Bid Number/बोली क्रमांक (बिड संख्या):
GEM/2023/B/3266499
Dated/दिनांक : 14-03-2023

Bid Document/ बिड दस्तावेज़

Bid Details/बिड विवरण	
Bid End Date/Time/बिड बंद होने की तारीख/समय	24-03-2023 20:00:00
Bid Opening Date/Time/बिड खुलने की तारीख/समय	24-03-2023 20:30:00
Bid Offer Validity (From End Date)/बिड पेशकश वैधता (बंद होने की तारीख से)	80 (Days)
Ministry/State Name/मंत्रालय/राज्य का नाम	Ministry Of Heavy Industries And Public Enterprises
Department Name/विभाग का नाम	Department Of Heavy Industry
Organisation Name/संगठन का नाम	Bharat Heavy Electricals Limited (bhel)
Office Name/कार्यालय का नाम	10250020-pem, Noida
Total Quantity/कुल मात्रा	11000
Item Category/मद केटेगरी	11kV- UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES-MAIN SUPPLY- 3C -240 , 3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES-MAIN SUPPLY- 3C -240 , 11kV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -3C-240 , 11kV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -1C-400 , 11kV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -1C-630 , 3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -3C-240 , 3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -1C-240
BOQ Title/बीओक्यू शीर्षक	HT XLPE CABLES FOR PANKI PROJECT
Years of Past Experience Required for same/similar service/उन्हीं/समान सेवाओं के लिए अपेक्षित विगत अनुभव के वर्ष	1 Year (s)
MSE Exemption for Years of Experience/अनुभव के वर्षों से एमएसई छूट/ and Turnover	No
Startup Exemption for Years of Experience/अनुभव के वर्षों से स्टार्टअप छूट/ and Turnover	No

Bid Details/बिड विवरण	
Document required from seller/विक्रेता से मांगे गए दस्तावेज़	Experience Criteria,Past Performance,Compliance of BoQ specification and supporting document *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer
Past Performance/विगत प्रदर्शन	10 %
Bid to RA enabled/बिड से रिवर्स नीलामी सक्रिय किया	Yes
RA Qualification Rule	H1-Highest Priced Bid Elimination
Type of Bid/बिड का प्रकार	Two Packet Bid
Primary product category	3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -1C-240
Time allowed for Technical Clarifications during technical evaluation/तकनीकी मूल्यांकन के दौरान तकनीकी स्पष्टीकरण हेतु अनुमत समय	7 Days
Payment Timelines	Payments shall be made to the Seller within **90** days of issue of consignee receipt-cum-acceptance certificate (CRAC) and on-line submission of bills (This is in supersession of 10 days time as provided in clause 12 of GeM GTC)
Evaluation Method/मूल्यांकन पद्धति	Total value wise evaluation

EMD Detail/ईएमडी विवरण

Required	No

ePBG Detail/ईपीबीजी विवरण

Advisory Bank	State Bank of India
ePBG Percentage(%)/ईपीबीजी प्रतिशत (%)	5.00
Duration of ePBG required (Months)/ईपीबीजी की अपेक्षित अवधि (महीने).	26

(a). EMD & Performance security should be in favour of Beneficiary, wherever it is applicable./ईएमडी और संपादन जमानत राशि, जहां यह लागू होती है, लाभार्थी के पक्ष में होनी चाहिए।

Beneficiary/लाभार्थी :

Branch CAG II New Delhi
10250020-PEM, Noida, Department of Heavy Industry, Bharat Heavy Electricals Limited (BHEL), Ministry of Heavy Industries and Public Enterprises
(A/c No. 39922687394 Ifsc Sbin0017313)

Splitting/विभाजन

Bid splitting not applied.

MSE Purchase Preference/एमएसई खरीद वरीयता

MSE Purchase Preference/एमएसई खरीद वरीयता	No

Details of the Competent Authority for MSE

Name of Competent Authority	SANJAY KUAMR DUBEY
Designation of Competent Authority	SDGM
Office / Department / Division of Competent Authority	BHEL
CA Approval Number	NA
Competent Authority Approval Date	14-03-2023
Brief Description of the Approval Granted by Competent Authority	For non divisible packages, MSE preference shall not be given.

Competent Authority Approval for not opting Micro and Small Enterprises Preference : View Document

Reserved for Make In India products

Reserved for Make In India products	Yes

1. Experience Criteria: In respect of the filter applied for experience criteria, the Bidder or its OEM {themselves or through reseller(s)} should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for number of Financial years as indicated above in the bid document before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the Financial year. In case of bunch bids, the category of primary product having highest value should meet this criterion.
2. Bid reserved for Make In India products: : Procurement under this bid is reserved for purchase from Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. However, eligible micro and small enterprises will be allowed to participate. The minimum local content to qualify as a class 1 local supplier is denoted in the bid document. All bidders must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which the bid is liable to be rejected. In case the bid value is more than Rs 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020 . In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.
3. Estimated Bid Value indicated above is being declared solely for the purpose of guidance on EMD amount and for determining the Eligibility Criteria related to Turn Over, Past Performance and Project / Past Experience etc. This has no relevance or bearing on the price to be quoted by the bidders and is also not going to have any impact on bid participation. Also this is not going to be used as a criteria in determining reasonableness of quoted prices which would be determined by the buyer based on its own assessment of reasonableness and based on competitive prices received in Bid / RA process.
4. Past Performance: The Bidder or its OEM {themselves or through re-seller(s)} should have supplied same or similar Category Products for 10% of bid quantity, in at least one of the last three Financial years before the bid opening date to any Central / State Govt Organization / PSU / Public Listed Company. Copies of relevant contracts (proving supply of cumulative order quantity in any one financial year) to be submitted along with bid in support of quantity supplied in the relevant Financial year. In case of bunch bids, the category related to primary product having highest bid value should meet this criterion.

5. Reverse Auction would be conducted amongst all the technically qualified bidders except the Highest quoting bidder. The technically qualified Highest Quoting bidder will not be allowed to participate in RA. However, H-1 will also be allowed to participate in RA in following cases:

i. If number of technically qualified bidders are only 2 or 3.
ii. If Buyer has chosen to split the bid amongst N sellers, and H1 bid is coming within N.
iii. In case Primary product of only one OEM is left in contention for participation in RA on elimination of H-1.
iv. If L-1 is non-MSE and H-1 is eligible MSE and H-1 price is coming within price band of 15% of Non-MSE L-1
v. If L-1 is non-MII and H-1 is eligible MII and H-1 price is coming within price band of 20% of Non-MII L-1

11kV- UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES-MAIN SUPPLY- 3C -240

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	2000	999

3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES- MAIN SUPPLY- 3C -240

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	2000	999

11kV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -3C-240

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	2500	999

11kV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -1C-400

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	1500	999

11kV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES -MANDATORY SPARE -1C-630

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	1000	999

3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES - MANDATORY SPARE -3C-240

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	1500	999

3.3 KV -UE, AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES - MANDATORY SPARE -1C-240

(Minimum 60% Local Content required for qualifying as Class 1 Local Supplier)

Brand Type/ब्रांड का प्रकार	Unbranded

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Vaishy	208020,Construction Manager, Bharat Heavy Electricals Limited c/o Chief Engineer (Projects), UPRVUNL PANKI TPS EXTENSION Panki , Dist. Kanpur (U.P) Pin-208020 (Uttar Prades)h	500	999

Buyer Added Bid Specific Terms and Conditions/क्रेता द्वारा जोड़ी गई बिड की विशेष शर्तें

1. **Generic**

   OPTION CLAUSE: The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

2. **Inspection**

   Nominated Inspection Agency: On behalf of the Buyer organization, any one of the following Inspection Agency would be conducting inspection of stores before acceptance:
   Pre-dispatch Inspection at Seller Premises (applicable only if pre-dispatch inspection clause has been selected in ATC):

   At vendor's works

   Post Receipt Inspection at consignee site before acceptance of stores:
   NA

3. **Certificates**

   The bidder is required to upload, along with the bid, all relevant certificates such as BIS licence, type test certificate, approval certificates and other certificates as prescribed in the Product Specification given in the bid document.

4. **Certificates**

   Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

5. **Generic**

   Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

6. **Generic**

   While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

7. **Buyer Added Bid Specific ATC**

Buyer uploaded ATC document Click here to view the file.

Disclaimer/अस्वीकरण

The additional terms and conditions have been incorporated by the Buyer after approval of the Competent Authority in Buyer Organization, whereby Buyer organization is solely responsible for the impact of these clauses on the bidding process, its outcome, and consequences thereof including any eccentricity / restriction arising in the bidding process due to these ATCs and due to modification of technical specifications and / or terms and conditions governing the bid. Any clause(s) incorporated by the Buyer regarding following shall be treated as null and void and would not be considered as part of bid:-

1. Definition of Class I and Class II suppliers in the bid not in line with the extant Order / Office Memorandum issued by DPIIT in this regard.
2. Seeking EMD submission from bidder(s), including via Additional Terms & Conditions, in contravention to exemption provided to such sellers under GeM GTC.
3. Publishing Custom / BOQ bids for items for which regular GeM categories are available without any Category item bunched with it.
4. Creating BoQ bid for single item.
5. Mentioning specific Brand or Make or Model or Manufacturer or Dealer name.
6. Mandating submission of documents in physical form as a pre-requisite to qualify bidders.
7. Floating / creation of work contracts as Custom Bids in Services.
8. Seeking sample with bid or approval of samples during bid evaluation process.
9. Mandating foreign / international certifications even in case of existence of Indian Standards without specifying equivalent Indian Certification / standards.
10. Seeking experience from specific organization / department / institute only or from foreign / export experience.
11. Creating bid for items from irrelevant categories.
12. Incorporating any clause against the MSME policy and Preference to Make in India Policy.
13. Reference of conditions published on any external site or reference to external documents/clauses.
14. Asking for any Tender fee / Bid Participation fee / Auction fee in case of Bids / Forward Auction, as the case may be.

Further, if any seller has any objection/grievance against these additional clauses or otherwise on any aspect of this bid, they can raise their representation against the same by using the Representation window provided in the bid details field in Seller dashboard after logging in as a seller within 4 days of bid publication on GeM. Buyer is duty bound to reply to all such representations and would not be allowed to open bids if he fails to reply to such representations.

This Bid is also governed by the General Terms and Conditions/ यह बिड सामान्य शर्तों के अंतर्गत भी शासित है

In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws./जेम की सामान्य शर्तों के खंड 26 के संदर्भ में भारत के साथ भूमि सीमा साझा करने वाले देश के बिडर से खरीद पर प्रतिबंध के संबंध में भारत के साथ भूमि सीमा साझा करने वाले देश का कोई भी बिडर इस निविदा में बिड देने के लिए तभी पात्र होगा जब वह बिड देने वाला सक्षम प्राधिकारी के पास पंजीकृत हो।बिड में भाग लेते समय बिडर को इसका अनुपालन करना होगा और कोई भी गलत घोषणा किए जाने व इसका अनुपालन न करने पर अनुबंध को तत्काल समाप्त करने और कानून के अनुसार आगे की कानूनी कार्रवाई का आधार होगा।

---Thank You/धन्यवाद---

Index of Annexures

GeM Tender Enquiry for HT XLPE CABLES for 1x 660 MW Panki Project

Sl. No.	Description	Annexures
1.	Additional terms and conditions (ATC)	Annexure I
2.	BOQ	Annexure II
3.	Delivery Schedule	Annexure III
4.	Land border certificate	Annexure IV
5.	Certificate for local Content	Annexure V
6.	Technical PQR	-
7.	Technical Specification	-
8.	Price Variation Clause (PVC)	-

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

Additional Terms and Conditions for subject Tender Enquiry to be complied by Bidders for Consideration in this tender:

1. **Dispatch Markings: -**

   Each box shall be marked with Capital Letters in "Red" indicating the PEM supply (Main Supply/ Commissioning spare/ Mandatory Spare) for 1x 660 MW Panki Thermal Power Station Project. Each package delivered under the Contract shall be marked by Supplier and such marking must be distinct and in English Language (all previous irrelevant markings being carefully obliterated). Such marking shall show the description and quantity of contents, the name and address of consignee, the Gross weight and Net weight of the package, the name of the Supplier, PEM P.O. reference number, with a distinctive number of mark sufficient for purposes of identification. Besides above necessary, packing shall bear a special marking `TOP', `BOTTOM', 'DO NOT TURN OVER", "KEEP DRY", "HANDLE WITH CARE", etc.

   IMPORTANT

   - Two copies of respective standard manufacturer's erection instruction/operation instruction manual shall be kept in each package / container for immediate reference by BHEL site and same shall be reflected in packing slip also
   - The Packing list details for the consignment must be put inside the Box/Boxes.

   Mandatory Spares: - The commissioning spares shall be properly packed separately in separate box and each spare shall be properly tagged giving details i.e. dispatch (to match the description given in the packing slip) to facilitate their proper identification. One Copy of Packing list must be put inside the Box.

   Note:- Main Supply items and items for Mandatory spares must be packed separately.

2. **Liquidated Damages: -**

   a) **Main Supply:-** Purchaser reserves the right to recover from the Seller/ Contractor, as agreed liquidated damages and not by way of penalty, a sum equivalent to half (½) percent and applicable GST thereon, of the total main supply & commissioning spares contract price excluding GST per week or part thereof, subject to a maximum of ten(10) percent of the total main supply & commissioning Spares contract price excluding GST, if the Seller/ Contractor fails to deliver any part of the ordered goods/stores within the period stipulated in the Order/ Contract.

   b) **LD on mandatory spares portion:** - LD shall be applicable @ ½ percent and applicable GST thereon, of the total mandatory spares portion contract value excluding GST per week or part thereof, limiting to 10% of total contract value of mandatory spares excluding GST

   NOTE:

   i. LR/RR date for indigenous supplies (Bill of Lading/AWB for Foreign supplies) shall be treated as the date of dispatch for levying LD. However, if receipted LR date for indigenous supply is beyond 30 days for FTL/ 45 days for PTL from the date of LR (PTL to be clearly mentioned in LR), such excess period shall be considered for LD purpose irrespective of dispatch date. Import General Manifest (IGM)/Bill of entry date (whichever is earlier), for foreign supplies, is beyond 90 days from the date of Bill of Lading/AWB, such excess period shall be considered for LD purpose irrespective of dispatch date.

ii. In case of any amendment/ revision, LD shall be linked to the amended/ revised contract value and delivery date(s).

iii. If Order/ Contract involves two or more Units/ Sets/ Lots/ Stages, then Liquidated Damages shall be levied on order/ contract value excluding GST of the delayed Unit/ Set/ Lot/ Stage, provided delivery stipulated in the Order/ Contract is Unit/ Set/ Lot/Stage wise, however total LD amount shall be limited to 10% of total order/ amended order value excluding GST of delayed Unit/ Set/ Lot/Stage. Any subsequent lot released (not envisaged in original contract) due to increase in quantity within permissible quantity variation shall be treated as separate lot for the purpose of LD.

iv. The sum specified above is not a penalty but a genuine pre-estimate of the loss/ damage which will be suffered by purchaser on account of delay on the part of the Contractor/Seller and the said amount will be deductible without proof of actual loss or damage caused by such delay.

