Tender Notification for

RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM & 11KV 3C X 150 sq.mm cable

NIT NO CMC/BR/22-23/RB/PR/FH/1003, DT 11.03.2022

Due Date for Bid Submission: 01.04.2022 1500HRS

BSES RAJDHANI POWER LIMITED,
BSES Bhawan, Nehru Place, New Delhi-110019 Corporate Identification Number: U74899DL2001PLC111527 Telephone Number: +91 11 3999 7235
Fax Number: +91 11 2641 9833
Website: www.bsesdelhi.com

SECTION – I: REQUEST FOR QUOTATION

Event Information

BRPL invites sealed tenders in 2 envelopes for **RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM & 11KV 3C X 150 sq.mm cable** from reputed manufacturers. The bidder must qualify the technical requirements as specified in clause 2.0 statedbelow. All envelopes shall be duly super scribed as "**RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM & 11KV 3C X 150 sq.mm cable "NITNo- CMC/BR/22-23/RB/PR/FH/1003, DT 11.03.2022"**

"PACKAGE-A" **RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM cable**

"PACKAGE-B" **RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3C X 150 sq.mm cable**

Pckg	Item	Technical Specification	Estimated Cost	Qty	Delivery
A	RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM cable	**GN101-03-SP-81-05**	91 Cr	350 KM	New Delhi Stores
B	RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3C X 150 sq.mm cable	**GN101-03-SP-172-01**	1 Cr	20 KM	

Note: - The rates quoted shall remain valid for one year from the date of LOI/RC

Note: Individual Drum Quantity may vary ±5%. There will be no positive tolerance on the overall total order quantity. However (-) 2% will be allowed on overall order quantity.

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/-(With GST)** 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.

The bids shall be addressed to:

Head of Department
Contracts & Materials Deptt. BSES Rajdhani Power Ltd. C&M Deptt.
1st Floor, C Block
BSES Bhawan, Nehru Place
New Delhi 110019

BRPL reserves the right to accept/reject any or all Tenders without assigning any reason thereof and alter the quantity of materials mentioned in the Tender documents by (±) 30% at the time of placing purchase orders.

Tender will be summarily rejected if:

- **Earnest Money Deposit (EMD)** of value for **PACKAGE-A** IS INR **91,00,000**/- and for **PACKAGE-B** is **INR 4,00,000/-**is not deposited in shape of Bank Draft/Pay Order/Banker's Cheque/BG drawn in favour of BSES Rajdhani Power Ltd, payable at Delhi.
- The offer does not contain "FOR NEW DELHI" price indicating break-up towards all taxes, duties & freight.
- Complete Technical details are not enclosed.
- Tender is received after due date and time**.**

2.0 Qualification Criteria:-

The prospective bidder must qualify all of the following requirements to be eligible to participate in the bidding. Bidders who meet following requirements will be considered as Successful bidder and BRPL has a right to disqualify those bidders who do not meet these requirements.

Package-A

1. The bidder must be a manufacturer of 11kV or higher voltage having a valid Type Test Reports of 11kV, 3CX300 sqmm or higher size cable carried out at CPRI/ ERDA.Type test report should not be older than 5 years.
   In case type test reports are older than five (5) years from the date of bid opening, bidder shall submit the undertaking that "since the last type test, the product has not undergone any change in design and the materiel used and the dimensions of the product are the same as the one on which the type test was conducted". Non submission of type test reports will lead to rejection of the offer. Type test older than ten (10) years shall not be acceptable and bid is liable for rejection..

2. The bidder should have manufacturing capacity of minimum 30-40kms per month.

3. The bidder should have qualified technical & qualified QA personnel at various stages of manufacture & testing.

4. Bidder should have Average Annual Sales Turnover of Rs 200.00 Crores or more in last 3 years (FY2018-19, 2019-20, 2020-21.

5. The bidder should have supplied at least 150 KM. 11kV, 3CX300 sqmm or higher size/higher voltage cable to any utilities/SEB's/PSU's or end user shall be Utility/SEB's/PSU's for developing distribution Network in last 5 years from tender due date.
   At least 75KM should be in successful operation in last 02 years and performance certificate shall be provided in the support of the same.

6. The bidder must possess valid ISO 9001:2000 certification and must possess valid BIS License.

7. In case of new bidders (not enlisted in BSES) , Factory Inspection & evaluation shall be carried out to ascertain bidders manufacturing capabilities and quality procedures. BRPL reserves the right to assess the capabilities /installed capacity

8. The bidder must submit an undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any major utilities/SEB's/other reputed companies

9. The Bidder shall submit an undertaking "No Litigation" is pending with the BRPL and Group Companies.

10. 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 statuary compliances as per the laws/rules etc. before the start of the work

NOTE: - For SL NO 5 of qualification criteria data to be submitted as per annexure-VI

Package-B

1. The bidder must be a manufacturer of 11KV or higher grade HT Power Cable of conductor size 300mm² and above having valid Type Test Reports carried out at CPRI/ERDA identical/similar to the construction being offered against present Tender.

2. The bidder should have manufacturing capacity of minimum 30-40kms per month.

3. The bidder should have qualified technical & qualified QA personnel at various stages of manufacture & testing.

4. Bidder should have Average Annual Sales Turnover of Rs 200.00 Crores or more in last 3 years (FY 18-19, 19-20 & 20-21)

5. The bidder should have supplied at least 150 km. of similar Cross section or higher to any major utilities/SEB's in last 3 years out of which at least 50% should be in successful operation for the last 2 years.

6. The bidder must possess valid ISO 9001:2000 certification and must possess valid BIS License.

7. In case of new bidders (not enlisted in BSES) , Factory Inspection & evaluation shall be carried out to ascertain bidders manufacturing capabilities and quality procedures. BRPL reserves the right to assess the capabilities /installed capacity

8. The bidder must submit an undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any major utilities/SEB's/other reputed companies

9. The Bidder shall submit an undertaking "No Litigation" is pending with the BRPL and Group Companies.

10. Th 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 statuary compliances as per the laws/rules etc. before the start of the work

NOTE: - For SL NO-5 of qualification criteria data to be submitted as per annexure-VII

3.0 Bidding and Award Process.

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

BID SUBMISSION

The bidders are required to submit the bids in 2(two) parts and submitted in 1 original + 1 duplicate to the following address

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

PART A: TECHNICAL BID comprising of following (in duplicate)

EMD
Non-refundable demand draft for Rs 1180/- in case the forms are downloaded from website
Documentary evidence in support of qualifying criteria
Technical Literature/ GTP/Type test report etc

Qualified Manpower available
Testing Facilities
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, BG etc
Power of Attorney for signing the bid

PART B: FINANCIAL BID comprising (1 original only)

- ✓ Price strictly in the Format enclosed in SECTION V indicating Break up of basic price, taxes & duties, Freight etc

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	01.04.2021, onwards
2	Last date of Queries, if any	26.03.2022, 1500hrs
3	Last date of receipt of bid documents	01.04.2022, 1500hrs
4	Date & time of opening of tender – Part A	01.04.2022, 1600hrs
5	Date & Time of opening of Part B of qualified bidders	Only Successful bidders

NOTE: In case last date of submission of bids & date of opening of bids is declared as holiday in BRPL office, the last date of submission will be following working day at the same time.

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.

Bidders are requested to submit the bid in one Original plus one copy in duplicate

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. 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.

Part –C : E- Bidding and Reverse Auction through SAP-SRM Module

Purchase reserves the right to use the reverse auction through SAP-SRM tool as an integral part of the entire tendering process. All the bidders who are techno-commercial qualified on the basis of tender requirements shall participate in reverse auction.

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

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

Award Decision

The purchaser reserves all the rights to award the contract to one or more bidders so as to meet the delivery requirement or nullify the award decision without any reason.

In the event of your bid being selected by purchaser (and / or its affiliates) and you subsequent DEFAULT on your bid; you will be required to pay purchaser (and / or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in NIT/RFQ.

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.

QTY VARIATION: The purchaser reserves the rights to vary the quantity by **(±) 30%** of the tender quantity.

Repeat Order: BRPL reserves the right to place repeat order at the same rates & terms and conditions as per this tender against additional requirement subject to mutual agreement between BRPL & supplier

Market Integrity

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

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

6.0 Supplier Confidentiality

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

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

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

7.0 Contact Information

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

	Technical	Commercial
Contact Person	to CES	To:- faiyaz.hussain@relienaceada.com
	Copy to : Pankaj Goyal	Copy to : Pankaj Goyal
Address	BSES RAJDHANI Power Ltd ,5th Floor , 20 No Building, Nehru Place,New Delhi 110019	C&M Deptt. 1st Floor , D-Block, BSES RAJDHANI Power Ltd BSES Bhawan, Nehru Place, New Delhi 110019
Email	Amitas.tomar@releianceada.com	Pankaj.goyal@releianceada.com

SECTION – II: INSTRUCTION TO BIDDERS

A. GENERAL

1.00

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

2.00 SCOPE OF WORK

The scope shall include Design, Manufacture, Testing at works conforming to the Technical Specifications/IS along with Packing, Forwarding, Transportation and Unloading and proper stacking at Purchaser's stores/site.

DISCLAIMER

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

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

- 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 Purchaser will in no case be responsible or liable for those costs.

B. BIDDING DOCUMENTS

The Scope of Work, Bidding Procedures and Contract Terms are described in the Bidding Documents are as follows:

Volume - I

- Request for Quotation (RFQ) - Section - I
- Instructions to Bidders (ITB) - Section - II
- Terms & Conditions of Contract (T&C) - Section -III
- Delivery schedule - Section IV
- Technical Specifications (TS) - Section V (Pages Enclosed)

Volume - II

- Price Format - Annexue -I
- Bid Form - Annexure -II
- Acceptance Form for Reverse Auction - Annexure –III
- EMD BG Format - Annexure -1V
- Commercial Terms & Conditions- Annexure –V
- No Deviation Sheet - Annexure –VI

5.00 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.

AMENDMENT OF BIDDING DOCUMENTS

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

6.02- The Amendment shall be part of the Bidding Documents, pursuant to Clause 6.01, and it will be notified in web site **www.bsesdelhi.com** and the same 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 Purchaser 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.

C. PREPARATION OF BIDS

7.0 LANGUAGE OF BID

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

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 against each tender.

Tender documents duly stamped and signed on each page by authorized signatory.

9.0 BID FORM

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

EMD

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

The EMD shall be denominated in any of the following form**:**

Banker's Cheque/Demand Draft/Pay Order drawn in favour of BSES Rajdhani Power Ltd, payable at Delhi.

A bank guarantee issued by any scheduled bank strictly as per the format enclosed and shall be valid for a period of thirty (30)days beyond the validity of the bid

The EMD may be forfeited in case of:

- ✓ the Bidder withdraws its bid during the period of specified bid validity

  or

- ✓ the case of a successful Bidder, if the Bidder does not
  - accept the Purchase Order, or
  - Furnish the required performance security BG.

BID PRICES

- Bidders shall quote for the entire Scope of Supply with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance with the requirement of Bidding Documents The Bidder shall complete the appropriate Price Schedules included herein , stating the Unit Price for each item & total Price.

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

Prices quoted by the Bidder shall be **"Firm"** and not subject to any price adjustment during the performance of the Contract. **A Bid submitted with an adjustable price/Price Variation Clause will be treated as non -responsive and rejected.**

11.0 BID CURRENCIES

Prices shall be quoted in Indian Rupees Only.

12.0 PERIOD OF VALIDITY OF BIDS

12.01- Bids shall remain valid for 120 days from the due date of submission of the Bid.

12.02 -Notwithstanding Clause 12.01 above, the Purchaser may solicit the Bidder‘s consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing and sent by post/courier

13.0 ALTERNATIVE BIDS

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

14.0 FORMAT AND SIGNING OF BID

The original Bid Form and accompanying documents (as specified in Clause 9.0), clearly marked "Original Bid" plus one copy must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copies, the original shall govern.

The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid.

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

D. SUBMISSION OF BIDS

15.0 SEALING AND MARKING OF BIDS

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.

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 as “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“.

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

16.0 DEADLINE FOR SUBMISSION OF BIDS

The original Bid, together with the required copies, must be received by the Purchaser at the address specified no **later than the due date specified earlier**

The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause9.0,in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended

17.0 ONE BID PER BIDDER

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

18.0 LATE BIDS

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

19.0 MODIFICATIONS AND WITHDRAWAL OF BIDS

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

E. EVALUATION OF BID

20.0 PROCESS TO BE CONFIDENTIAL

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

21.0 CLARIFICATION OF BIDS

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

22.0 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

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.

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.

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.

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

23.0 EVALUATION AND COMPARISON OF BIDS

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

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.

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

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.

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

F. AWARD OF CONTRACT

24.0 CONTACTING THE PURCHASER

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.

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

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

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

AWARD OF CONTRACT

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

Splitting of tendered quantity among two or more bidders:

BSES reserves the right to split the tender quantity among techno- commercially qualified bidders on account of delivery requirement in tender quantity under procurement.

For arranging timely procurement of material and to have uniform practice of distribution of quantity amongst eligible bidders, following procedure shall be applicable:

The tender quantity shall be split in following ratio:

(i) If the quantity is to be split among 2 bidders, it will be done in the ratio of 70:30 on L1 price.

(ii) If the quantity is to be split among 3 bidders, it will be done in the ratio of 60:25:15 on L1 price.

Any deviation in regards to above will have deviation approval from management.

27.0 THE PURCHASER 'S RIGHT TO VARY QUANTITIES

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

28.0 LETTER OF INTENT/ NOTIFICATION OF AWARD

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

29.0 PERFORMANCE BANK GAURANTEE

The successful Bidder shall furnish the Performance Bank Guarantee for an amount of 10% (Ten percent) of the Contract Price. The Performance Bond shall be valid for a period of 24 months from the date of Commissioning or 30 months from the date of last dispatch whichever is earlier plus 3 months claim period. Upon submission of the performance security, the EMD shall be released.

30.0 CORRUPT OR FRADULENT PRACTICES

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

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

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

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

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

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

SECTION – III: TERMS AND CONDITIONS

1.0 General Instructions

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

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.

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.

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.

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.

Definition of Terms

"Purchaser" shall mean BSES Rajdhani Power Limited, on whose behalf this bid enquiry is issued by its authorized representative / officers.

"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.

"Supply" shall mean the Scope of Contract as described.

"Specification" shall mean collectively all the terms and stipulations contained in those portions of this bid document known as RFQ, Commercial Terms & Condition, and Instructions to Bidders, Technical Specifications and the Amendments, Revisions, Deletions or Additions, as may be made by the Purchaser from time to time.

"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.

"Month" shall mean the calendar month and "Day" shall mean the calendar day.

"Codes and Standards" shall mean all the applicable codes and standards as indicated in the Specification.

