Bid Number: GEM/2021/B/1367740
Dated: 19-07-2021

Bid Document

Bid Details	
Bid End Date/Time	29-07-2021 14:00:00
Bid Opening Date/Time	29-07-2021 14:30:00
Bid Life Cycle (From Publish Date)	90 (Days)
Bid Offer Validity (From End Date)	80 (Days)
Ministry/State Name	Ministry Of Heavy Industries And Public Enterprises
Department Name	Department Of Heavy Industry
Organisation Name	Bharat Heavy Electricals Limited (bhel)
Office Name	10250020-pem, Noida
Total Quantity	1
Item Category	BOQ
Years of Past Experience required	3 Year (s)
MSE Exemption for Years of Experience and Turnover	No
Startup Exemption for Years of Experience and Turnover	No
Document required from seller	Experience Criteria,Past Performance,Certificate (Requested in ATC),Additional Doc 1 (Requested in ATC),Additional Doc 2 (Requested in ATC),Additional Doc 3 (Requested in ATC),Additional Doc 4 (Requested in ATC),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	80 %
Bid to RA enabled	Yes
Time allowed for Technical Clarifications during technical evaluation	2 Days
Estimated Bid Value	7248150
Evaluation Method	Total value wise evaluation

EMD Detail

Required	No

ePBG Detail

Advisory Bank	HDFC Bank
ePBG Percentage(%)	5.00
Duration of ePBG required (Months).	26

(a). EMD & Performance security should be in favour of Beneficiary, wherever it is applicable.

Beneficiary:
Dy. Manager
10250020-PEM, Noida, Department of Heavy Industry, Bharat Heavy Electricals Limited (BHEL), Ministry of Heavy Industries and Public Enterprises
(Rajeev Kumar)

Splitting

Bid splitting not applied.

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. 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.
3. Past Performance: The Bidder or its OEM {themselves or through re-seller(s)} should have supplied same or similar Category Products for 80% 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.

BOQ (1 pieces)

Whether Price variation applicable?	Price Variation Clause	Price variation clause document
Yes	PVC formulae highlighted in Red	16266681911.pdf

Brand Type	Unbranded

Technical Specifications

Specification Document	View File
BOQ Document	View File

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

Consignees/Reporting Officer and Quantity

S.No.	Consignee/Reporting Officer	Address	Quantity	Delivery Days
1	Sanjib Kumar Prasad	769011,BHEL SITE OFFICE, 1x250 MW NSPCL ROURKELA TPP-II SITE, ROURKELA STEEL PLANT, SUNDARGARH, ODISHA-769011	1	180

Buyer Added Bid Specific Additional Terms and Conditions

1. 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.
2. 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.
3. Scope of supply (Bid price to include all cost components) : Only supply of Goods
4. **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): BHEL NOMINATED TPIA/END CUSTOMER
   Post Receipt Inspection at consignee site before acceptance of stores: NA
5. 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.
6. Buyer Added text based ATC clauses

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1. Scope: supply (Bid price to include all cost components).

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2. Bidder has to provide the details as per TECHNICAL PQR (part of NIT documents) in its offer and has to note that bids of only those bidders shall be evaluated who meet the Technical Pre-Qualifying requirements. Above terms for PQR shall prevail in conflict (if any).

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3. Financial bid opening (Part-II) of a bidder shall be subjected to following:
   i. Approval of vendor by end customer.
   ii. Offered item should mandatorily conform to PP-MII order provisions.
   iii. Techno-Commercial recommendation by BHEL.
   iv. Qualification of Technical PQR and project specific criteria (PQR) against this Enquiry.

   * “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 i.e. Name & designation of Issuing Authority, its organization contact number and E-mail Id. In case the same is found not available, BHEL has the right to reject such document for evaluation”.

4. **Payment terms:** As per clause no. 12 (i) of GTC on GeM i.e. 100% payment shall be released within ten

(10) days of issue of Consignee Receipt-cum-Acceptance Certificate (CRAC) and on-line submission of bills. Vendor has to submit Tax invoice, Packing List, LR/RR, CRAC, PVC calculations, Insurance intimation, Guarantee Certificate, E-way bill for claiming payment.

5. Terms of Delivery shall be as per cl. No. 13 of GTC on GeM (i.e. Free Delivery at site basis including loading/unloading). However, unloading of items (at delivery point) shall be in the scope of buyer. Bidder to quote prices accordingly. Insurance shall be in buyer's scope and bidders are requested to quote accordingly. 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, Despatch Origin & destination details etc.) to policy underwriter (whose details shall be shared post award of contract).

6. 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.

7. Nature of package whether divisible or Non divisible is not applicable (due to LCLC case).

8. Bidder has to provide detailed break-up of quoted price in Ex-works, freight & Tax components.

9. Bidder has to inform quoted Freight charges as % of Total Quoted Ex-Works & Quoted GST rate %.

10. The Bidder 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.

11. **Price Variation Clause:** PVC shall be applicable for Order Qty. Refer PVC (Price Variation Formulae for Cables-attached and highlighted in red). PVC shall be payable within agreed contractual delivery period. In case of delay is attributable to vendor for the payment purpose the PVC shall be calculated based on rates applicable as on the date of expiry of contractual delivery date or actual delivery date whichever is beneficial to BHEL. (Page no.166-198)

12. Notes of BOQ shall be made part of ATC expect qty. variation.

13. **Delivery Period:** 180 days from the date of PO.

    Reference for list of drawing/ documents required post award of order and manufacturing period of 4 months has been taken from Standard Delivery Schedule (page no. 239).

    After award of contract – Successful Bidder shall have to get Detailed Design Drawings (Refer Technical specification PE-TS- 427-507-E012A, Volume II, Section I, Sheet 2 OF 2 for list of Drg/Doc applicable) approved from buyer before starting manufacturing. Successful Bidder shall submit 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.

Approval process of primary documents shall be completed within 60 days from Purchase Order. Seller shall be required to ensure supply as per approved Drawings with modifications as communicated by Buyer. If there is delay from buyer side in approval of drawing - the delivery period shall be refixed without LD for the period of delay in approval of Drawing. Only primary documents shall be considered for refixation of delivery. Above term 'After award of contract' is proposed from available clauses in ATC library on GEMS portal. Material shall be dispatched by vendor after issuance of MDCC by BHEL only. Further, TYPE TEST CERTIFICATES - LT XLPE POWER CABLES to be submitted within 1 week after conduction of type test.

14. LD shall be as per cl. no. 15 of GTC on GeM.

15. **Quantity Variation: -** Upto +25%, as per GeM ATC library clause.

16. Performance Security amount shall be @5% of the value of contract as per SS&P Circular dated 43 of 2020-21 dated 06/03/2021 ePBG In line with clause no 7 (ii) of GEM GTC, initial ePBG validity shall be 26 months from PO date (Considering delivery period of 6 months + 18 months guarantee period + 2 months claim period). However, BG will be released only after completion of all contractual liability or guarantee period whichever is later.

17. 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.

    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 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.

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

19. Remote Inspection: As per CMM email dt. 27/08/2020, following clause & "Guidelines for Remote Inspection of PEM BOIs" shall be made part of NIT:
    "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 attached to take up the inspection REMOTELY". Page no. 201-202.

20. Bidders to provide duly signed copy of Land Border certificate along-with their bid documents.

21. Bidders to,

• ensure compliance to Ministry of Power (MoP) Order No. 25-11/6/2018-PG dt. 02/07/2020 & Order No. 11/05/2018-Coord. dt. 23/07/2020, if applicable. (Page no. 235-238)

• ensure compliance of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020. (Page no. 203-234)

• to submit “Model Certificate for Tenders” as per Annexure-III of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020. (Page no. 203-234)

Note: Subsequent orders/circulars to be checked and to be complied.

22. Following points related to BOQ shall be applicable to this tender. Bidders to comply the same.

a) Quantities indicated shall be known as Order Quantities. The variation in quantities shall be as per NIT.
b) The bidder shall indicate the unit price of each type and size of cables listed as per the BOQ-Cum-Price Schedule enclosed with this specification. The unit prices shall apply for adjustment of variation in quantity.
c) Quantity indicated shall be cleared for manufacturing along with LOI. However, manufacturing of the cables shall be taken up by the successful bidder only after approval of technical and quality documentation. Subsequent lots shall be cleared for manufacture based on progress of engineering and site requirements.
d) Delivery schedule shall be as per NIT.
e) Standard drum length shall be 750/ 1000metres as mentioned against each cable size above. Tolerance on individual drum length shall be ±5%. 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. The overall tolerance limits stipulated above shall continue to apply (in case short lengths are accepted).
f) Overall tolerance on total dispatched quantity of each size shall be (-) 2% and (+) 0%. Cables consumed for testing and inspection shall be to bidder’s account.
g) Bidder shall indicate unit price of cables inclusive of type test charges. No separate charges shall be payable for type tests.
h) In case the quantities cleared by BHEL for manufacturing (in a lot) 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 implication.

i) Bidder shall quote for all sizes/types of cables as per specification, failing which their offer shall be rejected.

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7. Buyer uploaded ATC document Click here to view the file.

Disclaimer

The additional terms and conditions have been incorporated by the Buyer after approval of the Competent Authority in Buyer Organization. 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 specification and / or terms and conditions governing the bid. Any clause incorporated by the Buyer such as demanding Tender Sample, incorporating any clause against the MSME policy and Preference to make in India Policy, mandating any Brand names or Foreign Certification, changing the default time period for Acceptance of material or payment timeline governed by OM of Department of Expenditure shall be null and void and would not be considered part of bid. Further any reference of conditions published on any external site or reference to external documents / clauses shall also be null and void. 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

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.

---Thank You---

VOLUME II

NTPC-SAIL POWER COMPANY (P) LIMITED

1 X 250 MW ROURKELA PP-II EXPANSION PROJECT

TECHNICAL SPECIFICATION

FOR

LT XLPE POWER CABLES

SPECIFICATION NO: ***PE-TS-427-507-E012A***

REVISION: **0**

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

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS- 427-507-E012A	
BHEL	**TECHNICAL SPECIFICATION FOR LT XLPE POWER CABLES**	VOLUME II	
		REVISION 0	DATE: 18.06.2021
		SHEET	

CONTENTS

TOTAL NO. OF SHEETS= 34

(INCLUDING COVER/ SEPARATOR SHEETS)

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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 deviation 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 **TECHNICAL SPECIFICATION FOR LT XLPE POWER CABLES**	SPECIFICATION NO. PE-TS- 427-507-E012A
		VOLUME II
		SECTION I
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SECTION –I

SPECIFIC TECHNICAL REQUIREMENTS

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS- 427-507-E012A	
BHEL	**TECHNICAL SPECIFICATION FOR LT 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 LT XLPE POWER CABLES conforming to this specification.

1.2 General technical requirements of the LT 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.	1.2	Additionally, The Bidder/Sub-vendor should have manufactured and supplied prior to the date of Techno-Commercial bid opening (i.e. 11.06.2015) the following: (a) At least 100 km of aluminium conductor, XLPE insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract. (b) At least 100 km of aluminium conductor, PVC insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract. (c) At least one (1) km of flame retardant low smoke cables. (d) 1.1 kV or higher grade power cable of minimum 630 sq. mm. conductor size.
2	3.1	BHEL Standard Quality Plan (PE-QP-999-507-E002) shall be read as "QP. NO. 0000-999-QOE-S-041, REV-00". Additionally, The QP. NO. 0000-999-QOE-S-041 REV-00 shall be read in conjunction with Annexure A, B (Quality Assurance & Inspection) and C to QP.
3.	3.3	Additionally, Successful bidder shall submit the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening i.e. 11.06.15. These reports should be for the test conducted on the equipment similar to those proposed to be supplied

		under this contract and the test(s) should have been either conducted at an independent lab or should have witnessed by a client. The reports of type test shall be submitted for one size of each LT XLPE power cable.
4.	4.2	In case of 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 followed by complete drum covering by wooden plank. 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.

4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

4.1 Following documents/drawings shall be submitted after placement of order for BHEL & customer's approval:-

Sl. No.	Drawings/Document Description	Drawings / Document Number	Primary/ Secondary Document	Drg Sch for Vendors
1	Technical Data sheet - LT XLPE power cables	PE-V0-427-507-E111	Primary	R-0 Within 14 days from PO and subsequent revisions within 10 days of comments received from BHEL. BHEL shall furnish comments/approval on each submission within 18 days from reciept.
2	Cross-sectional Drgs.- LT XLPE Power Cables	PE-V0-427-507-E113	Primary	
3	Quality Plan - LT XLPE Power Cables	PE-V0-427-507-E913 *	Primary	
4	Steel drum drawing - LT XLPE Power Cables (if applicable)	PE-V0-427-507-E115	Primary	
5	Type Test Certificates – LT XLPE power cables	PE-V0-427-507-E114	Secondary	Within 1 week after conduction of type test

Note:

* NTPC endorsed 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 contents of the document.