3. Risk & Cost Purchase

BHEL reserves the right to terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

i) If the Seller/Contractor fails to deliver the goods or materials or any instalment thereof within the period(s) fixed for such delivery or the Seller's poor progress of the supply/ services vis-à-vis delivery/execution timeline as stipulated in the Contract, backlog attributable to seller including unexecuted portion of supply does not appear to be executable within balance available period;

ii) Delivers goods or materials not of the contracted quality and failing to adhere to the contract specifications;

iii) Withdrawal from or repudiation/ abandonment of the supply/ services by Seller before completion as per contract or if the Seller refuses or is unable to supply goods or materials covered by the Order/Contract either in whole or in part or otherwise fails to perform the Order/Contract;

iv) Non-supply by the Seller within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the Seller;

v) Termination of Contract on account of any other reason (s) attributable to Seller.

vi) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vii) If the Seller be an individual or a sole proprietorship Firm, in the event of the death or insanity of the Seller;

viii) If the Seller/Contractor being an individual or if a firm on a partnership thereof, shall at any time, be adjudged insolvent or shall have a receiving order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the Order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

ix) If the Seller/Contractor being a company is wound up voluntarily or by order of a Court or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances shall have arisen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager;

x) Non-compliance to any contractual condition or any other default attributable to Seller.

Such defaulting vendor/Seller shall not be eligible to participate in re-tendering conducted on account of risk purchase made due to fault of such vendor/Seller.

3.1 **Risk & Cost Amount against Balance Work:**

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

3.2 *** Balance scope of work (in case of termination of contract):**

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose.

Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: In case portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract

quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

3.3 **LD against delay in executed work in case of Termination of Contract:**

LD against delay in executed work shall be calculated in line with above LD clause, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of LD against delay in executed work in case of termination of contract" is given below.

i. Let the time period from scheduled date of start of work till termination of contract excluding the period of

Hold (if any) not attributable to contractor = T1

ii. Let the value of executed work till the time of termination of contract = X

iii. Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were

planned for execution till termination of contract = Y

iv. Delay in executed work attributable to contractor i.e. T2 = [1-(X/Y)] x T1

v. LD shall be calculated in line with LD clause (clause 16) of the Contract for the delay attributable to

contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

3.4 Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor

Without prejudice to the other means of recovery of such dues from the Seller recoveries from the Seller on whom risk & cost has been invoked shall be made from the following:

a) Dues available in the form of Bills payable to seller, SD, BGs against the same contract.

b) Dues payable to seller against other contracts in the same Region/Unit/ Division of BHEL.

c) Dues payable to seller against other contracts in the different Region/Unit/ division of BHEL.

In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

4. For recognition of dispatch, vendor to submit following documents to BHEL by e-mail/ fax immediately on dispatch: - GST compliant invoice, LR (indicating Invoice No., no. of boxes, PTL (if applicable) etc.), Packing List (Must be indicating No. of boxes, Packing size, Gross weight and net weight of each package, Contents of the package with cross reference to BoM item code no. or item serial no. and Quantity of each item separately), Insurance Intimation to underwriter through email/fax, Dispatch Clearance.

B. Following ATC available in GEM shall also be made part of NIT: -

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

i. Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

ii. Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

iii. Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

iv. The bidder is required to upload, along with the bid, all relevant certificates such as BIS license, type test certificate, approval certificates and other certificates as prescribed in the Product Specification given in the bid document.

v. While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

Additional Terms and Conditions for subject Tender Enquiry to be complied by bidders for consideration in this tender:

A. Bidders to ensure that Third party/Customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organization contact number and E-mail Id. In case the same is found not available, BHEL has the right to reject such document from evaluation.

B. "This item /package/system falls under the list of items defined in para 3 of ministry of finance guideline date 20.09.16 (procurement of items related to public safety, health, critical security operations and Equipment's etc.) & hence criteria of prior experience /turnover shall be same for all bidders including start up /MSME".

C. **Guarantee & Warrantee** shall be as per Cl. No. 10 of GTC on GeM for the bid. However, Guarantee & Warrantee time period shall be 18 months from the date of last supply in the contract.

D. Evaluation shall be on the basis of total all inclusive, landed price at consignee destination (Refer Cl. No. 6 of GTC on GEM).

E. **Terms of Delivery**: FOR Dispatch Station Basis. However, Transit insurance shall be in the scope of seller and unloading of items (at delivery point) shall be in buyer scope. Further, w.r.t. Transit Insurance supplier has to inform the details of dispatches (such as Policy No., Consignee Name, Consignment Packing details, Project Name, Purchase Order No., LR No. & date, Invoice No. & date, Dispatch Origin & destination details etc.) to policy underwriter under intimation to BHEL.

F. PQR criteria uploaded with Buyer uploaded Bid Specific document shall prevail value of Experience criteria and Past performance parameter mentioned in GeM bid.

G. "Due to COVID-19 pandemic condition prevailing in the country BHEL/PEM may go for Remote Inspection of Offered items if required. Vendors are requested to be equipped with the facilities/gadgets as indicated in the guidelines available at : https://pem.bhel.com/Documents/VendorSection/Vendor/Guidelines.pdf to take up the inspection remotely.

H. **Inspection call to be raised by bidder on BHEL CQIR portal** (details shall be shared at the of execution of order) and Inspection agency shall attend at the inspection within seven (07) days of the date on which the material is notified as being ready. In case of delay in witnessing of inspection beyond stipulated time (i.e. 7 days from the date on which the material is notified as being ready), by BHEL arising due to reasons not attributable to vendor, BHEL will extend the delivery period for such delay in carrying out inspection. If BHEL is not able to witness inspection up to 15 days then in addition to delay beyond stipulated period, extension in delivery time of 07 days for arranging fresh inspection will be given.

When the tests have been satisfactorily completed at Seller/ Contractor's works, the Inspection Agency shall issue an inspection report that effect within seven (07) days after completion of the tests, but if the tests were not witnessed by the Inspection Agency or his representative, the material acceptance report would be issued within seven (07) days after receipt of the test certificates by the Purchaser.

Purchaser will issue MDCC to the Seller/ Contractor within 7 days based on inspection report/ test certificates/Certificate of Conformance as applicable. In case of delay in issuance of MDCC beyond 7 days stipulated time (i.e. from the date of successful inspection report), by BHEL arising due to reasons not attributable to vendor, BHEL will extend the delivery period for such delay in issuing

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

MDCC. If BHEL is not able to issue MDCC up to 15 days then in addition to delay beyond stipulated period, 7 days' additional time shall be given to vendor to facilitate the vendor for arranging logistics arrangements.

I. All Bidders shall be required to submit applicable Freight % & GST % included in their prices during clarification stage of Tender.

J. Performance Bank Guarantee: shall be as per Cl. No. 7 of GTC of GeM. Performance Security amount shall be @5% of the value of contract value.

K. **Payment Terms:** As per clause no. 12 (i) of GTC on GeM. Payments shall be made to the Seller within 90 days (45 days for seller qualified and registered as Micro or small and 60 days for Medium enterprises as per MSMED Act.) of issue of consignee receipt-cum-acceptance certificate (CRAC) and on-line submission of bills (This is in supersession of 10 days' time as provided in clause 12 of GeM GTC).

Supplier has to provide Original Tax Invoice + 1 copy of Tax invoice, Packing List, LR/RR or AWB, CRAC, Insurance intimation, Guarantee Certificate, E-way bill (as applicable) for payment.

Further bidder to submit the final documents (Final drgs & Inspection document) in 12 no.s of hard copies and 04 no.s of CD along with Invoice.

Provision of offline payment in GeM shall be utilized.

L. **Bid reserved for Make in India products: -** Procurement under this bid is reserved for purchase from Class 1 local suppliers as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a class 1 local supplier is denoted in the bid document as 60%. All bidders must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which the bid is liable to be rejected.

Regarding verification of local content, the local supplier at the time of tender, bidding or solicitation shall be required to provide certification (as per enclosed **Annexure-V**) as per para 9 of PP-MII order revision dated 16.09.2020.

M. **This is conditional tender enquiry. Financial bid opening (Part-II) of a bidder shall be subjected to following: -**

(i) Approval of bidder by Customer (NTPC/UPRVUNL)
(ii) Techno-Commercial evaluation/recommendation by BHEL.
(iii) Qualification of Technical PQR
(iv) Offered item should mandatorily conform to PP-MII order provisions.

N. **Consignee Details** (for PRC - Provisional Receipt Certificate & CRAC - Consignee's Receipt cum Acceptance Certificate, as applicable) shall be as per Project Site official details.

O. The Bidder has to declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/guidelines.

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

P. Bidders to ensure the following: -

• Ensure compliance to Ministry of Power (MoP) Order No. 11/05/2018-Coord. dt. 28/07/2020, if applicable.

• Ensure compliance of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020.

• to submit "Model Certificate for Tenders" as per **Annexure-IV** of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020, 08/02/21, 06/09/22 & 23.02.23. Bidder to submit the following undertaking on their letter head duly signed from the highest competent authority at your end (i.e Owner, partner, CMD, Director etc.)

Q. Delivery Period: As per attached Annexure-III. Delivery period for sake of GeM bid shall be chosen as 999 days from PO date. However, this period shall not be considered for delivery and delay analysis purpose.

R. For registration in BHEL PEM- Online registration portal is operational, Non-registered Vendors who wish to apply for registration in BHEL-PEM can apply through Online Registration Portal available at www.pem.bhel.com - vendor section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration can be uploaded on the website and submit the application for registration. However, registration of suppliers is not mandatory in case of open tender.

S. Quantity Variation clause of +/- 25% of GeM ATC shall be utilized using option clause.

T. CIF is not applicable for subject tender.

U. PVC shall be applicable for subject package as per enclosed PVC annexure. Base date is February 2023 (One month prior to date of tendering). Price variation shall be limited to +20% and -ve price variation shall be unlimited. PVC shall be payable only for contractual delivery period (including delivery extensions if any) i.e no PVC shall be payable for delay in delivery attributed to vendor & in delayed delivery cases, PVC for contractual delivery date & actual delivery date shall be compared and whichever is found lower side shall be payable to vendor.

V. Integrity pact not applicable.

W. MSE Preference: - Being subject package is non-divisible and MSE preference shall not be given.

X. Bidder to note the following: -

A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

- they have controlling partner (s) in common;' or
- they receive or have received any direct or indirect subsidy/ financial stake from any of them; or
- they have the same legal representative/agent for purposes of this bid; or
- they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; or
- Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid, or
- In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry.

ANNEXURE –I (HT XLPE CABLES)

Additional Terms and Conditions (ATC)

One manufacturer can also authorize only one agent/dealer. There can be only one bid from the following:

1. The principal manufacturer directly or through one Indian agent on his behalf; and
2. Indian/foreign agent on behalf of only one principal,'

or

- A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid, or
- In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business. "

Y. All other terms & conditions shall be as per GeM bid, selected Additional Terms & Conditions from GeM library and GTC on GeM 4.0 (version 1.18) available on GeM Portal on enquiry floating date shall be applicable.

1X660 MW PANKI TPS

Annexure-II to BOQ-CUM-PRICE SCHEDULE FOR HT XLPE POWER CABLES (MAIN SUPPLY)

Sr. No.	Item code	Item description	Unit	Total Quantity (metres)	Drum Length (Meters)
1.0		**11/11kV (UE), AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES**			
1.1	507-27037-A	3C-240	MTR	2000	500
2.0		**3.3/3.3 KV (UE), AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES**			
2.1	507-27081-A	3C-240	MTR	2000	500

Notes:

1. Unit Price of Mandatory Spare item shall be same as that of Main item wherever applicable.
2. Tolerance on individual drum length shall be ±5%.
3. Overall tolerance on total dispatched quantity of each size shall be (-) 2% and (+) 0% except where the total ordered quantity is one single drum length of 500m, in which case it shall be -5% to 0%. Cables consumed for testing and inspection shall be to bidder's account.
4. For each individual cable size, one short length of not less than 200m may be accepted only in the final drum length to complete the supply (except where the total ordered quantity is one single drum length of 500m). The overall tolerance limits stipulated above shall continue to apply (in case short lengths are accepted).
5. In case of the quantities cleared by BHEL for manufacturing are manufactured and offered for inspection by successful bidder in more than one batch, BHEL reserves the right to witness type testing on all batches without any price implications.
6. Unit price of cables quoted by bidder shall be inclusive of type test charges. No separate charges shall be payable for type tests.