"Offer Sheet" shall mean Bidder's firm offer submitted to BRPL in accordance with the specification.

"Contract" shall mean the "Letter of Acceptance/Purchase Order" issued by the Purchaser.

"Contract Price" shall mean the price referred to in the "Letter of Acceptance/Purchase Order".

"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.

"Acceptance" shall mean and deemed to include one or more of the following as will be stipulated in the specification:

a) The written acceptance of material by the inspector at suppliers works to ship the materials.
b) Acceptance of material at Purchaser site stores after its receipt and due inspection/ testing and release of material acceptance voucher.
c) Where the scope of the contract includes supply, acceptance shall mean issue of necessary equipment / material takeover receipt after installation & commissioning and final acceptance.

3.0 Contract Documents & Priority

3.01Contract Documents: The terms and conditions of the contract shall consist solely of these RFQ conditions and the offer sheet.

4.0 Scope of Supply -General

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.

Bidder shall have to quote for the Bill of quantities as listed in Section – IV of this RFQ.

Quantity variation and additional requirement if any shall be communicated to successful bidder during project execution.

All relevant drawings, data and instruction manuals.

5.0 Quality Assurance and Inspection

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

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

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

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

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

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

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.

Packing List: The contents of each package shall be itemized on a detailed list showing the exact weight, extreme outside dimensions (length, width and 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.

7.0 Price basis for supply of materials

Bidder to quote their prices on Landed Cost Basis and separate price for each item. FIRM prices for supply to BRPL site/ stores inclusive of packing, forwarding, loading at manufacturer's premises, Freight & GST.

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

Transit insurance will be arranged by Purchaser; however bidder to furnish required details in advance for arranging the same by Purchaser.

Terms of payment and billing

For Supply of Equipments:

100% payment shall be made within 45 days from the date of receipt of material at store/ site

Bidder to submit the following documents against dispatch of each consignment:

- **i.** Consignee copy of LR
- **ii.** Supplier detailed invoice showing commodity description, quantity, unit price, total price and basis of delivery.
- **iii.** Original certificate issued by BRPL confirming receipt of material at site and acceptance of the same.
- **iv.** Dispatch clearance & inspection report issued by the inspection authority
- **v.** Packing List.
- **vi.** Test Reports
- **vii.** Guarantee Certificate.

9.0 Price Validity

9.01 All bids submitted shall remain valid, firm and subject to unconditional acceptance by BRPL Delhi as mentioned earlier, the prices shall remain valid and firm till contract completion.

10.0 Performance Guarantee

The bidder shall establish a performance bond in favor of BRPL in an amount not less than ten percent (10%) of the total price of the Contract (the "Performance Bond"). The Performance Bond shall be valid for a period of 24 months from the date of Commissioning or 30 months from the date of last dispatch whichever is earlier plus 3 months claim period.

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.

11.0 Forfeiture

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.

Each Performance BG established under will be automatically and unconditionally forfeited without recourse if BRPL in 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 Warranty / Defects Liability Period

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

14.0 Return, Replacement or Substitution.

BRPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BRPL may in 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, labor 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.

15.0 Effective Date of Commencement of Contract:

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

16.0 Time – The Essence of Contract

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

17.0 The Laws and Jurisdiction of Contract:

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

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

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.

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 for payment to the relevant bank the Performance Bond;

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

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

20.0 Penalty for Delay

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

The total amount of penalty for delay under the contract will be subject to a maximum of ten percent (10%) of the basic (ex-works) price

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.

21.0 **Statutory variation in Taxes and Duties**

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

Force Majeure

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.

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.

i. Dangers of navigation, perils of the sea.

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.

Mitigation of Events of Force Majeure Each Party shall:

- 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;
- 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 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.

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.

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.

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.

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.

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

23.0 Transfer and Sub-Letting

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

24.0 Recoveries

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

25.0 Waiver

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

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

SECTION – IV:

QUANTITY AND DELIVERY REQUIREMENT

S.No	Item Description	Specification	Requirement		Location
			Qty.	Delivery Schedule	
BSES RAJDHANI POWER LIMITED					
1	RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM cable	GN101-03-SP-81-05	350 KM	As per BRPL requirement	New Delhi Stores
2	RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3C X 150 sq.mm cable	GN101-03-SP-172-01	20 KM	As per BRPL requirement	New Delhi Stores

SECTION – V

TECHNICAL SPECIFICATION (TS)

RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM & 11KV 3C X 150 sq.mm cable

NIT NO CMC/BR/22-23/RB/PR/FH/1003
DT 11.03.2022

Technical Specification

for

H. T. Cables

(11kV : 1CX1000, 3CX300 and 3CX150 sqmm)

Specification No: GN101-03-SP-172-01

Prepared by		Reviewed by		Approved by		Rev./ Pages	Date
Name	Sign	Name	Sign	Name	Sign		
Gautam Deka	16/3/22	Amit Tomar		K. Sheshadri		1/42	**16.03.2022**
Pronab Bairagi	16/03/22						

Index

Revision Record

Rev no	Clause no.	Item descriptions	As per old Technical Specification(SP-EWHP-01-R3)	As per Revised Technical Specification(GN101-03-SP-172-01)	Date of approval	Approved by
0	2.0.0	Cable Construction Features	XLPE	TR-XLPE	23/07/19	KS
0	2.1.12-C-12	Embossing and printing	Drum no. was not included	Drum no. included in embossing along with laser printing at an interval 1 mtr.	23/07/19	KS
0	4.0.0-a	Type Test	Type test report with validity 5 years only	Type Test Required After Award of PO: i) Type test-1: 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 BRPL during inspection of cable. Cost for this type test shall be borne by the respective Bidder. ii) Type test -2: 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 BRPL during inspection of cable. This type test is applicable subject to BRPL requirement and cost shall be borne by BRPL.	23/07/19	KS
0	4.0.0-c	Routine Test	1. CRM 2. HV 3. PD	Test Added- 1. Stripability 2. Impulse 3. Armour Coverage 4. Physical Dimensions	23/07/19	KS
0	4.0.0-d	Inspection	Only Final Inspection was included	Added Stage Inspection before final inspection -OEM shall intimate 10 days advance to BRPL along with complete manufacturing scheduled	23/07/19	KS
0	4.0.0-e	Acceptance Tests	a. Wafer Boil test- once per PO b. Void-and-contamination Test- once per PO c. Strippability Test- once per PO d. Water Penetration Test (WPT)- once per PO e. Impulse- not included f. Heating Cycle- not included	**Upgraded** a. Wafer Boil test- in each lot b. Void-and-contamination Test- in each lot c. Strippability Test- in each lot d. Water Penetration Test (WPT)- in each lot **Added** e. Impulse in each lot sample basis f. Heating Cycle with Potential on sample basis once per PO	23/07/19	KS

16/03/2022

Rev no	Clause no.	Item descriptions	As per old Technical Specification(SP-EWHP-01-R3)	As per Revised Technical Specification(GN101-03-SP-172-01)	Date of approval	Approved by
0	6.0.0	Drum Length and Tolerance	11kV, 3 Core cable a) 300 mtr +/- 5 %	11kV, 3 Core cable a) 300 mtr +/- 5 % (60% of PO qty.) b) 500 mtr +/- 5 % (40% of PO qty.)	23/07/19	KS
0	7.0.0-e	Type of Drum	Steel/Wooden	only Steel non returnable	23/07/19	KS
1	2.1.13	Cable Pulling eye	Cable Pulling eye required	Removed cable pulling eye	16/03/22	KS
1	4.0.0	Testing and Inspection	Type test	Type test clause modified as below "For participation in the tender Type Test report shall be submitted from CPRI/ERDA only and shall not be more than 5 years old from the date of tender. If the report is more than 5 years and but less than 10 years old than bidder to submit undertaking that there is no design changes from the Type test conducted. "	16/03/22	KS
1	4.0.0 a. 2	Type Test	Type Test	Removed- Type test-1: 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 BRPL during inspection of cable. Cost for this type test shall be borne by the respective Bidder.	16/03/22	KS
1	6.0.0	Drum Length and Tolerance	11kV, 3 Core 150 sqmm cable a) 300 mtr +/- 5 % (60% of PO qty.) b) 500 mtr +/- 5 % (40% of PO qty.)	11kV, 3 Core 150 sqmm cable a) 500 mtr +/- 5 %	16/03/22	KS
1	6.0.0	Drum Length and Tolerance	11kV, 3 Core 300 sqmm cable a) 300 mtr +/- 5 % (60% of PO qty.) b) 500 mtr +/- 5 % (40% of PO qty.)	11kV, 3 Core 300 sqmm cable a) 500 mtr +/-5%	16/03/22	KS
1	6.0.2	Overall tolerance	+/- 2 % of total length	Modified to - 2 % for the total cable length for the entire order.	16/03/22	KS

16/3/22 16/03/2022

Proposed by
Gautam Deka/Pronab Bairagi

Reviewed by
Amit Tomar

Approved by
K. Sheshadri

General Specification

1.0.0 Codes & Standards

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

National Standards

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

International Standards

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

2.0.0 Cable Construction Features

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

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

Cable Code:

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

(N.A. - Not applicable for Specification)

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

2X	XLPE insulation	

W	Steel round Wire armour	(N.A.)
WW	Double steel round Wire armour	(N.A.)
Wa	Non-magnetic round Wire armour	
F	Steel formed wire (strip) armour	
FF	Double steel formed wire (strip) armour	(N.A.)
Fa	Non-magnetic formed wire (strip) armour	(N.A.)
-	(“un-armoured” or without armour)	(N.A.)

Y	PVC outer sheath	

Sr. No.	Description	Conductor Material	Cable Code
1.	11 kV, 3c x 150 sq. mm.	Al	A 2X F Y
2.	11 kV, 3c x 300 sq. mm.	Al	A 2X F Y
3.	11 kV, 1c x 1000 sq. mm.	Al	A 2X Wa Y

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

2.1.1	**Conductor**	a) Electrolytic Grade Stranded Aluminium Conductor

		b) Grade: H2 as per IS: 8130 / 1984 (For Al) c) Stranded, compacted and circular in shape d) Class 2 e) "Longitudinal Water-Blocking Arrangement" (or water-tight construction or water barrier protection) shall be provided within the Conductor. i) As per manufacturer's procedures, 100 % water-tight conductor shall be achieved. iii) Make & Type of materials to be used (i.e. Water-swellable tapes / yarn / powder, etc.) shall also be stated in the List of Sub-Vendors for pre-order approval. f) All detailed constructional features shall be shown in the cross-sectional drawing.
2.1.2	**Conductor Screen**	Extruded semi-conducting material. (Also refer Cl. 2.1.3.) (Tapes are not acceptable)
2.1.3	**Insulation**	a) Extruded XLPE (Cross-Linked Poly-Ethylene) Insulation, with water-tree retardant (WTR) property b) The required compound used shall be from BRPL-approved sub-vendors and not from any other (refer Annexure – C). c) Uniform thickness of insulation shall be within the permissible values as per IEC Standards; eccentricity check shall be carried out to ensure this. d) Insulation Color : natural

2.1.4	**Insulation Screen**	a) Freely-strippable semi-conducting screen, which should not require application of heat for its removal. (Refer Cl. 2.1.3.) b) Text "Do not Heat - Freely Strippable" to be printed on insulation screen (at every 600 mm interval). c) Round shape over the outer semi-con shall be within the permissible limits as per IEC standards; Ovality check shall be carried out to ensure this. d) Compound used shall be suitable for the operating temperature of the Cable and shall be compatible with the insulation used.
2.1.4A	**XLPE Process**	
2.1.4A-1	11 kV	Dry Cure and Dry Cool process only.
2.1.4A-2	Not in use	
2.1.4A-3	Extrusion	It is mandatory that Conductor Screen, Insulation and Insulation Screen shall be extruded simultaneously, in a Single One-Time Process (i.e. as a triple-head extrusion) to ensure homogeneity of layers over the conductor, and absence of voids.
2.1.4A-4	Make of Compounds for Insulation and Semi-conducting	Any deviation from Approved Makes mentioned in Annexure-C shall not be acceptable, unless the deviation has been specifically approved by BRPL during tendering stage,
2.1.5	**Water-Swell able Tape**	a) Semi-Conducting Water-Sellable Tape shall be provided, under the copper tape, on each core. b) Nominal thickness : 0.3 mm c) Weight: 118 gm / sq. m approx. d) Swell height: ≥ 12 mm in 1 min. e) Compatible to strippable / non-strippable semi-con, over which it is applied.

2.1.6	**Core Identification**	a) For 3-core cables, cores shall be identified by coloured strips (Red, Yellow, Blue), applied helically / longitudinally below the copper tape. The coloured strips shall carry the name of cable manufacturer permanently printed at 1 meter intervals; this is to provide additional identification of manufacturer of the cable.
2.1.6A	Copper Tape	Copper Tape shall be applied helically over the layer formed after application of insulation screen, water-swell able tape and identification strip.
2.1.7	**Filler**	a) All interstices, including center interstices shall be filled by PP filler. b) PP Filler shall be non-hygroscopic, not having any effect on other compounds used, stable at cable temperatures, etc. c) PVC filler is not acceptable. d) Filler is not applicable for single-core cables.
2.1.8	**Binder Tape**	As per manufacturer's standard
2.1.9	**Inner Sheath**	Extruded Inner Sheath of Black PVC type ST-2 (IS 5831)
2.1.10	**Armour**	a) For 3-core Cables : Galvanised Steel flat strip armour b) For 1-core Cables : Non-magnetic round wire armour (hard-drawn aluminium wire) c) Minimum area of coverage of armouring shall be 90 % (min.). At any time, the gap between any two adjacent armour strips / wires shall not be more than the width of strip / diameter of wire.

		d) Zero negative tolerance is for : • Thickness of armour strip • Diameter of armour wire
2.1.11	**Binder Tape**	Rubberised cotton tape
2.1.12	**Outer Sheath**	a) Extruded outer sheath of PVC (ST-2 as per IS 5831) with termite-repellant and anti-rodent properties. (Outer Sheath shall be FRLS-type, if chosen by purchaser.)
		b) Shape of the cable over the outer sheath shall be circular, when manufactured / completed. Regular Ovality check shall be carried out at factory, to detect any abnormality. Manufacturing quality shall be such that cable will retain its circular shape, even after it is laid at site.
		c) The Outer Sheath shall be embossed as well as laser printed with following minimum text at a interval of 1 mtr: 1. The voltage designation 2. Type of construction / cable code (e.g. A2XFY) 3. Manufacturer's Name and Trade-mark 4. Number of cores and nominal cross-sectional area of conductor 5. Progressive (sequential) length of cable at every meter, starting from zero for every drum. Colour filled in for the progressive marking, shall be with proper contrast in colouring. 6. Name of buyer / purchaser, 7. Month & Year of manufacturing 8. IS reference, i.e. IS : 7098