	DOCUMENT TITLE **TECHNICAL SPECIFICATION FOR LT XLPE POWER CABLES**	SPECIFICATION NO. PE-TS- 427-507-E012A VOLUME II SECTION I REVISION 0 DATE: 18.06.2021 SHEET 1 OF 3

DATA SHEET-A

1.0	Type of Cable	Flame Retardant Low Smoke (FR-LSH)	
2.0	Standard applicable in general(Latest amendment to be referred if any)	IS:7098 (Part-1), 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	
3.0	Voltage Grade	1.1kV	
4.0	Number of cores, cross sectional area of conductors and quantities	As per BOQ-Cum price schedule.	
5.0	**FAULT CHARACTERISTICS**		
	Fault Level	*50kA*	
	Fault Clearing Time	1 sec	
6.0	**CONDUCTOR**		
(a)	Material	Aluminium (With Tensile strength more than 100N/sq.mm.)	Copper
	Grade and Class	Stranded, H2, Class 2	Stranded, annealed plain high conductivity, Class 2
(b)	Standard Applicable	IS: 8130	
(c)	Shape	Compacted Circular / shaped as per IS	
(d)	Min. number and diameter of strands for main and neutral conductor [Neutral conductor cross section w.r.t main conductor shall be as per Table-2 of IS: 7098 (Part-1)]	As per Table-2 of IS: 8130	
7.0	**INSULATION**		
(a)	Material	Cross-Linked Polyethylene(XLPE)	
(b)	Standard Applicable	IS: 7098 (Part-1)	
(c)	Continuous withstand temperature	90°C	
(d)	Short-circuit withstand temperature	250°C	
(e)	Method of application	By extrusion; sleeve extrusion not permitted.	
(f)	Nominal Thickness of insulation	As per IS: 7098 (Part-1)	
8.0	**CORE IDENTIFICATION**	Following colour scheme shall be adopted. 1 core - Red, Black, Yellow or Blue 2 core - Red & Black 3 core - Red, Yellow & Blue 4 core - Red, Yellow, Blue and Black. For reduced neutral conductors, the core shall be black.	
9.0	**INNER SHEATH**		
(a)	Material	PVC Type ST-2	
(b)	Standard Applicable	IS: 7098 (Part-1) & IS: 5831	
(c)	Colour	*Black*	
(d)	Whether FR-LSH	*NO*	

(e)	Inner sheath applicable for single core cable	*NO*
(f)	Fillers	Acceptable
(g)	Material of fillers (if permitted)	Same as inner sheath (Material of filler to be compatible with that of inner sheath)
(h)	Method of application	
(1)	Multi-core cables:	
(i)	With fillers	*Pressure/Vacuum extruded*
(ii)	Without fillers	*Pressure extruded*
(2)	Single-core cables:	*NA*
10.0	***ARMOUR***	
(a)	*Applicable*	As per BOQ-Cum price schedule
(b)	Material:	
(i)	Single core cables	Aluminium Round / Formed Wire H4 grade to IS: 8130 with maximum resistivity of 0.028264 ohm mm2 per meter at 20 deg C
(ii)	*Multi-core cables*	*Galvanised Steel Formed Wire/Strip* conforming to (i) Type 'a'/ 'b' as per Table-6 of IS 7098 part-I and (ii) IS 3975 as per project requirements
(iii)	Standard Applicable	Dimension as per IS: 7098 (Part-1) Table-6 and tolerance on dimension as per IS:3975
(c)	Minimum Coverage	90%
(d)	Gap between armour wires	Shall not exceed one armour wire space (No cross-over/ over-riding)
(e)	Breaking load of joint	95 % of normal armour
(f)	Zinc rich paint shall be applied on armour joint surface of G.S. wire / formed wire.	
11.0	**OUTERSHEATH**	
(a)	Material	PVC Type ST2 as per IS: 5831
(b)	Colour	Black ~~(Yellow for 3CX2.5 sqmm CU Armoured cable only, Refer BOQ-Cum price schedule).~~
(c)	Whether FR-LSH	Yes
(d)	Method of application	Extruded
(e)	Thickness of outer sheath	As per Table-8 of IS: 7098 (Part-1)
(f)	Marking	*Cable size (cross section area and no. of cores) and voltage grade @ 5m (by embossing)* *Word "XLPE" "FR-LSH" etc, @ 5m (by embossing)* *Manufacturer's name and/ or trade name, and year of manufacture @ 5m (by embossing)* *'BHEL-PEM' and 'NSPCL' Name @5m (by embossing)* *Progressive sequential marking @ 1m (by embossing/ printing)*
12.0	**FR-LSH CHARACTERISTICS**	
(a)	Oxygen index	Min 29 (As per IS 10810 part-58)
(b)	Temperature index	Min. 250°C(As per ASTMD 2863)
(c)	Acid gas generation	Max. 20% by weight (As per IEC-60754-1)
(d)	Smoke density rating	Max. 60% (As per ASTM D 2843)
(e)	**Flammability Test**	
(i)	*Flammability test for all cables*	*As per: IEC-60332 Part-3, CAT-B*

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13.0	**TOLERANCE ON OUTER DIAMETER**	Up to 30mm; ± 1.5mm Above 30mm; + 5% or ± 2mm, whichever is less.
14.0	**MINIMUM BENDING RADIUS**	
(a)	Single core cables	15 x O.D.
(b)	Multi core cables	12 x O.D.
15.0	**SAFE PULLING FORCE**	
(a)	Aluminium conductor cable	30 N/ sq. mm.
(b)	Copper conductor cable	50 N/ sq. mm.
16.0	**CABLE DRUMS**	
(a)	*Type of Drum*	Wooden as per IS 10418. OR Steel drum.
(b)	Standard drum length	750m (±) 5% - For sizes 150 sq. mm. & above 1000m (±) 5% - For all other sizes
(c)	Painting	Entire surface to be painted
(d)	Construction details of Drum	Clause no 4.2 & 4.3 of Section-II of this technical specification
(e)	Particular information on Drum	Each drum shall carry manufacturer's name, purchaser's name, address and contract no., item no. & type, size & length of cable and net gross weight stencilled on both sides of drum. A tag containing same information shall be attached to the leading end of the cable. An arrow & suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.
(f)	Cable Packing	**Pls refer 4.0 Packing of Section-II of this technical specification. It may be noted that the outer most cable layer shall be covered with water proof cover polythene followed by complete drum covering with wooden plank of suitable thickness across flanges. (Pls refer typical drawing of cable drum packing in Annexure C to QP, attached in section -II)**

	DOCUMENT TITLE **TECHNICAL SPECIFICATION FOR LT XLPE POWER CABLES**	**SPECIFICATION NO. PE-TS-427- 507 –E012A** **VOLUME II** **SECTION I** **REV NO. 0 DATE 18.06.2021** **SHEET 1 OF 3**

DATASHEET C

GUARANTEED TECHNICAL PARTICULARS
(TO BE SUBMITTED BY SUCCESSFUL BIDDER)

S.No.		Unit	Description
1.0	**General**	-	
1.1	Name of manufacturer	-	
1.2	Place of Manufacture	-	
2.0	**Standards Applicable**		
2.1	**IS: 7098 Part-I** For general specification of XLPE Cables	-	YES
2.2	**IS: 8130** For conductor material	-	YES
2.3	**IS: 5831** For material of inner sheath & outer sheath.	-	YES
2.4	**IS: 3975 / IS: 8130** For armour of 3 core/ single core cables	-	YES
2.5	**IS: 10810** For method of tests	-	YES
2.6	**IS:10418** For cable drums	-	YES
2.7	**ASTMD-2863** For oxygen index test	-	YES
2.8	**ASTMD-2843** For smoke density test	-	YES
2.9	**SS:424-14-75 & IEC-332-III-Cat-B & CAT-A, IEC-332-I/ IEEE: 383** For flammability test	-	YES
2.10	**IEC-754-1** For Acid gas generation	-	YES
2.11	Current rating of cables conforms to	-	
2.12	Short circuit rating conforms to	-	
2.13	Formula for calculating short circuit current for Different duration	-	
3.0	(a) Installation Conditions at site	deg. C	
	i) Ambient air temperature	deg. C	
	ii) Ground temperature	cm	
	iii) Depth of laying of cables buried in ground	deg. C cm/W	
	(b) Installation conditions for current rating specified at clause 6.3		
4.0	CHARACTERISTICS OF FRLS SHEATH		

NAME OF VENDOR				REV.	
NAME	SIGNATURE	DATE	SEAL		

	(a) Oxygen index		
	(b) Temperature index		
	(c) Acid gas generation		
	(d) Smoke density rating		
5.0	CABLE DRUMS		
	(a) Type & construction		
	(b) Standard drum length		
	(c) Tolerance on drum length		
6.0	INFORMATION TO BE FILLED IN FOR EACH SIZE CABLE IN THE FORM OF TABLE		
6.1	No. of cores x size		
6.2	Voltage grade (Uo/U)	kV	
6.3	Base current ratings (*) based on Cl. 3.0		
	(a) In air	Amp	
	(b) In ground	Amp	
	(c) ducts	Amp	
6.4	Short circuit rating	kA,Sec	
6.5	(a) D.C. resistance of conductor at 20 deg C	ohm/km	
	(b) A.C. resistance of conductor at 90 deg. C	ohm/km	
	(c) Reactance of cable at Normal frequency	ohm/km	
	(d) Electrostatic capacitance of cable at normal frequency	mF/km	
6.6	CONDUCTOR		
	(a) Material type & grade	-	
	(b) No & dia of wires in each core before stranding	no x mm	
	(c) Shape	-	
6.7	XLPE INSULATION		
	(a) Nominal thickness of insulation	mm	
	(b) Method of Curing	-	
6.8	PVC ST2 INNERSHEATH		
	(a) Material	-	
	(b) Thickness (min.)	mm	
	(c) Method of application	-	
	1. Multi-core cables		
	(i) With fillers		
	(ii) With out fillers	Pressure Extruded	
	2. Single core cables		

	d) Type and shape of fillers (if used)		
	e) Colour		
6.9	ARMOUR		
	(a) Material		
	(i) Single core cables		
	(ii) Multi-core cables		
	(b) Size/ dimensions		
	(c) Minimum no. of wires /formed wires		
	(d) Tolerance on formed wire dimension		
	(e) Maximum resistivity of GS formed wire		
	(f) Maximum resistivity of Aluminium round wire		
6.10	PVC ST2 FRLS OUTERSHEATH		
	(a) Nominal thickness of outer sheath	mm	
6.11	DIAMETERS		
	(a) Diameter of insulated conductor	mm	
	(b) Cable diameter under armour	mm	
	(c) Cable diameter over armour	mm	
	(d) Overall diameter of cable	mm	
6.12	Tolerance on overall diameter	(±) mm	
6.13	Minimum bending radius	x O.D	
6.14	Safe Pulling Force	kG	
6.15	Weight of cable	kg./km	
	(a) Weight of conductor	MT/km	
	(b) Weight of XLPE insulation	MT/km	
	(c) Weight of PVC (Inner Sheath, Outer Sheath & Fillers)	kg./km	
	(d) Weight of Armour (As applicable)	kg./km	
6.16	Dimension of drum	mm	
6.17	Shipping weight	kg	
6.18	Cable marking on outer sheath		

(*) For single core cables, the continuous current rating shall be furnished separately for armour earthed at one end and at both ends.

SECTION – II

GENERAL TECHNICAL SPECIFICATION

	DOCUMENT TITLE	SPECIFICATION NO. PE-TS-427-507-E012A	
BHEL	**TECHNICAL SPECIFICATION FOR LT XLPE POWER CABLES**	VOLUME II	
		SECTION II	
		REVISION 0	DATE: 21.02.2017
		SHEET 1 OF 1	

1.0 TECHNICAL REQUIREMENTS

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

1.2 It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation at site conditions.

2.0 CODES & STANDARDS

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

2.2 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-E002 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 requirements, routine / acceptance testing and special testing requirements shall be as per Annexure –A to QP. Charges for all these tests for all the equipments & components shall be deemed to be included in the bid price (except UV Radiation & Hydraulic 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 as specified in Datasheet-A.

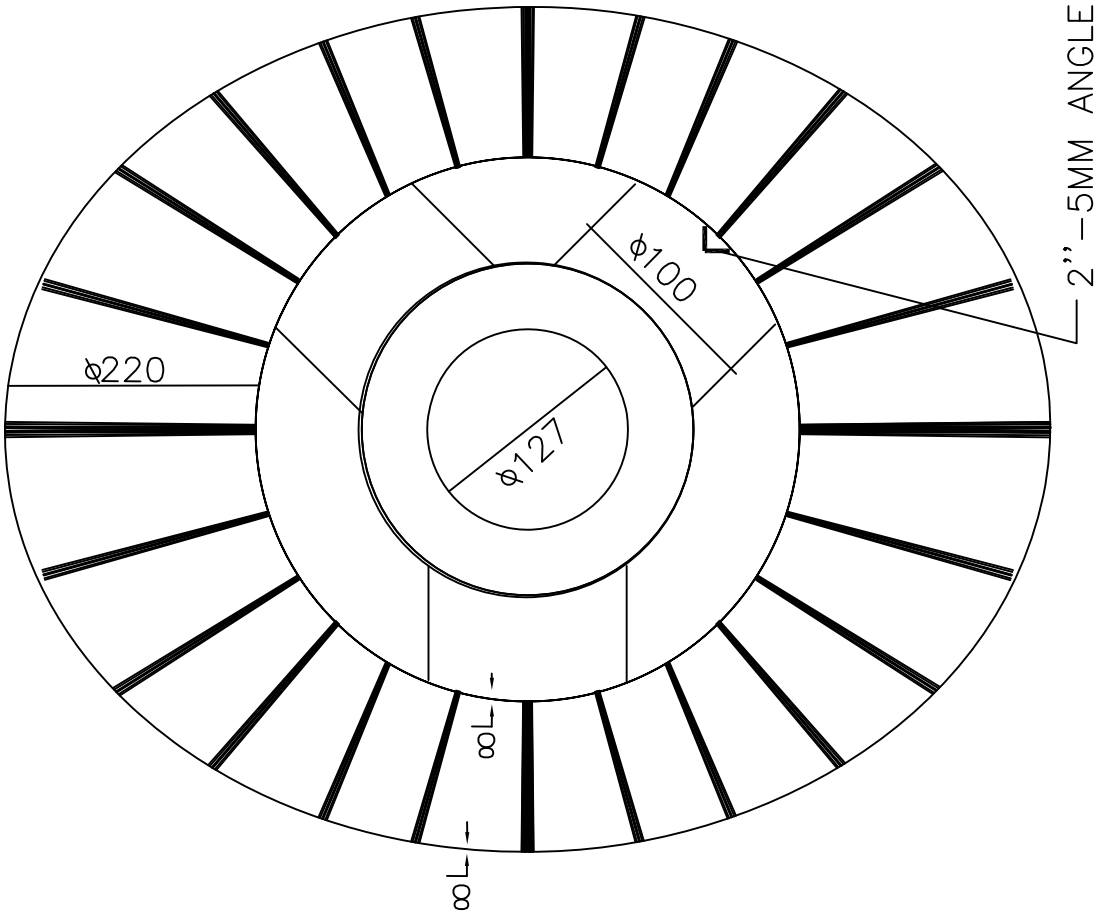
4.2 In case of wooden drums, all wooden parts shall be manufactured from seasoned wood treated with copper napthenates / zinc napthenates (refer IS: 401). Dimensions of wooden drums shall be as per IS 10418. All ferrous parts shall be treated with suitable rust protective finish or coating to avoid rusting during transit and storage. BIS certification mark shall be stamped on each cable drum. Over the cables polyethylene sheet shall be wrapped and then sealed properly.