1X660 MW PANKI TPS

Annexure-II BOQ-CUM-PRICE SCHEDULE FOR HT XLPE POWER CABLES (MANDATORY SPARE)

Sr. No.	Item code	Item description	Unit	Total Quantity (metres)	Drum Length (Meters)
1.0		**11/11kV (UE), AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES**			
1.1	-	3C-240	MTR	2500	500
1.2	-	1C-400	MTR	1500	500
1.3	-	1C-630	MTR	1000	500
2.0		**3.3/3.3 KV (UE), AL CONDUCTOR XLPE INSULATED ARMOURED POWER CABLES**			
2.1	-	3C-240	MTR	1500	500
2.2	-	1C-240	MTR	500	500

Anneuxre III to Delivery Schedule

Sl. No.	Package Code	Package name	DEPTT	BHEL Drawing No	Drawing Title	Primary/Secondary	Drg Sch for Vendors	Standard Delivery Terms for Supply Portion
1	507-27000-A	HT XLPE CABLES	ELECT	PE-V0-426-507-E103	CROSS SECTION DRGS. - HT XLPE CABLES	**Primary**	R-0 within 14 days from PO & subsequent revisions within 10 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	For Lot-1: Within Four (04) months from date of CAT-1 approval of Primary drawing/documents, subjected to drawing/document submission/re-submission schedule as stipulated, in case of any delay in submission/re-submission of Primary drawing/documents, then same shall be reduced from the given delivery period. For Subsequent Lots: Within 3 months from Lot clearance by BHEL.
2	507-27000-A	HT XLPE CABLES	ELECT	PE-V0-426-507-E912	QUALITY PLAN - HT XLPE CABLES	**Primary**		
3	507-27000-A	HT XLPE CABLES	ELECT	PE-V0-426-507-E101	TECHNICAL DATA SHEET - HT XLPE CABLES	**Primary**		
4	507-27000-A	HT XLPE CABLES	ELECT	PE-V0-426-507-E104	TYPE TEST CERTIFICATES - HT XLPE CABLES	**Secondary**	Within 1 week after conduction of type test	

Notes:-

(i) The end period specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule.

(ii) The delivery conditions specified are for contractual LD purposes, however BHEL may ask for early deliveries without any compensation thereof.

(iii) Non-applicable drawings shall be decided during bid evaluation of the package.

(iv) Wherever schedule of drawings/documents submission / re-submission is stipulated in the Technical Specifications, same shall be superseded by delivery specified in NIT.

(v) Vendor to start manufacturing activities only after obtaining specific manufacturing clearance from BHEL Purchase group.

(vi) In case BHEL manufacturing clearance date is later than the date of Cat-1 approval of Primary drawing/documents, then the contractual delivery period will be calculated by setting off the time gap between Cat-1 approval date of Primary drawing/documents and the manufacturing clearance date, from any delay by vendor in submission/re-submission of Primary drawing/documents

(vii) In case -ve qty. variation not utilised till PO placement, Lot- I qty. shall be treated as PO qty.

Annexure IV

An undertaking regarding Model Clauses on company letter head only

(To be provided along with bid)

Reference: NIT No.-

Package: - HT XLPE CABLES

Project: 1x 660 MW Panki TPS

TO WHOM SO IT MAY CONCERN

This is with reference to Ministry of Finance circular dated 23.07.20, 08.02.21,06.09.22 & 23.02.23 reg. restriction under rule 144 (xi) of GFR.

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India. I hereby certify that M/s …….. …… (bidder name) is not from such a country and is eligible to be considered/participate in tender enquiry for against aforesaid tender enquiry.

Sign & Signature (Not below Director/owner of the company)

Date:

Place:

ANNEXURE V
1x 660 MW Panki TPS
HT XLPE CABLES
Letter head of Company

Ref……. Date……

To,
Bharat Heavy Electricals Limited
PEM, PPEI Building, Plot No 25,
Sector -16A, Noida (U.P) -201301

Subject: - Certification regarding local content

Reference: Tender Enquiry No.……

Name of Package: HT XLPE CABLES

Dear Sir,

We hereby certify that items offered by us of HT XLPE CABLES for 1x 660 MW Panki TPS ……..(minimum % of local content) meets the requirement of minimum local content in line with applicable clause of Make In India and the Public Procurement (Preference to Make in India), Order 2017 dated-15.06.2017, 28.05.2018 & 29.05.2019, 04.06.20, 16.09.20 and subsequent order dated 16.11.21.

We further confirm that details of location at which the local value addition is made will be our registered works at ……(address of the works)

Yours very truly

……. (authorized signatory of company)

…… (firm name)

authorized signatory
of company

VOLUME II

UPRVUNL

1 X 660 MW PANKI TPS

TECHNICAL SPECIFICATION

FOR

HT XLPE POWER CABLES

SPECIFICATION NO: ***PE-TS-426-507-E001***

REVISION: **00**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UP (INDIA) – 201301

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS- 426-507-E001	
	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	VOLUME II	
		REVISION 0	DATE: 02.03.2023
		SHEET 1 of 1	

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4.	SECTION – II	
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	TOTAL NO. OF SHEETS=	28
	(INCLUDING COVER/ SEPARATOR SHEETS)	

	DOCUMENT TITLE TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	SPECIFICATION NO. PE-TS- 426-507-E001
		VOLUME II
		REVISION 0 / DATE: 02.03.2023
		SHEET 1 of 1

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same

2. There are no deviations with respect to specification other than those furnished in the 'schedule of deviations'

3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.

4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.

5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ-Cum-Price schedule' of the specification shall not be considered (i.e., technical description & quantities as per the specification shall prevail).

BIDDER'S STAMP & SIGNATURE

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS- 426-507-E001	
	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	VOLUME II	
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		REVISION - 0	DATE: 02.03.2023

SECTION –I

SPECIFIC TECHNICAL REQUIREMENTS

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS- 426-507-E001	
	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	VOLUME II	
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1.0 SCOPE OF ENQUIRY

1.1 Design, Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of HT XLPE Power Cables conforming to this specification.

1.2 General technical requirements of the HT XLPE Power cables are indicated in Section-II. Project specific technical/ quality requirements / changes are listed in Section-I.

1.3 The stipulations of Section-I, followed by those of Data Sheet-A shall prevail in case of any conflict between the stipulations of Section-I, Data Sheet - A & Section-II.

1.4 The documents shall be in English Language and MKS system of units.

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per 'BOQ-cum-price schedule' as part of NIT.

3.0 SPECIFIC TECHNICAL REQUIREMENTS

S.No.	Reference Clause No. of Section- II	Specific Requirement/ Change
1.	Clause No. 3.1 to be read as	BHEL Standard Quality Plan (PE-QP-999-507-E001A R0) shall be read as "QP. NO. 0000-999-QOE-S-042, REV-02". However, Type testing on cables shall be conducted as per attached QP along with Annexure-A.

4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

4.1 Documents/drawings shall be submitted after placement of order for BHEL and customer approval which has been specified in NIT.

Note:

1. Vendor shall submit the dates for drawing/document submission/BHEL comments/ resubmission after approval of documents.
2. In BOM each of the item to be uniquely identified with item code no. or item Sl. No. Supplier to ensure that all the items which will find separate mention in the packing list are covered in detailed BOM. Supplier to give following undertaking in BOM: " The BOM provided here completes the scope (in content and intent) of material supply under PO no. ---- dtd ----- Any additional material which may become necessary for the intended application of supplied item/package will be supplied free of cost in most reasonable time."

4.2 Drawings/ documents shall be submitted through Document Management System (DMS).

* Standard Quality Plan as enclosed in the technical specification is to be appended with cover sheet bearing document number and description as stated above. The signed and stamped copy of the same shall be submitted to BHEL without making any changes in the content of the document.

Subvendor shall be subject to customer approval.

	DOCUMENT TITLE **TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES**	SPECIFICATION NO. PE-TS-426-507-E001	
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DATASHEET A

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS- 426-507-E001	
		VOLUME II	
	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	SECTION I	
		REVISION 00	DATE: 02.03.2023
	DATA SHEET-A		
S.No.	Particulars	Unit	Description
1	**Type of Cable**		Flame Retardant-Low Smoke (FR-LSH) HT CABLE
1.1	**Voltage Grade**		*11/11 kV (unearthed) & 3.3/3.3kV (unearthed)*
2	**STANDARDS APPLICABLE**		
2.1	Standard applicable in general (Latest amendment to be referred if any)	YES	IS:7098 (Part-2), IS:8130, IS:5831, IS:10810, IS:3975, ASTMD:2843, ASTMD:2863, IEC-754-1, IEC:60332 (Part-1), IEC:60332-3-23, IEEE:60383, IS:3961, IS:4905, IEC:60
2.2	Current rating of cables conforms to	-	As per IS:3961 (P-7)/2017
2.3	Short circuit rating conforms to	-	IEC 60949
2.4	Formula for calculating short circuit current for different durations	-	KxA/√t K Amp (Where A =Total area of Conductor in mm2 & t = time in seconds , K= 0.094 for Al)
3	**INSTALLATION CONDITIONS AT SITE**		
3.1	Ambient air temperature	deg. C	50
3.2	Ground temperature	deg. C	30
3.3	Depth of laying of cables buried in ground	cm	90
3.4	Thermal resistivity of soil	deg. C cm/W	150
5	**CONDUCTOR**		
5.1	Material type & grade	-	H2 Grade Stranded Aluminium Conductor, Class-2 of IS:8130/2013
5.2	Cable Size		As per BOQ-Cum-Price Schedule
5.3	Shape	-	Compacted Circular
6	**CONDUCTOR SCREEN**		
6.1	Material	-	Extruded Cross-linked Semi-conducting compound
6.2	Minimum thickness	mm	0.3
7	**XLPE INSULATION**		Cross-Linked Polyethylene(XLPE)
7.1	Nominal thickness of insulation	mm	As per IS:7098 (P-2)/2011
7.2	Extrusion & method of curing	-	Triple Extrusion (Extruded semi-conducting compound conductor screen and insulation screen shall be applied along with XLPE insulation in a single operation by triple extrusion process) Dry curing using Nitrogen
7.3	Continuous withstand temperature		90°C
7.4	Short-circuit withstand temperature		250°C
8	**INSULATION SCREEN**		
8.1	Type of screen	-	Insulation screen shall consist of two parts: 1. Non-Metallic Part 2. Metallic Part
8.2	Material and thickness (minimum and nominal)	mm	
8.2.1	Metallic	-	Copper Tape applied helically on core of Min thickness 0.10 mm
	No. of tapes and Minimum overlapping	-	1. No. of tapes and Minimum overlapping 10%
8.2.2	Non-metallic	-	Extruded Cross-linked Semi-conducting compound. Thickness of Semi Conducting Compound - 0.3 mm (Min.)
8.3	Earth fault current withstand capacity (calculation to be furnished)	kA, sec.	300A,2 sec (For multi-core cables, screen of each core shall be rated individually for the above value).
8.4	Extrusion & method of curing		Same as that, mentioned for Insulation above.
8.5	**CORE IDENTIFICATION**		By coloured strips applied on the cores or by numerals printing on the cores
9.0	**INNERSHEATH**		
9.1	Material		Extruded HRPVC Type ST-2
9.2	Standard Applicable		IS: 7098 (Part-2) & IS: 5831
9.3	Colour		*Black*
9.4	Whether FR-LSH		***YES***

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	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	SECTION I	
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	DATA SHEET-A		
9.5	Inner sheath applicable for single core cable		***YES***
9.6	Fillers		Not Acceptable (except for centre filler)
9.7	Material of fillers (if permitted)		Same as inner sheath
9.8	Method of application		
9.8.1	Multi-core cables:		
9.8.1.1	With fillers		*Pressure/Vacuum extruded*
9.8.1.2	Without fillers		*Pressure extruded*
9.9	Thickness of inner sheath		As per Table-5 of IS: 7098 (Part-2)
10	**ARMOUR**		
10.1	Material	-	Galvanised Steel
10.1.1	Multicore cables		Strip Armour (Armour dimensions as per Sl. No.(ii) of table – 6 of IS 7098 Part-II.
10.1.2	Single core cables		Aluminium Round Wire H4 grade to IS: 8130
10.2	Standard Applicable		Dimension as per IS: 7098 (Part-2) Table-6 and tolerance on dimension as per IS:3975
10.3	Minimum Coverage		90%
10.5	Gap between armour wire		Shall not exceed one armour wire space (No cross over / Over riding)
10.6	Breaking load of Joint		>95% of normal armour
11	**OUTERSHEATH**		
11.1	Material		Extruded *HRPVC*
			Type ST2 as per IS: 5831
11.2	Colour		*Black*
11.3	Whether FR-LSH		YES
11.4	Method of application		Extruded
11.5	Thickness of outer sheath		As per Table-7 of IS: 7098 (Part-2)
11.6	Marking/Embossing on Outersheath		*BHEL-PEM and UPRVUNL, Manufacturer's name and /or trade mark, voltage grade, year of manufacture, Type of insulation, Cable size (cross section area of conductor and no. of cores), Cable Code IS Number(s), ISI MARK, Type of inner & outer sheath e.g. "FRLSH" etc. @ 5 m (by embossing),* *Progressive sequential marking of length of cable in meters @ 1m (by printing) for 11kV & 3.3 kV Cables.*
12	**FR-LSH CHARACTERISTICS**		
12.1	Oxygen index		Min 29 (As per IS 7098-2 /ASTMD 2863)
12.2	Temperature index		Min. 250°C(As per IS 7098-2 /ASTMD 2863)
12.3	Acid gas generation		Max. 20% by weight (As per IS 7098-2 /IEC-60754-1)
12.4	Smoke density rating		Max. 60% (As per IS 7098-2 /ASTM D 2843)
12.5	Flammability Test		
13	**FLAMMABILITY**		
13.1	*Flammability test for single cable*		*YES (As per: IEC-60332 Part-1)*
13.2	*Flammability test for bunched cables*		*YES (As per: IEC-60332 Part-3, CAT-B)*
13.3	*Flammability test as per IEEE: 60383*		*YES*
13.4	*As per Swedish Chimney test SEN-SS-424-1475-F3*		*YE, as applicable*
14	*Anti-rodent and Termite repulsion Test*		*YES*
15	*Anti-Fungal Test*		*NO (self certification by supplier for Anti-fungal properties)*
16	Special Tests		
16.1	*Hydrolytic Stability as per ASTM D 3137 :81 (Duration:- 14 days)*		*NO*
16.2	*UV Radiation Test as per BS EN ISO 4892-2 (Duration:- 14 days)*		*NO*
16.3	*UV Radiation Test as per ASTM G 154 (Duration:- 14 days)*		*NO*
17	**DIAMETERS**		
17.1	Tolerance on overall diameter	(±) mm	(±)2 mm. over the declared value
18	**Cable Drum Details**		
18.1	*Type of Drum*		Steel

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	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	SECTION I	
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	DATA SHEET-A		
18.2	Standard drum length		*As specified in BOQ-Cum-Priced Schedule*
18.3	Details of marking on Drum		BHEL-PEM and UPRVUNL, Manufacturer's name and /or trade mark, voltage grade, year of manufacture, Type of insulation, Type of inner & outer sheath e.g. "FRLSH" etc Cable size (cross section area of conductor and no. of cores), Cable Code IS/IEC Number(s),Length of Cable, ISI Mark, Direction of rotation by Arrow, Approx Gross Mass.