		9. Batch No. / Lot No. (For traceability purpose, in case of any, in case of any manufacturing defect or otherwise arising in the cable in future.) 10. Purchase Order Number & date 11. Word ' FRLSH ', in case the cable is of FRLSH type. 12. Drum no.
2.1.13	**Sealing-end Cap** (for Cables) {R1}	a) Cable both ends (inner and outer end) shall be sealed as per drawing MISC/E/4-1131/1698. One PVC cap with Polyurethane compound shall be provided as primary sealing and heat-shrink end-cap shall form a secondary sealing over the PVC cap.
3.0.0	(This number not used.)	
4.0.0	**Testing & Inspection**	Tests shall be carried out in accordance with IS 7098 (Part-2).
	a) Type Tests (IS 7098, IEC)	1) To Qualify in Tender: Cables must be of type tested quality. Type Test Reports shall be submitted for the type, size and rating of cable offered in the bid. For participation in the tender Type Test report shall be submitted from CPRI/ERDA only and shall not be more than 5 years old from the date of tender. If the report is more than 5 years and but less than 10 years old than bidder to submit undertaking that there is no design changes from the Type test conducted. {R1} 2) 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 BRPL during inspection of cable. This type test is applicable subject to BRPL requirement and cost shall be borne by BRPL.
	b) BRPL QAP (Typical)	In general, all tests mentioned in the BRPL QAP (Characteristics – Typical) mentioned in Annexure-F shall be included in the Routine Tests, Type Tests and Acceptance Tests stated above.
	c) Routine Tests	1. Measurement of Electrical Resistance 2. HV Test with power frequency AC voltage 3. Partial Discharge test 4. "Strippability Test" at both the ends of cable for each drum, to check the freely-strippable property of the Insulation Screen (outer semi-con). 5. Impulse voltage test of one drum 6. Armour coverage measurement 7. Physical test-Dimensions of each and every layer and components. Test results from the above tests must appear in the documents forwarded by the vendor for Inspection call / waiver.
	d) Inspection	1. The Buyer reserves the right to witness all tests specified on completed cables. 2. The Buyer reserves the right to inspect cables at Sellers works at any time prior to dispatch, to verify compliance with the specifications. 3. In-process (stage inspection) and final inspection call intimation shall be given at 10 days advance to the purchaser along with complete manufacturing scheduled. 4. Minimum lot size of Cables to be offered for inspection shall be mutually agreed between Purchaser and Vendor, before placing the order. Vendor shall raise inspection call only after a

		minimum lot size is ready and with due factory routine tests already carried out.
	e) Acceptance Tests	Acceptance Tests shall be conducted as per Cl. 18.2 of IS 7098 (Part-2) and the approved Quality Assurance Plan (QAP) for each lot of cables. Following tests shall also be carried out during the Acceptance Tests : a) "Wafer Boil Test" for checking integrity of semi-conducting layers-in each lot. b) "Void-and-contamination Test" for the Insulation-in each lot c) "Strippability Test" at both the ends of cable for each drum, to check freely-strippable property of the Insulation Screen (outer semi-con) - in each lot. d) "Water Penetration Test (WPT)", as per applicable IEC standards, to check adequacy of water-blocking arrangement provided inside the conductor -in each lot. e) Impulse voltage test – in each lot sample basis. f) Heating Cycle along with potential once per PO on sample basis.
	f) Test Certificates (TC)	Three sets of complete Test Certificates (Routine tests and Acceptance tests) shall be submitted along with the delivery of cables. Soft copy of the TCs shall be separately e-mailed to the Purchaser. **Note :** Make/grades of critical materials (such as, for conductor screen, insulation, insulation screen, etc.), actually used during manufacturing of cables for order-on-hand, shall be clearly stated in the TCs forwarded by the Manufacturer, enabling references in future.

5.0.0	**Drawing, Data and Manuals**	a) Refer Annexure-A regarding Document Submission. b) Cross-Sectional Drawing shall show every feature of construction, including the thickness / diameter over every layer. This drawing shall also state the text to be embossed over the outer sheath - i.e. type/size, etc. of the cable, drum no./lot no., sequential marking over every meter, printing text on outer semi-con ("Do Not Heat-Freely Strippable"), font sizes to be used, additional text, if any, etc. Also, drum details, markings to be made on both sides of the drum, and so on.
5.0.1	Documents to be submitted along with bid	The vendor shall submit : a) Cross-sectional drawing b) GTP (all data to appear) c) Type Test certificates d) Fault Level Calculation for armour and copper tape screen e) Complete Cable Catalogue and Manual f) Armour Coverage Calculation g) Raw materials make list
5.0.2	Documents after award of contract	Within 15 days, the seller has to submit four sets of above-mentioned drawings, along with one soft copy for buyer's approval.
5.0.3	Final As-Built Drawings	One soft copy of all documents, including type & routine test certificates.
6.0.0	**Drum length & tolerance** {R1}	Cable length per drum

6.0.1	a) 11 kV, 3Cx150 sqmm b) 11kV , 3Cx300 sqmm c) 11 kV, Single core cable	a) 500 mtr +/- 5% (100% of the ordered quantity) b) 500 mtr +/- 5% (100% of the ordered quantity) c) 500 mtr +/- 5 % (100% of the ordered quantity)
6.0.2	Overall tolerance {R1}	- 2 % for the total cable length for the entire order.
6.0.3	Short length of cables	Manufacturer shall take prior approval from Purchaser for any supply of short length cables. For 11 kV cables, minimum acceptable short length cables can be 250 meter. In any case, manufacturer shall not put two cable pieces of different short lengths in same cable drum. Only one short length drum shall be accepted and in last lot only.
7.0.0	**Packing, Shipping, Handling & Storage**	
	a) Packing	1. Both the ends of the cables shall be properly sealed to prevent any deterioration of the cable, due to ingress of water, etc. 2. Cable inner end (starting end) shall project, outside the completely wound cable, by sufficient length enabling verify cable details, including the initial length marking. 3. Similarly, outer end of the cable shall be saddled / secured to the drum properly to prevent any external damage to the end at any time. 4. Before putting on wooden planks, protective covers (thick plastic sheets, etc.) shall be secured over the wound cable, to avoid any abrasion by wooden planks, over the outer sheath of the cable.

		5. After providing the protective covers, the cable drums shall be finally closed by wooden planks (with saddles), without leaving any gaps between the planks; i.e. 100 % covering shall be ensured.
	b) Drum Identification Markings:	Direct marking (i.e. text painting through stencils, etc.) shall be done on the drums, instead of attaching labels, which may be misplaced/lost over a period of time. 1. Drum identification number 2. Cable voltage grade 3. Cable code (e.g. A2XFY, etc.) 4. Number of cores and cross sectional area 5. Cable quantity, i.e. cable length (meter) 6. Purchase order number & date 7. SAP item code 8. Total weight of cable and drum (kg) 9. Manufacturer's Name 10. Buyer's name 11. Month & Year of Manufacturing 12. Direction of rotation of drum 13. Cable length final end-markings (i.e., reading at the inner end and reading at the outer end, just before packing, shall be marked on the drum.)
	c) Shipping information	The seller shall give complete shipping information concerning the weight, size of each package
	d) Transit damage	The seller shall be responsible for any transit damage due to improper packing.
	e) Type of Drum	Steel drums (all the drums shall be non returnable except otherwise mentioned in the tender), as per relevant IS / IEC.
	f) Cable Drum handling	The drums shall be with M.S. spindle plate (with nut-bolts) of adequate size to suit the spindle rods, normally required for handling the drums, according

		to expected weight of the cable drums.
8.0.0	**Quality Assurance Plan (QAP)**	
8.0.1	Vendor's QAP	Manufacturer shall submit QAP in line with BRPLQAP (Annexure-F) for purchaser's approval before starting of manufacturing which is mandatory
8.0.2	Inspection Points	As per BRPL approved QAP and special BRPL requirement if any to cross check the product quality. Seller must have to meet the special requirement of BRPL during inspection.
9.0.0	**Progress Reporting**	
9.0.1	Outline Document	To be submitted for purchaser's approval for outline of programmes for production, stage-inspection, testing, final inspection, packing, dispatch and documentation.
9.0.2	Detailed Progress Report	To be submitted to Purchaser once a month containing : i) Progress on material procurement ii) Progress on fabrication (as applicable) iii) Progress on assembly (as applicable) iv) Progress on internal stage-inspection v) Reason for any delay in total programme vi) Details of test failures, if any, during manufacturing stages. vii) Progress on final box-up Constraints / Forward Path
10.0.0	**Deviation**	a) Deviations from this specification shall be listed separately by bidder clause wise (format given in Annexure- H) 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. b) 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. c) 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.

Annexure – A

Scope, Documentation and Delivery schedule

1. Scope

A.	Scope	Design, manufacture, testing at manufacturer's works before dispatch, packing, delivery, unloading, stacking at stores/site of H.T. Power cables, as per Purchaser's BOQ (Bill of Quantity).
B.	Delivery Schedule	To be filled up on a case-to-case basis.

a) **Document Submission**

Submission of drawings, calculations, catalogues, manuals, test reports shall be as follows. (Also refer clause 5.0.0 – Drawings, Data and Manuals.)

Legend:

GTP : Guaranteed Technical Particulars
TTR : Type Test Report
RTR : Routine Test Report

	Documents Along with offer	After award of contract - for Approval	Final documents (after Approval)
GTP	3 copies	** 1 soft copy	** 1 soft copy + CD
Drawings	3 copies	** 1 soft copy	** 1 soft copy + CD
Calculations	3 copies	** 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.

3. Delivery Schedule

a)	Delivery period Start Date	:	From date of LOI / LOA
b)	Delivery period End Date	:	As agreed with supplier
c)	Material dispatch Clearance	:	After inspection by purchaser

Annexure - B

GUARANTEED TECHNICAL PARTICULARS (GTP)

Note:

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

Sr. No.	Description	Buyer's requirement	Unit	Seller's Data
1.0	Purchase Req. No.	-		
2.0	Guarantee Period (Min.)	60 Months (from date of commissioning) / 66 Months (from date of receipt at purchaser's store) whichever is earlier		
3.0	Applicable IS / IEC Standard followed by vendor	IS 7098 Part-2 / IEC 60502-2		
4.0	Make	-		
5.0	**Type** (as required by purchaser)			
	a) 11 kV, 3c x 150 sq. mm.	A2XFY		
	b) 11 kV, 3c x 300 sq. mm.	A2XFY		
	c) 11 kV, 1c x 1000 sq. mm.	A2XWaY		
6.0	**Voltage Grade**			
	a) 11 kV, 3c or 1c	6.35 / 11	kV	
7.0	Maximum Conductor temperature			
A	Continuous	90	deg. C	
B	Short time	250	deg. C	
8.0	**Conductor**	Compacted, Circular, Water tight construction is mandatory		
A	Material and Grade	As per Cl. 2.1.1		
B	Size	As shown under 5.0 above		
C	Wires in each conductor	As per Table 2 of IS 8130	Nos.	

D	Conductor Shape	As per Cl. 2.1.1 ⊖		
E	Dia. of wires in each conductor before compaction	Manufacturer Standard	mm	
F	Diameter over conductor		mm	
G	Maximum Conductor resistance at 20 ° C			
	a) 11 kV, 3c x 150 sq. mm.	0.2060	ohm/km	
	b) 11 kV, 3c x 300 sq. mm.	0.1000	ohm/km	
	c) 11 kV, 1c x 1000 sq. mm.	0.0291	ohm/km	
H	Longitudinal Water Blocking Arrangement within conductor	Is it provided and shown in the cross-sectional drawing? (Yes / No)		
I	Short circuit current-carrying capacity of conductor		kA for 1 sec.	
9.0	**Conductor Screen** (inner semi-con)			
A	Material & type	As per Cl. 2.1.2		
B	Thickness (min)	0.50	mm	
C	Diameter over conductor screen		mm	
D	Make and grade of semi-conducting compound			
10.0	**Insulation**			
A	Insulation Material	As per Cl. 2.1.3		
B	Nominal thickness			
	a) 11 kV, 3c or 1c	3.6	mm	
C	Minimum thickness			
	a) 11 kV, 3c or 1c	3.14	mm	
D	Diameter over Insulation		mm	
E	Make and grade of Insulation compound			
F	Eccentricity	As per IEC standards	%	
G	Water-tree retardant property	Required		
11A.	**Insulation Screen** (outer semi-con)			
a.	i) Thickness of freely strippable Semi conducting screen	0.50	mm	
	ii) Make and grade of semi-conducting compound			
	iii) Printing	As per Cl. No. 2.1.4 (Yes / No)		
	iv) Ovality of the core	2	%	
b.	Diameter over Insulation Screen (approx.)		mm	
11B.	**Water-Swellable Tape**			

	(if required by Purchaser)			
	a) Thickness b) Weight c) Swell height d) Compatible to strippable / non-strippable semi-con, over which it is applied. e) Make & Grade f) Pre-slitted packed tapes from sub-vendors approved by BRPL	a) 0.3 mm b) 118 gm / sq. m c) ≥ 12 mm in 1 min. d) Yes / No e) Pl. state f) Yes / No		
11C.	**Cable Core identification** a) By coloured strips over cores applied helically / longitudinally b) Manufacturer's name shall be permanently printed on the strips, at close intervals.			
11D.	**Copper Tape**			
	i) Dimensions	a) Thickness : 0.06 + 5 % b) Width : 50 mm C) Overlap: 10% d) no negative tolerance in thickness of copper tape	Mm	
	ii) Fault current-carrying capacity of copper tape	Manufacturer's Standard (Calculation sheet shall be attached)	… kA for … sec.	
11E.	Diameter over laid up core (approx.)		mm	
12.0	**Filler** (Material and type)	As per Cl. 2.1.7 (Specify no. & size of filler at center & core interstices)		
	a) 11 kV, 3c x 150 sq. mm.			
	b) 11 kV, 3c x 300 sq. mm.			
	d) 11 kV 1core	Not applicable		
12A.0	**Binder Tape**	over laid-up cores		
13.0	**Inner Sheath**			
A	Material and type	As per Cl. 2.1.9		