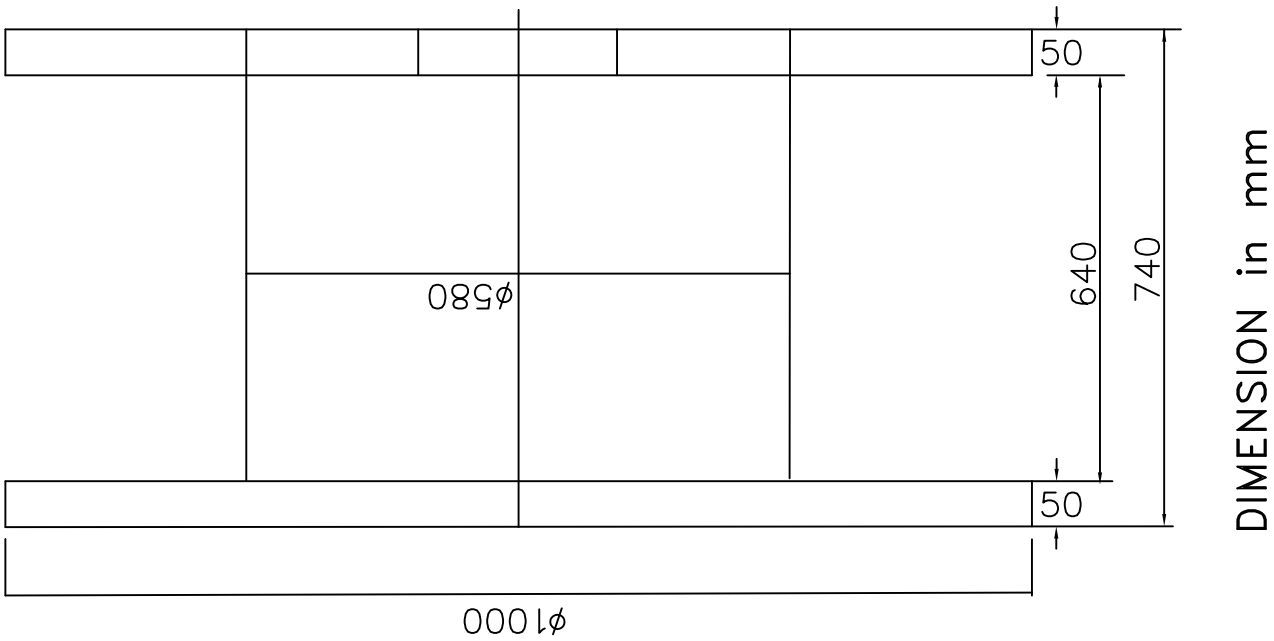
4.3 In case of Steel drums, New or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Over the cables polyethylene sheet shall be wrapped and then sealed properly. For Typical details of Steel drums, Annexure-I 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 LT XLPE POWER CABLES.

STEEL DRUM DRAWING (TYPICAL)

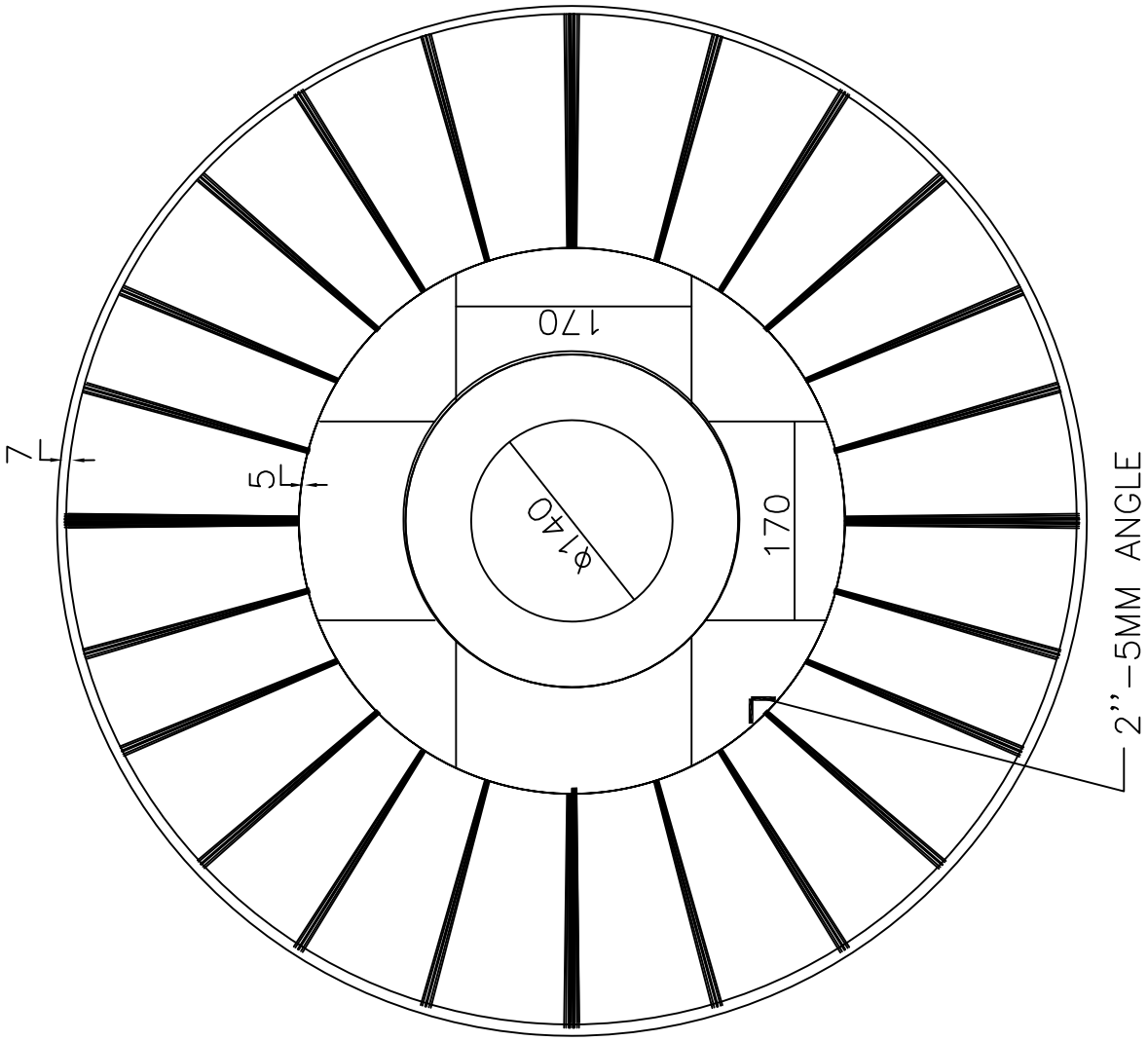
ANNEXURE-I TO SECTION-II

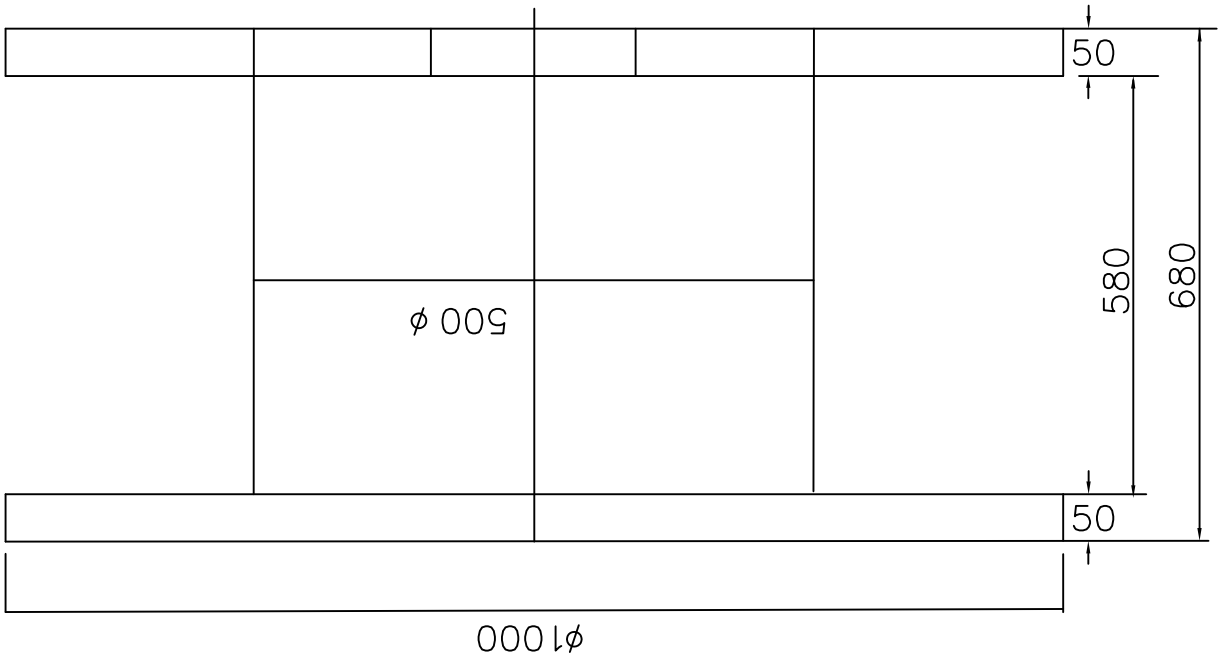
(Sheet 1 of 2)





ANNEXURE-I TO SECTION-II





DIMENSION in mm

एनटीपीसी NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 1 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

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 cable drum. 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.														
A	**Raw material/ Brought out Items**													
1.01	Aluminum	1.Make	MA	Verify	100%	--	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	QCR		V	--	--	
		2. Resistivity	MA	Elect	As per Cable Mnfr Std.	--	IS5082	IS5082	-do--		P	--	--	
1.02	PVC / XLPE/compound for insulation	1. Make	MA	Verify	--do--	100%	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	--do--		V	V	--	
		2. Type/ Grade	MA	Verify	100%	100%	NTPC ADS	NTPC ADS	--do--		V	V	V	
		3. All acceptance test as per manufacturer norms including thermal stability test for PVC insulation	MA	Verify	As per manufacturer norms	As per manufacturer norms	NTPC ADS	NTPC ADS	--do--		V	V	V	Refer note 1
1.03	PVC Compound for Inner sheath	1. Make	MA	Verify	--do--	--do--	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	--do--		V	V	V	
		2. Type/ Grade	MA	Verify	--do--	--do--	NTPC ADS	NTPC ADS	--do--		V	V	V	
1.04	Steel wire / Formed Wire (As applicable)	1. Make	MA	Verify	--do--	--do--	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	--do--		V	V	V	
		2. Dimension	MA	Meas	1 sample from each size / lot	--	NTPC APPROVED DATA SHEET & IS 3975	NTPC APPROVED DATA SHEET & IS 3975	--do--		P	--	--	
		3. All acceptance tests as per IS 3975	MA	Verify	As per IS 3975	--	IS 3975	IS 3975	Supplier TC		V	V	--	
1.05	PVC compound for Sheath	1. Make	MA	Verfy	As per manufacturer norms	100%	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	QCR		V	V	--	
		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 manufacturer norms	NTPC ADS	NTPC ADS	QCR		V	V	V	Refer note 1

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
-M:MANUFACTURER/SUPPLIER, C:MAIN SUPPLIER, N:NTPC, P:PERFORM W:WITNESS,V:VERFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 2 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

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
		4. Thermal Stability	MA	Chem	One sample / Batch	--	NTPC ADS	NTPC ADS	QCR		P	--	--	
		5. Oxygen Index	MA	Chem	--do--	--	NTPC ADS/ IS 10810 Part 58	NTPC ADS/ IS 10810 Part 58	--do--		P	-- -	--	
		6. Acid Gas Emission	MA	Chem	One sample / Batch	--	NTPC ADS / IEC60754	NTPC ADS / IEC60754	QCR		P	--	--	
1.06	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.
1.07	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/Setting 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--	--do--	--do--	--do--	--do--		P	V	V	Refer Sl. No.3.03(iii)
		4. Wrapping 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 ADS	--do--		P	--	--	
2.03	Insulation extrusion	1. Surface finish	MA	Visual	One sample/Setting of each size	-	NTPC spec	SHOULD BE SMOOTH. NO POROSITY IS PERMITTED.	QCR		P	--	--	XLPE/ PVC compound shall be preferably loaded in to extruder by suction method.

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 3 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg Dt.

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.Colour of cores	MA	Visual	One sample/Setting of each size	-	NTPC ADS	NTPC ADS	QCR		P	--	--	
		3.Thickness	CR	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--		P	--	--	
		4.Spark Test	CR	Elect	100%	100%	CABLE MANUF. STD.	No FAILURE	--do --		P	V	V	1.Spark test failure record is to be verified. 2.Core repairing not permitted
		5. Hot Set	CR	Mech	One sample/Setting of each size	--	IS 7098- Part I	IS 7098- Part I	--do--		P	--	--	Sample is to be taken from both top & bottom end
2.04	Laying up	1. Core sequence	MA	Visual	--do--	--	IS 1554 (Part I) & IS 7098- Part I	IS 1554 (Part I) & IS 7098- Part I	--do--		P	--	--	
		2. Direction of lay	MA	Visual	--do--	--	-do-	--do--	--do--		P	--	--	
		3. Dia over laid up core	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--		P	--	--	
2.05	Inner Sheath	1.Colour	MA	Visual	-do--	-	--do--	--do--	--do--		P	--	--	
		2. Surface Finish	MA	Visual	100%	-	NTPC SPECIFICATION	FISH EYE, BLOW HOLE NOT PERMITTED	--do--		P	--	-	
		3.Thickness	MA	Meas	One sample/Setting of each size	-	NTPC ADS	NTPC ADS	--do--		P	--	--	
		4.Dia over inner sheath	MI	Meas	--do--.	-	--do--	---do--	--do--		P	--	--	
2.06	Armouring (As Applicable)	1.Dimension	MA	Meas	--do--	-	--do--	--do--	--do--		P	--	--	
		2.No. of wires / strip	MA	Meas.	--do--	-	--do--	--do--	--do--		P	--	--	
		3. Direction of lay	MA	Visual	--do--	--	IS 1554 (Part 1) & IS 7098- Part I	IS 1554 (Part 1) & IS 7098- Part I	QCR		P	--	--	

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 4 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY अनुमोदित A.K. Garg Director

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
		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	--	--	--
2.07	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)		--do--		P	--	--	PVC FRLS compound shall be preferably loaded in to extruder by suction method.
		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%	-	Drum no., IS1554-1 / IS7098-1,Cable size, Voltage grade & Words "FRLS" at every 5 meter is to be embossed. Embossing shall be automatic, in line & marking shall be legible & indelible. (As per NTPC specification)		--do--		P	--	--	Drum no. on cable may be embossed/printed
		6. Sequencial marking	MA	Visual	Full length	--	Sequencial marking of length of cable in meter at every one meter is to be embossed / printed. Embossing / printing shall be progressive, automatic, in line & marking shall be legible & indelible. (A s per NTPC specification)		--do--		P	--	--	
C	**Finished Cables**													
3.01	Type test reports clearance from NTPC Engineering	All type tests as per NTPC specification	CR	Doc.	100%	100%	NTPC SPECIFICATION / NTPC ADS / IS 1554 (PartI) & IS 7098- Part I	NTPC SPECIFICATION / NTPC ADS / IS 1554 (PartI) & IS 7098- Part I	--do--	✓	P	V	V	

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 5 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY Approved A.K. Garg