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	TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES	SECTION I	
		REVISION 00	DATE: XX:XX:XXXX
	DATA SHEET-C		
S.No.	Particulars	Unit	Description
1	**GENERAL**		
1.1	Name of Manufacturer		Vendor to furnish (VTF)
1.2	Place of Manufacture		Vendor to furnish (VTF)
2	**Type of Cable**		Flame Retardant-Low Smoke (FR-LSH) HT CABLE
2.1	**Voltage Grade**		*11/11 kV (unearthed) & 3.3/3.3kV (unearthed)*
3	**STANDARDS APPLICABLE**		
3.1	Standard applicable in general (Latest amendment to be referred if any)	YES	IS:7098 (Part-2), IS:8130, IS:5831, IS:10810, IS:3975, ASTMD:2843, ASTMD:2863, IEC-754-1, IEC:60332 (Part-1), IEC:60332-3-23, IEEE:60383, IS:3961, IS:4905, IEC:60
3.2	Current rating of cables conforms to	-	As per IS:3961 (P-7)/2017
3.3	Short circuit rating conforms to	-	IEC 60949
3.4	Formula for calculating short circuit current for different durations	-	KxA/√t K Amp (Where A =Total area of Conductor in mm2 & t = time in seconds , K= 0.094 for Al)
4	**INSTALLATION CONDITIONS AT SITE**		
4.1	Ambient air temperature	deg. C	50
4.2	Ground temperature	deg. C	30
4.3	Depth of laying of cables buried in ground	cm	90
4.4	Thermal resistivity of soil	deg. C cm/W	150
5	**INFORMATION TO BE FILLED IN FOR EACH SIZE CABLE IN THE FORM OF TABLE**		
5.1	No. of cores x size		Vendor to furnish (VTF)
5.2	Voltage grade (Uo/U)		Vendor to furnish (VTF)
5.3	Base current ratings (*) based on Clause No. 3.0		
5.3.1	In air		Vendor to furnish (VTF)
5.3.2	In ground		Vendor to furnish (VTF)
5.3.3	ducts		Vendor to furnish (VTF)
5.4	Short circuit rating		Vendor to furnish (VTF)
5.5	Properties		
5.5.1	D.C. resistance of conductor at 20 deg. C		Vendor to furnish (VTF)
5.5.2	A.C. resistance of conductor at 90 deg. C		Vendor to furnish (VTF)
5.5.3	Reactance of cable at normal frequency		Vendor to furnish (VTF)
5.5.4	Electrostatic capacitance of cable at normal frequency		Vendor to furnish (VTF)
6	**CONDUCTOR**		
6.1	Material type & grade	-	H2 Grade Stranded Aluminium Conductor, Class-2 of IS:8130/2013
6.2	No & dia of wires in each core before stranding	no x mm	Vendor to furnish (VTF)
6.3	Shape	-	Compacted Circular
7	**CONDUCTOR SCREEN**		
7.1	Material	-	Extruded Cross-linked Semi-conducting compound
7.2	Minimum thickness	mm	0.3
8	**XLPE INSULATION**		Cross-Linked Polyethylene(XLPE)
8.1	Nominal thickness of insulation	mm	Vendor to furnish (VTF)
8.2	Extrusion & method of curing	-	Triple Extrusion (Extruded semi-conducting compound conductor screen and insulation screen shall be applied along with XLPE insulation in a single operation by triple extrusion process) Dry curing using Nitrogen
8.3	Continuous withstand temperature		90°C
8.4	Short-circuit withstand temperature		250°C
9	**INSULATION SCREEN**		
9.1	Type of screen	-	Insulation screen shall consist of two parts: 1. Non-Metallic Part 2. Metallic Part
9.2	Material and thickness (minimum and nominal)	mm	

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	DATA SHEET-C		
9.2.1	Metallic *(Vendor to furnish exact calculation based on actual thickness)*	-	Copper Tape applied helically on core of Min thickness 0.10 mm
9.2.2	No. of tapes and Minimum overlapping	-	1. No. of tapes and Minimum overlapping 10%
9.3	Non-metallic	-	Extruded Cross-linked Semi-conducting compound. Thickness of Semi Conducting Compound - 0.3 mm (Min.)
9.4	Earth fault current withstand capacity (calculation to be furnished)	kA, sec.	300A,2 sec (For multi-core cables, screen of each core shall be rated individually for the above value).
9.5	Extrusion & method of curing		Same as that, mentioned for Insulation above.
9.6	**CORE IDENTIFICATION**		By coloured strips applied on the cores or by numerals printing on the cores
10.0	**INNERSHEATH**		
10.1	Material		Extruded HRPVC Type ST-2
10.2	Standard Applicable		IS: 7098 (Part-2) & IS: 5831
10.3	Colour		Black
10.4	Whether FR-LSH		YES
10.5	Inner sheath applicable for single core cable		YES
10.6	Fillers		Not Acceptable (except for centre filler)
10.7	Material of fillers (if permitted)		Same as inner sheath
10.8	Method of application		
10.9	Multi-core cables:		
10.9.1	With fillers		Vendor to furnish (VTF)
10.9.2	Without fillers		Pressure extruded
10.10	Single-core cables:		Vendor to furnish (VTF)
10.11	Type & Shape of fillers (if used)		Vendor to furnish (VTF)
10.12	Thickness (min.)	mm.	Vendor to furnish (VTF)
11	**ARMOUR**		
11.1	Material	-	Galvanised Steel
11.2	Standard Applicable		Dimension as per IS: 7098 (Part-2) Table-6 and tolerance on dimension as per IS:3975
11.3	Size/ dimensions	-	Vendor to furnish (VTF)
11.4	Minimum no. of wires/ formed wires	-	Vendor to furnish (VTF)
11.5	Minimum Coverage		90%
11.6	Gap between armour wire		Shall not exceed one armour wire space (No cross over / Over riding)
11.7	Breaking load of Joint		>95% of normal armour
12	**OUTERSHEATH**		
12.1	Material		Extruded HRPVC
			Type ST2 as per IS: 5831
12.2	Colour		Black
12.3	Whether FR-LSH		YES
12.4	Method of application		Extruded
12.5	Thickness of outer sheath		Vendor to furnish (VTF)
13	**DIAMETERS**		
13.1	Diameter of insulated conductor	mm.	Vendor to furnish (VTF)
13.2	Cable diameter under armour	mm.	Vendor to furnish (VTF)
13.3	Cable diameter over armour	mm.	Vendor to furnish (VTF)
13.4	Overall diameter of cable	mm.	Vendor to furnish (VTF)
13.5	Tolerance on overall diameter	(±) mm	±2.0
13.6	Minimum bending radius	x O.D.	Vendor to furnish (VTF)
13.7	Safe pulling force	kg.	Vendor to furnish (VTF)
13.8	Weight of cable	kg./km	
13.8.1	Weight of conductor	MT./km	Vendor to furnish (VTF)

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	DATA SHEET-C		
13.8.2	Weight of XLPE insulation	MT./km	Vendor to furnish (VTF)
13.8.3	Weight of PVC (Inner Sheath & Fillers)	kg./km	Vendor to furnish (VTF)
13.8.4	Weight of Aluminium Round Wire / GS formed Wire (Approx)	kg./km	Vendor to furnish (VTF)
13.8.5	Weight of PVC (Outer Sheath)	kg./km	Vendor to furnish (VTF)
13.9	Dimension of drum (F X B X T) (Approx)	mm.	Vendor to furnish (VTF)
13.10	Shipping weight (Approx)	kg	Vendor to furnish (VTF)
14	**Cable marking on outer sheath**	-	
14.1	Marking/Embossing on Outersheath *(VTF Manufacturer's Name and Trade Mark)*		BHEL-PEM and UPRVUNL, Manufacturer's name and /or trade mark, voltage grade, year of manufacture, Type of insulation, Cable size (cross section area of conductor and no. of cores), Cable Code IS Number(s), ISI MARK, Type of inner & outer sheath e.g. "FRLSH" etc. @ 5 m (by embossing), Progressive sequential marking of length of cable in meters @ 1m (by printing) for 11kV & 3.3 kV Cables.
15	**FR-LSH CHARACTERISTICS**		
15.1	Oxygen index		Min 29 (As per IS 7098-2 /ASTMD 2863)
15.2	Temperature index		Min. 250oC(As per IS 7098-2 /ASTMD 2863)
15.3	Acid gas generation		Max. 20% by weight (As per IS 7098-2 /IEC-60754-1)
15.4	Smoke density rating		Max. 60% (As per IS 7098-2 /ASTM D 2843)
15.5	Flammability Test		
16	**FLAMMABILITY**		
16.1	*Flammability test for single cable*		*YES (As per: IEC-60332 Part-1)*
16.2	*Flammability test for bunched cables*		*YES (As per: IEC-60332 Part-3, CAT-B)*
16.3	*Flammability test as per IEEE: 60383*		*YES*
16.4	*As per Swedish Chimney test SEN-SS-424-1475-F3*		*YE, as applicable*
17	**Anti-rodent and Termite repulsion Test**		*YES*
18	**Anti-Fungal Test**		*NO (self certification by supplier for Anti-fungal properties)*
19	**Special Tests**		
19.1	*Hydrolytic Stability as per ASTM D 3137 :81 (Duration:- 14 days)*		*NO*
19.2	*UV Radiation Test as per BS EN ISO 4892-2 (Duration:- 14 days)*		*NO*
19.3	*UV Radiation Test as per ASTM G 154 (Duration:- 14 days)*		*NO*
20	**Cable Drum Details**		
20.1	*Type of Drum*		*Steel*
20.2	Standard drum length		*As specified in BOQ-Cum-Priced Schedule*
20.3	Details of marking on Drum *(VTF Manufacturer's Name and Trade Mark)*		*BHEL-PEM and UPRVUNL, Manufacturer's name and /or trade mark, voltage grade, year of manufacture, Type of insulation, Type of inner & outer sheath e.g. "FRLSH" etc Cable size (cross section area of conductor and no. of cores), Cable Code IS/IEC Number(s),Length of Cable, ISI Mark, Direction of rotation by Arrow, Approx Gross Mass.*

SECTION – II

GENERAL TECHNICAL SPECIFICATION

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS-426-507-E001	
BHEL	**TECHNICAL SPECIFICATION FOR HT XLPE POWER CABLES**	VOLUME II	
		SECTION II	
		REVISION 00	DATE: 02.03.2023
		SHEET 1 OF 2	

1.0 TECHNICAL REQUIREMENTS

1.1 Technical requirements for HT XLPE POWER CABLES shall be as indicated in this section, in addition to those specified in Section I & Datasheet-A.

2.0 CODES & STANDARDS

2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.

2.2 The design, material, construction, manufacture, inspection and testing of HT XLPE POWER CABLES shall conform to the latest revision of relevant standards and codes of practices mentioned in Data Sheet – A.

2.3 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

3.0 QUALITY ASSURANCE REQUIREMENTS

3.1 Bidder shall confirm compliance with the BHEL Standard Quality Plan (PE-QP-999-507-E001A R0) as attached with the specification without any deviations. At contract stage, the successful bidder shall submit the same QP for BHEL/ ultimate customer's approval. In case bidder has reference QP agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ultimate customer's approval. There shall be no commercial implication to BHEL on account of minor changes in QP during contract stage.

3.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved Quality Plan.

3.3 Type testing, routine / acceptance testing and special testing requirements shall be as per Annexure to QAP. Charges for all these tests for all the equipment & components shall be deemed to be included in the bid price (except UV Radiation & Hydrolytic Stability test).

3.4 The charges of UV Radiation test & Hydrolytic Stability test (if applicable) shall be reimbursed extra at actual against original money receipt of Govt. Lab. (CPRI/ ERDA etc).

3.5 Cost of cables consumed for testing shall be to bidder's account.

4.0 Packing

4.1 Cables shall be supplied in non-returnable drums. Material of cable drums shall be wooden.

4.2 **Wooden drums**:

For wooden drums, all wooden parts shall be manufactured from seasoned wood treated with copper napthenates / zinc napthenates (refer IS: 401) and anti-termite. The surface of the drum and the outer most cable layer shall be covered with water proof cover. Both the ends of the cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection. Dimensions of wooden drums shall be as per IS 10418. All ferrous parts shall be treated with suitable rust protective finish or coating to avoid rusting during transit and storage. BIS certification mark shall be stamped on each cable drum.

Steel drums:

In case of Steel drums, New or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Over the cables polyethylene sheet shall be wrapped and then sealed properly. For Typical details of Steel drums, Annexure-B to Section-II, may be referred by the bidder. Bidder may modify, to choose appropriate dimensions of steel drums to suite various sizes/weight/ lengths of HT XLPE POWER CABLES. BIS certification mark shall be stamped on each cable drum.

4.3 Each drum shall carry manufacturer's name, Owner's name, address and contract number, Type of cable & voltage grade, Year of manufacture, Type of insulation / sheath e.g. XLPE /HRPVC FRLS as applicable, No. of core and size of cables, Cable code, Length of cable on drum,IS number, ISI Mark, Approx. gross mass stenciled on both side of the drum, Direction of rotation by arrow. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.