B	Minimum thickness			
	a) 11 kV, 3c x 150 sq. mm.	0.6	mm	
	b) 11 kV, 3c x 300 sq. mm.	0.7	mm	
	c) 11 kV, 1c x 1000 sq. mm.	0.7	mm	
C	Approx. dia. over inner sheath		mm	
14.0	**Armour**	as per purchaser's requirements		
A	Material			
	a) 11 kV, 3c	G. I. Strip	No.	
	b) 11 kV 1c	non-magnetic wire armour (Aluminium wire)	No.	
B	Armour – Wires a) Diameter of wire b) Number of wires (min.)	As per Table 4 of IS 7098 Part-2 (zero negative tolerance for diameter)	mm. no.	
C	Armour – GI strips a) Width of strip & Thickness of strip b) Number of strips (min.)	4 x 0.8 (zero negative tolerance for thickness)	mm no.	
D	Approx. Equivalent Area		sq. mm.	
E	Area covered by armour	Min. 90 % Calculation shall be attached.	%	
F	Dia. over armour - approx.		Mm	
G	Fault current carrying capacity of armour	Calculation sheet shall be attached.	… kA for … sec.	
15.0	**Outer Sheath**			
A	Material and type	As per Cl. 2.2.12		
B	Thickness (min.)	** As per Table-5 of IS 7098 Part-2		
	a) 11 kV, 3c x 150 sq. mm.	**	mm	
	b) 11 kV, 3c x 300 sq. mm.	**	mm	
	e) 11 kV, 1c x 1000 sq. mm.	**	mm	
C	Color	Blue		
D	Embossing (details as per Cl. 2.1.12)	Yes		
E	FRLS Properties	As per customer's requirement		
16.0	Approx. overall diameter	**{R1}**	mm	

17.0	Standard drum length with tolerance			
	a) 11 kV, 3Cx150 sqmm b) 11kV , 3Cx300 sqmm	500 mtr +/- 5%	meters	
	a) 11 kV 1c x 1000 sq. mm.	500 mtr +/- 5%	meters	
17A	Overall order tolerance-**{R1}**	- 2 % for the total cable length for the entire order.		
18.0	**Cable Drum**			
a.	Type of drum	Steel non returnable (Specify the relevant IS / IEC followed for drum design)		
b.	Markings on the drum (as per Cl. 7.0.0)	On both faces		
18A.0	**Cross-Sectional Drawing** (ref. Cl. 5.0.0)	Is drawing submitted, showing every feature of constructions? (Yes / No)		
19.0	**a. Sealing-end Cap-{R1}** (provided at the both end) Refer drawing in Annexure-E	Is manufacturer's / Sub-Vendor's drawing submitted? (Yes / No)		
20.0	**Weights**			
	a) Net weight of cable (approx.)		kg / km	
	b) Weight of empty drum {R1}	500 mtr	Kg	
	c) Weight of Cable with drum {R1}	500 mtr	Kg	
	d) Size of Drum {R1}	500 mtr	mm	
	e) Drawing of Drum {R1}	required	EA	
21.0	Continuous current rating for standard I. S. condition laid Direct			
	a) In ground 30° C		Amp	
	b) In duct 30° C		Amp	
	c) In air 40° C		Amp	
22.0	(not used)			

23.0	Electrical Parameters at Maximum Operating temperature:			
A	AC Resistance		ohm / km	
B	Reactance at 50 c/s		ohm / km	
C	Impedance		ohm / km	
D	Zero sequence impedance		ohm / km	
E	Positive sequence impedance		ohm / km	
F	Negative sequence impedance		ohm / km	
G	Capacitance		micro-farad / km	
H	Conductance {R1}		Amperes per volts	
I	Inductive susceptance {R1}		mho	
J	Capacitive susceptance {R1}		ohms	
24.0	Recommended minimum bending radius	12 x O. D.	mm	
25.0	De-rating factor for following Ambient Temperatures :	Ground / Air		
	a) At 30° C			
	b) At 35° C			
	c) At 40° C			
	d) At 45° C			
	e) At 50° C			
26.0	Group factor for following numbers of cables laid :	Touching Trefoil		
	a) 3 Nos.			
	b) 4 Nos.			
	c) 5 Nos.			
	d) 6 Nos.			
27.0	Recommended pressure for laying cable using power winch	30 N / mm2	N / sq. mm.	
28.0	Process of Cross-linking of Polyethylene			
	a) 11 kV, 3c or 1c	Dry Cure process and Dry Cooling only		
29.0	**Type test** (TTR - Type Test Report)	Is copy of latest valid TTR for respective sizes enclosed? (Yes / No)		

30.0	**Quality Assurance Plan** (QAP)	Is QAP Format (Annexure-F), duly filled in and enclosed? (Yes / No)		
31.0	**List of Sub-Vendors** for construction items (Annexure-C)	Is this list enclosed for BRPL approval? (Yes / No)		

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
5.	Aluminium Rod	1	Bharat Aluminium Co. Ltd. (BALCO)
		2	Hindustan Aluminium Co. Ltd. (HINDALCO)
		3	National Aluminium Co. Ltd. (NALCO)

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

Annexure - D

Service Conditions

(Atmospheric / Soil conditions at Site)

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

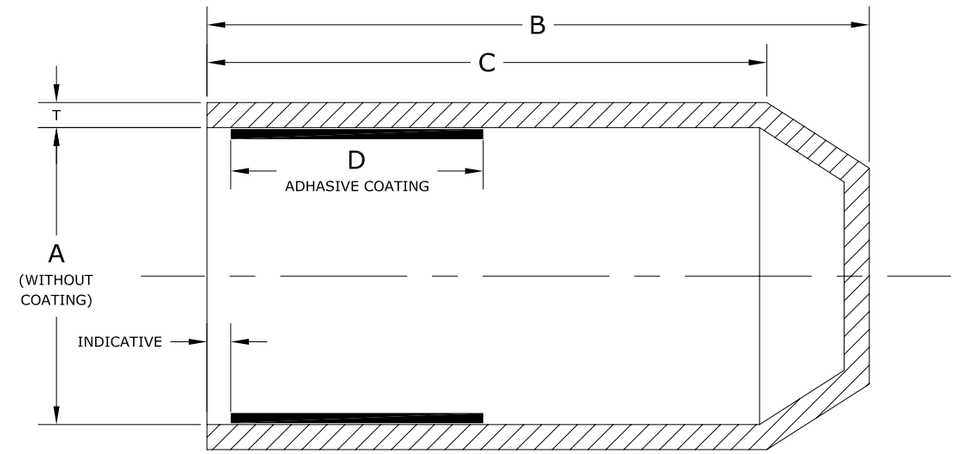
Annexure E

General Arrangement Drawing for--**{R1}** End-sealing Cap

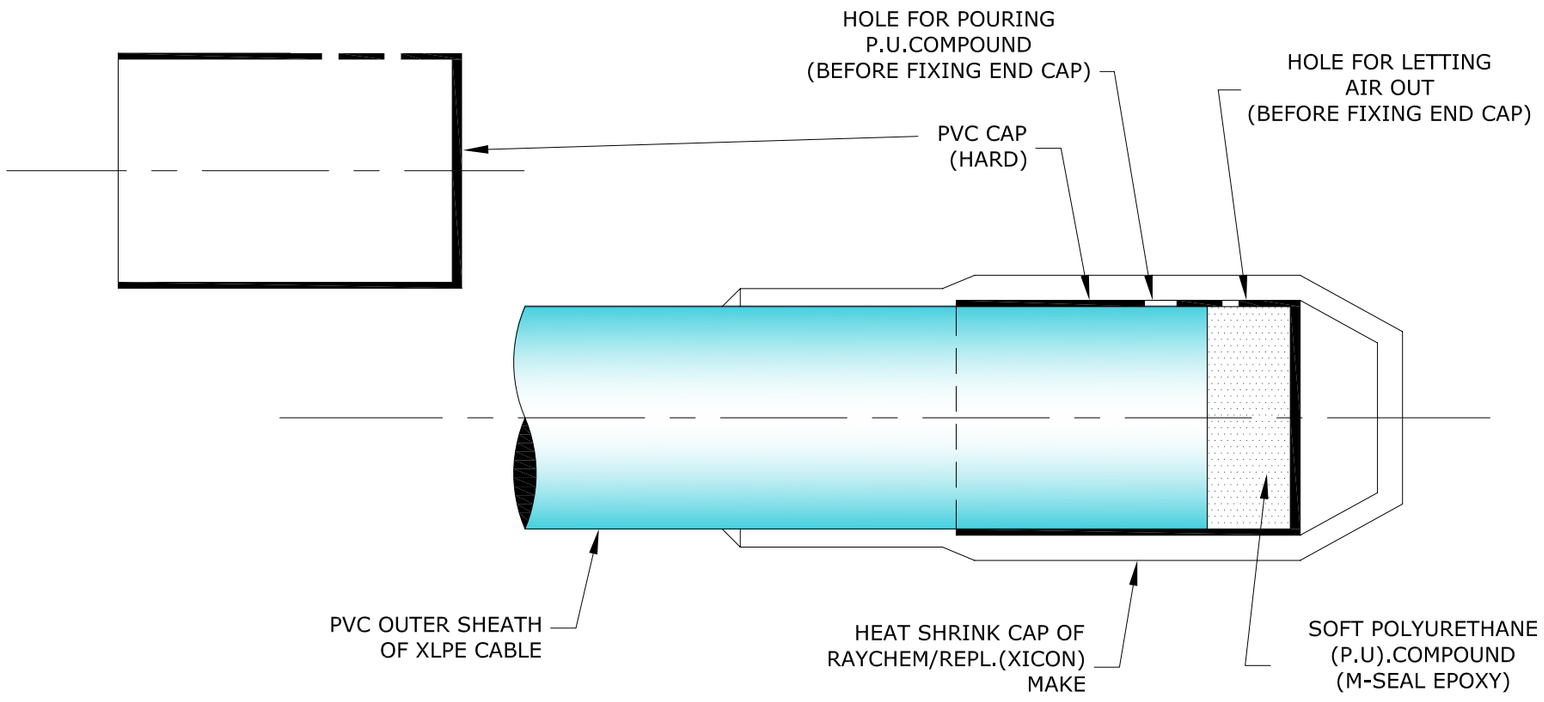
DIMENSIONS

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



END CAP
(AS SUPPLIED)
SECTIONAL VIEW



END CAP
(AFTER HEAT SHRINKING OVER THE CABLE END)

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

RELIANCE

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

SCALE :NOT TO SCALE | DATE: 09-05-2011

END SEALING CAP
(FOR XLPE CABLE)

DRAWN BY: BJR | CHECKED BY: AP/DS/PS | APPROVED BY:

REVISIONS

Annexure- F

QAP Format
(Quality Assurance Plan)
For H. T. Cables (Typical)

Typical Characteristics are mentioned in the above QAP format, which is appearing on the next pages.

Vendor shall submit the QAP, duly filled in, in accordance with IS / IEC standards and manufacturer's standards/procedures, for Purchaser's approval, during pre-order / post-order stages.

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, 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	

BSES

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, P : Perform, W : Witness, V : Verification											
	tape	b) Swelling height	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Weight	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
8	Steel Drum	a) Dimension	Major	Meas.	1 sample per size	IS 10418 / Purchase order		-	P	P	-	
		b) Finish & workman ship	Minor	Visual	1 sample per size	Compliance to standard Engineering norms & free from surface defects		-	P	P	-	
9	Binder tape	a) Dimensions & material	Minor	Physical	Sample	MPS	MPS	-	P	P	-	
10	Polypropylene filler	a) Size	Minor	Physical	Sample	Purchase order	Purchase order	-	P	P	-	
11	Heat shrinkable end cap	a) Bore diameter	Major	Physical	1 sample per size	--	--	-	-	P	-	
		b) Length of end cap	Minor	Physical	1 sample per size	--	--	-	-	P	-	
B	**PROCESS INSPECTION**											
1	Wire Drawing	a) Diameter	Major	Physical	Sample			Reg./Sheet	-	P	V	
		b) Surface finish	Major	Visual	100 %	Smooth & free from defects		--	-	P	-	
		c) Tensile test (for Al)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	P	V	
		d) Elongation test (for Cu)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	-	V	
		e) Wrapping test (for Al)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	P	V	
2	Stranding	a) No. of wires/strands	Major	Physical	At the time of m/c setting			Reg./Sheet	-	P	V	
		b) Lay length & Lay direction	Major	Physical	-do-			-	-	P	V	
		c) Dia of conductor	Major	Physical	During setting & once in each shift			Reg./Sheet	-	P	V	
		d) Surface finish	Major	Visual	100 %	No surface defects and free from sharp edges, scratches, grease, oil etc.		-	-	P	-	
3	Core extrusion (Conductor screen, Insulation & insulation screen)	a) Compound Make/Grade	Major	Visual	During m/c setting			-	-	P	-	Insulation screen shall be freely strippable, without application of heat.
		b) Thickness of insulation & extruded S.C. layers	Major	Physical	During m/c setting after stabilisation	Tech. Data Sheet / IS 7098/II/2011	Tech. Data Sheet / IS 7098/II/2011	Reg./Sheet	-	P	V	
		c) Surface finish	Minor	Visual	100 %	Smooth & free from defects		-	-	P	-	
		d) Printing on outer semi- conducting layer	Major	Visual	100 %	"DO NOT HEAT, FREELY STRIPPABLE"		-	-	P	-	

BSES

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

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									SV	MFR	BRPL	
1	2	3	4	5	6	7	8	9	10	11	12	13
	Legend : SV : Sub-Vendor of Cable Manufacturer, MFR : Cable Manufacturer, MPS : Material Purchase Specification,											
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		h) Eccentricity of insulation	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		i) Core diameter	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		j) Void & contamination test for insulation (Silicon Oil test)	Major	Physical	Sample			-	-	P	V	
		k) Wafer boil test for extruded semi-conducting layers	Major	Physical	1 sample/lot	BIS draft Specn	BIS draft Specn	Reg./Sheet	-	P	V	
4	Taping - water Swellable semi-conducting	a) Dimensions	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Tape Application (Overlap)	Minor	Visual	During m/c setting	Suitable overlap	Suitable overlap	-	-	P	-	
5	Taping - Copper tape	a) Width & Thickness of tape	Major	Physical	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		b) Number of tapes	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Tape application (Overlap)	Minor	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
6	Laying up	a) Identification of cores	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	Cores shall be laidup with PP fillers & suitable tape binder shall be provided over laid up assembly
		b) Direction of lay, core Sequence & Lay length	Major	Visual	During m/c setting	IS 7098/II/2011, PIL-W-02	IS 7098/II/2011, PIL-W-02	-	-	P	-	
		c) Application of binder tape	Minor	Visual	During m/c setting	Tech. Data Sheet		-	-	P	-	
		d) Shape of laid up assembly	Minor	Visual	100%	Reasonably circular	Reasonably circular	-	-	P	-	
7	Inner sheath	a) Material & type	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Thickness	Major	Physical	During m/c setting & drum change	Tech. Data Sheet & IS 7098/II/2011	ech. Data Sheet & IS 7098/II/2011	Reg./Sheet	-	P	V	
		c) Surface finish	Minor	Visual	100 %	Surface shall be smooth & free from defects		-	-	P	-	
		d) Colour of inner sheath	Major	Visual	100 %	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
8	Armouring	a) Dimension of armour wires/strips	Major	Physical	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	No negative tol. on strip thickness/wire diameter
		b) No. of armour strip/wire	Major	Counting	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Armour coverage	Minor	Visual	During m/c setting	IS 7098/II/2011	IS 7098/II/2011	-	-	P	-	
		d) Direction of lay	Major	Visual	During m/c setting	IS 7098/II/2011	IS 7098/II/2011	-	-	P	-	
		e) Lay length/Gear setting	Minor	Visual	During m/c setting			-	-	P	-	

