Optical Fiber	36 Nos.		
Maximum Cabled Fiber Attenuation dB/Km		1310nm : 0.36 & 1550nm : 0.23 & 1625nm : 0.26	
Multi Mode Optical Fiber	12 Nos.	Fiber OM2 : 50/125	
Maximum Cabled Fiber Attenuation dB/Km		8500nm : 3.5 & 1300nm : 1.5	
Loose Tube			
Filling Gel		Thixotropic gel to prevent water ingress in loose tube (ITCO T 250)	
Fiber Per Tube	12 Nos.		
Tube	4 Nos.	Thermoplastic Material (PBT)	
Core			
Central Strength Member		Fibre Reinforced Plastic (FRP) to provide tensile strength and antibuckling properties.	
Filler	2 Nos.	Polyethylene Black	
Water blocking elements		Cable flooding gel is added in interstices of core to prevent water ingress in the cable core (ITCO C 480)	
Core Covering		Binder and Polyester Tape	
Cable			
Rip Cord	2 Nos.	Polyester Based Twisted Yarn	Applied below Outer Sheath
Outer Sheathing		UV Proof Black MDPE (ME 6052/ME 6056)	2.2 mm Nominal Thickness

CONSTRUCTIONAL DETAILS



Typical construction Diagram - Not to Scale

OPTICAL FIBER CABLE PERFORMANCE

MECHANICAL				ENVIRONMENTAL	
Max. Tensile strength	2500 N	Crush Resistance	2000 N / 100x100 mm	Temp. Performance	
Minimum Bend Radius	20 D	Impact strength	25 Nm.	Installation	-20°C to +80°C
Repeated Bending Test	20 D, 30 Cycle	Torsion	±180°	Service	-20°C to +80°C
				Storage	-20°C to +80°C
Water Penetration	1m head, 3m samples, 24 Hr			Drip Test	30 cm, 70°C, 24 hr

Tests shall be carried out as per IEC 60793 & IEC 60794-1-2/GR 20 Standards. Change in attenuations shall be ≤ 0.05 dB.

COLOR DETAILS

Optical Fibre Colour	Blue, Orange, Green, Brown, Slate, White, Red, Black, Yellow, Violet, Pink, Aqua.
Loose Tube Colour	For G657A1 : Blue, Orange, Green & For OM2 : Brown.
Outer Sheath Colour	Black

PHYSICAL PARAMETERS

Cable Diameter (mm)	11.75 \pm 0.25	Cable Wt. (Kg/Km)	114 \pm 10%	Cable Length:	2 Km \pm 5%
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PRINTING DETAILS

Cable Printing details (White - Hot Foil Emb.)	MONTH & YEAR OF MANUFACTURE LENGTH CODE METER MARKING
The accuracy of marking shall be $\pm 0.5\%$. Occasional loss of printing & remarking shall be as per Bell core CR 20 and this supercedes the earlier markings.	