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		SHEET -	

QUALITY PLAN

NTPC	Name:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)	STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-042 REV-02 DATE : 03/12/2018 Page 1 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR	APPROVED BY K K OJHA	1

Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
	Instructions: 1) Cable manufacturer to maintain records to show co- relation of raw materials to finished cables i.e. raw material batch/ lot no. should be traceable to the final cable drum number or batch number. 2) Cable manufacturer to maintain all quality control records identified as per all QP stages enumerated below whether it is identified for NTPC verification or witness or not. 3) Sources of raw material shall be submitted at the time of submission of endorsement sheet for approval by NTPC.													
A	**Raw material/ Brought out Items**													
1.01	Aluminum rod for conductor	1.Make	MA	Verify	100%	---	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	QCR		V	--	--	
		2. Grade	MA	--do--	--do--	--	NTPCADS	NTPC ADS	--do--		V	--	---	
		3. Resistivity	MA	Elect	As per cable mnfr std.	--	IS 5082	IS 5082	-do--		P	--	--	
1.02	Aluminum rod for Armouring (as applicable)	1. Make	MA	Verify	100%	--	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	Q.C.R		V	--	--	
		2. Grade	MA	Verify	As per mnfr std.	--	NTPC ADS	NTPC ADS	Manuf. TC		V	--	--	
		3. Resistivity	MA	Verify	-do-	-	IS 5082	IS 5082	-do--		P	--	--	
1.03	Copper rod (If applicable)	1. Make	MA	Verify	100%	--	Manufacturer approved vender	Manufacturer approved vender	QCR		V	--	--	
		2. Resistivity	MA	Verify	As per cable mnfr std.	--	IS 613	IS 613	--do--		P			
1.04	XLPE compound for insulation	1. Make	MA	Verify	--do--	100%	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	--do--		V	V	V	
		2. Type/ Grade	MA	Verify	100%	100%	NTPC ADS	NTPC ADS	--do--		V	V	V	
		3. Shelf life/ Storage condition	MA	Verify	100%	100%-	Compound manuf. Std	Compound manuf. Std	QCR		V	V	V	
		4. All acceptance test as per manufacturer norms	MA	Verify	As per manufacturer norms	As per manufacturer norms	NTPC ADS	NTPC ADS	Supplier TC		V	V	V	Refer note 1
1.05	PVC Compound for Inner sheath	1. Make	MA	Verify	As per manufacturer norms	--	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	Supplier TC		V	V	--	
		2. Type/ Grade	MA	Verify	--do--	--	NTPC ADS	NTPC ADS	--do--		V	V	--	

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

	Name:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)				QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 2 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR		APPROVED BY K K OJHA Dt.....				2
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks	
1	2	3	4	5	6		7	8	9	10				11	
1.06	Semi Conducting Compound	1.Make	MA	Verify	100%	100%	NTPC Approved sources	NTPC Approved sources	--do--	√	P	V	V		
		2. Resistivity	MA	--do--	100%	100%	NTPCADS	NTPCADS	--do--		P	V	V		
		3. Shelf Life / Storage condition	MA	Verify	100%	100%	Compound manuf. recommendation	Compound manuf. recommendations	--do--		P	V	V		
1.07	Copper tape (Electrolytic High Conductivity Copper Foils)	1. Make	MA	Verify	100%	100%	NTPC Approved sources	NTPC Approved sources	--do--	√	P	V	V		
		2. Dimension	MA	Measu	As per cable mnfr std.	--	NTPC ADS	NTPC ADS	--do--		P	--	--		
		3. Resistivity	MA	Verify	100%	----	IS 613	IS 613	Supplier TC		V	V	V		
		4. Chem.& Phy. properties	MA	Elec & Mech.	As per cable mnfr std.	--	As per cable mnfr std.	As per cable mnfr std.	--do--		V	V	-		
1.08	Polyester Tape (As applicable)	1.Make	MA	Verify	100%	100%	Manufacturer approved vendor	Manufacturer approved vendor	--do--		P	V	V		
		2. Dimension	Phy.	Meas	As per cable mnfr std.	--	Manuf. Data sheet	Manuf. Data sheet	--do--		P	-	-		
		3. T.S & Elongation	Phy.	Phy.	-do--	--	--do--	--do--	--do--		V	--	--		
1.09	Steel wire / Formed Wire (As applicable)	1. Make	MA	Verify	As per cable mnfr std.	100%	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	QCR		V	V	V	BIS licensees only	
		2. Dimension	MA	Meas	1 sample from each size / lot	--	NTPC APPROVED DATA SHEET & IS 3975	NTPC APPROVED DATA SHEET & IS 3975	QCR		P	--	--		
		3. All acceptance tests as per IS 3975	MA	Verify	As per IS 3975	--	IS 3975	IS 3975	Supplier TC		V	V	--		
1.10	PVC compound for Sheath	1. Make	MA	Verify	As per manufacturer norms	100%	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	QCR		V	V	V		

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

1345271/2023/PSPM-EL

	1.1 kV:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		**STANDARD QUALITY PLAN** (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)				QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 3 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR		APPROVED BY K K OJHA				3
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check		Reference Document	Acceptance Norms	Record Format	Agency				Remarks
					M	C/ N				D*	M	C	N	
1	2	3	4	5	6		7	8	9	10				11
		2. Type / Grade	MA	Verify	100%	100%	NTPC ADS	NTPC ADS	QCR		V	V	V	
		3. All acceptance test as per manufacturer norms	MA	Verify	As per manufacturer norms	As per manufactu rer norms	Compound Mnfr standard	IS 5831	QCR		V	V	V	Refer note 1
		4. Thermal Stability	MA	Chem	One sample / Batch	--	IS 5831	IS 5831	QCR		P	--	--	
		5. Oxygen Index	MA	Chem	--do--	--	NTPC ADS/ IS 10810 Part 58	NTPC ADS	--do--		P	---	--	
1.11	Filler Material (As applicable	1.Type	MA	Verfy	As per manuf. Std.	----	NTPC ADS	NTPC ADS	QCR	-	P	--	--	
1.12	Wooden Drum	1. Dimension	MI	Meas	Manuf. Std.	--	IS 10418	IS10418	--do--		P	--	--	
		2. Anti termite treatment	MI	Chem	Cable manuf. std	--	CABLE MANUF. STD.	CABLE MANUF. STD.	COC		V	V	V	COC from drum manuf.
1.13	Steel Drum	1. Dimension	MI	Meas	--do--	--	--do--	--do--	QCR		P	--	--	
		2. Surface finish	MI	Meas	--do--	--	--do--	--do--	--do-		P	--	--	
B	**Process & Stage Inspection**													
2.01	Wire Drawing	1.Surface finish	MA	Visual	One sample/Settin g of each size	--	SHOULD BE SMOOTH & FREE FROM SCRATCHES	SHOULD BE SMOOTH & FREE FROM SCRATCHES	QCR		P	--	--	
		2. Wire Diameter	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do-		P	--	--	
		3. Tensile test	CR	Mech	--do--	One sample / Setting of each size	IS 8130	IS 8130	--do--		P	V	V	Refer Sl. No.3.03(iii)
		4. Wrapping test	CR	Mech	--do--	--do--	--do--	--do--	--do--		P	V	V	--do--
		5. Annealing Test	CR	Mech	--do--	--do--	--do--	--do--	-do--		P	V	V	--do--
2.02	Bunching / stranding	1. No. of wires	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do-		P	--	--	
		2.Dia of wire	MA	Meas	-do--	--	--do--	--do--	--do--		P	--	--	
		3. Dimension of Conductor	MA	Meas	--do--	--	--do--	--do--	--do--		P	--	--	
		4.Direction of lay	MA	Visual	--do--	--	--do-	--do--	--do--		P	--	--	
		5.Records of strand breakage / welding during conductor stranding	MA	Verify	--do--	--	IS 8130	IS8130	--do--		P	--	--	
		6.Surface finish	MA	Visual	--do--	--	--do--	--do--	--do--		P	--	--	
		7. DC Resistance	CR	Meas	--do--	--	IS8130/NTPC ADS	IS8130/ NTPC	--do--		P	--	--	

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1345271/2023/BS-EM-EL

	4 CORE:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		**STANDARD QUALITY PLAN** (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)				QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 4 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR		APPROVED BY K K OJHA Dt.			4
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C.	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
								ADS						
2.03	Insulation extrusion (Conductor screen, XLPE Insulation & Insulation screen)	1. Surface finish	MA	Visual	One sample / Setting of each size	--	Extrusion should be by triple extrusion technique Method of curing for cables shall be "dry curing / gas curing/ steam curing" up to 11KV & " dry curing/ gas curing " for 19/33 KV Insulation extrusion area should be preferably clean & dust free. Extrusion Should be smooth. No porosity is permitted	QCR-		P	-	--	
		2.Thickness	CR	Meas	--do--	--	NTPC ADS	NTPC ADS	QCR	P	--	--	
		3. Eccentricity & Ovality	CR	Meas	--do--	--	Eccentricity of core shall not exceed 10% and Ovality not to exceed 2%	Eccentricity of core shall not exceed 10% and Ovality not to exceed 2%	--do--	P	-- -	--	
		3.Hot Set	CR	Mech	One sample/Setting of each size	--	IS 7098- Part II	IS 7098- Part II	--do--	P	--	--	Sample is to be taken from both top & bottom end
2.04	Copper Taping	1. Thickness	CR	Mech	--do--	--	NTPC ADS	NTPCADS	--do-	P	--	--	
		2. No. of tape	CR	Meas	--do--	--	--do--	--do-	--do--	P	--	--	
		3. Tape application overlap	CR	Meas	--do--	--	--do--	---do--	--do--	P	--	--	
		4. Core identification tape	CR	Visual	--do--	--	--do--	---do--	--do--	P	--	--	
2.05	Laying up	1. Core sequence	MA	Visual	--do--	--	IS 7098- Part II	IS 7098- Part II	--do--	P	--	--	
		2. Direction of lay	MA	Visual	--do--	--	-do-	--do--	--do--	P	--	--	
		3. Lay Length	MA	Meas	--do--	--	Manuf. Std.	Manuf. Std	--do-				
		4. Dia over laid up core	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--	P	--	--	
2.06	Inner Sheath	1.Colour	MA	Visual	-do--	-	--do--	--do--	--do--	P	--	--	
		2.Thickness	MA	Meas	One sample/Setting of each size	-	NTPC ADS	NTPC ADS	--do--	P	--	--	
		3.Dia over inner sheath	MI	Meas	--do--.	-	--do--	---do--	--do--	P	--	--	
2.07	Armouring (As Applicable)	1.Dimension	MA	Meas	--do--	-	--do--	--do--	--do--	P	--	--	
		2.No. of wires / strip	MA	Meas.	--do--	-	--do--	--do--	--do--	P	--	--	

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	1.1kV:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)			QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 5 of 9		REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR		APPROVED BY K K OJHA Dt.				5
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ N	Reference Document		Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7		8	9	10				
		3. Direction of lay	MA	Visual	--do--	--	IS 7098- Part II	IS 7098- Part II	QCR		P	--	--		
		4.Coverage & Quality of armouring	MA	Meas.	100%	--	Min. area of coverage of armouring shall be 90%. The gap between amour wires / formed wires shall not exceed one amour wire/ formed wire space & there shall be no cross over/ over riding of amour wire / formed wire. Zn rich paint shall be applied on amour joint surface of G.S. Wire /formed wire. The breaking load of amour wire joint shall not be less than 95% of that amour wire / formed wire. (As per NTPC specification)		QCR		P	--	--		
		5 Dia over armouring	MA	Meas.	One sample/Setting of each size	--	NTPC ADS		--do--		P	--	--		--
2.08	Outer Sheath	1. Surface finish	MA	Visual	100%	--	Pimple, Fish Eye, Burnt particles, Blow Hole not permitted. Repairing on outer sheath not permitted. (As per NTPC specification) PVC FRLS compound shall be preferably loaded in to extruder by suction method.		--do--		P	--	--		
		2.Colour of sheath	MA	Visual	One sample/Setting of each size	--	NTPC ADS	NTPC ADS	--do--		P	--	--		
		3. Dia over outer sheath	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--		P	--	--		
		4.Thickness of outer sheath	CR	Meas	--do--	-	--do--	--do--	--do--		P	--	--		
		5. Embossing quality	MA	Visual	100%	-	Following shall be embossed or printed on outer sheath at every 5 meter length of cable in addition to identification as per IS:(1).Batch number or Drum number (2) IS 1554 –Part-I (3) Cable size, (4) Voltage grade (5) word "FRLS" (marking shall be legible & indelible).		--do--		P	--	--		
		6. Sequencial marking	MA	Visual	Full length	--	Sequential marking of length of cable in meters at every one meter is to be embossed or printed. Embossing or printing shall be progressive, automatic, in line & marking shall be legible & indelible. In addition, Drum No. is also to be embossed/printed on full cable length		--do--		P	--	--		
C	**Finished Cables**														
3.01	Type Test clearance from NTPC Engineering to be verified at the time of final inspection.														
3.02	Routine Tests	1.High Voltage test at room temperature	CR	Elect	100%	100%	NTPC ADS / IS 7098- Part II	NTPC ADS	Test certificate	✓	P	W	W		Refer note 2

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

	TYPE:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)			QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 6 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR	APPROVED BY K K OJHA						6
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks	
1	2	3	4	5	6		7	8	9	10				11	
		2.Conductor Resistance	CR	Elect	100%	100%	NTPC ADS / IS 7098- Part II	NTPC ADS	--do--	✓	P	W	W	Refer note 2	
		3. Partial Discharge Test	CR	Elect.	100%	100%	NTPC ADS / IS 7098- Part II	NTPC ADS	-do--	√	P	W	W	For Screened cable only/ Refer note 2	
3.03	**Acceptance Tests**														
3.03 (i)	Construction of finished Cable	1. OD of Cable	MA	Meas.	Each type & size of cables as per sampling plan of IS 7098- Part II		NTPC ADS	NTPC ADS	--do--	✓	P	W	W		
		2. Laying of core	CR	Visual	--do--		NTPC ADS / IS 7098- Part II	NTPC ADS / IS 7098- Part II	--do--	✓	P	W	W		
		3. Core Identification	CR	Visual	--do--		--do--	--do--	--do--	✓	P	W	W		
		4. Colour of outer sheath & Inner sheath	MA	Visual	Each type & size of cables as per sampling plan of IS 7098- Part II		NTPC ADS	NTPC ADS	--do--	✓	P	W	W		
		5. Inner sheath thickness	CR	Meas	- do -		--do--	--do--	--do--	✓	P	W	W		
		6. Copper tape / Wire dimension with overlap (As applicable)	CR	Phy	--do--		NTPC ADS/ Min overlap 20%	NTPC ADS/ Min. overlap 20%	--do--	√	P	W	W		
3.03 (ii)	Armour wires/ Formed wires.	1.Dimensions	CR	Meas	Each type & size of cables as per sampling plan of IS 7098- Part II		NTPC ADS/ IS7098-II	NTPC ADS	Test Certific	✓	P	W	W	Test as applicable for Galvanized wires/ strips / Al wires	
		2. No. of wires/ formed wire	CR	Mech	-- do --		--do--	--do--	--do--	✓	P	W	W		
		3. Tensile test	CR	Mech	--do--		IS 3975	IS 3975	--do--	✓	P	V	V		
		4. Elongation test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	V	V		
		5.Torsion test (for round wires only)	CR	Mech	--do--		--do--	--do--	--do--	√	P	V	V		
		6. Wrapping test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	V	V		
		7. Resistance test	CR	Mech	--do--		--do--	--do-	--do-	✓	P	V	V		
		8.Mass of Zinc coating	CR	Meas	--do--		--do--	--do--	--do--	✓	P	V	V		
		9. Uniformity of Zinc Coating	CR	Chem.	--do--		--do--	--do--	--do--	✓	P	V	V		
		10.Adhesion test	CR	Mech	--do--		--do--	--do-	--do--	✓	P	V	V		
		11.Freedom from defects	CR	Visual	--do--		--do--	--do--	--do--	✓	P	V	V		
3.03	Conductor	1.Resistance Test	CR	Elect	--do--		--do--	--do--	--do--	✓	P	W	W		