BSES

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FOR 11 kV H. T. CABLES

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		b) Thickness	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Overall diameter	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		d) Surface finish & colour of sheath	Major	Visual	100 %	Surface smooth & free from defects. Colour as per Tech. Data Sheet		-	-	P	-	
		e) Cable length verification	Major	Visual	Each length	Manufacturing Plan	Manufacturing Plan	-	-	P	-	
		f) Marking	Major	Visual	Each length	As per approved GTP/cross sectiona drawing		Reg./Sheet	-	P	V	
C	**FINAL INSPECTION**											
1	Routine tests	a) High Voltage	Critical	Electrical	100 %	IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	V	
		b) Conductor Resistance	Critical	Electrical	100 %	IS 8130/84	IS 8130/84	Test Report	-	P	V	
		c) Partial Discharge	Critical	Electrical	100 %	IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	V	
		d) Impulse	Critical	Electrical	One sample per lot			Test Report		P	V	
		e) Armour Coverage	Critical	Physical	One sample per lot			Test Report		P	V	
		f) Physiacal Dimensions	Critical	Physical	One sample per lot			Test Report		P	V	
		g) Freely Strippable insulation screen (Strippability Test)	Major	Physical	One sample per lot	Factory Standard	Factory Standard	Test Report	-	P	V	
2	Stage Inspection	Wire Drawing	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	Stage Inspection shall be conducted subject to BRPL requirement
		Extrusion process	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Raw maerial inspection at factory	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Wrapping of Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Tensile test for Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		a) Annealing test for copper	Major	Physical	Appendix A to IS 7098/II/2011, each lot sample basis	IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records.
		b) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		c) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Tests N/A on finished conductor.
		d) Conductor resistance test	Major	Electrical	Appendix A to IS 7098/II/2011, each lot	IS 8130/84	IS 8130/84	Test Report	-	P	W	

BSES

QUALITY ASSURANCE PLAN (QAP)

FOR 11 kV H. T. CABLES

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1	2	3	4	5	6	7	8	9	10	11	12	13
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		g) Tensile strength & Elongation at break of insulation & outer sheath	Major	Physical		IS 7098/II/2011 & IS 5831/84	IS 7098/II/2011 & IS 5831/84	Test Report	-	P	W	
		h) Partial discharge test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		i) High voltage test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		j) Insulation resistance (Volume resistivity) test	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		k) Tests for dimension of armour wires/strips	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		l) Test for anti termite & anti rodent property of outer sheath	Major	Physical		Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	W	
		m) Rewinding of cable on drum	Major	Visual		To check cable appearance, drum appearance, cable winding, packing, embossing/printing/sequential marking		Reg./Sheet	-	P	W	
		n) Void & contamination test for insulation (Silicon Oil test)	Major	Physical				Reg./Sheet	-	P	W	
		o) Wafer boil test for extruded semi-conducting layers	Major	Physical				Reg./Sheet	-	P	W	
3	Acceptance tests	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	Each Lot Sample Basis	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-	As per IS-	Test Report	-	P	W	

BSES

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FOR 11 kV H. T. CABLES

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		z) Ageing & Water absorption test(Gravimetric) on Insulation & Outer sheath	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		z1) Heating Cycle with Potential	Critical	Electrical	sample basis, once per PO			Test Report	-	P	W	
		z2) Raw Material Verification in all aspects	Major	Physical	Each Lot					P	W	
		Z3) OFC Continuty Test and verification of outer sheath marking with continuous 15mm red strip for OFC embedded identification	Major	Physical	Each Lot					P	W	
4	Type tests at vendor's works	a) Tests on conductor										
		i) Annealing test for copper	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records. Tests N/A on finished conductor.
		ii) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iii) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iv) Conductor resistance test	Major	Electrical		IS 8130/84	IS 8130/84	Test Report	-	P	V	
		b) Tests for armouring wires/strips										
		i) Dimensions of wire/strip	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		ii) Tensile strength & Elongation at break	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	Only for Steel wires/strips
		iii) Torsion test for wire	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		iv) Winding test for strip	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		v) Uniformity of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vi) Mass of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vii) Resistivity of wire/strip	Major	Electrical		IS 3975	IS 3975	Test Report	-	P	W	
		c) Test for thickness of insulation & sheath	Major	Physical		IS 7098/II/2011 & Tech. Data sheet	IS 7098/II/2011 & Tech. Data sheet	Test Report	-	P	W	
		d) Physical tests for insulation									W	
		i) Tensile strength & Elongation test	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		iii) Hot set test	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	

BSES

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

BSES

QUALITY ASSURANCE PLAN (QAP)

FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, 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. BRPL may witness Raw material and in process inspection in addition to Routine/Acceptance tests at any time/stage of manufacturing.
5. BRPL’s Inspector may randomly select a cable drum for type testing at vendor’s works.
6. For each of the offered lot for inspection, BRPL 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 BRPL

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 BRPL

BSES

Technical Specification

for

11kV, 3CX400 sqmm Cable

[Conventional and Cable in Co-extruded Duct (CCD) Cable]

Specification No: GN101-03-SP-81-05

BSES Rajdhani Power Ltd.								
Prepared by		Reviewed by		Approved by		Rev.	Pages	Date
Name	Sign	Name	Sign	Name	Sign			
Gautam Deka/ Pronab Bairagi	16/3/22 16/03/2022	Amit Tomar		K. Sheshadri		5	41	16.03.22

Index

Revision Record

Rev No	Revision Date	Item/ clause no:	Descriptions	Nature of Changes	Approved by
1	16.05.2018	2.1.3	XLPE	XLPE to TR-XLPE (Hanwa-CLNA TR-8142, DOW-HFDB-4202 EC, BOREALIS-TR-LE-4121)	KS
1	16.05.2018	7.0.0 (e)	Drum	Returnable to Non-Returnable Drum	KS
2	18.04.2019	2.1.6A	OFC	Optical Fiber Cable (Embeded in the place of filler)	KS
2	18.04.2019	Annexure B 12A.0		Guranteed Technical Particulars of Optical Fiber Cable	KS
2	18.04.2019	Annexure I		Detailed Technical Parameter of Optical Fiber Cable (Single Mode Fiber –G.657.A1 -36Nos; Multi Mode Fiber –OM2 -12Nos.)	KS
3	25.07.2019	4.0.0 (a)	Type Test	Type Test Required After Award of PO: i) Type test-1: 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 BRPL during inspection of cable. Cost for this type test shall be borne by the respective Bidder. ii) Type test -2: 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 BRPL during inspection of cable. This type test is applicable subject to BRPL requirement and cost shall be borne by BRPL.	KS
3	25.07.2019	2.1.11 (c)	Outer Sheath	Outer Sheath- a) Drum no. added in embossing b) Drum no. added in printing (laser print)	KS
3	25.07.2019	4.0.0 (C)	Routine Test	Routine Test added a. Impulse Voltage test b. Armour Coverage c. Physical Dimensions	KS
3	25.07.2019	4.0.0 (e)	Acceptance Test	Acceptance Test a. Impulse voltage test added	KS
3	25.07.2019	Annexure-F	QAP	QAP added	KS
3	25.07.2019	Annexure-G	Inspection Expenses	Inspection Expenses-Not Applicable	KS
4	16.07.2021	Clause no 2.1.11.2	For CCD cable(Cable in Co-extruded duct)	a) Extruded PE compound Type ST 7 (Black) – Thickness 2.84 mm b) Conduit material over Extruded PE compound – Extruded HDPE compound Thickness 2 mm, Color Orange(IS 557)	KS
4	16.07.2021	2.1.9 (a)	Armour	a) For CCD cable Galvanized Steel round armour added	KS
5	16.07.2021	2.1.9 (a)	Armour	Clause modified as below- a) For 3-core Cables : For Conventional cable and CCD Cable Galvanized Steel flat strip armour to be provided	KS
5	16.03.2022	2.1.12	Outer sheath	15 mm red color marking by extrusion process is added for both Conventional and CCD cable	KS
5	16.03.2022	2.1.13	Cable	Removed cable pulling eye	KS

Rev No.	Revision Date	Item/ clause no:	Descriptions	Nature of Changes	Approved by
5	16.03.2022	4.0.0	inspection and Testing	Type test clause modified as below "For participation in the tender Type Test report shall be submitted from CPRI/ERDA only and shall not be more than 5 years old from the date of tender. If the report is more than 5 years and but less than 10 years old than bidder to submit undertaking that there is no design changes from the Type test conducted. "	KS
5	16.03.2022	4.0.0 a. 2	Type Test	Removed- Type test-1: 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 BRPL during inspection of cable. Cost for this type test shall be borne by the respective Bidder.	KS
5	16.03.2022	6.01	Drum length	**11kV, 3cx400 sqmm cable** a) 300 mtr +/- 5 % (40% of PO qty.) b) 500 mtr +/- 5 % (60% of PO qty.)	KS
5	16.03.2022	6.0.2	Overall tolerance	Modified to - 2 % for the total cable length for the entire order.	KS

16/3/22 16/03/2022

Proposed by
Gautam Deka/Pronab Bairagi

Reviewed by
Amit Tomar

Approved by
K. Sheshadri

General Specification

1.0.0 Codes & Standards

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

National Standards

IS 7098 Part-2	Cross linked polyethylene (XLPE) insulated PVC sheathed cables for working voltages from 3.3 kV up to and including 33 kV.
IS 5831 : 1984	PVC insulation & sheath of electric cables.
IS 10810 : 1984	Methods of test for cables.
IS 8130 : 1984	Conductors for insulated electric cables and flexible cords.
IS 3975 : 1999	Mild steel wires, formed wires and tapes for armouring of cables.
IS 10462 (Part 1) / 1983	Fictitious Calculation Method for determination of dimensions of protective covering of cables

International Standards

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

2.0.0 Cable Construction Features

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

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

Cable Code:

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

(N.A. - Not applicable for Specification)

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

2X	XLPE insulation	

W	Steel round Wire armour	(N.A.)
W W	Double steel round Wire armour	(N.A.)
Wa	Non-magnetic round Wire armour	
F	Steel formed wire (strip) armour	
FF	Double steel formed wire (strip) armour	(N.A.)
Fa	Non-magnetic formed wire (strip) armour	(N.A.)
-	("un-armoured" or without armour)	(N.A.)

Y	PVC outer sheath	

Sr. No.	Description	Conductor Material	Cable Code
1.	11 kV, 3CX400 sq. mm. (Conventional cable)	Al	A 2X F Y
2	11 kV, 3CX400 sq. mm. (CCD Cable)	Al	A 2X F 2Y 2Y

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

2.1.1	**Conductor**	a) Electrolytic Grade Stranded Aluminium Conductor

		b) Grade: H2 as per IS: 8130 / 1984 (For Al) c) Stranded, compacted and circular in shape d) Class 2 e) "Longitudinal Water-Blocking Arrangement" (or water-tight construction or water barrier protection) shall be provided within the Conductor. i) As per manufacturer's procedures, 100 % water-tight conductor shall be achieved. iii) Make & Type of materials to be used (i.e. Water-swellable tapes/ yarn) shall also be stated in the List of Sub-Vendors for pre-order approval. f) All detailed constructional features shall be shown in the cross-sectional drawing.
2.1.2	**Conductor Screen**	Extruded semi-conducting material. (Also refer Cl. 2.1.3.) (Tapes are not acceptable)
2.1.3	**Insulation**	a) Extruded TR-XLPE (TR-Cross-Linked Poly-Ethylene) Insulation. Technical requirement of TR-XPLE shall be full filled as mentioned in Annexure-H b) The required compound used shall be from BRPL-approved sub-vendors and not from any other (refer Annexure – C). c) Uniform thickness of insulation shall be within the permissible values as per IEC Standards; eccentricity check shall be carried out to ensure this. d) Insulation Color : natural
2.1.4	**Insulation Screen**	a) Freely-strippable semi-conducting screen, which should not require application of heat for its removal.

		(Refer Cl. 2.1.3.) b) Text “Do not Heat - Freely Strippable” to be printed on insulation screen (at every 600 mm interval). c) Round shape over the outer semi-con shall be within the permissible limits as per IEC standards; Ovality (2% max) check shall be carried out to ensure this. d) Compound used shall be suitable for the operating temperature of the Cable and shall be compatible with the insulation used.
2.1.4A	**XLPE Process**	
2.1.4A-1	11 kV	Dry Cure and Dry Cool process only.
2.1.4A-2	Extrusion	It is desirable that Conductor Screen, Insulation and Insulation Screen shall be extruded simultaneously, in a Single One-Time Process (i.e. as a triple-head extrusion) to ensure homogeneity of layers over the conductor, and absence of voids.
2.1.4A-3	Make of Compounds for Insulation and Semi-conducting	Any deviation from Approved Makes mentioned in Annexure-C shall not be acceptable, unless the deviation has been specifically approved by BRPL, prior to sourcing the compounds and taking up manufacturing of cable.
2.1.4	Water-Swellable Tape	a) Semi-Conducting Water-Sellable Tape shall be provided, under the copper tape, on each core. b) Nominal thickness : 0.3 mm c) Weight: 118 gm / sq. m approx. d) Swell height: ≥ 12 mm in 1 min. e) Compatible to strippable / non-strippable semi-con, over which it is applied.
2.1.5	**Core Identification**	a) For 3-core cables, cores shall be identified by coloured strips (Red, Yellow, Blue), applied

		helically / longitudinally below the copper tape. The coloured strips shall carry the name of manufacturer permanently printed at close intervals; this is to provide additional identification of manufacturer of the cable.
2.1.5A	**Copper Tape**	Copper Tape shall be applied helically over the layer formed after application of insulation screen, water-swellable tape and identification strip. Zero negative tolerance in thickness of copper tape.
2.1.6		
2.1.6A	**Filler Details**	a) All interstices, including center interstices shall be filled by PP filler. b) PP Filler shall be non-hygroscopic, not having any effect on other compounds used, stable at cable temperatures, etc. c) PVC filler is not acceptable. d) Filler is not applicable for single-core cables.
2.1.6B	**Optical Fiber Cable**	a) OFC shall be embedded inside the cable in place of one filler, details as per Annexure I
2.1.7	**Binder Tape**	As per manufacturer's standard
2.1.8	**Inner Sheath**	Extruded Inner Sheath of Black PVC type ST-2 (IS 5831)