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
3.02	Routine Tests	1.High Voltage test at room temperature	CR	Elect	100%	100%	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	Test certific ate	✓	P	W	W	Refer note 2
		2.Conductor Resistance	CR	Elect	100%	100%	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	Test certific ate	✓	P	W	W	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 1554 (Part 1) & IS 7098- Part I		NTPC ADS	NTPC ADS	--do--	✓	P	W	W	
		2. Laying of core	CR	Visual	--do--		NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	--do--	✓	P	W	W	
		3. Core Identification	CR	Visual	--do--		--do--	--do--	--do--	✓	P	W	W	
		4. Colour of outer sheath	MA	Visual	--do--		NTPC ADS	NTPC ADS	--do--	✓	P	W	W	
		5. Inner sheath thickness	CR	Meas	- do -		--do--	--do--	--do--	✓	P	W	W	
		6. Inner sheath colour	MA	Visual	- do -		- do -	- do -	--do--	✓	P	W	W	
3.03 (ii)	Armour wires/ Formed wires (if applicable)	1.Dimensions	CR	Meas	--do--		NTPC ADS /IS1554(Partl)/IS3975	NTPC ADS /IS1554(Partl) /IS3975	--do--	✓	P	W	W	
		2. No. of wires/ formed wire	CR	Mech	-- do --		--do--	--do--	--do--	✓	P	W	W	
		3. Tensile test	CR	Mech	--do--		--do-	--do--	--do--	✓	P	W	W	
		4. Elongation test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	W	
		5.Torsion test (for round wires only)	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	W	
		6. Wrapping test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	W	
		7. Resistance test	CR	Mech	--do--		--do--	--do-	--do-	✓	P	W	W	

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FORMAT NO:QS-01-QAI-P-10/F3-R1

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 6 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY Ashok Garg Dt. N.T.P.C., Noida

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
		8.Mass of Zinc coating	CR	Meas	Each type & size of cables as per sampling plan of IS 1554 (Part 1) & IS 7098- Part I		NTPC ADS /IS1554(PartI)/IS3975	NTPC ADS /IS1554(PartI) /IS3975	Test certific ate	✓	P	W	W	
		9. Uniformity of Zinc Coating	CR	Chem.	--do-		--do--	--do-	--do-	✓	P	W	W	
		10.Adhesion test	CR	Mech	--do--		--do--	--do-	--do--	✓	P	W	W	
		11.Freedom from defects	CR	Visual	--do--		--do--	--do--	--do--	✓	P	W	W	
3.03 (iii)	Conductor													
		1.Resistance Test	CR	Elect	--do--		--do--	--do--	--do--	✓	P	W	W	
		2.Tensile test (For aluminum conductor only)	CR	Mech	Each type & size of cables as per sampling plan of IS IS 1554 (Part I)/7098(Part-1)		NTPC ADS/ IS 8130	NTPC ADS/ IS 8130	--do--	✓	P	W	W	Test report of manufacturer to be reviewed as per Sl. No. 2.01 for Tensile test & wrapping test (for Aluminum) in case this test is not applicable for cable under inspection as per IS 8130 cl. 6.2
		3.Wrapping test (For aluminum conductor only)	CR	Mech	--do--		--do--	--do--	-do--	√	P	P	W	--do--

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 7 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY अनुमोदित A.K. Garg Dt. N.T.P.C., Noida

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
3.03 (IV)	PVC/XLPE/ Insulation & PVC Sheath	1. Thickness of insulation & PVC Sheath	CR	Meas	Each type & size of cables as per sampling plan of IS IS 1554 (Part I)/IS7098(Part-1)		NTPC ADS/ IS 1554(Partl) & IS 7098 Part I	NTPC ADS/ IS 1554(Partl) & IS 7098 Part I	Test Certificate	√	P	W	W	
		2.Tensile strength & elongation at break of insulation & outer sheath (before ageing)	CR	Mech	Each type & size of cables as per sampling plan of IS IS 1554 (Part I)/IS7098(Part-1)		NTPC ADS/ IS 1554(Partl) & IS 7098 Part I	NTPC ADS/ IS 1554(Partl) & IS 7098 Part I	Test Certificate	✓	P	W	W	Refer Note 3 Also
		3.Tensile strength & elongation at break of insulation & outer sheath (after Ageing)	CR	Mech	Refer Note 3		--do--	--do--	--do--	✓	P	W	W	Refer Note 3 ath)
		4. Insulation resistance (Volume resistivity method)	CR	Elect	Each type & size of cables as per sampling plan of IS 1554 (Part 1) & IS 7098-Part I		--do--	--do--	--do--	✓	P	W	W	
		5.High voltage test at room temperature	CR	Elect	Each type & size of cables as per sampling plan of IS 1554 (Part 1) & IS 7098-Part I		--do--	--do--	--do--	✓	P	W	W	
		6..Hot Set test (for XLPE insulation only)	CR	Phy	--do--		--do--	-do--	--do-	√	P	W	W	
		7.Thermal stability on PVC Insulation and outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		-do--	--do--	--do--	✓	P	W	W	

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 8 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg Approved Dt.... N.T.P.C., Noida

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
		8.Oxygen index Test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		NTPC ADS / IS10810 Part 58	NTPC A.D.S	--do-	✓	P	W	W	
		9.Smoke density rating 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	
		10.Acid gas generation test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		NTPC ADS & IEC 60754-1	NTPC ADS	Test Certificate	✓	P	W	W	
		11.Flammability test on completed cable	CR	Chem	Refer Note 4	Refer Note 4	NTPC ADS & IEC 60332 Part-3 (Category-B)	NTPC ADS	--do--	✓	P	W	W	
		12.Surface finish & length measurement.	CR	Visual & Meas	One length of each size	One length of each size	(1) Drum no. (2) IS1554-I /IS7098-1,Cable size, Voltage grade & Words " FRLS" 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 in meter at every one meter is to be embossed / printed. Embossing / printing shall be progressive, automatic, in line & marking shall be legible & indelible	--do--	✓	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. Zn rich paint shall be applied on armour joint surface of G.S. Wire /formed wire	--do-	√	P	W	W	
4	Packing	1. Sealing	MA	Visual	100%	100%	(1)IS1554(Part-I) & IS 7098-Part I (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: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 9 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY Approved Dt..... A.K. Garg

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

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 is to carry out ageing test & test report is to be reviewed (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/ Regional Offices** :- Routine Test of manufacturer internal test report are to be verified by NTPC at the time of final inspection. 2(b) **In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre/ Regional Offices**,:- Routine Test are to be witnessed by Main Contractor & NTPC. This is in addition to manufacturer internal test report to be verified by NTPC at the time of final inspection.
3)	**Refer table on page 10 &11of 11 for Sampling & Acceptance criteria.**
4)	For PVC insulated LT power cable :- For cables with OD less than equal to 30 mm, any size of cable may be clubbed together. For cables where OD is more than 30 mm, clubbing to be done for cables having similar ODs. For XLPE insulated LT Power cable: Clubbing to be done for cables having similar ODs.
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**

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FORMAT NO:QS-01-QAI-P-10/F3-R1

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 10 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY अनुमोदित A.K. Garg Approved

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

Sampling & Acceptance Criteria

Criteria	Manufacturer experience prerequisite	Condition	Testing procedure	Remarks
Samples as per relevant IS from every size/ type of cable in the offered lot shall be tested for Tensile Strength & Elongation (before ageing). The values will be compared with corresponding values mentioned in the Type Test report accepted by NTPC. These values of Tensile Strength & Elongation (before ageing) should be within +/ - 15% tolerance (final values should be more than the minimum values indicated in relevant standard) of the Type Test report	In case of Manufacturers/ Supplier who have supplied cables in the past through Corporate Centre / Regional offices	In case of sizes/ type which meet the criteria	1 Sample of PVC insulation & outer sheath per type of cables offered which have met the criteria, will be put on accelerated ageing test (refer IRS specification no. IRS: S-63/2007 Rev 3.0). The samples shall be aged in air oven at temperature of 130ºc+/- 2ºc for 5 hours. 1 Sample of XLPE insulation per type of cables offered which have met the criteria, will be put on ageing test as per IS 7098. After wards the samples shall be tested for Tensile Strength & Elongation. Acceptance norms shall be as per relevant IS. **This test shall be witnessed by NTPC.**	In case the samples do not meet the requirement in accelerated ageing test **then 1 sample of that size/ type will be put on ageing test as per IS.**
		In case of size /type which do not meet the criteria	Particular size/ type will be put on ageing test as per IS. **This test shall be witnessed by NTPC.**	----

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एनटीपीसी NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 11 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY Approved Dt A.K. Garg.

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
				In case of Manufacturers/ Supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre / Regional offices	In case of size /type which meet the criteria		1 Sample per type out of all sizes which have met the criteria, will be put on aging test and **witnessed by NTPC as per relevant IS**							----
					In case of size/ type which do not meet the criteria		Particular size / type will be put on ageing test as per IS. **This test shall be witnessed by NTPC**							----

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	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER: PE-TS-427-507-E012A
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R01	SPECIFICATION TITLE:
	SHEET 7 OF 9	SYSTEM	ITEM: LT XLPE POWER CABLES	DOC. NO.

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 one size of cable for every lot and type of cable (CU/AL conductor)
   b) Flammability Test to be conducted only on one sample/ lot.

B. **Acceptance Test Conduction:**

1. Conduction of acceptance tests and sampling of acceptance test shall be as per QP NO. 0000-999-QOE-S-040, REV-00 along with Annexure-C (i.e. quality assurance & inspection).

C. Routine Test Conduction:

1. Conduction of Routine tests shall be as per QP NO. 0000-999-QOE-S-040, REV-00 along with Annexure-C (i.e. quality assurance & inspection).

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	

333360/2021/PS-PEM-EL

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER: PE-TS-427-507-E012A
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R01	SPECIFICATION TITLE:
	SHEET **8** OF 9	SYSTEM	ITEM: LT XLPE POWER CABLES	DOC. NO.

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.	Resistance 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	
X.	Adhesion test	For GS wires/Strip only	**T, A**		
3.0	**Physical Tests for XLPE Insulation & PVC sheath**				
I.	Test for thickness	Applicable for XLPE insulation, PVC inner sheath & PVC outer sheath	**T, A**	IS 10810 Pt 6	
II.	Tensile strength and elongation test at break	Applicable for XLPE insulation & PVC outer sheath			
(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 & PVC outer sheath	**T**	IS 10810 Pt 11	
IV.	Loss of mass in air oven test	For PVC outer sheath only	**T**	IS 10810 Pt 10	
V.	Hot deformation test	For PVC outer sheath only	**T**	IS 10810 Pt 15	
VI.	Heat shock test	For PVC outer sheath only	**T**	IS 10810 Pt 14	
VII.	Shrinkage test	For XLPE insulation & PVC outer sheath only	**T**	IS 10810 Pt 12	
VIII.	Thermal stability test	For PVC 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.	Insulation resistance test (Volume resistivity method)	For complete cable	**T**		
4.0	**Improved Fire performance (FR-LSH) Tests**				
I.	Oxygen index test	For PVC outer sheath only	**T, A**	IS 10810 Pt 58 / ASTMD 2863	
II.	Smoke density test	For PVC outer sheath only	**T**	IS 10810 Pt 63 / ASTMD 2843	
III.	Acid gas generation test	For PVC outer sheath only	**T, A**	IS 10810 Pt 59 / IEC-754-1	

BHEL	PARTICULARS	BIDDER/ VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S / VENDORS COMPANY SEAL

333360/2021/PS-PEM-EL

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER: PE-TS-427-507-E012A
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R01	SPECIFICATION TITLE:
	SHEET **9** OF 9	SYSTEM	ITEM: LT XLPE POWER CABLES	DOC. NO.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
IV.	Temperature Index Test	For PVC outer sheath only	**T**	IS 10810 Pt 64 / ASTMD 2863	
5.0	**Flammability Tests**				
I.	Flammability test for bunched cables	For complete cable	**T**	IS 10810 Pt 62/ IEC-60332 (Part-3-23-Cat-B/Cat-A,	**Test & Category applicable as indicated in Datasheet-A**
II.	Flammability test for single cable	For complete cable	**T,A**	IS: 10810 Pt 61 / 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	
6.0	**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	

BHEL	PARTICULARS	BIDDER/ VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S / VENDORS COMPANY SEAL

ANNEXURE-B TO QP

QUALITY ASSURANCE & INSPECTION

MODULE NO. SQE 13

L.T POWER CABLES
(1.1 KV PVC & XLPE CABLES)

Attributes / Characteristics Item / Components / Sub System Assembly	Make, Rating, Type & TC	Dimension/surface finish	Mechanical Properties	Chemical Composition	Electrical Properties	Spark Test	Hot set test (XLPE)	Lay length / Sequence	Armour coverage, Cross over, looseness, Gap between two armour wire/strip	Sequential marking/surface finish /cable length	Tensile strength, elongation before & after ageing of insulation & outer sheath	Thermal Stability of insulation and outer sheath *	Anti ternite treatment on wooden drums	Constructional / requirement as per NSPCL Spec.	Routine and acceptance test as per Relevant Standard and NSPCL specification	FRLS Test
Aluminum (IS-8130)	Y	Y	Y	Y	Y											
PVC Compound (IS-5831)	Y		Y		Y						Y					
XLPE Compound(IS-7098 Part-I)	Y		Y		Y		Y				Y					
FRLS PVC Compound(IS-5831) ASTM-D-2843/ IS 10810 (Part-58) IEC-60754 Part-I	Y		Y								Y					
Armour wire/strip (IS-3975)	Y	Y	Y													
Insulated Core		Y				Y	Y					Y				
Laid up core		Y						Y								
PVC Inner sheath		Y														
Armouring		Y							Y							
Outer sheath		Y								Y	Y	Y				Y
Finish cable (IS-1554 & 7098 – Part-1) ASTM-D-2843/ IS 10810 (Part- - 58) IEC-60754 Part-I Swedish Chimney SS 4241475 for (F3 category) Flammability test IEC-60332 Part –3 Cat-B	Y	Y							Y	Y	Y	Y		Y	Y	Y
Wooden drum (IS-10418) / Steel drum		Y											Y			

Note: This is an indicative list of test/checks. The manufacturer is to furnish a detailed quality plan indicating the practice and procedure along with relevant supporting documents.