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

	Item:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)			QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 7 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR		APPROVED BY K K OJHA				7
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	M	C	N	Remarks	
1	2	3	4	5	6		7	8	9	10				11	
(iii)		2.Tensile test	CR	Mech	Each type & size of cables as per sampling plan of IS 7098(Part-11		IS 8130	IS 8130	Test Certific ate	✓	P	W	W	Test report of manufacturer to be reviewed as per Sl. No. 2.01 for Tensile test & wrapping test	
		3.Wrapping test	CR	Mech	--do--		--do--	--do--	-do--	√	P	P	W	--do—	
3.03 (iv)	XLPE Insulation & PVC Sheath	1.Thickness of insulation & sheath	CR	Meas.	--do-		NTPC ADS & IS 7098-Part II	NTPC ADS	--do--	✓	P	W	W		
		2.Tensile strength & elongation at break of insulation & outer sheath (before & after ageing)	CR	Mech	One sample per batch of offered lot irrespective of sizes		IS 7098-Part II	IS 7098-Part II		✓	P	V	V	MTR for Ageing Test of the offered lot shall be verified	
		2(A).Tensile strength & elongation at break of insulation & outer sheath	CR	Mech	Each type & size of cables as per sampling plan of IS 7098(Part-11)		IS 7098-Part II	IS 7098-Part II		✓	P	W	W		
		3. Insulation resistance (Volume resistivity method)	CR	Elect	Each type & size of cables as per sampling plan of IS 7098-Part II		--do--	--do--	--do--	✓	P	W	W		
		4. Partial Discharge test	CR	Elect.	--do--		--do--	--do--	--do--	√	P	W	W	For Screened cable only	
		5.High voltage test at room temperature	CR	Elect	Each type & size of cables as per sampling plan of IS 7098-Part II		--do--	--do--	--do--	✓	P	W	W		
		6.Thermal stability on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		-do--	--do--	--do--	✓	P	W	W		
		7. Hot Set Test for insulation	CR	Mech	Each type & size of cables as per sampling plan of IS 7098-Part II		IS 7098-Part I	IS 7098-Part II	--do--	✓	P	W	W	For XLPE insulation only	
		8.Smoke density test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		NTPC ADS & ASTMD2843	NTPC ADS	-do--	✓	P	W	W	Refer Note 3	
		9.Acid gas generation test on	CR	Chem	--do--		NTPC ADS & IEC 60754-1	'NTPC ADS	--do--	✓	P	W	W	Refer Note 3	

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	NAME OF ITEM:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)			QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 8 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR		APPROVED BY K K OJHA Dt.				8
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
		outer sheath												
		10. Oxygen Index	CR	Chem	--do--		NTPC ADS/ IS 10810 Part 58	--do--	--do--	√	P	W	W	Refer Note 3
		11.Flammability test on finished cable	CR	Chem	One sample irrespective of sizes		NTPC ADS & IEC 60332 Part-3 (Category-B)	--do--	--do--	✓	P	W	W	
		12.Surface finish & length measurement.	CR	Visual & Meas	100% (COC from Manufacturer to be submitted for surface finish as per specification' s requirement)	one length of each offered lot of 25 drums of all sizes	(1) Drum number / Outer sheath extrusion batch number (2) IS 7098-Part II (3)Cable size, Voltage grade , Words " FRLS" & Screen Fault Current & duration at every 5 meter is to be embossed. Embossing shall be automatic, in line & marking shall be legible & indelible. (3) Sequential marking of length of cable at every meter length is to be embossed / printed. .(4) Manufacturer's identification as per IS . Embossing / printing shall be progressive, automatic, in line & marking shall be legible & indelible.	Test Certific ate	✓	P	W	W	Pimple, Fish Eye, Burnt particles, Blow Hole etc. not permitted. Repairing on outer sheath not permitted.
		13. Sequence of cores armour coverage, gap between two consecutive armour/ formed wire	CR	Visual & Meas	One length of each size	One length of each size	Min. area of coverage of armouring shall be 90%. The gap between armour wires / formed wires shall not exceed one armour wire/ formed wire space & there shall be no cross over/ over riding of armour wire / formed wire.	--do-	√	P	W	W	Zn rich paint shall be applied on armour joint surface of G.S. Wire /formed wire
		14. Measurement of Eccentricity & Ovality	CR	Meas.	--do--	--do--	Eccentricity of core shall not exceed 10% and Ovality not to exceed 2%	-do--	√	P	W	W	
4	Packing	1. Sealing	MA	Visual	100%	100%	(1) IS 7098-Part II (2) The surface of the drum and the outer most cable layer shall be covered with water proof cover. (3) Both the ends of cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by "U" nails.	QCR	✓	P	--	--	
4.01	Identification	NTPC Sealing	MA	Visual	100%	100%	Sealing shall be visible	QCR	√	P	V	V	

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NTPC	ITEM:- HT POWER FRLS CABLE (3.3 KV TO 33 KV)		STANDARD QUALITY PLAN (CONFORMING TO CODE:IS 7098 Part-II AND NTPC TECHNICAL SPECIFICATION)			QP. NO. 0000-999- QOE- S-042 REV-02 DATE : Page 9 of 9	REVIEWED BY AMAN PANDEY RAJESH SHARMA S K LAL DINESH KUMAR	APPROVED BY K K OJHA			9
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	C/ N	Reference Document	Acceptance Norms	Record Format	Agency D*	M C N	Remarks
1	2	3	4	5	6		7	8	9	10		11

Notes:	
1)	If the compound manufacturer is carrying out Ageing test , test report of compound manufacturer is to be reviewed. If the compound manufacturer is not carrying out ageing test, then cable manufacturer will carry out ageing test & the test report will be reviewed by NTPC (quantum of ageing test sample shall be one sample /batch)
2)	(a) In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by NTPC and Main Contractor at the time of final inspection. NTPC and Main Contractor will also witness routine tests on cables on 10% sample basis. (b) In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by NTPC at the time of final inspection. NTPC will witness routine tests on cables for the first order on 10% sample basis and Main Contractor will witness routine tests on cables for the first order on 100% basis.
3)	1. For Smoke Density rating test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 2. For Acid Gas Generation test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 3. For Oxygen Index test: if the test result without conditioning is within (+)7% of the minimum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 4. In case the test results without conditioning do not meet the maximum/minimum specified value, the manufacturer may exercise the option of retesting the samples after conditioning as per standard.
LEGEND:	**NTPC ADS: NTPC approved data sheet, QCR: quality control records of cable manufacturer, CABLE MANUF STD- cable manufacturer's internal plant standard, MI: minor, MA: major, CR: critical, COC- certificate of conformance**

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

Annexure "A" to Quality Plan

TYPE/ ACCEPTANCE/ ROUTINE TEST REQUIREMENTS

A. Type Test Conduction:

1. Tests for which "T" is indicated in the 'Test Conduction Required As' column below shall be conducted as Type Test.

2. Sampling:
   a. Type test to be conducted on 1 drum for every 10 drums or less of each type and size of cable/ lot.
   b. Electrical tests to be conducted on one drum of every size & voltage grade of cables.
   c. FRLS test & Flammability Test to be conducted on every size & voltage grade of cables. Sampling quantity as per appendix –D of IS 7098-2, D2.2.

B. **Acceptance Test Conduction:**

1. Tests for which "A" is indicated in the 'Test Conduction Required As' column below shall be conducted as Acceptance tests.

2. Sampling:
   a. Acceptance tests shall be as per 1 drum for every 10 drums or less of each type and size of cable/ lot.
   b. FRLS test & Flammability Test to be conducted on every size & voltage grade of cables. Sampling quantity as per appendix –D of IS 7098-2, D2.2.

C. Routine Test Conduction:

1. Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests.

2. Sampling: Routine tests shall be conducted on 100% cable drums.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
1.0	**Tests for Conductor**				
I.	Annealing test	For copper conductor only	**T, A**	IS 10810 Pt 1	***Internal in process Test Report to be furnished for acceptance test***
II.	Tensile test	For aluminium conductor only *(Not applicable for compacted circular or shaped conductor)*	**T, A**	IS 10810 Pt 2	
III.	Wrapping test	For aluminium conductor only *(Not applicable for compacted circular or shaped conductor)*	**T, A**	IS 10810 Pt 3	
IV.	Resistance test	For Al/Cu	**T, A, R**	IS 10810 Pt 5	
2.0	**Tests for Armour Wires/Strips**				
I.	Measurement of dimensions	Applicable for Aluminium wire & GS wire/Strip	**T,A**	IS 10810 Pt 36	
II.	Tensile test	Applicable for Aluminium wire & GS wire/Strip	**T, A**	IS 10810 Pt 37	
III.	Elongation at break test	Applicable for GS wire/Strip only	**T, A**	IS 10810 Pt 37	
IV.	Torsion test	For GS round wire only	**T, A**	IS 10810 Pt 38	

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Annexure "A" to Quality Plan

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
V.	Winding test	For GS strip only	**T, A**	IS 10810 Pt 39	
VI.	Resistivity test	Applicable for Aluminium wire & GS wire	***T, A***	IS 10810 Pt 42	
VII.	Uniformity of Zinc coating test	For G. S. wires/Strip only	***T, A***	IS 10810 Pt 40	
VIII.	Mass of Zinc coating test	For G. S. wires/Strip only	***T, A***	IS 10810 Pt 41	
IX.	Wrapping Test	For Aluminium wires only	***T, A***	IS 10810 Pt 3	
3.0	**Physical Tests for XLPE Insulation & PVC sheath**				
I.	Test for thickness & Eccentricity	Applicable for XLPE insulation, HRPVC inner sheath & For HRPVC *inner/outer sheath* only	**T, A**	IS 10810 Pt 6	
II.	Tensile strength and elongation test at break	Applicable for XLPE insulation & For HRPVC *inner/outer sheath* only			
(a)	Before ageing		**T, A**	IS 10810 Pt 7	
(b)	After ageing		**T, A**	IS 10810 Pt 7	
III.	Ageing in air oven	Applicable for XLPE insulation & For HRPVC *inner/outer sheath* only	**T**	IS 10810 Pt 11	
IV.	Loss of mass in air oven test	For HRPVC *inner/outer sheath* only	**T**	IS 10810 Pt 10	
V.	Hot deformation test	For HRPVC *inner/outer sheath* only	**T**	IS 10810 Pt 15	
VI.	Heat shock test	For HRPVC *inner/outer sheath* only	**T**	IS 10810 Pt 14	
VII.	Shrinkage test	For XLPE insulation & For HRPVC *inner/outer sheath* only	**T**	IS 10810 Pt 12	
VIII.	Thermal stability test	For HRPVC *inner/outer sheath* only	**T**	IS 10810 Pt 60	
IX.	Hot set test	For XLPE insulation only	**T, A**	IS 10810 Pt 30	
X.	Water absorption (gravimetric) test	For XLPE insulation only	**T**	IS 10810 Pt 33	
XI.	Degree of cross-linking	For XLPE insulation only	**T**	IS 7098-II	
4.0	**Tests On Extruded Semi-conducting Screen**				
I.	Test for Strippability	Applicable for Semi-conducting Strippable screen	**T**	IS 7098-II	Not applicable since it is bonded type
II.	Volume Resistivity	Applicable for Semi-conducting Strippable screen	**T**	IS 7098-II	
III.	Test for cross linking		**A**	IS 7098-II	
5.0	**Improved Fire performance (FR-LSH) Tests**				
I.	Oxygen index test	*For inner/outer sheath only*	**T, A**	IS 10810 Pt 58 / ASTMD 2863	*Sample shall be as per IS 7098,Part 2*

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Annexure "A" to Quality Plan

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
II.	Smoke density test	*For inner/outer sheath only*	**T, A**	ASTMD 2843	
III.	Acid gas generation test	*For inner/outer sheath only*	**T, A**	IS 10810 Pt 59 / IEC-754-1	
IV.	Temperature Index Test	*For inner/outer sheath only*	**T,A**	IS 10810 Pt 64 / ASTMD 2863	
6.0	**Flammability Tests**				
I.	Flammability test for bunched cables	For complete cable	**T,A**	IEC-60332 (Part-3)	
II.	Flammability test for single cable	For complete cable	**T,A**	IEC:60332 Part-1	
III.	Swedish chimney test	For complete cable	**A**	SEN SS 424 1475 (Class F3)	
IV.	Flammability test	For complete cable	**A**	IEEE: 60383	
7.0	**Electrical Tests**				
I.	High Voltage Test	For complete cable	**T, A, R**	IS 10810 Pt 45	
II.	Insulation Resistance Test (Volume resistivity method)	For complete cable	**T, A**	IS 10810 Pt 43	
III.	Partial discharge test (shall be carried out on full drum length)		**T,A,R**	IS 10810 Pt 46	
IV.	Bending Test followed by Partial Discharge test		**T**	IS 10810 Pt 50	
V.	Dielectric Power Factor Test (i) As a function of voltage (ii) As a function of temperature		**T**	IS 10810 Pt 48	
VI.	Heat Cycle Test		**T**	IS 10810 Pt 49	
VII.	Impulse Withstand Test		**T**	IS 10810 Pt 47	
VIII.	Thermal ageing test	For complete cable	**T**	IS 7098-II	
IX.	*Flammability Test*	*For HRPVC sheathed cable*	*T*	*IS 10810 Pt 53*	
8.0	**Anti-rodent and Termite Repulsion test**	For HRPVC *outer sheath* only	**A**	Refer Note	**Test applicable as indicated in Datasheet-A**
9.0	**Anti-Fungal Test**	For HRPVC outer sheath only	**A**	**Self-certification by vendor for anti-fungal property.**	
10.0	**Special Test**				
I.	Hydrolytic Stability	For Complete Cable	**A (**)**	ASTM D 3137	**Test applicable as indicated in Datasheet-A**
II.	Ultraviolet Test	For Complete Cable	**A (**)**	BS EN ISO 4892-2	

***** These tests shall be conducted on one sample for the entire contract and duration of these tests shall be 14 days.***

Note: A few chipping of the PVC compound is slowly ignited on a porcelain dish or cubicle in a muffle furnace at about 60-degree C. The resulting ignited ash is boiled with a little ammonium acetate solution (10%). Place a drop of aqueous sodium sulphide solution on a thick filter paper and allow soaking. Touch the spot with a drop of above extract. A black spot indicates the presence of lead, the anti-termite and rodent compound.