2.1.9	**Armour**	b) For 3-core Cables : For Conventional cable and CCD Cable Galvanized Steel flat strip armour {R5} c) Minimum area of coverage of armouring shall be 90 % (min.). At any time, the gap between any two adjacent armour strips shall not be more than the width of strip. d) Zero negative tolerance is for : Thickness of armour strip
2.1.10	**Binder Tape**	Rubberised cotton tape
2.1.11	**Outer Sheath**	
2.1.11.1	**For conventional cable**	a) Extruded outer sheath of PVC (ST-2 as per IS 5831) with termite-repellant and anti-rodent properties. (Outer Sheath shall be FRLS-type, if chosen by purchaser.)
2.1.11.2	**For CCD cable(Cable in Co-extruded duct) {R4}**	b) Extruded PE compound Type ST 7 (Black) – Thickness 2.84 mm c) Conduit material over Extruded PE compound – Extruded HDPE compound Thickness 2 mm, Color Orange(IS 557)
		c) Shape of the cable over the outer sheath shall be circular, when manufactured / completed. Regular Ovality check shall be carried out at factory, to detect any abnormality. Manufacturing quality shall be such that cable will retain its circular shape, even after it is laid at site.
		d) The Outer Sheath shall be embossed as well as laser printed with following minimum text at a interval 1 mtr. : 1. The voltage designation 2. Type of construction / cable code

		(e.g. A2XFY) 3. Manufacturer's Name and Trade-mark 4. Number of cores and nominal cross-sectional area of conductor 5. Progressive (Laser print) (sequential) length of cable at every meter, starting from zero for every drum. Colour filled in for the progressive marking, shall be with proper contrast in colouring. 6. Name of buyer / purchaser, 7. Month & Year of manufacturing 8. IS reference, i.e. IS : 7098 9. Batch No. / Lot No. (For traceability purpose, in case of any, in case of any manufacturing defect or otherwise arising in the cable in future.) 10. Purchase Order Number & date 11. Word ' FRLSH ', in case the cable is of FRLSH type. 12. Drum no.
2.1.12	Identification marking on outer sheath	15 mm continuous red color marking shall be provided by extrusion process for identification of OFC embedded cable. This is applicable for both Conventional cable.
2.1.13	**Sealing-end Cap** (for Cables) {R5}	a) Cable both ends (inner and outer end) shall be sealed as per the drawing MISC/E/4-1131/1698. One PVC cap with Polyurethane compound shall be provided as primary sealing and heat-shrink end-cap shall form a secondary sealing over the PVC cap.
3.0.0	(This number not used.)	
4.0.0	**Testing & Inspection**	Tests shall be carried out in accordance with IS 7098 (Part-2).
	a) Type Tests	<u>1) To Qualify in Tender:</u>

		Cables must be of type tested quality. Type Test Reports shall be submitted for the type, size and rating of cable offered in the bid. For participation in the tender Type Test report shall be submitted from CPRI/ERDA only and shall not be more than 5 years old from the date of tender. If the report is more than 5 years and but less than 10 years old than bidder to submit undertaking that there is no design changes from the Type test conducted. {R5} 2) Type Test Required After Award of PO: {R5} 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 BRPL during inspection of cable. This type test is applicable subject to BRPL requirement and cost shall be borne by BRPL.
	b) BRPL QAP (Typical)	In general, all tests mentioned in the BRPLQAP (Characteristics – Typical) mentioned in Annexure-F shall be included in the Routine Tests, Type Tests and Acceptance Tests stated above.
	c) Routine Tests	1. Measurement of Electrical Resistance 2. HV Test with power frequency AC voltage 3. PD test 4. "Strippability Test" at both the ends of cable for each drum, to check the freely-strippable property of the Insulation Screen (outer semi-con). 5. Impulse voltage test of one drum 6. Armour coverage measurement 7. Physical test-Dimensions of each and every layer and components. Test results from the above tests must appear in the documents forwarded by the vendor for Inspection call / waiver.

	d) Inspection	-- The Buyer reserves the right to witness all tests specified on completed cables. -- The Buyer reserves the right to inspect cables at Sellers works at any time prior to dispatch, to verify compliance with the specifications. -- In-process (stage inspection) and final inspection call intimation shall be given 10 days in advance to the purchaser. -- Minimum lot size of Cables to be offered for inspection shall be mutually agreed between Purchaser and Vendor, before placing the order. Vendor shall raise inspection call only after a minimum lot size is ready and with due factory routine tests already carried out.
	e) Acceptance Tests	Acceptance Tests shall be conducted as per Cl. 18.2 of IS 7098 (Part-2) and the approved Quality Assurance Plan (QAP) in each lot of cables. Following tests shall also be carried out during the Acceptance Tests : a) "Wafer Boil Test" for checking integrity of semi-conducting layers. b) "Void-and-contamination Test" for the Insulation c) "Strippability Test" at both the ends of cable for each drum, to check freely-strippable property of the Insulation Screen (outer semi-con). d) "Water Penetration Test (WPT)", as per applicable IEC standards, to check adequacy of water-blocking arrangement provided inside the conductor. e) Heating cycle test along with potential shall be applicable on sample basis once in a PO. Jointing and Termination kits required for this test shall be in the scope of bidder. f) Impulse voltage test ~~g)~~ Internal type test shall be carried out once

		against each tender, on sample basis at manufacturer lab.
	f) Test Certificates (TC)	Three sets of complete Test Certificates (Routine tests and Acceptance tests) shall be submitted along with the delivery of cables. Soft copy of the TCs shall be separately e-mailed to the Purchaser. **Note :** Make/grades of critical materials (such as, for conductor screen, insulation, insulation screen, etc.), actually used during manufacturing of cables for order-on-hand, shall be clearly stated in the TCs forwarded by the Manufacturer, enabling references in future.
5.0.0	**Drawing, Data and Manuals**	a) Refer Annexure-A regarding Document Submission. b) Cross-Sectional Drawing shall show every feature of construction, including the thickness / diameter over every layer. This drawing shall also state the text to be embossed over the outer sheath - i.e. type/size, etc. of the cable, drum no./lot no., sequential marking over every meter, printing text on outer semi-con ("Do Not Heat-Freely Strippable"), font sizes to be used, additional text, if any, etc. Also, drum details, markings to be made on both sides of the drum, and so on.
5.0.1	Documents to be submitted along with bid	The vendor shall submit : a) Cross-sectional drawing b) GTP (all data to appear) c) Type Test certificates d) End cap drawing {R5} e) Fault Level Calculation for armour and copper tape screen

		f) Complete Cable Catalogue and Manual g) Armour Coverage Calculation
5.0.2	Documents after award of contract	Within 15 days, the seller has to submit four sets of above-mentioned drawings, along with one soft copy for buyer's approval.
5.0.3	Final As-Built Drawings	One soft copy of all documents, including type & routine test certificates.
6.0.0	**Drum length & tolerance**	Cable length per drum
6.0.1	11 kV, 3Cx 400 mm2 cable conventional and CCD {R5}	300 mtr (40% of PO) and 500 mtr(60% of PO) With +/- 5 % variation in each drum.
6.0.2	Overall tolerance {R5}	- 2 % for the total cable length of the entire order.
6.0.3	Short length of cables	Manufacturer shall take prior approval from Purchaser for any supply of short length cables. 11 kV cables, minimum acceptable short length cables can be 250 meter and only one short length drum shall be acceptable in last lot. In any case, manufacturer shall not put two cable pieces of different short lengths in same cable drum.
7.0.0	**Packing, Shipping, Handling & Storage**	
	a) Packing	1. Both the ends of the cables shall be properly sealed to prevent any deterioration of the cable, due to ingress of water, etc. 2. Cable inner end (starting end) shall project, outside the completely wound cable, by sufficient length enabling verify cable details, including the initial length marking.

		3. Similarly, outer end of the cable shall be saddled / secured to the drum properly to prevent any external damage to the end at any time. 4. Before putting on wooden planks, protective covers (thick plastic sheets, etc.) shall be secured over the wound cable, to avoid any abrasion by wooden planks, over the outer sheath of the cable. Alternatively PP sheets can be put as protective covers. 5. After providing the protective covers, the cable drums shall be finally closed by wooden planks (with saddles), without leaving any gaps between the planks; i.e. 100 % covering shall be ensured.
	b) Drum Identification Markings:	Direct marking (i.e. text painting through stencils, etc.) shall be done on the drums, instead of attaching labels, which may be misplaced/lost over a period of time. 1. Drum identification number 2. Cable voltage grade 3. Cable code (e.g. A2XFY, etc.) 4. Number of cores and cross sectional area 5. Cable quantity, i.e. cable length (meter) 6. Purchase order number & date 7. SAP item code 8. Total weight of cable and drum (kg) 9. Manufacturer's Name 10. Buyer's name 11. Month & Year of Manufacturing 12. Direction of rotation of drum 13. Cable length final end-markings (i.e., reading at the inner end and reading at the outer end, just before packing, shall be marked on the drum.)
	c) Shipping information	The seller shall give complete shipping information concerning the weight, size of each package

	d) Transit damage	The seller shall be responsible for any transit damage due to improper packing.
	e) Type of Drum	Non-Returnable Steel drums, as per relevant IS / IEC.
	f) Cable Drum handling	The drums shall be with M.S. spindle plate (with nut-bolts) of adequate size to suit the spindle rods, normally required for handling the drums, according to expected weight of the cable drums.
8.0.0	**Quality Assurance Plan (QAP)**	
8.0.1	Vendor's QAP	Manufacturer shall submit QAP in line with BRPL QAP format for purchaser's approval before manufacturing.
8.0.2	Inspection Points	To be mutually identified and agreed upon in QAP.
9.0.0	**Progress Reporting**	
9.0.1	Outline Document	To be submitted for purchaser's approval for outline of program for production, stage-inspection, testing, final inspection, packing, dispatch and documentation.
9.0.2	Detailed Progress Report	To be submitted to Purchaser once a month containing : i) Progress on material procurement ii) Progress on fabrication (as applicable) iii) Progress on assembly (as applicable) iv) Progress on internal stage-inspection v) Reason for any delay in total program vi) Details of test failures, if any, during manufacturing stages. vii) Progress on final box-up Constraints / Forward Path
10.0.0	**Deviation**	a) Deviations from this specification are only acceptable, where the Seller has listed in his

		quotation the requirements he cannot, or does not, wish to comply with, and the Buyer has accepted, in writing, the deviations before award of P.O. b) In the absence of any list of deviation along with BRPL acceptance, it will be assumed by the Buyer that the Seller complies fully with this specification. c) 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 with BRPL acceptance, will not be considered as a deviation from this tech spec at any stage of contract.

Annexure – A

Scope, Documentation and Delivery schedule

1. Scope

A.	Scope	Design, manufacture, testing at manufacturer's works before dispatch, packing, delivery, unloading, stacking at stores/site of H.T. Power cables, as per Purchaser's BOQ (Bill of Quantity).
B.	Delivery Schedule	To be filled up on a case-to-case basis.

a) **Document Submission**

Submission of drawings, calculations, catalogues, manuals, test reports shall be as follows. (Also refer clause 5.0.0 – Drawings, Data and Manuals.)

Legend:

GTP : Guaranteed Technical Particulars
TTR : Type Test Report

RTR : Routine Test Report

	Documents Along with offer	After award of contract - for Approval	Final documents (after Approval)
GTP	3 copies	** 1 soft copy	** 1 soft copy + CD
Drawings	3 copies	** 1 soft copy	** 1 soft copy + CD
Calculations	3 copies	** 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.

3. Delivery Schedule

a) Delivery period Start Date : from date of LOI / LOA

b) Delivery period End Date : as agreed with supplier

c) Material dispatch Clearance : after inspection by purchaser

Annexure - B

GUARANTEED TECHNICAL PARTICULARS (GTP)

Note:

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

Sr. No.	Description	Buyer's requirement	Unit	Seller's Data
1.0	Purchase Req. No.	-		
2.0	Guarantee Period (Min.)	60 Months (from date of commissioning) / 66 Months (from date of receipt at purchaser's store) whichever is earlier		
3.0	Applicable IS / IEC Standard followed by vendor	IS 7098 Part-2 / IEC 60502-2		
4.0	Make	-		
5.0	**Type** (as required by purchaser)			
	11 kV, 3c x 400 sq. mm.	A2XFY		
	11 kV, 3c x 400 sq. mm, CCD	A2XF2Y2Y{R5}		
6.0	**Voltage Grade**			
	11 kV, 3c	6.35 / 11	kV	
7.0	Maximum Conductor temperature			
A	Continuous	90	deg. C	
B	Short time	250	deg. C	
8.0	**Conductor**			
A	Material and Grade	As per Cl. 2.1.1		
B	Size	As shown under 5.0 above		
C	Wires in each conductor	As per Table 2 of IS 8130	Nos.	
D	Conductor Shape	As per Cl. 2.1.1 ~~c~~		
E	Dia. of wires in each conductor before compaction	Manufacturer Standard	mm	

F	Diameter over conductor		mm	
G	Maximum Conductor resistance at 20 ° C			
	11 kV, 3c x 400 sq. mm.	0.0778	ohm/km	
	11 kV, 3c x 400 sq. mm. CCD	0.0778	ohm/km	
H	Longitudinal Water Blocking Arrangement within conductor	Is it provided and shown in the cross-sectional drawing? (Yes / No)		
I	Short circuit current-carrying capacity of conductor	37.6	kA for 1 sec.	
9.0	**Conductor Screen** (inner semi-con)			
A	Material & type	As per Cl. 2.1.2		
B	Thickness (min)	0.50	mm	
C	Diameter over conductor screen		mm	
D	Make and grade of semi-conducting compound			
10.0	**Insulation**			
A	Insulation Material	As per Cl. 2.1.3		
B	Nominal thickness			
	11 kV, 3c	3.6	mm	
C	Minimum thickness (at a point)			
	11 kV, 3c	3.14	mm	
D	Diameter over Insulation (Approx.)		mm	
E	Make and grade of Insulation compound			
F	Eccentricity	As per IEC standards	%	
G	Water-tree retardant property	mandatory required		
11A.	**Insulation Screen** (outer semi-con)			
a.	i) Thickness of freely strippable Semi conducting screen	0.50	mm	
	ii) Make and grade of semi-conducting compound			
	iii) Printing	As per Cl. No. 2.1.4 (Yes / No)		
	iv) Ovality of the core	As per IEC Standards	%	
b.	Diameter over Insulation Screen (approx.)		mm	