2. Not applicable for XLPE insulation

QUALITY ASSURANCE & INSPECTION

	ROUTINE TESTS **Routine tests shall be carried out on each drum of finished cables for all types & sizes.** **Following shall constitute routine tests:**
1)	Conductor Resistance test
2)	High voltage test at room temperature
	ACCEPTANCE TESTS
	Following Acceptance tests shall be carried out for each type and size of the cables on the cable drums selected at random as per sampling plan mentioned in IS: 1554 Part 1 & IS 7098 Part-I
A)	**For Conductor**
1)	Annealing test For copper conductor only
2)	Tensile test For aluminium conductor only
3)	Wrapping test For aluminium conductor only
4)	Resistance test
B)	**For Armour Wires / Formed Wires (If applicable)**
1)	Measurement of Dimensions
2)	Tensile Tests
3)	Elongation Test
4)	Torsion Test For Round wires only
5)	Wrapping Test
6)	Resistance Test
7)	Mass of Zinc coating test For G S wires / Formed wires only
8)	Uniformity of Zinc coating For G S wires / Formed wires only
9)	Adhesion test For G S wires / Formed wires only
10)	Freedom from defects
C)	**For PVC / XLPE insulation & PVC Sheath**
1)	Test for thickness
2)	Hot set test For XLPE insulation only
3)	Tensile strength & Elongation before ageing
D)	**For completed cables**
1)	Insulation resistance test (Volume resistivity method)
2)	High voltage test **at room temperature**

E)	**Following tests shall be carried out and only one sample shall be taken from each offered lot of all sizes for these tests:-**
1)	Thermal stability test **on PVC insulation and outer sheath**
2)	Oxygen index test **on outer sheath**
3)	Smoke density rating test **on outer sheath as per ASTM –D 2843**
4)	Acid gas generation test **on outer sheath as per IEC –60 754 (Part 1)**

QUALITY ASSURANCE & INSPECTION

F) **Ageing test on PVC / XLPE insulation and PVC outer sheath as per following:**

In case of regular manufacturers:-

Samples as per relevant IS from every size & type of cable in the offered lot shall be tested for tensile strength & elongation (before ageing). The values will be compared with corresponding values mentioned in the type test report accepted by NSPCL.
In case values of tensile strength & elongation (before ageing) of PVC insulation & outer sheath are within + /- 15% of the type test reports then 1 sample from sizes which meet the criteria will be put on accelerated ageing test. The accelerated ageing test procedure for PVC insulation & outer sheath: sample to be put in air oven at temperature of 130^c +/- 2^c for 5 hours, tensile strength & elongation acceptance norms as per relevant IS.

However in case the tensile strength and elongation values are not within +/- 15% of type test values then 1 sample of that particular size of cable will be tested for tensile strength & elongation after ageing test as per relevant IS.

For XLPE insulation: 1 sample of every size will be put on ageing test as per relevant IS.

In case of new manufacturers / suppliers (supplying first time to NSPCL through corporate contract):-

Samples as per relevant IS from every size & type of cable in the offered lot shall be tested for tensile strength & elongation before ageing. 1 Samples from every size & type of cable in the offered lot shall be tested for tensile strength & elongation after ageing test as per IS.

G) **Flammability test as per IEC 60332 - Part- 3 (Category- B) on completed cable as per following sampling plan.**
The test shall be carried out on every size & type of power cable offered for inspection as an acceptance test. This test will be carried out using composite sampling i.e. irrespective of sizes of cables of a particular type, may be tested together as per calculations in line with the IEC (all sizes will be covered)

H) **Following tests shall be carried on one length of each size of offered lot:**

Surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires

TYPICAL DRAWING OF CABLE DRUM PACKING

ANNEXURE-C TO QP

Rajeev Kumar Sharma

From: Megha/ मेघा <megha1@bhel.in>
Sent: 17 July 2021 16:07
To: 'Rajeev Kumar Sharma'
Cc: 'Sandeep Lodh'; abhayagrawal@bhel.in; 'Alok Vats'; 'Pramod Kumar Gautam(Sr Dy GM/PGIII/PS-PEM)'
Subject: RE: 1X250 MW NSPCL ROURKELA PP-II EXP- LT XLPE POWER CABLE : PE-PI-407-507-12006
Attachments: Price Variation Formulae for Cables.pdf

In reference to the trailing mail, please find highlighted PVC factors as per attached pdf.

सादर / Regards,
मेघा / Megha
प्रबंधक (विद्युत) / Manager (Electrical)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Limited
पीएस-पीईएम, पीपीईआई बिल्डिंग / PS-PEM, PPEI Building
प्लॉट नं. २५, सेक्टर १६ए, नोएडा-२०१३०१ / Plot No. 25, Sector 16A, Noida-201301
दूरभाष + ९१ १२० ४२१३५१२ / Telephone + 91 120 4213512
ई-मेल / E-mail : megha1@bhel.in

From: Rajeev Kumar Sharma [mailto:rajeevsharma@bhel.in]
Sent: 17 July 2021 13:55
To: 'Megha/ मेघा' <megha1@bhel.in>
Cc: 'Sandeep Lodh' <sandeeplodh@bhel.in>; abhayagrawal@bhel.in; 'Alok Vats' <alokvats@bhel.in>; 'Pramod Kumar Gautam(Sr Dy GM/PGIII/PS-PEM)' <pkgautam@bhel.in>
Subject: RE: 1X250 MW NSPCL ROURKELA PP-II EXP- LT XLPE POWER CABLE : PE-PI-407-507-12006

Madam,
As discussed, please also highlight the variation factors to be used for subject package.

Regards,
Rajeev Kumar
PS-PEM/ PG-III
3582, 9654360233

From: Alok Vats [mailto:alokvats@bhel.in]
Sent: 13 July 2021 18:01
To: 'Rajeev Kumar Sharma' <rajeevsharma@bhel.in>
Cc: 'Sandeep Lodh' <sandeeplodh@bhel.in>; abhayagrawal@bhel.in; 'Megha/ मेघा' <megha1@bhel.in>
Subject: RE: 1X250 MW NSPCL ROURKELA PP-II EXP- LT XLPE POWER CABLE : PE-PI-407-507-12006

Respected Sir,
Please find attached, highlighted applicable PVC formulae for the subject indent.

Regards,
Alok Vats
Engineer – Electrical
PS- PEM NOIDA

From: Rajeev Kumar Sharma [mailto:rajeevsharma@bhel.in]
Sent: 12 July 2021 13:08
To: 'Alok Vats' <alokvats@bhel.in>
Cc: 'Sandeep Lodh' <sandeeplodh@bhel.in>; abhayagrawal@bhel.in; 'Megha/ मेघा' <megha1@bhel.in>; pkgautam@bhel.in
Subject: RE: 1X250 MW NSPCL ROURKELA PP-II EXP- LT XLPE POWER CABLE : PE-PI-407-507-12006

Sir,
Please highlight the applicable PVC formulae for subject indent .

Regards,
Rajeev Kumar
PS-PEM/ PG-III
3582, 9654360233

From: Alok Vats [mailto:alokvats@bhel.in]
Sent: 03 July 2021 15:59
To: rajeevsharma@bhel.in
Cc: 'Sandeep Lodh' <sandeeplodh@bhel.in>; abhayagrawal@bhel.in
Subject: RE: 1X250 MW NSPCL ROURKELA PP-II EXP- LT XLPE POWER CABLE

Respected Sir,

Please ignore the previous mails from my side pertaining to this matter.
And please find attached, Pulse estimate sheet of 1X250 MW NSPCL ROURKELA PP-II EXP- LT XLPE POWER CABLE.

Regards,
Alok Vats
Engineer – Electrical

From: Rajeev Kumar Sharma [mailto:rajeevsharma@bhel.in]
Sent: 03 July 2021 09:39
To: 'Megha/ मेघा' <megha1@bhel.in>
Cc: abhayagrawal@bhel.in; 'pkgautam' <pkgautam@bhel.in>
Subject: 1X250 MW NSPCLROURKELA PP-II EXP- LT XLPE POWER CABLE
Importance: High

Project : 1X250 MW NSPCLROURKELA PP-II EXP
Package : LT XLPE POWER CABLE
Indent No. PE-PI-407-507-12006

Madam,
Engineering is requested to provide following inputs for subject indent in order to float the tender through GeM Portal:

1. Please share the estimate sheet generated through PULSE or password to enable us to download the estimate sheet from eoffice.
   Attached Pulse estimate sheet.

2. In line with CMM email dated 10/03/2021, following may please be confirmed:-
   The feasibility for diversion of the surplus material from the other sites has been assessed and confirmation of indented items are either not available or infeasible to arrange from other sites will be ensured before ordering.
   Confirmed.

3. As per attached email dated 19/03/2021/ record notes, quantity variation in GeM is available upto +25% (refer point no 9 of attached record notes). As per CMM advisory dated 04/03/2021 (email copy attached), applicable quantity variation for subject package is +/-30%. As this tender is being processed through GeM custom bid feature, quantity variation for subject package shall be kept as +25% inline with attached email dated 19/03/2021/ record notes. Engg. may inform any change in technical scope due to same.
   No change.

Regards,
Rajeev Kumar
PS-PEM/ PG-III
3582, 9654360233

Ref: PW/PE/CMM-PVC Cables Packages (Rev-02) **Dated:19/02/2019**

Note: Applicable for cable tenders released on or after 14/01/2019.

Price Variation Formulae for cables -Annexure-I

1. Prices shall be variable as per price variation formulae given below (basis IEEMA).
The price variation shall be limited to + 20% of total ex-works price actually supplied (cable size wise) and -ve price variation shall be unlimited. Rates for working out price variation shall be as per rates published by IEEMA for the factors given in Annexure-II

2. **Base date for prices:**

Initial Price (As per IEEMA) for-Alo, Cuo, CCo, PVCCo & Feo:
Base Date shall be- 1st working day of the previous month to the date of issue of tender enquiry.

Final Price (as per IEEMA) for- Al, Cu, Cc, PVCC & Fe:
1st working day of month, one month prior to the date on which cable is notified as being ready for inspection i.e TPIA inspection call raise date on web portal.

3. Variation factor value for ALF, CuF, CCFAL, CCFCu, XLFAL, XLFCu, FeF & FeW as applicable shall be as per Technical Specification.

4. PVC shall be payable within contractual delivery period (including any extension thereto).

IEEMA table for Price variation cause for various type of cable

1. Aluminium conductor cable

S.No	Cable Type	AIF (Single core unarmoured & Multi core armoured)	AIF (Single core armoured)	CCFAl	XLFAL (Single core)	XLFAL (Multi core)	FeF	FeW	IEEMA Formula
1.	HT XLPE Power cable	ALP	H1	H2	XL3	XL4	H3	H5	P=Po+AIF(AL-Alo) + XLFAL(CC-CCo) +CCFAI(PVCC-PVCCo) + FeF(Fe-Feo)
2.	LT XLPE Power Cable	ALP	P1	L2	XL1	XL1	P3	P3 (Additional)	P=Po+AIF(AL-Alo) + XLFAL(CC-CCo) +CCFAI(PVCC-PVCCo) + FeF(Fe-Feo)
3.	LT PVC Power Cable	ALP	P1	P2	-	-	P3	P3 (Additional)	P=Po+AIF(AL-Alo) + CCFAI(PVCC-PVCCo) + FeF(Fe-Feo)
4.	LT HRPVC Power Cable	ALP	P1	P2	-	-	P3	P3 (Additional)	P=Po+AIF(AL-Alo) + CCFAI(PVCC-PVCCo) + FeF(Fe-Feo)

2. Copper conductor cable

S no.	Cable type	CuF	AIF (single core armoured)	CCFCu	XLFCU (Single core)	XLFCU (Multi core)	FeF	FeW	IEEMA Formula
I	HT XLPE Power cable	CUP	H4	H2	XL3	XL4	H3	H5	P=Po+CuF(Cu-Cuo) + XLFCU(CC-CCo) +CCFCu(PVCC-PVCCo) + FeF(Fe-Feo) + AIF(AL-Alo)
2	LT XLPE Power Cable	CUP	P4	L2	XL1	XL1	P3	P3 (Additional)	P=Po+CuF(Cu-Cuo) + XLFCU(CC-CCo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo) + AIF(AL-Alo)

S no.	Cable type	CuF	AIF (single core armoured)	CCFCu	XLFCU (Single core)	XLFCU (Multi core)	FeF	FeW	IEEMA Formula
3	LT PVC Power Cable	CUP	P4	P2	--	--	P3	P3 (Additional)	P=Po+CuF(Cu-Cuo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo) + AIF(AL-Alo)
4	LT HRPVC Power Cable	CUP	P4	P2	--	--	P3	P3 (Additional)	P=Po+CuF(Cu-Cuo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo) + AIF(AL-Alo)
5	LT XLPE Control Cable	CUC	--	P5	--	XL2	P6	P6 (Additional)	P=Po+CuF(Cu-Cuo) + XLFCU(CC-CCo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo)
6	LT PVC Control Cable	CUC	--	P5	--	--	P6	P6 (Additional)	P=Po+CuF(Cu-Cuo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo)
7	LT HRPVC Control Cable	CUC	--	P5	--	--	P6	P6 (Additional)	P=Po+CuF(Cu-Cuo) + CCFCu(PVCC-PVCCo) + FeF(Fe-Feo)
8	LT XLPE Fire Survival Power Cable	CUP	P4	L2	XL1	XL1	P3	P3 (Additional)	P=Po+CuF(Cu-Cuo) + XLFCU(CC-CCo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo))+ AIF(AL-Alo)
9	LT XLPE Fire Survival Control	CUC	--	P5	--	XL2	P6	P6 (Additional)	P=Po+CuF(Cu-Cuo) + XLFCU(CC-CCo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo)
10	LT EPR Fire Survival Power Cable	CUP	P4	L2	--	--	P3	P3 (Additional)	P=Po+CuF(Cu-Cuo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo))+ AIF(AL-Alo)
11	LT EPR Fire Survival Control cable	CUC	--	P5	--	--	P6	P6 (Additional)	P=Po+CuF(Cu-Cuo) + CCFCu (PVCC-PVCCo) + FeF(Fe-Feo)
12	Screened control Cable (Overall screen)	Cu POS	--	--	--	--	Fe POS	Fe POS	P=Po+CuF(Cu-Cuo) + FeF(Fe-Feo)
13	Screened control Cable (Individual	Cu PIS	--	--	--	--	Fe PIS	Fe PIS	P=Po+CuF(Cu-Cuo) + FeF(Fe-Feo)

Annexure-II

IEEMA *Table* for Price Variation Clause for various types of Cables

Notes:-

(i) Cu POS, Cu PIS, Fe POS & Fe PIS tables shall be as per IEEMA circular No. IIEMA (PVC) /Instrumentation Cable/2014 effective from dtd 01.07.2014.

(ii) All other tables shall be as per IEEMA circular No. 35//DIV/CAB/05/ dated 24.04.2018.

Terms used in PVC formulae:

P = Price payable as adjusted in accordance with above appropriate formula (In Rs./Km).
Po= Price quoted/confined (in Rs./km).