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1345271/2023/PS-PEM-EL

BHEL	PANKI TPS (1X660 MW)	PE-PQ-426-507-E001
	PRE-QUALIFICATION REQUIREMENTS FOR HT XLPE POWER CABLES	REVISION NO. 00 DATE 02/03/2023
		Page 1 of 1

ITEMS: HT XLPE POWER CABLE SCOPE: Supply: YES; Erection & Commissioning: NO;	
1	Vendor should be a manufacturer of HT Cables
2	Availability of test reports on HT XLPE FRLS Power Cables to establish in-house capability to carry out all routine, type & acceptance tests as per relevant IS/International Standards (except UV Radiation & Hydrolytic Stability Test which can be conducted at Govt. lab/Govt. approved Independent lab).
3	Capacity of manufacturing 10 km of HT XLPE Power Cables per month
4	Manufactured and supplied at least one (1) km of FRLS cables of any voltage level prior to 02.11.2015.
5	Manufactured & supplied HT XLPE Power Cable sizes of minimum 240sqmm for 3/3.5 core and minimum 630sqmm for single core cable
6a	Manufactured & supplied at least 50 km of 6.35/11 KV or higher voltage grade XLPE insulated power cables in one or more orders prior to 02.11.2015.
6b	Manufactured & supplied at least 10 km of 11kV/6.6kV/3.3kV XLPE insulated power cables in one single order.
7	Minimum two (2) nos. purchase orders for HT XLPE Power Cables shall be submitted which should not be more than five (5) years old from date of techno-commercial bid opening.

Notes (General points of PQR):

1. Consideration of offer shall be subject to customer's approval of bidder, if applicable.
2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities & capacity of the bidder to perform the contract, should the circumstance warrant such assessment in the overall interest of BHEL.
4. After satisfactory fulfilment of all the above criteria/requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.
5. Bidder to submit test reports as per PQR Clause No. 2 to establish vendor has in-house facility to conduct all tests including Impulse withstand test.
6. PQR 4 & 6a is in line with customer provenness criteria.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
P. Vinayaka	02/03/23	02/03/2023	
PRATIK VINAYAKA, MANAGER	ABHISHEK, SR. MANAGER	PRAVEEN DUTTA, AGM	DEBASISA RATH, AGM (DH)

FOR PVC CLAUSE FOLLOWING ALSO TO BE NOTED:

- SMIFS/SMIF factor for 3.3KV Cable shall be as per formula given in IEEMA circular & SMIFS/SMIF factor for 11KV Cable shall be as per Table H3(a) & H3(b) of IEEMA circular attached with NIT. (All other factors shall be as per IEEMA circular attached with NIT).
- Factor of 3.3 KV (UE) Armoured (Screened cables) shall be as per factor of IEEMA Circular for 3.3kV (E) Unscreened Arm.

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Ref. No. 91/DIV/CAB/05

9th October 2019

All Members of Cable Division & All SEBs, Utilities & Listed Purchasing organisations

Sub: i) Revision in Price Variation Formulae for Medium Voltage Power Cables
ii) New Price Variation Formula for 6 Quad Railway signalling Cables as per RDSO specs

IEEMA was working on inclusion of Metallic screen factors of copper tape applicable for the MV Power Cables and on specific request from Railways, IEEMA was also working on evolution of factors and formula for 6 Quad Railway Signalling Cables as per RDSO specifications.

IEEMA has been discussing internally on evolution of standards weight factors of metals and polymers applicable for EHV Cables for various standard rating and for specific short circuit test requirements.

After compilation of all inputs of factors from major manufacturers, the revised Price Variation Formulae for EHV Cables, MV Power Cables including metallic screen factor (Cu tape) have been prepared. Similarly a new PV formula for 6 Quad Railway signalling cables as per RDSO specification has also been prepared. The same in the draft form were circulated vide cir. No. 73/DIV/CAB/05 dated 23rd August 2019 for your reviews.

Since there are no adverse comments received; we are making these formulae operational from 1st September 2019. We request and recommend all the users & stakeholders including Utilities, PSUs etc. to incorporate these PV formulae in all the new tenders/contracts.

For pending contracts of EHV Cables and MV Power Cables, the date of delivery on or after 1st September 2019, to arrive at the final price variation, we recommend using the following two stage method, which is a standard institutionalized methodology adopted by IEEMA for change over in all IEEMA PV clauses.

1. Calculate price variation 'P' from applicable prices/indices from your base date / date of tendering up to September 2019 i.e. considering all prices/indices published in PV circular of September 2019 at numerator place; using IEEMA PV clause effective from 1st November 2017.

2. Treat the above calculated 'P' as 'P_0' and calculate final price variation considering all prices / indices published in September 2019 as base prices/indices (at the denominator place) up to the applicable prices/indices as per your date of delivery; using revised PV clause of MV Power Cable effective from 1st September 2019.

Director

Encl: Revised PV Formulae for EHV Cables, Medium Voltage Power Cables
New PV Formula for 6 Quad Railway signaling Cables as per RDSO specs

CIN No. U99999MH1970GAPO14629

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IEEMA (PVC)/MV SCREEN CABLE/2019 **Effective from: 1st September 2019**

Price Variation Clause for 3.3-33 KV XLPE Insulated Armoured Single & Three core Screen Cables

The Price quoted/confirmed is based on the input cost of raw materials/components as on the date of quotation, and the same is deemed to be related to the prices of raw materials as specified in the price variation clause given below. In case of any variation in these prices, the price payable shall be subject to adjustment up or down in accordance with the formulae provided in this document.

Terms used in price variation formulae:

P Price payable as adjusted in accordance with above appropriate formula **(in Rs/Km)**
Po Ex-Works Price quoted/confirmed **(in Rs/Km)**

ALUMINIUM

AlF Variation factor for Aluminium

Al Price of Aluminium. This price is as applicable one month prior to the date of delivery.
Alo Price of Aluminium. This price is as applicable one month prior to the date of tendering.

COPPER

CuF Variation factor for copper

Cu Price of CC copper rods. This price is as applicable one month prior to the date of delivery.
Cuo Price of CC copper rods. This price is as applicable one month prior to the date of tendering.

PVC COMPOUND

PVCc price of PVC compound. This price is as applicable on first working day of the month, one month prior to the date of delivery.
PVCco Price of PVC compound. This price is as applicable on first working day of the month, one month prior to the date of tendering.

CCFAl Variation factor for PVC compound/Polymer for aluminum conductor cable.
CCFCu Variation factor for PVC compound/Polymer for copper conductor cable.

XLPE COMPOUND

Cc price of XLPE compound. This price is as applicable on first working day of the month, one month prior to the date of delivery.
Cco Price of XLPE compound. This price is as applicable on first working day of the month, one month prior to the date of tendering.

XLFAL Variation factor for XLPE compound for aluminum conductor cable.
XLFCU Variation factor for XLPE compound for Copper conductor cable.

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IEEMA (PVC)/MV SCREEN CABLE/2019 **Effective from: 1st September 2019**

STEEL

FeF	Variation factor for steel
FeW	Variation factor for round wire steel armouring
Fe	Price of Steel Strips/steel wire. This price is as applicable on the first working day of the month, one month prior to the date of delivery.
Feo	Price of steel strips/steel wire. This price is as applicable on first working day of the month, one month prior to the date of tendering.

COPPER TAPE

SMIFS	Variation Factor for Copper Tape
SMIF1	Price of CC copper rods. This price is as applicable one month prior to the date of delivery.
SMIF0	Price of CC copper rods. This price is as applicable one month prior to the date of tendering.

The above prices and indices are as published by IEEMA vide Circular reference IEEMA (PVC)/CABLE(R-1)/--/-- prevailing as on 1st working day of the month i.e. one month prior to the date of tendering.

The date of delivery is the date on which the cable is notified as being ready for inspection/dispatch (in the absence of such notification, date of manufacturer's dispatch note is to be considered as the date of delivery) or contracted delivery date (including any agreed extension thereto) whichever is earlier.

Notes: All prices of raw materials are exclusive of GST amount. The details of prices are as under:

1. Price of Aluminium is LME average Cash SELLER Settlement price of Primary Aluminium in US$ per MT as published by London Metal Bulletin (LME) including Premium for Aluminium Ingot in US$ per MT is converted in Indian Rs./MT.
2. Price of PVC Compound (in Rs/MT) is the ex-works price, as quoted by the manufacturer.
3. Price of XLPE Compound (in Rs/MT) is the ex-works price, as quoted by the manufacturer
4. Price of CC copper rods (in Rs/MT) is ex-works price as quoted by the primary producer.
5. Price of galvanized steel strip / steel wire (in Rs/MT) is ex-works price as quoted by the manufacturer for Round steel Wire and Flat steel strip (the relevant price of steel strip or steel wire is to be selected depending upon the type of armouring of the cable).

Price variation formulae

G. For Aluminium conductor XLPE insulated 3.3 to 33 kV Single Core Armoured power cables

$$P = Po + AlF\ (Al - Alo) + XLFAL(CC-Cco) + SMIFS\ (SMIF1-SMIF0) + CCFAl\ (PVCc - PVCco)$$

For Single Core unarmoured cables Aluminium factor (AlF) shall be referred from Table ALP

Table References:

ALP	Aluminium conductor Factor in single core (for unarmoured cable) ; AlF
H1	Aluminium Armour Factor for Armour with Al Cond.
H2(a)	XLPE Compound Factor ; XLFAl
H3(a)	Copper Tape Factor ; SMIFS
H5(a)	Polymer factor for Single core cable ; CCFAl

Note: For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below
If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet
D= Density= 8.89 for Cu. & 2.703 for Al **SMIFS=(A*D)/1000**

H. For Copper conductor XLPE insulated 3.3 to 33 kV Single Core Armoured power cables

P = Po + CuF (Cu – Cu0) + XLFCu(CC-Cco)+ SMIFS (SMIF1-SMIF0) + AlF(Al-Alo) + CCFAl (PVCc – PVCco)

For Single Core unarmoured cables Aluminium factor (AlF) shall be 0

Table References:

CuP	Copper conductor Factor in single core ; CuF
H2(a)	XLPE Compound Factor ; XLFCu
H3(a)	Copper Tape Factor ; SMIFS
H4(a)	Aluminium Armour factor ; AlF
H5(a)	Polymer factor for Single core cable ; CCFCu

Note: For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet
D= Density= 8.89 for Cu. & 2.703 for Al
SMIFS=(A*D)/1000

I. For Aluminium conductor XLPE insulated 3.3 to 33 kV Three Core Armoured power cables

P = Po + AlF (Al – Alo) + XLFAL(CC-Cco)+ SMIF (SMIF1-SMIF0) + FeF(FeF1-FeF0) + CCFAl (PVCc – PVCco)

For unarmoured Three Core cables , Steel Armour factor (FeF for Strip & FeW for Wire) shall be 0

Table References:

ALP	Aluminium conductor Factor in three core ; AlF
H2(b)	XLPE Compound Factor ; XLFAl
H3(b)	Copper Tape Factor ; SMIF
H4(b)	Steel Strip Armour Factor ; FeF. For Steel Wire Armour Refer Table H4(c); FeW
H5(b)	Polymer factor for Three Core cable ; CCFAl

Note: For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet
D= Density= 8.89 for Cu. & 2.703 for Al
SMIF=(A*D)/1000

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IEEMA (PVC)/MV SCREEN CABLE/2019 **Effective from: 1st September 2019**

J. For Copper conductor XLPE insulated 3.3 to 33 kV Three Core Armoured power cables

P = Po + CuF (Cu – Cuo) + XLFCu(CC-Cco)+ SMIF(SMIF1-SMIF0) + FeF(FeF1-FeF0) + CCFCu (PVCc - PVCco)

For Three Core unarmoured cables , Steel Armour factor (FeF for Strip & FeW for Wire) shall be 0

Table References:

CuP	Copper conductor Factor in three core ; CuF
H2(b)	XLPE Compound Factor ; XLFCu
H3(b)	Copper Tape Factor ; SMIF
H4(b)	Steel Strip Armour Factor ; FeF. For Steel Wire Armour Refer Table H4(c); FeW
H5(b)	Polymer factor for Three Core cable ; CCFCu

Note: For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet
D= Density= 8.89 for Cu. & 2.703 for Al
SMIF=(A*D)/1000

The PV factor for metallic screen will be computed based on approved screen area in case of cables having a specific short circuit capacity

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TABLE ALP

VARIATION FACTOR FOR ALUMINIUM (AIF)

POWER CABLES WITH ALUMINIUM CONDUCTOR
(EXCLUDING SINGLE CORE ARMOURED CABLES)

Nominal Cross Sectional Area (in Sq. mm.)	1 core	2 core	3 core	3.5 core	4 core
2.5	0.007	0.014	0.021	-	0.028
4	0.011	0.023	0.034	-	0.046
6	0.017	0.034	0.052	-	0.069
10	0.029	0.053	0.087	-	0.116
16	0.046	0.091	0.137	-	0.183
25/16	0.073	0.146	0.219	0.262	0.292
35/16	0.101	0.202	0.302	0.345	0.404
50/25	0.137	0.273	0.410	0.478	0.547
70/35	0.197	0.395	0.593	0.687	0.791
95/50	0.274	0.548	0.821	0.949	1.095
120/70	0.346	0.691	1.036	1.221	1.382
150/70	0.425	0.853	1.279	1.464	1.706
185/95	0.533	1.070	1.605	1.861	2.140
225/120	0.655	1.310	1.965	2.287	2.620
240/120	0.703	1.400	2.099	2.421	2.799
300/150	0.879	1.757	2.635	3.033	3.514
400/185	1.126	2.249	3.374	3.873	4.498
500	1.418	2.838	4.256	-	5.675
630	1.828	3.663	5.494	-	7.326
800	2.340	4.679	7.018	-	9.357
1000	2.951	5.890	8.834	-	11.779