11B.	**Water-Swellable Tape** (if required by Purchaser)			
	a) Thickness b) Weight c) Swell height d) Compatible to strippable / non-strippable semi-con, over which it is applied. e) Make & Grade f) Pre-slitted packed tapes from sub-vendors approved by **BRPL**	a) 0.3 mm b) 118 gm / sq. m c) ≥ 12 mm in 1 min. d) Yes / No e) Pl. state f) Yes / No		
11C.	**Cable Core identification** a) By coloured strips over cores applied helically / longitudinally b) Manufacturer's name shall be permanently printed on the strips, at close intervals.			
11D.	**Copper Tape**			
	i) Dimensions	a) Thickness : 0.06 +/- 5 % b) Width : 50 mm C) Overlap: 10% Zero negative tolerance in thickness of copper tape	mm	
	ii) Fault current-carrying capacity of copper tape	1.1kA (3 cores combined) (Calculation sheet shall be attached)	… kA for … sec.	
11E.	Diameter over laid up core (approx.)		mm	
12.0	**Filler** (Material and type)	As per Cl. 2.1.7 (Specify no. & size of filler at center & core interstices)		
	11 kV, 3c x 400 sq. mm.			
	11 kV, 3c x 400 sq. mm CCD			

12A.0	**Optical Fiber Cable**	Single Mode (G.657.A1)- 36Nos. Multi Mode (OM2)- 12Nos. As per Annexure I	Nos.	
12B.0	**Binder Tape**	over laid-up cores		
13.0	**Inner Sheath**			
A	Material and type	As per Cl. 2.1.9		
B	Minimum thickness			
	11 kV, 3c x 400 sq. mm.	0.7	mm	
	11 kV, 3c x 400 sq. mm. CCD	0.7	mm	
C	Approx. dia. over inner sheath		mm	
14.0	**Armour**	as per purchaser's requirements		
A	Material			
	11 kV, 3cx400 sqmm	G. I. Strip	No.	
	11 kV, 3cx400 sqmm CCD	G. I. Strip	No.	
C	Armour – GI strips a) Width of strip & Thickness of strip b) Number of strips (min.)	4 x 0.8 (zero negative tolerance for thickness)	mm no.	
D	Approx. Equivalent Area		sq. mm.	
E	Area covered by armour	Min. 90 % Calculation shall be attached.	%	
F	Dia. over armour - apprx.		mm	
G	Fault current carrying capacity of armour	Calculation sheet shall be attached.	… kA for … sec.	
15.0	**Outer Sheath**			
i	**Conventional Cable**			
A	Material and type	PVC Compound , ST-2, as per IS 5831:1984		
B	Thickness (min.)	3		
	11 kV, 3c x 400 sq. mm.	**	mm	
C	Color	Blue		
D	Embossing (details as per Cl. 2.1.11)	Yes / No		
E	FRLS Properties	As per customer's requirement		
F	Special marking on outer	Required		

	sheath- 15mm red continuous strip by extrusion process {R5}			
ii	CCD Cable			
A	Outer sheath (Outer Layer)			
	Material Type	Extruded PE, ST-7		
	Colour	Black		
	Thickness	2.84 mm		
B	Conduit (Most outer Layer)			
	Material Type	Extruded HDPE		
	Colour	Orange		
	Thickness	2 mm		
	15mm red continuous strip by extrusion process {R5}	Required		
16.0	Approx. overall diameter		mm	
17.0	Standard drum length with tolerance			
	11 kV, 3c x 400 sq. mm. {R5}	300 and 500 with +/- 5%	meters	
17A	Overall order tolerance {R5}	- 2 % for the total cable length of the entire order.		
18.0	**Cable Drum**			
a.	Type of drum	Steel (Non-Returnable) (Specify the relevant IS / IEC followed for drum design)		
b.	Markings on the drum (as per Cl. 7.0.0)	On both faces		
18A.0	**Cross-Sectional Drawing** (ref. Cl. 5.0.0)	Is drawing submitted, showing every feature of constructions? (Yes / No)		
19.0	**a. Sealing-end Cap** (to be provided at the both end) {R5} Refer drawing	Is manufacturer's / Sub-Vendor's drawing submitted? (Yes / No)		
20.0	**Weights** {R5}			
	a) Net weight of cable (apprx.)		kg / km	
	b) Weight of empty drum {R5}	300 mtr 500 mtr	Kg	
	c) Weight of Cable with drum {R5}	300 mtr 500 mtr	kg	
	d)Drum size {R5}	300 mtr 500 mtr	mm	

	e)Drawing of Drum {R5}	Required	--	
21.0	Continuous current rating for standard I. S. condition laid Direct			
	a) In ground 30° C	400	Amp	
	b) In duct 30° C	IS/IEC	Amp	
	c) In air 40° C	520	Amp	
22.0	(not used)			
23.0	Electrical Parameters at Maximum Operating temperature:			
A	AC Resistance		ohm / km	
B	Reactance at 50 c/s		ohm / km	
C	Impedance		ohm / km	
D	Zero sequence impedance		ohm / km	
E	Positive sequence impedance		ohm / km	
F	Negative sequence impedance		ohm / km	
G	Capacitance		micro-farad / km	
H	Conductance {R5}		Amperes per volts	
I	Inductive susceptance {R5}		mho	
J	Capacitive susceptance {R5}		ohms	
24.0	Recommended minimum bending radius	12x O. D.	mm	
25.0	De-rating factor for following Ambient Temperatures :	Ground / Air		
	a) At 30° C			
	b) At 35° C			
	c) At 40° C			
	d) At 45° C			
	e) At 50° C			
26.0	Group factor for following numbers of cables laid :	Touching Trefoil		
	a) 3 Nos.			
	b) 4 Nos.			
	c) 5 Nos.			
	d) 6 Nos.			
27.0	Recommended pressure for laying cable using power winch	30 N / mm2	N / sq. mm.	

28.0	Process of Cross-linking of Polyethylene			
	a) 11 kV, 3c	Dry Cure and Dry Cooling process only		
29.0	**Type test** (TTR - Type Test Report)	Is copy of latest valid TTR for respective sizes enclosed? (Yes / No)		
30.0	**Quality Assurance Plan** (QAP)	Is QAP Format (Annexure-F), duly filled in and enclosed? (Yes / No)		
31.0	**List of Sub-Vendors** for construction items (Annexure-C)	Is this list enclosed for BRPL approval? (Yes / No)		

Annexure - C

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

Annexure - D

Service Conditions

(Atmospheric / Soil conditions at Site)

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

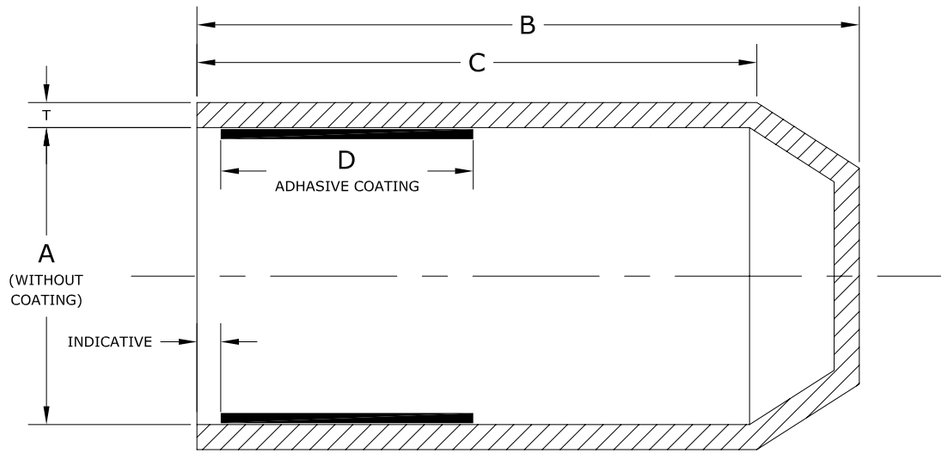
Annexure- E

General Arrangement Drawing for End-sealing Cap

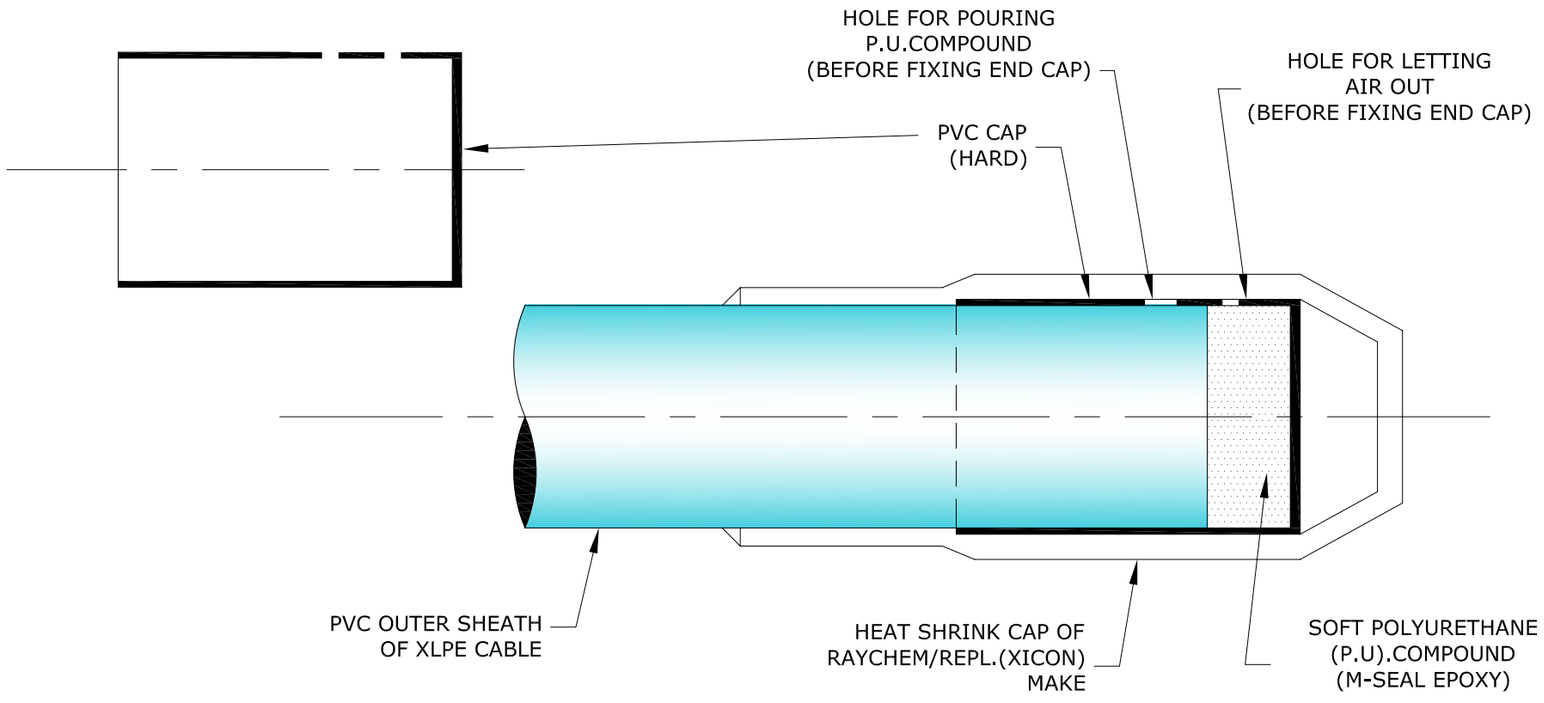
DIMENSIONS

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



END CAP
(AS SUPPLIED)
SECTIONAL VIEW



END CAP
(AFTER HEAT SHRINKING OVER THE CABLE END)

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

RELIANCE

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

SCALE :NOT TO SCALE | DATE: 09-05-2011

END SEALING CAP
(FOR XLPE CABLE)

DRAWN BY: BJR | CHECKED BY: AP/DS/PS | APPROVED BY:

REVISIONS

Annexure- F

QAP Format
(Quality Assurance Plan)
For H. T. Cables (Typical)

Vendor shall follow the QAP enclosed with this specification strictly,

BSES

QUALITY ASSURANCE PLAN (QAP)

FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, 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	

BSES

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, P : Perform, W : Witness, V : Verification											
	tape	b) Swelling height	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		c) Resistivity	Major	Electrical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
		d) Weight	Major	Physical	Sample	MPS	MPS	Reg./Sheet	P	P/V	V	
8	Steel Drum	a) Dimension	Major	Meas.	1 sample per size	IS 10418 / Purchase order		-	P	P	-	
		b) Finish & workman ship	Minor	Visual	1 sample per size	Compliance to standard Engineering norms & free from surface defects		-	P	P	-	
9	Binder tape	a) Dimensions & material	Minor	Physical	Sample	MPS	MPS	-	P	P	-	
10	Polypropylene filler	a) Size	Minor	Physical	Sample	Purchase order	Purchase order	-	P	P	-	
11	Heat shrinkable end cap	a) Bore diameter	Major	Physical	1 sample per size	--	--	-	-	P	-	
		b) Length of end cap	Minor	Physical	1 sample per size	--	--	-	-	P	-	
B	**PROCESS INSPECTION**											
1	Wire Drawing	a) Diameter	Major	Physical	Sample			Reg./Sheet	-	P	V	
		b) Surface finish	Major	Visual	100 %	Smooth & free from defects		--	-	P	-	
		c) Tensile test (for Al)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	P	V	
		d) Elongation test (for Cu)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	-	V	
		e) Wrapping test (for Al)	Major	Physical	Sample	IS: 8130/84	IS: 8130/84	Reg./Sheet	-	P	V	
2	Stranding	a) No. of wires/strands	Major	Physical	At the time of m/c setting			Reg./Sheet	-	P	V	
		b) Lay length & Lay direction	Major	Physical	-do-			-	-	P	V	
		c) Dia of conductor	Major	Physical	During setting & once in each shift			Reg./Sheet	-	P	V	
		d) Surface finish	Major	Visual	100 %	No surface defects and free from sharp edges, scratches, grease, oil etc.		-	-	P	-	
3	Core extrusion (Conductor screen, Insulation & insulation screen)	a) Compound Make/Grade	Major	Visual	During m/c setting			-	-	P	-	Insulation screen shall be freely strippable, without application of heat.
		b) Thickness of insulation & extruded S.C. layers	Major	Physical	During m/c setting after stabilisation	Tech. Data Sheet / IS 7098/II/2011	Tech. Data Sheet / IS 7098/II/2011	Reg./Sheet	-	P	V	
		c) Surface finish	Minor	Visual	100 %	Smooth & free from defects		-	-	P	-	
		d) Printing on outer semi- conducting layer	Major	Visual	100 %	"DO NOT HEAT, FREELY STRIPPABLE"		-	-	P	-	

BSES

QUALITY ASSURANCE PLAN (QAP)

FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, P : Perform, W : Witness, V : Verification											
		h) Eccentricity of insulation	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		i) Core diameter	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		j) Void & contamination test for insulation (Silicon Oil test)	Major	Physical	Sample			-	-	P	V	
		k) Wafer boil test for extruded semi-conducting layers	Major	Physical	1 sample/lot	BIS draft Specn	BIS draft Specn	Reg./Sheet	-	P	V	
4	Taping - water Swellable semi-conducting	a) Dimensions	Minor	Physical	Sample	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Tape Application (Overlap)	Minor	Visual	During m/c setting	Suitable overlap	Suitable overlap	-	-	P	-	
5	Taping - Copper tape	a) Width & Thickness of tape	Major	Physical	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		b) Number of tapes	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Tape application (Overlap)	Minor	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
6	Laying up	a) Identification of cores	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	Cores shall be laidup with PP fillers & suitable tape binder shall be provided over laid up assembly
		b) Direction of lay, core Sequence & Lay length	Major	Visual	During m/c setting	IS 7098/II/2011, PIL-W-02	IS 7098/II/2011, PIL-W-02	-	-	P	-	
		c) Application of binder tape	Minor	Visual	During m/c setting	Tech. Data Sheet		-	-	P	-	
		d) Shape of laid up assembly	Minor	Visual	100%	Reasonably circular	Reasonably circular	-	-	P	-	
7	Inner sheath	a) Material & type	Major	Visual	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
		b) Thickness	Major	Physical	During m/c setting & drum change	Tech. Data Sheet & IS 7098/II/2011	ech. Data Sheet & IS 7098/II/2011	Reg./Sheet	-	P	V	
		c) Surface finish	Minor	Visual	100 %	Surface shall be smooth & free from defects		-	-	P	-	
		d) Colour of inner sheath	Major	Visual	100 %	Tech. Data Sheet	Tech. Data Sheet	-	-	P	-	
8	Armouring	a) Dimension of armour wires/strips	Major	Physical	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	No negative tol. on strip thickness/wire diameter
		b) No. of armour strip/wire	Major	Counting	During m/c setting	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Armour coverage	Minor	Visual	During m/c setting	IS 7098/II/2011	IS 7098/II/2011	-	-	P	-	
		d) Direction of lay	Major	Visual	During m/c setting	IS 7098/II/2011	IS 7098/II/2011	-	-	P	-	
		e) Lay length/Gear setting	Minor	Visual	During m/c setting			-	-	P	-	

BSES

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, P : Perform, W : Witness, V : Verification											
		b) Thickness	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		c) Overall diameter	Major	Physical	Each length	Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	V	
		d) Surface finish & colour of sheath	Major	Visual	100 %	Surface smooth & free from defects. Colour as per Tech. Data Sheet		-	-	P	-	
		e) Cable length verification	Major	Visual	Each length	Manufacturing Plan	Manufacturing Plan	-	-	P	-	
		f) Marking	Major	Visual	Each length	As per approved GTP/cross sectiona drawing		Reg./Sheet	-	P	V	
C	**FINAL INSPECTION**											
1	Routine tests	a) High Voltage	Critical	Electrical	100 %	IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	V	
		b) Conductor Resistance	Critical	Electrical	100 %	IS 8130/84	IS 8130/84	Test Report	-	P	V	
		c) Partial Discharge	Critical	Electrical	100 %	IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	V	
		d) Impulse	Critical	Electrical	One sample per lot			Test Report		P	V	
		e) Armour Coverage	Critical	Physical	One sample per lot			Test Report		P	V	
		f) Physiacal Dimensions	Critical	Physical	One sample per lot			Test Report		P	V	
		g) Freely Strippable insulation screen (Strippability Test)	Major	Physical	One sample per lot	Factory Standard	Factory Standard	Test Report	-	P	V	
2	Stage Inspection	Wire Drawing	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	Stage Inspection shall be conducted subject to BRPL requirement
		Extrusion process	Major	Visual	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Raw maerial inspection at factory	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Wrapping of Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		Tensile test for Aluminium	Major	Physical	100 %	Tech. Data Sheet	IS/IEC	Test Report	-	P	W	
		a) Annealing test for copper	Major	Physical	Appendix A to IS 7098/II/2011, each lot sample basis	IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records.
		b) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		c) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Tests N/A on finished conductor.
		d) Conductor resistance test	Major	Electrical	Appendix A to IS 7098/II/2011, each lot	IS 8130/84	IS 8130/84	Test Report	-	P	W	

BSES

QUALITY ASSURANCE PLAN (QAP)

FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, P : Perform, W : Witness, V : Verification											
		g) Tensile strength & Elongation at break of insulation & outer sheath	Major	Physical		IS 7098/II/2011 & IS 5831/84	IS 7098/II/2011 & IS 5831/84	Test Report	-	P	W	
		h) Partial discharge test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		i) High voltage test	Critical	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		j) Insulation resistance (Volume resistivity) test	Major	Electrical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		k) Tests for dimension of armour wires/strips	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		l) Test for anti termite & anti rodent property of outer sheath	Major	Physical		Tech. Data Sheet	Tech. Data Sheet	Reg./Sheet	-	P	W	
		m) Rewinding of cable on drum	Major	Visual		To check cable appearance, drum appearance, cable winding, packing, embossing/printing/sequential marking		Reg./Sheet	-	P	W	
		n) Void & contamination test for insulation (Silicon Oil test)	Major	Physical				Reg./Sheet	-	P	W	
		o) Wafer boil test for extruded semi-conducting layers	Major	Physical				Reg./Sheet	-	P	W	
3	Acceptance tests	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	Each Lot Sample Basis	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-	As per IS-	Test Report	-	P	W	

BSES

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, P : Perform, W : Witness, V : Verification											
		z) Ageing & Water absorption test(Gravimetric) on Insulation & Outer sheath	Major	Physical		IS 5831/84	IS 5831/84	Test Report	-	P	W	
		z1) Heating Cycle with Potential	Critical	Electrical	sample basis, once per PO			Test Report	-	P	W	
		z2) Raw Material Verification in all aspects	Major	Physical	Each Lot					P	W	
		Z3) OFC Continuty Test and verification of outer sheath marking with continuous 15mm red strip for OFC embedded identification	Major	Physical	Each Lot					P	W	
4	Type tests at vendor's works	a) Tests on conductor										
		i) Annealing test for copper	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	Verification of process records. Tests N/A on finished conductor.
		ii) Tensile test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iii) Wrapping test for aluminium	Major	Physical		IS 8130/84	IS 8130/84	-	-	P	V	
		iv) Conductor resistance test	Major	Electrical		IS 8130/84	IS 8130/84	Test Report	-	P	V	
		b) Tests for armouring wires/strips										
		i) Dimensions of wire/strip	Major	Physical		IS 3975, IS 10810 Pt. 36 & Tech. Data sheet		Test Report	-	P	W	
		ii) Tensile strength & Elongation at break	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	Only for Steel wires/strips
		iii) Torsion test for wire	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		iv) Winding test for strip	Major	Physical		IS 3975	IS 3975	Test Report	-	P	W	
		v) Uniformity of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vi) Mass of zinc coating	Major	Chemical		IS 3975	IS 3975	Test Report	-	P	W	
		vii) Resistivity of wire/strip	Major	Electrical		IS 3975	IS 3975	Test Report	-	P	W	
		c) Test for thickness of insulation & sheath	Major	Physical		IS 7098/II/2011 & Tech. Data sheet	IS 7098/II/2011 & Tech. Data sheet	Test Report	-	P	W	
		d) Physical tests for insulation									W	
		i) Tensile strength & Elongation test	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		ii) Ageing in air oven	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	
		iii) Hot set test	Major	Physical		IS 7098/II/2011	IS 7098/II/2011	Test Report	-	P	W	

BSES

QUALITY ASSURANCE PLAN (QAP)
FOR 11 kV H. T. CABLES

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

BSES

QUALITY ASSURANCE PLAN (QAP)

FOR 11 kV H. T. CABLES

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			Remark
									SV	MFR	BRPL	
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,											
	BRPL : BSES Rajdhani Power Ltd, 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. BRPL may witness Raw material and in process inspection in addition to Routine/Acceptance tests at any time/stage of manufacturing.
5. BRPL’s Inspector may randomly select a cable drum for type testing at vendor’s works.
6. For each of the offered lot for inspection, BRPL 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 BRPL

Annexure- G

Inspection Expenses:

Not applicable

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:

Details of Optical Fiber Cable attached

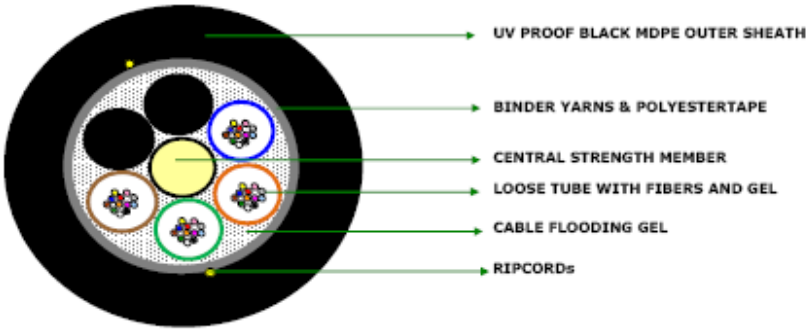
Annexure I:
Details of Optical Fiber Cable

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

PRODUCT INFORMATION

Fiber			
Single Mode Optical Fiber	**36 Nos.**	**Fiber ITU.T - G.657A1**	
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,30Cycle	**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 ± 0.25	**Cable Wt. (Kg/Km)**	114 ± 10%	**Cable Length:**	2 Km ± 5%

PRINTING DETAILS

Cable Printing details (White - Hot Foil Emb.)	48F TELEPHONE SYMBOL LASER SYMBOL MONTH & YEAR OF MANUFACTURE LENGTH CODE METER MARKING

The accuracy of marking shall be ± 0.5%. Occasional loss of printing & remarking shall be as per Bell core GR 20 and this supercedes the earlier markings.

ANNEXURE - I

PRICE FORMAT

ITEM DESCRIPTION	QTY	UoM	EX- WORKS RATE PER KM	UNIT FREIGHT	GST	UNIT LANDED	TOTAL LANDED COST
RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3Cx400 SQ.MM cable	350	KM					
RATE CONTRACT FOR SUPPLY OF 11KV GRADE XLPE INSULATED ALUMINIUM CONDUCTOR POWER CABLE OF SIZE 11KV 3C X 150 sq.mm cable	20	KM					

ANNEXURE -II

BID FORM

To

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

Sir,

1 We understand that BRPL is desirous of procuring of ..... in its licensed distribution network area in Delhi

2 Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods in full conformity with the Terms and Conditions and technical specifications as may be determined in accordance with the terms and conditions of the contract.

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

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

5 We agree to abide by this Bid for a period of …120… days from the due date of bid submission and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

6 We declare that we have studied the provision of Indian Laws for supply of equipments /materials and the prices have been quoted accordingly.

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

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

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

Dated this..... day of 2022

Signature..... In the capacity of .....

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

(IN BLOCK CAPITALS).....

ANNEXURE - III

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To 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 bidders who are techno-commercially qualified on the basis of tender requirements 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 to participate 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 auto bid process t safeguard themselves 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.

ANNEXURE -IV

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 it's Corporate Office at BSES Bhawan Nehru Place, New Delhi -110019, (herein after called —the "Purchaser") in the sum of
..... (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

TH E CONDITIONS of this obligation are:

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 TWENTY DAYS(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(s)

ANNEXURE -V

COMMERCIAL TERMS AND CONDITIONS

Sl N	Item Description	AS PER BRSPL	BIDDER'S CONFIRMATIO
1	Validity	**120 days** from the date of offer.	
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 shall be in vendor's scope	
3	Payment terms	100% payment within **45 days** after receipt of material at stores	
4	Delivery schedule	As per SECTION – IV	
5	Defect Liability period	60 months after commissioning or 66 months from the last date of dispatch, whichever is earlier	
6	Penalty for delay	1% per week of delay of undelivered units or part thereof subject to maximum of 10% of total PO value of undelivered units	
7	Performance Bank Guarantee	10% of total PO value valid for 24 months after commissioning or 30 months from the last date of dispatch, whichever is earlier plus 3 months towards claim period	

Bidder should also furnish the below details for future communication:-

FOR TECHNICAL QUERY:		
CONTACT PERSON & DESIGNATION	NAME	DESIGNATION
E-MAIL	MOBILE NO	TELEPHONE NO

FOR COMMERCIAL QUERY:		
CONTACT PERSON & DESIGNATION	NAME	DESIGNATION
E-MAIL	MOBILE NO	TELEPHONE NO

ANNEXURE VI

NO DEVIATION SHEET

SL NO	SL NO OF TECHNICAL SPECIFICATION	DEVIATIONS,IF ANY

SIGNATURE & SEAL OF BIDDER

NAME OF BIDDER

ANNEXURE-VII

FORMAT FOR BACKUP OF SUPPLY & PERFORMANCE QUANTITY

S.No	PO No	PO Date	PO Qty	Supplied		Customer	F.Y
				Qty.	Date		

CHECK LIST

Sl No	Item Description	YES / NO
1	INDEX	YES/NO
2	COVERING LETTER	YES/NO
3	BID FORM (UNPRICED) DULY SIGNED (1 nos. Original +1 nos. Photo Copy)	
4	BILL OF MATERIAL (UNPRICED) (1 nos. Original +1 nos. Photo Copy)	YES/NO
5	TECHNICAL BID (1 nos. Original +1 nos. Photo Copy)	YES/NO
6	ACCEPTANCE TO COMMERCIAL TERMS AND CONDITIONS	YES/NO
7	FINANCIAL BID (IN SEALED ENVELOPE – 1 ORIGINAL)	YES/NO
8	EMD IN PRESCRIBED FORMAT	YES/NO
9	DEMAND DRAFT OF RS 1180/- DRAWN IN FAVOUR OF	BSES RAJDHANI POWER LTD
10	POWER OF ATTORNEY/AUTHORISATION LETTER FOR SIGNING THE BID	
11	ACCEPTANCE FORM FOR REVERSE AUCTION	YES/NO
12	PLANT MANUFACTURING CAPACITY (CA CERTIFIED)	YES/NO
13	ANNUAL TURNOVER (CA CERTIFIED)	YES/NO
14	PERFORMANCE CERTIFICATE AS PER QR	YES/NO
15	SUPPLIED QUANTITY AS PER PQR	YES/NO
16	ISO Certification /Any other certification/Type test Report/BIS etc as per PQR	YES/NO
17	Quality Assurance /Organization Chart	YES/NO
18	Undertakings as per NIT	YES/NO
19	Technical Deviation	YES/NO
20	SUPPLIED/PERFORMANCE QTY AS PER QR (IN ANNEXURE-VII) CA CERTIFIED	YES/NO
Note : The above document must be properly tagged with page nos.		