1. ALUMINIUM
ALF Variation factor for aluminium.
Al =Price of aluminium.
Alo = Price of aluminium.

2 COPPER
CuF =Variation factor for copper.
Cu = Price of CC copper rods.
Cuo = Price of CC copper rods.

3.PVCc COMPOUND/POLYMER
PVCc = Price of PVC compound.
PVCco= Price of PVC compound.
CCFAL= Variation factor for PVC compound/Polymer for aluminium conductor cable.
CCFCu =Variation factor for PVC compound/Polymer for copper conductor cable.

4. XLPE COMPOUND
Cc = Price of XLPE compound.
Cco= Price of XLPE compound.
XLFAL= Variation factor for XLPE compound for aluminium conductor cable.
XLFCu =Variation factor for XLPE compound for copper conductor cable.

5.STEEL
Fe= Price of steel strips/steel wire.
Feo= Price of steel strips/steel wire.
FeF =Variation factor for steel.
FeW=Variation factor for round wire steel armouring.

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IEEMA (PVC)/Instrumentation Cable/2014 **Effective from: 1st July 2014**

Material Price Variation Clause For Instrumentation 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 Price quoted/confirmed **(in Rs/Km)**

COPPER

CuF Variation factor for copper

Cu Price of CC copper rods. This price is as applicable on first working day of the month, one month prior to the date of delivery.

Cu_o Price of CC copper rods. This price is as applicable on first working day of the month, one month prior to the date of tendering.

STEEL

FeF Variation factor for steel

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.

Fe_o 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.

The above prices and indices are as published by IEEMA vide Circular reference IEEMA(PVC)/CABLE/--/-- 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, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

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IEEMA (PVC)/Instrumentation Cable/2014 **Effective from: 1st July 2014**

Notes

(a) All prices of raw materials are exclusive of modvatable excise/CV duty amount and exclusive of any other central, state or local taxes, octroi, etc.

(b) All Prices are as on first working day of the month.

(c) The details of prices are as under:

1. Price of CC copper rods (in Rs/MT) is ex-works price as quoted by the primary producer.
2. 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 formula for 'Instrumentaion Cables'

P = Po + CuF (Cu – Cuo) + FeF (Fe – Feo)

1. **For Pair Instrumentation Over all Screen Cables**

Tables References:

Cu POS Copper Factor
Fe POS Steel Factor

2. **For Pair Instrumentation Individual and Over all Screen Cables**

Tables References:

Cu PIS Copper Factor
Fe PIS Steel Factor

3. **For Triad Instrumentation Over all Screen Cables**

Tables References:

Cu TOS Copper Factor
Fe TOS Steel Factor

4. **For Triad Instrumentation Individual & Overall Screen Cables**

Tables References:

Cu TIS Copper Factor
Fe TIS Steel Factor

Deputy Director General

Copper Factors for Instrumentation Cables - CuF

Cu POS

Pair Instrumentation Over all Screen Cables					
No. of Pairs Cable size in sq.mm	0.5 sq.mm	0.75 sq.mm	1.0 sq.mm	1.5 sq.mm	2.5 sq.mm
1	0.0142	0.0185	0.0233	0.0326	0.0500
2	0.0258	0.0345	0.0440	0.0625	0.0978
3	0.0353	0.0484	0.0626	0.0904	0.1433
4	0.0448	0.0623	0.0811	0.1183	0.1888
5	0.0578	0.0800	0.1022	0.1467	0.2356
6	0.0662	0.0926	0.1210	0.1768	0.2829
7	0.0756	0.1067	0.1378	0.2000	0.3245
8	0.0852	0.1204	0.1582	0.2327	0.3741
9	0.0933	0.1334	0.1734	0.2534	0.4134
10	0.1046	0.1485	0.1959	0.2893	0.4665
11	0.1111	0.1600	0.2089	0.3067	0.5023
12	0.1236	0.1764	0.2333	0.3452	0.5580
13	0.1289	0.1867	0.2445	0.3600	0.5912
14	0.1378	0.2000	0.2623	0.3867	0.6356
15	0.1467	0.2134	0.2800	0.4134	0.6801
16	0.1618	0.2322	0.3080	0.4573	0.7409
17	0.1645	0.2400	0.3156	0.4667	0.7690
18	0.1734	0.2534	0.3334	0.4934	0.8134
19	0.1822	0.2667	0.3512	0.5201	0.8579
20	0.1911	0.2800	0.3689	0.5467	0.9023
21	0.2000	0.2934	0.3867	0.5734	0.9468
22	0.2089	0.3067	0.4045	0.6001	0.9912
23	0.2178	0.3200	0.4223	0.6267	1.0357
24	0.2381	0.3437	0.4575	0.6813	1.1068
25	0.2356	0.3467	0.4578	0.6801	1.1246
26	0.2445	0.3600	0.4756	0.7068	1.1690
27	0.2534	0.3734	0.4934	0.7334	1.2135
28	0.2623	0.3867	0.5112	0.7601	1.2579
29	0.2711	0.4001	0.5290	0.7868	1.3024
30	0.2800	0.4134	0.5467	0.8134	1.3468
31	0.2889	0.4267	0.5645	0.8401	1.3913
32	0.2978	0.4401	0.5823	0.8668	1.4357
33	0.3067	0.4534	0.6001	0.8934	1.4802
34	0.3156	0.4667	0.6179	0.9201	1.5246
35	0.3245	0.4801	0.6356	0.9468	1.5691
36	0.3334	0.4934	0.6534	0.9735	1.6135
37	0.3423	0.5067	0.6712	1.0001	1.6580
38	0.3512	0.5201	0.6890	1.0268	1.7024
39	0.3600	0.5334	0.7068	1.0535	1.7469
40	0.3689	0.5467	0.7245	1.0801	1.7913
41	0.3778	0.5601	0.7423	1.1068	1.8358
42	0.3867	0.5734	0.7601	1.1335	1.8802
43	0.3956	0.5867	0.7779	1.1601	1.9247
44	0.4045	0.6001	0.7957	1.1868	1.9691
45	0.4134	0.6134	0.8134	1.2135	2.0136
46	0.4223	0.6267	0.8312	1.2402	2.0580
47	0.4312	0.6401	0.8490	1.2668	2.1025
48	0.4710	0.6759	0.9010	1.3410	2.2009

Copper Factors for Instrumentation Cables - CuF

Cu PIS

Pair Instrumentation Individual and Over all Screen Cables					
No. of Pairs Cable size in sq.mm	0.5 sq.mm	0.75 sq.mm	1.0 sq.mm	1.5 sq.mm	2.5 sq.mm
1	0.0133	0.0178	0.0222	0.0311	0.0489
2	0.0349	0.0437	0.0531	0.0717	0.1069
3	0.0490	0.0621	0.0763	0.1041	0.1570
4	0.0630	0.0806	0.0994	0.1389	0.2071
5	0.0800	0.1022	0.1245	0.1689	0.2578
6	0.0937	0.1200	0.1484	0.2042	0.3103
7	0.1067	0.1378	0.1689	0.2311	0.3556
8	0.1218	0.1569	0.1948	0.2692	0.4107
9	0.1334	0.1734	0.2134	0.2934	0.4534
10	0.1503	0.1943	0.2417	0.3349	0.5122
11	0.1600	0.2089	0.2578	0.3556	0.5512
12	0.1785	0.2313	0.2882	0.4001	0.6128
13	0.1867	0.2445	0.3023	0.4178	0.6490
14	0.2000	0.2623	0.3245	0.4489	0.6979
15	0.2134	0.2800	0.3467	0.4801	0.7468
16	0.2350	0.3053	0.3812	0.5305	0.8141
17	0.2400	0.3156	0.3912	0.5423	0.8446
18	0.2534	0.3334	0.4134	0.5734	0.8934
19	0.2667	0.3512	0.4356	0.6045	0.9423
20	0.2800	0.3689	0.4578	0.6356	0.9912
21	0.2934	0.3867	0.4801	0.6668	1.0401
22	0.3067	0.4045	0.5023	0.6979	1.0890
23	0.3200	0.4223	0.5245	0.7290	1.1379
24	0.3479	0.4535	0.5673	0.7911	1.2165
25	0.3467	0.4578	0.5690	0.7912	1.2357
26	0.3600	0.4756	0.5912	0.8223	1.2846
27	0.3734	0.4934	0.6134	0.8534	1.3335
28	0.3867	0.5112	0.6356	0.8846	1.3824
29	0.4001	0.5290	0.6579	0.9157	1.4313
30	0.4134	0.5467	0.6801	0.9468	1.4802
31	0.4267	0.5645	0.7023	0.9779	1.5291
32	0.4401	0.5823	0.7245	1.0090	1.5780
33	0.4534	0.6001	0.7468	1.0401	1.6269
34	0.4667	0.6179	0.7690	1.0712	1.6758
35	0.4801	0.6356	0.7912	1.1024	1.7247
36	0.4934	0.6534	0.8134	1.1335	1.7736
37	0.5067	0.6712	0.8357	1.1646	1.8225
38	0.5201	0.6890	0.8579	1.1957	1.8713
39	0.5334	0.7068	0.8801	1.2268	1.9202
40	0.5467	0.7245	0.9023	1.2579	1.9691
41	0.5601	0.7423	0.9246	1.2891	2.0180
42	0.5734	0.7601	0.9468	1.3202	2.0669
43	0.5867	0.7779	0.9690	1.3513	2.1158
44	0.6001	0.7957	0.9912	1.3824	2.1647
45	0.6134	0.8134	1.0135	1.4135	2.2136
46	0.6267	0.8312	1.0357	1.4446	2.2625
47	0.6401	0.8490	1.0579	1.4757	2.3114
48	0.6887	0.8936	1.1186	1.5587	2.4186

Steel Factors for Instrumentation Cables - FeF					
Fe POS					
Pair Instrumentation Over all Screen Cables					
No. of Pairs Cable size in sq.mm	0.5 sq.mm	0.75 sq.mm	1.0 sq.mm	1.5 sq.mm	2.5 sq.mm
1	0.1490	0.1565	0.1635	0.1735	0.1930
2	0.2190	0.2335	0.2470	0.2665	0.2595
3	0.2360	0.2545	0.2690	0.2900	0.2680
4	0.2390	0.2580	0.2715	0.2945	0.2830
5	0.2630	0.2820	0.2420	0.2805	0.3155
6	0.2840	0.3160	0.2805	0.2995	0.3430
7	0.2840	0.2595	0.2805	0.2995	0.3430
8	0.3235	0.2930	0.3030	0.3315	0.3780
9	0.2805	0.3180	0.3290	0.3590	0.4205
10	0.2970	0.3215	0.3455	0.3755	0.4385
11	0.3005	0.3255	0.3490	0.3805	0.4435
12	0.3055	0.3440	0.3680	0.3880	0.4520
13	0.3265	0.3530	0.3780	0.4105	0.4785
14	0.3265	0.3530	0.3780	0.4105	0.4785
15	0.3490	0.3765	0.4015	0.4365	0.5195
16	0.3490	0.3765	0.4015	0.4365	0.5195
17	0.3590	0.4005	0.4140	0.4635	0.5470
18	0.3590	0.4005	0.4265	0.4635	0.5470
19	0.3590	0.4005	0.4265	0.4635	0.5470
20	0.3830	0.4240	0.4535	0.4920	0.5760
21	0.3830	0.4240	0.4535	0.4920	0.5760
22	0.4065	0.4520	0.4785	0.5310	0.6190
23	0.4065	0.4520	0.4810	0.5310	0.6190
24	0.4305	0.4770	0.5070	0.5595	0.6475
25	0.4305	0.4770	0.5070	0.5595	0.6475
26	0.4305	0.4770	0.5070	0.5595	0.6475
27	0.4355	0.4820	0.5245	0.5660	0.6700
28	0.4570	0.5045	0.5345	0.5895	0.6950
29	0.4570	0.5045	0.5345	0.5895	0.6950
30	0.4570	0.5045	0.5345	0.5895	0.6950
31	0.4795	0.5285	0.5595	0.6150	0.7225
32	0.4820	0.5285	0.5595	0.6150	0.7225
33	0.4820	0.5285	0.5595	0.6150	0.7225
34	0.4920	0.5520	0.5835	0.6410	0.7500
35	0.4920	0.5520	0.5835	0.6410	0.7500
36	0.4920	0.5520	0.5835	0.6410	0.7500
37	0.4920	0.5520	0.5835	0.6410	0.7500
38	0.5145	0.5760	0.6225	0.6550	0.7805
39	0.5145	0.5760	0.6225	0.6550	0.7805
40	0.5145	0.5760	0.6225	0.6550	0.7805
41	0.5395	0.6025	0.6475	0.6975	0.8230
42	0.5395	0.6025	0.6475	0.6975	0.8230
43	0.5395	0.6025	0.6475	0.6975	0.8230
44	0.5635	0.6265	0.6735	0.7250	0.8540
45	0.5635	0.6265	0.6760	0.7250	0.8540
46	0.5635	0.6265	0.6760	0.7250	0.8540
47	0.5635	0.6265	0.6760	0.7250	0.8540
48	0.5635	0.6265	0.6760	0.7375	0.8665

Steel Factors for Instrumentation Cables - FeF

Fe PIS

Pair Instrumentation Individual and Over all Screen Cables

No. of Pairs Cable size in sq.mm	0.5 sq.mm	0.75 sq.mm	1.0 sq.mm	1.5 sq.mm	2.5 sq.mm
1	0.1880	0.1980	0.2070	0.2220	0.2410
2	0.2315	0.2460	0.2595	0.2815	0.2755
3	0.2505	0.2690	0.2820	0.2495	0.2830
4	0.2645	0.2830	0.2420	0.2805	0.3155
5	0.2895	0.2730	0.2805	0.3005	0.3430
6	0.2755	0.2980	0.3005	0.3280	0.3730
7	0.2755	0.2980	0.3005	0.3280	0.3730
8	0.2980	0.3215	0.3455	0.3740	0.4230
9	0.3230	0.3490	0.3730	0.4040	0.4685
10	0.3405	0.3655	0.3765	0.4215	0.4885
11	0.3430	0.3690	0.3815	0.4265	0.4945
12	0.3490	0.3765	0.4015	0.4470	0.5160
13	0.3715	0.3990	0.4255	0.4720	0.5420
14	0.3715	0.3990	0.4255	0.4720	0.5420
15	0.3955	0.4240	0.4510	0.5020	0.5720
16	0.3955	0.4240	0.4510	0.5020	0.5720
17	0.4190	0.4495	0.4795	0.5295	0.6150
18	0.4190	0.4495	0.4795	0.5295	0.6150
19	0.4190	0.4495	0.4795	0.5295	0.6150
20	0.4445	0.4770	0.5060	0.5570	0.6450
21	0.4445	0.4895	0.5060	0.5695	0.6450
22	0.4695	0.5045	0.5345	0.5870	0.6885
23	0.4695	0.5045	0.5345	0.5870	0.6885
24	0.4970	0.5310	0.5620	0.6285	0.7210
25	0.4970	0.5310	0.5620	0.6285	0.7210
26	0.4970	0.5310	0.5620	0.6285	0.7210
27	0.5035	0.5495	0.5810	0.6360	0.7410
28	0.5135	0.5610	0.6050	0.6610	0.7690
29	0.5135	0.5610	0.6050	0.6610	0.7690
30	0.5260	0.5610	0.6050	0.6610	0.7690
31	0.5495	0.5845	0.6300	0.6885	0.7990
32	0.5495	0.5845	0.6300	0.6885	0.7990
33	0.5495	0.5845	0.6300	0.6885	0.7990
34	0.5735	0.6225	0.6585	0.7285	0.8405
35	0.5735	0.6225	0.6585	0.7285	0.8405
36	0.5735	0.6225	0.6585	0.7285	0.8405
37	0.5735	0.6225	0.6585	0.7285	0.8405
38	0.5990	0.6485	0.6850	0.7575	0.8740
39	0.5990	0.6485	0.6850	0.7575	0.8740
40	0.5990	0.6485	0.6850	0.7575	0.8740
41	0.6250	0.6775	0.7135	0.7880	0.9180
42	0.6250	0.6775	0.7135	0.7880	0.9180
43	0.6250	0.6775	0.7135	0.7880	0.9180
44	0.6485	0.7050	0.7410	0.8165	0.9495
45	0.6485	0.7050	0.7410	0.8165	0.9495
46	0.6485	0.7050	0.7410	0.8165	0.9495
47	0.6485	0.7050	0.7410	0.8165	0.9495
48	0.6485	0.7050	0.7535	0.8290	0.9620

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Cir. No. 35/DIV/ CAB/05/ 24th April 2018

To Members of the Cable Division, Utilities, Railways & Listed purchasing organizations

Sub: Correction in PV formulae of LT XLPE Power Cable and addition of factors for HT XLPE Power Cables

We have recently published revised Price Variation Clause for LT&HT XLPE Power Cables and made it effective from 1st November 2017 vide Cir. No.111/DIV/CAB/05 dated 5th December 2017

While replying to a query of a buyer it is observed that the polymer factor for LT XLPE Power Cables (both aluminium and copper) was incorrectly represented by Table P2.