TABLE CUP

VARIATION FACTOR FOR COPPER CONDUCTOR (CUF)
POWER CABLES WITH COPPER CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	1 core	2 core	3 core	3.5 core	4 core
2.5	0.023	0.046	0.069	-	0.092
4	0.036	0.076	0.112	-	0.151
6	0.056	0.112	0.171	-	0.227
10	0.095	0.174	0.286	-	0.382
16	0.151	0.299	0.451	-	0.602
25/16	0.240	0.480	0.720	0.862	0.960
35/16	0.332	0.664	0.993	1.135	1.329
50/25	0.451	0.898	1.348	1.572	1.799
70/35	0.648	1.299	1.950	2.260	2.602
95/50	0.901	1.802	2.700	3.121	3.601
120/70	1.138	2.273	3.407	4.016	4.545
150/70	1.398	2.806	4.207	4.815	5.611
185/95	1.753	3.519	5.279	6.121	7.038
225/120	2.154	4.309	6.463	7.522	8.617
240/120	2.312	4.605	6.904	7.963	9.206
300/150	2.891	5.779	8.667	9.976	11.558
400/185	3.703	7.397	11.097	12.738	14.794
500	4.664	9.334	13.998	-	18.665
630	6.012	12.048	18.070	-	24.095
800	7.696	15.389	23.082	-	30.775
1000	9.706	19.372	29.055	-	38.741

Table : H1

VARIATION FACTOR FOR ALUMINIUM (AIF)

ALUMINIUM ARMOURED SINGLE CORE XLPE INSULATED 3.3 TO 33 KV CABLES

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Aluminium Conductor					
	3.3 KV(E) unscreened Arm	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
35	0.251	0.284	0.301	0.344	0.358	0.473
50	0.312	0.336	0.352	0.397	0.408	0.672
70	0.385	0.409	0.423	0.469	0.501	0.723
95	0.476	0.500	0.518	0.637	0.656	0.856
120	0.561	0.586	0.601	0.726	0.744	0.949
150	0.653	0.678	0.696	0.823	0.842	1.050
185	0.773	0.797	0.893	0.949	0.965	1.183
240	0.997	1.063	1.083	1.139	1.154	1.387
300	1.209	1.271	1.283	1.333	1.307	1.753
400	1.438	1.556	1.565	1.620	1.636	2.046
500	1.873	1.901	1.910	2.110	2.128	2.484
630	2.337	2.361	2.369	2.580	2.595	2.978
800	3.007	3.071	3.080	3.145	3.163	3.588
1000	3.737	3.741	3.749	3.804	3.822	4.565

TABLE : H2 (a)
VARIATION FACTOR FOR XLPE(XLFAl/XLFCu)
SINGLE CORE ARMOURED /UNARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross-Sectional Area (in Sq. mm.)	XLPE Factor for Armoured/ Unarmoured Cable with AL /CU Conductor					
	3.3 KV(E) unscreened Arm	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	0.110	0.131	0.170	0.279		
35	0.122	0.137	0.175	0.284	0.317	0.522
50	0.135	0.151	0.191	0.307	0.341	0.563
70	0.155	0.172	0.215	0.342	0.379	0.615
95	0.174	0.193	0.241	0.377	0.417	0.670
120	0.192	0.212	0.262	0.407	0.449	0.713
150	0.209	0.229	0.283	0.437	0.481	0.757
185	0.228	0.250	0.308	0.471	0.518	0.809
240	0.255	0.279	0.343	0.519	0.569	0.883
300	0.280	0.322	0.372	0.560	0.613	0.943
400	0.326	0.392	0.420	0.625	0.683	1.041
500	0.388	0.461	0.469	0.694	0.757	1.142
630	0.467	0.520	0.529	0.777	0.845	1.265
800	0.567	0.593	0.602	0.874	0.949	1.407
1000	0.656	0.665	0.660	0.955	1.036	1.525

Note : XLPE factors include Semicons for Conductor & Insulation screen

TABLE – H2 (b)
VARIATION FACTOR FOR XLPE (XLFAl/XLFCu)
THREE CORE ARMOURED /UNARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross-Sectional Area (in Sq. mm)	3.3 KV unscreened Arm	6.6 KV (E) ARM	6.6 KV (UE)/ 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
25	0.315	0.394	0.511	0.838		
35	0.339	0.427	0.545	0.880	0.982	1.638
50	0.378	0.474	0.600	0.957	1.065	1.751
70	0.435	0.541	0.679	1.067	1.183	1.916
95	0.489	0.604	0.755	1.171	1.295	2.071
120	0.537	0.661	0.822	1.265	1.396	2.210
150	0.585	0.719	0.890	1.359	1.497	2.350
185	0.642	0.784	0.968	1.468	1.614	2.513
240	0.717	0.873	1.074	1.615	1.773	2.732
300	0.781	1.006	1.167	1.744	1.928	2.919
400	0.886	1.227	1.314	1.948	2.130	3.229
500	0.956	1.421	1.446	2.148	2.381	3.588
630	1.129	1.582	1.609	2.382	2.630	3.940

Note : XLPE factors include Semicons for Conductor & Insulation screen

TABLE – H3 (a)
VARIATION FACTOR FOR COPPER TAPE (SMIFS)
SINGLE CORE ARMOURED /UNARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross-Sectional Area in sq.mm.	6.6 KV (E)	6.6 KV (UE) / 11 KV (E)	11 KV (UE)	22 KV (E)	33 KV (E)
	ARM	ARM	ARM	ARM	ARM
35	0.0181	0.0201	0.0249	0.0263	0.0163
50	0.0194	0.0215	0.0263	0.0277	0.0348
70	0.0217	0.0237	0.0285	0.0299	0.0370
95	0.0237	0.0257	0.0305	0.0319	0.0387
120	0.0254	0.0275	0.0323	0.0337	0.0408
150	0.0273	0.0291	0.0339	0.0353	0.0424
185	0.0292	0.0313	0.0361	0.0375	0.0446
240	0.0322	0.0340	0.0388	0.0401	0.0472
300	0.0351	0.0364	0.0426	0.0426	0.0497
400	0.0403	0.0411	0.0457	0.0471	0.0543
500	0.0446	0.0450	0.0499	0.0513	0.0582
630	0.0494	0.0496	0.0544	0.0558	0.0630
800	0.0545	0.0547	0.0595	0.0609	0.0681
1000	0.0598	0.0584	0.0645	0.0659	0.0731

TABLE – H3 (b)
VARIATION FACTOR FOR COPPER TAPE (SMIF)
THREE CORE ARMOURED /UNARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross-Sectional Area in sq.mm.	6.6 KV (E)	6.6 KV (UE) / 11 KV (E)	11 KV (UE)	22 KV (E)	33 KV (E)
	ARM	ARM	ARM	ARM	ARM
35	0.0549	0.0607	0.0717	0.0790	0.0000
50	0.0590	0.0649	0.0755	0.0831	0.1044
70	0.0654	0.0712	0.0822	0.0895	0.1110
95	0.0714	0.0773	0.0882	0.0955	0.1171
120	0.0771	0.0829	0.0939	0.1012	0.1225
150	0.0818	0.0878	0.0989	0.1062	0.1278
185	0.0884	0.0943	0.1052	0.1125	0.1341
240	0.0968	0.1026	0.1136	0.1209	0.1425
300	0.1062	0.1102	0.1216	0.1289	0.1497
400	0.1216	0.1238	0.1348	0.1422	0.1638
500	0.1353	0.1356	0.1467	0.1545	0.1762
630	0.1485	0.1491	0.1602	0.1680	0.1897

TABLE : H4 (a)
VARIATION FACTOR FOR ALUMINIUM (AIF)
SINGLE CORE ARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Cu CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Copper Conductor					
	3.3 KV(E) unscreened Arm	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
35	0.153	0.187	0.204	0.247	0.258	0.372
50	0.179	0.203	0.220	0.262	0.275	0.425
70	0.196	0.219	0.233	0.278	0.311	0.444
95	0.213	0.237	0.254	0.373	0.392	0.470
120	0.228	0.253	0.268	0.393	0.410	0.488
150	0.243	0.269	0.287	0.414	0.432	0.504
185	0.261	0.285	0.381	0.437	0.455	0.526
240	0.324	0.389	0.410	0.465	0.480	0.556
300	0.365	0.428	0.440	0.490	0.510	0.737
400	0.432	0.471	0.480	0.536	0.552	0.783
500	0.489	0.517	0.526	0.726	0.744	0.844
630	0.544	0.568	0.572	0.787	0.801	0.902
800	0.706	0.787	0.797	0.862	0.880	0.982
1000	0.824	0.865	0.867	0.923	0.940	1.324

TABLE : H4 (b)
VARIATION FACTOR FOR STEEL STRIP ARMOUR (FeF)
THREE CORE ARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross Sectional Area Sq. mm.	3.3 KV (E) unscreened arm	6.6 KV (E)	11 KV (E) / 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	0.551	0.604	0.656	0.814		
35	0.645	0.645	0.731	0.879	0.937	-
50	0.675	0.703	0.761	0.937	0.966	1.181
70	0.761	0.761	0.849	0.996	1.055	1.289
95	0.820	0.849	0.907	1.083	1.113	1.348
120	0.879	0.907	0.966	1.142	1.172	1.406
150	0.966	0.966	1.055	1.201	1.259	1.494
185	1.025	1.055	1.113	1.259	1.318	1.553
240	1.142	1.142	1.231	1.377	1.406	1.641
300	1.231	1.259	1.318	1.465	1.524	1.758
400	1.348	1.406	1.435	1.582	1.641	1.876

TABLE : H4 (c)
VARIATION FACTOR FOR STEEL WIRE ARMOUR (FeW)
THREE CORE ARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross Sectional Area in Sq. mm	3.3 KV (E) Unscreened arm	6.6 KV (E)	11 KV (E) / 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	1.258	1.457	1.612	2.509	1.503	--
35	1.361	1.569	1.853	2.644	2.797	2.517
50	1.682	1.687	2.321	2.800	2.921	4.569
70	2.033	1.979	2.503	3.219	3.347	4.809
95	2.202	2.507	2.718	4.019	4.200	5.437
120	2.371	2.675	2.882	4.241	4.416	6.713
150	2.870	2.847	3.265	4.447	4.621	6.976
185	3.121	3.309	4.148	4.726	5.289	7.356
240	3.758	4.227	4.442	5.442	6.651	7.718
300	4.099	5.024	5.182	6.894	7.084	8.187
400	5.750	6.572	6.658	7.433	7.657	8.760
500	6.716	6.777	6.861	7.588	7.797	8.830
630	7.492	7.465	7.477	8.209	8.386	9.413

TABLE : H5 (a)
VARIATION FACTOR FOR Polymer (CCFAL/CCFCu)
SINGLE CORE ARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV(E) Unscreened ARM	6.6 KV (E) ARM	6.6 KV (UE) / 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
35	0.123	0.259	0.278	0.330	0.376	0.468
50	0.152	0.272	0.294	0.379	0.394	0.483
70	0.170	0.295	0.317	0.404	0.419	0.508
95	0.184	0.317	0.338	0.435	0.449	0.554
120	0.197	0.337	0.392	0.457	0.472	0.576
150	0.194	0.389	0.413	0.477	0.492	0.597
185	0.224	0.414	0.445	0.502	0.539	0.674
240	0.276	0.456	0.479	0.558	0.573	0.711
300	0.294	0.489	0.506	0.587	0.602	0.811
400	0.333	0.569	0.578	0.687	0.703	0.866
500	0.367	0.675	0.679	0.809	0.826	1.056
630	0.438	0.735	0.739	0.873	0.928	1.168
800	0.529	0.863	0.866	1.027	1.05	1.189
1000	0.648	1.031	1.035	1.138	1.158	1.402

TABLE : H5 (b)
VARIATION FACTOR FOR POLYMER (CCFAI / CCFCu)
THREE CORE ARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH Al / Cu CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm	3.3 KV ARM Unscreen ARM	6.6 KV (E) ARM	6.6 KV (UE) / 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
35	0.374	0.990	1.142	1.604	1.782	-
50	0.445	1.119	1.260	1.834	2.046	2.864
70	0.547	1.290	1.396	2.011	2.284	3.219
95	0.594	1.440	1.647	2.269	2.428	3.367
120	0.732	1.692	1.877	2.498	2.715	3.646
150	0.812	1.906	2.061	2.767	2.931	3.927
185	0.960	2.086	2.406	3.028	3.180	4.166
240	1.130	2.484	2.744	3.398	3.580	4.589
300	1.219	2.912	3.161	3.840	4.016	5.029
400	1.313	3.530	3.664	4.353	4.666	5.736
500	1.652	3.925	3.971	4.621	4.878	5.913
630	1.949	4.487	4.982	5.225	5.477	6.696

Fillers added in PVC consumption

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

i.	***Item/Scope of Sub-contracting***			
ii.	***Address of the registered office***	***Details of Contact Person (Name, Designation, Mobile, Email)***		
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured***	***Details of Contact Person: (Name, Designation, Mobile, Email)***		
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting***			
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting***			
vi.	***Details of proposed works***			
1.	***Year of establishment of present works***			
2.	***Year of commencement of manufacturing at above works***			
3.	***Details of change in Works address in past (if any)***			
4.	***Total Area***			
	Covered Area			
5.	***Factory Registration Certificate***	***Details attached at Annexure – F2.1***		
6.	***Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)***	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)***		
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)***	***Details attached at Annexure – F2.3***		
8.	***After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)***	***Applicable / Not applicable Details attached at Annexure – F2.4***		
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any***	***Details attached at Annexure – F2.5***		
10.	***Sources of Raw Material/Major Bought Out Item***	***Details attached at Annexure – F2.6***		
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing***	***Details attached at Annexure – F2.7***		

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)***	***Details attached at Annexure – F2.8***
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-***	***Applicable / Not applicable***
	List of qualified Welders	***Details attached at Annexure – F2.10***
	List of qualified NDT personnel with area of specialization	***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate*** ***(if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name:		***Desig:***		***Sign:***		***Date:***	

Company's Seal/Stamp:-