We have now corrected the anomaly by correcting the PV formulae of LT XLPE Aluminium and Copper Insulated Cables (Sl. No. D & E) by representing Polymer factor by Table L2.

We have also worked out factors for XLPE, Copper and Steel for 3 core HT XLPE Power Cables for 500 and 630 sq.mm.

We now enclose complete PV clause of Cable by including all the PV formulae of different types of power cable (Sl. No. A to I), polymer factor Table L2 and updated XL4, H2 and H5 Table of factors for your perusal & record.

We request to replace PV clause of Cable already circulated vide Cir. 111/DIV/CAB/05 dated 5th December 2017 with the enclosed PV clause in your records for future use.

Senior Director

Encl: as above

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IEEMA (PVC)/CABLE(R-1)/2017 **Effective from: 1st November 217**

Material Price Variation Clause For PVC And XLPE Insulated 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 Price quoted/confirmed **(in Rs/Km)**

ALUMINIUM

AlF Variation factor for aluminium

Al Price of Aluminiujm. This price is as applicable of first working day of the month, one month prior to the date of delivery.

Alo Price of aluminium. This price is as applicable on first working day of the month, 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 on first working day of the month, one month prior to the date of delivery.

Cuo Price of CC copper rods. This price is as applicable on first working day of the month, 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.

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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.

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.

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, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Notes

(a) All prices of raw materials are exclusive of GST amount.
(b) All prices excluding Aluminium & Copper are as on first working day of the month.
(c) 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).

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Price variation formulae for 'Power Cables'

A. Aluminum conductor PVC insulated 1.1 kV power cables

$P = Po + AlF\ (AL - Alo) + CCFAl\ (PVCc - PVCco) + FeF\ (Fe - Feo)$

For unarmourd multicore cables (without steel armour); FeF = 0

Table References:

ALP	Aluminium conductor in single core unarmoured & multicore cables
P1	Aluminium conductor aluminium armour in single core armoured cables
P2	PVC compound
P3	Steel armour

B. Copper conductor PVC insulated 1.1 kV power cables

$P = Po + CuF\ (Cu - Cuo) + CCFCu\ (PVCc - PVCco) + Fef\ (Fe - Feo) + AlF\ (Al - Alo)$

For steel armoured cables; AlF = 0 For aluminium armoured cables; FeF = 0
For unarmoured cables; FeF, AlF = 0

Tables References:

CUP	Copper conductor
P2	PVC compound
P3	Steel armour
P4	Aluminium armour

C. Copper conductor PVC insulated 1.1 kV control cables

$P = Po + CuF\ (Cu - Cuo) + CCFCu\ (PVCc\text{-}PVCco) + FeF\ (Fe\text{-}Feo)$

For unarmoured cables; FeF = 0

Tables References:

CUC	Copper conductor
P5	PVC compound
P6	Steel armour

D. Aluminum conductor XLPE insulated 1.1 kV power cables

$P = Po + AlF\ (AL - Alo) + XLFAL(CC\text{-}Cco) + CCFAl\ (PVCc - PVCco) + FeF\ (Fe - Feo)$

For unarmourd multicore cables (without steel armour); FeF = 0

Table References:

ALP	Aluminium conductor in single core unarmoured & multicore cables
P1	Aluminium conductor aluminium armour in single core armoured cables
L2	Polymer (CCFAl)
P3	Steel armour
XL1	XLPE Compound (XLFAL)

E. Copper conductor XLPE insulated 1.1 kV power cables

$P = Po + CuF\ (Cu - Cuo) + XLFCU\ (CC\text{-}Cco) + CCFCu\ (PVCc - PVCco) + Fef\ (Fe - Feo) + AlF\ (Al - Alo)$

For steel armoured cables; AlF = 0 For aluminium armoured cables; FeF = 0

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For unarmoured cables; FeF, AlF = 0

Tables References:

CUP	Copper conductor
L2	Polymer (CCFCu)
P3	Steel armour
P4	Aluminium armour
XL1	XLPE Compound (XLFCu)

F. Copper conductor XLPE insulated 1.1 kV control cables

P = Po + CuF (Cu – Cuo) + XLFCU (CC-Cco)+ CCFCu (PVCc-PVCco) + FeF (Fe-Feo)

For unarmoured cables; FeF = 0

Tables References:

CUC	Copper conductor
P5	PVC compound
P6	Steel armour
XL2	XLPE Compound

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

P = Po + AlF (Al – Alo) + XLFAL(CC-Cco)+CCFAl (PVCc – PVCco) + FeF (Fe – Feo)

For unarmoured multicore cables (without steel armour); FeF = 0

Table Refernces:

ALP	Aluminium conductor in single core unarmoured & multicore cables
H1	Aluminium conductor + aluminium armour in single core armoured cables
H2	Polymer
H3/H5	Steel armour (Flat/Round)
XL3/XL4	XLPE Compound (Single core /Multicore)

H. Copper conductor XLPE Insulated 3.3 to 33 kV power cables

P = Po + CuF (Cu – Cuo) + XLFCU (CC-Cco)+ CCFCu (PVCc – PVCco) + FeF (Fe – Feo) + AlF (Al – Alo)

For steel armoured cables; AlF = 0 For aluminium armoured cables; FeF = 0
For unarmoured cables; FeF, AlF = 0

Table References:

CUP	Copper conductor
H2	Polymer
H3/H5	Steel armour (Flat/Round)
H4	Aluminium armour
XL3/XL4	XLPE Compound (Single core /Multicore)

I. Copper conductor XLPE insulated 1.0 and 1.5 kV Solar PV DC cables

P = Po + CuF (Cu – Cuo)
Table CUsdc Copper Conductor

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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

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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 CUsdc

VARIATION FACTOR FOR COPPER CONDUCTOR (CUF)
1.0 & 1.5KV Solar PV DC Cables with Copper Conductor

Cable Size in sq.mm.	Copper content in MT/km
2.5	0.023
4	0.038
6	0.058
10	0.090

TABLE CUC

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

No of Cores	Core size 1.5 sq mm	Core size 2.5 sq mm
2	0.026	0.047
3	0.039	0.070
4	0.052	0.094
5	0.065	0.117
6	0.078	0.141
7	0.091	0.164
8	0.110	0.182
9	0.117	0.205
10	0.130	0.235
12	0.157	0.282
14	0.183	0.329
16	0.209	0.376
18	0.246	0.410
19	0.248	0.446
20	0.260	0.456
24	0.313	0.563
27	0.352	0.634
30	0.391	0.704
37	0.483	0.869
44	0.573	1.033
52	0.678	1.221
61	0.796	1.432

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P1

VARIATION FACTOR FOR ALUMINIUM (AIF)

ALUMINIUM ARMOURED SINGLE CORE PVC INSULATED 1.1 KV CABLES

Nominal cross sectional area (in Sq.mm)	Aluminium factor for Aluminium armoured cable with aluminium conductor
4	0.0685
6	0.0795
10	0.1017
16	0.1303
25	0.1693
35	0.2090
50	0.2597
70	0.3360
95	0.4567
120	0.5443
150	0.6427
185	0.7743
240	0.9737
300	1.2582
400	1.5502
500	1.8958
630	2.3650
800	2.9306
1000	3.7666

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P2

VARIATION FACTOR FOR PVC COMPOUND (CCFAI/CCFCu)

PVC INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal cross Sectional Area (in Sq. mm)	1 core	2 core		3 core		3.5 core		4 core	
	Unarm	Unarm	arm	Unarm	arm	Unarm	arm	Unarm	arm
2.5	0.079	0.125	0.139	0.141	0.157	-	-	0.161	0.179
4	0.094	0.140	0.156	0.164	0.182	-	-	0.188	0.209
6	0.101	0.154	0.171	0.179	0.199	-	-	0.198	0.220
10	0.114	0.194	0.216	0.214	0.238	-	-	0.249	0.277
16	0.142	0.234	0.246	0.279	0.290	-	-	0.328	0.345
25	0.171	0.288	0.303	0.364	0.383	0.422	0.444	0.443	0.466
35	0.189	0.321	0.338	0.403	0.429	0.489	0.515	0.498	0.524
50	0.211	0.411	0.433	0.508	0.535	0.613	0.645	0.647	0.681
70	0.241	-	-	0.613	0.645	0.707	0.744	-	-
95	0.284	-	-	0.795	0.811	0.908	0.927	-	-
120	0.339	-	-	0.866	0.884	1.024	1.045	-	-
150	0.388	-	-	1.070	1.092	1.289	1.315	-	-
185	0.450	-	-	1.310	1.337	1.499	1.530	-	-
225	0.521	-	-	1.586	1.618	1.840	1.878	-	-
240	0.534	-	-	1.649	1.683	1.990	2.031	-	-
300	0.653	-	-	2.007	2.048	2.361	2.409	-	-
400	0.770	-	-	2.437	2.487	2.616	2.669	-	-
500	0.936	-	-	3.117	3.181	3.687	3.762	-	-
630	1.175	-	-	-	-	-	-	-	-
800	1.433	-	-	-	-	-	-	-	-
1000	1.642	-	-	-	-	-	-	-	-

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P3

VARIATION FACTOR FOR STEEL (FeF)

PVC INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal Cross sectional Area (in Sq. mm)	2 core	Shape	3 core	Shape	3 ½ core	Shape	4 core	Shape
4	0.305	W	0.335	W	-	-	0.363	W
6	0.348	W	0.363	W	-	-	0.407	W
10	0.392	W	0.407	W	-	-	0.293	F
16	0.235	F	0.293	F	-	-	0.323	F
25	0.293	F	0.352	F	0.382	F	0.382	F
35	0.323	F	0.382	F	0.411	F	0.440	F
50	0.382	F	0.440	F	0.469	F	0.499	F
70	0.411	F	0.499	F	-	F	0.587	F
95	0.499	F	0.587	F	0.616	F	0.645	F
120	0.528	F	0.616	F	0.675	F	0.731	F
150	0.587	F	0.675	F	0.731	F	0.790	F
185	0.645	F	0.761	F	0.820	F	0.879	F
240	0.731	F	0.879	F	0.937	F	0.996	F
300	0.820	F	0.966	F	1.055	F	1.113	F
400	0.937	F	1.083	F	1.172	F	1.231	F
500	1.055	F	1.231	F	1.348	F	1.406	F
630	1.172	F	-	-	-	-	-	-

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P3 (Additional)

VARIATION FACTOR FOR ROUND WIRE 'W' STEEL (FeF)

PVC INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in sq. mm)	2 Core	3 Core	3 .5 Core	4 Core
1.5	0.247	0.259		0.288
2.5	0.273	0.289		0.329
4	0.305	0.335		0.363
6	0.348	0.363		0.407
10	0.392	0.407		0.533
16	0.439	0.523	0.014	0.573
25	0.526	0.625	0.664	0.685
35	0.591	0.685	0.729	0.761
50	0.661	0.790	0.864	1.108
70	0.745	1.122	1.200	1.256
95	1.085	1.286	1.376	1.443
120	1.147	1.386	1.479	1.562
150	1.267	1.526	1.684	2.173
185	1.403	2.090	2.315	2.421
240	1.994	2.397	2.641	2.722
300	2.180	2.642	3.670	3.842
400	2.987	3.728	4.126	4.292
500	3.517	4.226	5.958	6.301
630	4.774	6.018	6.737	7.141

TABLE P4

VARIATION FACTOR FOR ALUMINIUM (AIF)
PVC INSULATED 1.1 KV POWER CABLES WITH COPPER CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	Aluminium Factor for Aluminium armoured cable with copper conductor
4	0.058
6	0.063
10	0.073
16	0.084
25	0.096
35	0.108
50	0.123
70	0.139
95	0.183
120	0.198
150	0.218
185	0.241
240	0.271
300	0.379
400	0.424
500	0.478
630	0.537
800	0.591
1000	0.816

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P5

VARIATION FACTOR FOR PVC COMPOUND (CCFCu)
PVC INSULAYTED CONTROL CABLES WITH COPPER CONDUCTOR

No of cores	Core size 1.5 sq mm		Core size 2.5 sq mm	
	Unarm	Arm	Unarm	Arm
2	0.118	0.121	0.125	0.139
3	0.121	0.131	0.141	0.157
4	0.137	0.152	0.161	0.179
5	0.157	0.174	0.187	0.206
6	0.179	0.199	0.234	0.260
7	0.179	0.199	0.234	0.260
8	0.193	0.215	0.292	0.325
9	0.216	0.241	0.300	0.335
10	0.236	0.262	0.303	0.337
12	0.249	0.277	0.334	0.371
14	0.311	0.327	0.389	0.409
16	0.344	0.362	0.435	0.458
18	0.352	0.371	0.474	0.500
19	0.375	0.395	0.476	0.501
20	0.391	0.412	0.519	0.546
24	0.457	0.481	0.584	0.615
27	0.491	0.517	0.631	0.664
30	0.529	0.557	0.706	0.743
37	0.615	0.647	0.835	0.879
44	0.739	0.778	1.019	1.026
52	0.845	0.889	1.100	1.158
61	0.952	1.002	1.246	1.312

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P6

VARIATION FACTOR FOR STEEL (FeF)

PVC INSULATED CONTROL CABLES WITH COPPER CONDUCTOR

No of cores	Core size 1.5 sq mm	Shape of armour	Core size 2.5 sq mm	Shape of armour
2	0.243	W	0.277	W
3	0.257	W	0.289	W
4	0.277	W	0.314	W
5	0.303	W	0.342	W
6	0.329	W	0.379	W
7	0.329	W	0.379	W
8	0.341	W	0.456	W
9	0.383	W	0.275	F
10	0.408	W	0.325	F
12	0.289	F	0.342	F
14	0.306	F	0.360	F
16	0.317	F	0.372	F
18	0.332	F	0.350	F
19	0.343	F	0.397	F
20	0.368	F	0.400	F
24	0.398	F	0.475	F
27	0.414	F	0.478	F
30	0.425	F	0.503	F
37	0.461	F	0.548	F
44	0.507	F	0.601	F
52	0.556	F	0.641	F
61	0.585	F	0.685	F

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE P6 (Additional)

VARIATION FACTOR FOR ROUND WIRE 'W' STEEL (FeF)
PVC INSULATED CONTROL CABLES WITH COPPER CONDUCTOR

No. of Cores	Core size 1.5 sq mm	Core size 2.5 sq mm
2	0.243	0.273
3	0.257	0.289
4	0.277	0.314
5	0.303	0.342
6	0.329	0.379
7	0.329	0.379
8	0.341	0.456
9	0.383	0.508
10	0.408	0.535
12	0.510	0.572
14	0.546	0.625
16	0.581	0.660
19	0.608	0.696
24	0.714	0.819
25	0.679	0.798
27	0.732	0.837
28	0.696	0.815
30	0.758	0.881
33	0.747	0.883
37	0.820	1.217
44	0.926	1.355
48	1.122	1.308
50	1.122	1.308
52	1.149	1.361
56	1.202	1.388
61	1.299	1.520

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE L2

VARIATION FACTOR FOR POLYMER (CCFAl / CCFCu)
XLPE INSULATED 1.1 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	1 core	2 core		3 core		3.5 core		4 core	
	Unarm	Unarm	Arm	Unarm	Arm	Unarm	Arm	Unarm	Arm
2.5	0.055	0.163	0.175	0.166	0.177	-	-	0.177	0.188
4	0.075	0.201	0.204	0.205	0.213	-	-	0.218	0.213
6	0.085	0.213	0.234	0.205	0.230	-	-	0.242	0.232
10	0.082	0.252	0.280	0.217	0.251	-	-	0.285	0.298
16	0.089	0.278	0.341	0.289	0.246	-	-	0.300	0.279
25	0.101	0.307	0.278	0.276	0.247	0.295	0.264	0.331	0.290
35	0.109	0.330	0.319	0.305	0.270	0.328	0.292	0.368	0.319
50	0.124	0.482	0.685	0.348	0.311	0.372	0.335	0.422	0.394
70	0.146	0.354	0.335	0.469	0.397	0.489	0.420	0.528	0.464
95	0.163	0.436	0.389	0.504	0.441	0.544	0.471	0.591	0.523
120	0.176	0.475	0.421	0.556	0.498	0.599	0.538	0.722	0.656
150	0.217	0.510	0.490	0.690	0.611	0.717	0.633	0.840	0.762
185	0.236	0.631	0.608	0.836	0.738	0.854	0.756	1.007	0.899
240	0.273	0.750	0.726	1.002	0.842	1.079	0.952	1.238	1.119
300	0.303	0.919	0.887	1.161	1.012	1.170	1.031	1.457	1.414
400	0.372	1.093	1.040	1.376	1.283	1.545	1.379	1.778	1.626
500	0.413	1.342	-	1.568	1.400	1.806	1.456	-	-
630	0.469	1.546	-	-	-	-	-	-	-
800	0.569	-	-	-	-	-	-	-	-
1000	0.667	-	-	-	-	-	-	-	-

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE XL1
VARIATION FACTOR FOR XLPE COMPOUND (XLFAL/XLFCU)
XLPE INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal cross Sectional Area (in Sq. mm)	1 core		2 core		3 core		3.5 core		4 core	
	Unarm	Arm	Unarm	Arm	Unarm	arm	Unarm	Arm	Unarm	arm
2.5	0.007	0.010	0.014	0.014	0.021	0.021			0.028	0.028
4	0.009	0.012	0.018	0.018	0.027	0.027			0.036	0.036
6	0.010	0.015	0.022	0.022	0.033	0.033			0.043	0.043
10	0.013	0.018	0.025	0.025	0.039	0.039			0.053	0.053
16	0.016	0.023	0.034	0.034	0.049	0.049			0.065	0.065
25	0.021	0.030	0.048	0.048	0.070	0.070	0.084	0.084	0.093	0.093
35	0.025	0.035	0.059	0.059	0.084	0.084	0.099	0.099	0.112	0.112
50	0.033	0.044	0.075	0.075	0.108	0.108	0.130	0.130	0.144	0.144
70	0.042	0.054	0.095	0.095	0.137	0.137	0.160	0.160	0.179	0.179
95	0.048	0.062	0.110	0.110	0.160	0.160	0.190	0.190	0.211	0.211
120	0.060	0.076	0.138	0.138	0.200	0.200	0.239	0.239	0.266	0.266
150	0.078	0.095	0.180	0.180	0.259	0.259	0.296	0.296	0.344	0.344
185	0.097	0.116	0.224	0.224	0.324	0.324	0.369	0.369	0.430	0.430
240	0.116	0.137	0.266	0.266	0.388	0.388	0.446	0.446	0.518	0.518
300	0.138	0.164	0.325	0.325	0.467	0.467	0.540	0.540	0.620	0.620
400	0.175	0.214	0.357	0.357	0.536	0.536	0.619	0.619	0.714	0.714
500	0.217	0.260	0.440	0.440	0.660	0.660	0.769	0.769	0.880	0.880
630	0.265	0.318	0.542	0.542	0.814	0.814	0.941	0.941	1.085	1.085
800	0.323	0.389								
1000	0.375	0.444								

TABLE XL2
VARIATION FACTOR FOR XLPE COMPOUND (XLFCU)
XLPE INSULAYTED CONTROL CABLES WITH COPPER CONDUCTOR

No of cores	Core size 1.5 sq mm		Core size 2.5 sq mm	
	Unarm	Arm	Unarm	Arm
2	0.010	0.010	0.012	0.012
3	0.016	0.016	0.018	0.018
4	0.021	0.021	0.025	0.025
5	0.026	0.026	0.031	0.031
6	0.031	0.031	0.037	0.037
7	0.036	0.036	0.043	0.043
8	0.036	0.036	0.043	0.043
9	0.042	0.042	0.049	0.049
10	0.052	0.052	0.061	0.061
12	0.062	0.062	0.074	0.074
14	0.073	0.073	0.086	0.086
16	0.083	0.083	0.098	0.098
18	0.094	0.094	0.110	0.110
19	0.099	0.099	0.116	0.116
20	0.104	0.104	0.123	0.123
24	0.125	0.125	0.147	0.147
27	0.140	0.140	0.165	0.165
30	0.156	0.156	0.184	0.184
37	0.192	0.192	0.227	0.227
44	0.229	0.229	0.270	0.270
52	0.270	0.270	0.319	0.319
61	0.317	0.317	0.374	0.374

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

TABLE XL3

VARIATION FACTOR FOR XLPE(XLFAL/XLFCU)

SINGLE CORE ARMOURED /UNARMOURED XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH CU / AL CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	XLPE Factor for Armoured/ Unarmoured Cable with AL /CU Conductor					
	3.3 KV	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 – XL4

VARIATION FACTOR FOR XLPE (CCF1Al / CCF1Cu)

3 CORE XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV 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	3.538
630	1.129	1.582	1.609	2.382	2.630	3.940

Note : XLPE factors include Semicons for Conductor & Insulation screen

IEEMA (PVC)/CABLE(R-1)/2017 Effective from: 1st November 217

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	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
VARIATION FACTOR FOR POLYMER (CCFAl / CCFCu)
3 CORE XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV 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

TABLE H3
VARIATION FACTOR FOR STEEL (FeF)
XLPE INSULATED 3.3 TO 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area Sq. mm.	3.3 KV	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

VARIATION FACTOR FOR ALUMINIUM (AlF)

XLPE INSULATED SINGLE CORE 3.3 TO 33 KV POWER CABLES WITH COPPER CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Copper Conductor					
	3.3 KV	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 - H5

VARIATION FACTOR FOR STEEL (FeW)

XLPE INSULATED 3.3KV TO 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area in Sq. mm	3.3/3.3 KV	3.3/6.6 KV	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

	PRE-QUALIFICATION REQUIRMENTS FOR LT XLPE POWER CABLE OF FGD, HYDRO & R&M PROJECTS*	PE-PQ-999-507 -E012 REVISION NO. 00 DATE *23/06/2021* SHEET NO.1 OF 1

ITEMS: L T XLPE Power Cable **SCOPE:** Supply: YES; Erection & Commissioning: NO;	
1.0	Vendor should be a manufacturer of LT power cables
2.0	Availability of test reports of tests on LT XLPE FRLS power cables to establish in-house capability to carry out all routine, type & acceptance tests as per relevant ISI International Standards (except UV radiation & hydrolytic stability test which can be conducted at Govt. Lab Govt. approved Independent lab).
3.0	Capacity of manufacturing 50 km of LT Power cables per month.
4.0	Manufactured and supplied at least one (1) km of FRLS cables.
5.0	Manufactured and supplied LT Power cable sizes of minimum 240 sq. mm for 3/3.5 core and minimum 630 sq. mm for single core cable.
6.0	Manufactured & supplied at least 100 km of LT Power cables in one or more orders and at least 50 km in one single order.
7.0	Minimum two (2) nos. purchase orders for LT XLPE Power cables shall be submitted which should not be more than five (5) years old from the date of application for registration or date of techno- commercial bid opening (as applicable) for establishing continuity in business.

**This PQR can also be used for small quantities supplied for Thermal / Nuclear Projects*

Notes (General points):

1.Consideration of offer shall be subject to customer's approval of bidders, 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. Any other project specific requirement shall be as per Annexure-I and bidder shall submit relevant supporting documents. Bidder to meet criteria as stated above and as per Annexure- I.

4. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

5. 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.

PREPARED BY	REVIEWED BY	APPROVED BY
MANMOHAN MAHAPATRA MEGHA	SANDEEP LODH (SDGM-ELECT) PRAVEEN DUTTA (AGM-ELECT)	DEBASISA RATH (AGM & DH – ELECTRICAL)

ANNEXURE – I

PROJECT SPECIFIC REQUIREMENT

PROJECT: 1 x 250 MW ROURKELA TPS

1) The Bidder/Sub-vendor should have manufactured and supplied prior to the date of Techno-Commercial bid opening (i.e 11.06.2015) the following:

a) At least 100 km of aluminium conductor, XLPE insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract.

b) At least 100 km of aluminium conductor, PVC insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract.

c) At least one (1) km of flame retardant low smoke cables.

d) 1.1 kV or higher grade power cable of minimum 630 sq. mm. conductor size.

2) More stringent of the PQR clauses mentioned in SHEET NO. 1 of 1 and Annexure-I (PROJECT SPECIFIC REQUIREMENT) shall prevail.

Alok Vats
[Engineer]

Abhay Agrawal
[SR. MGR.]

Sandeep Lodh
[SR. DGM]

Debasisa Rath
[AGM-ELECTRICAL]

BHEL / PEM / PG-I-2

SPECIAL CONDITIONS OF CONTRACT (REV -01)

1 X 250 MW ROURKELA PP-II EXPANSION

These Conditions shall be read and construed along with General Condition of Contract enclosed along with the tender enquiry. In case of any conflict or inconsistency, the condition given in special condition of contract shall prevail over the general condition of the contract.

Sl. No.	Title	Description
1	**Project Name**	**1 X 250 MW ROURKELA PP-II EXPANSION**
2	**Nature of Project**	Domestic
3	**Customer**	NTPC-SAIL POWER COMPANY PRIVATE LTD (NSPCL)
4	**Consultant**	MECON LIMITED
5	**Consignee Address**	BHARAT HEAVY ELECTRICALS LTD (BHEL), 1 X 250 MW ROURKELA PP-II EXPANSION- EPC PACKAGE, NTPC-SAIL POWER COMPANY PRIVATE LIMITED, DISTT. SUNDARGARH, ODISHA-769011 **(LR SHOULD BE IN THE NAME OF BHEL)**
6	**BHEL Site Office Address**	CONSTRUCTION MANAGER BHEL SITE OFFICE – 1 X 250 MW ROURKELA PP-II EXPANSION- EPC PACKAGE, NTPC-SAIL POWER COMPANY PRIVATE LIMITED, DISTT. SUNDARGARH, ODISHA-769011
7	**Mode of Dispatch**	Road
8	**BHEL clearance for road transport required**	For all Transport By Road
9	**BHEL Clearance for Despatch**	Yes, MDCC shall be issued by BHEL-PEM/Customer
10	**Road Permit Required**	Online road permit is applicable for this project. Prescribed format (to be provided at execution stage) duly filled up by the vendor to be submitted to BHEL-PEM for arranging road permit from customer
11	**Freight**	PREPAID BASIS (shall be considered for evaluation)
12	**BHEL CST Details**	CST : ND - 5341151 w.e.f. 01/07/2006 UP TT : ND – 0345307 w.e.f. 01/07/2006 UP TIN : 09765702874
13	**Customer CST Details**	Details for Rourkela :- a) TIN : 21762000157 b) CST : 21762000157 c) Service Tax Reg No : AABCN5467AST005 NSPCL Head office TIN : 07796936233

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14	**Dispatch Markings**	Supplies under each of following headings shall be packed in separate boxes:- **Main Supply along with Commissioning spares OR Mandatory Spares** Each box shall be marked on all sides with Capital letters in "RED" indicating the "PEM SUPPLY (**Main Supply along with Commissioning spares** or **Mandatory Spares)**" for 1 X 250 MW ROURKELA PP-II EXPANSION. Each package delivered under the Contract shall be marked by vendor as per details listed below and such marking must be distinct and in English language (all previous irrelevant markings being carefully obliterated) for the purpose of identification. Each and every box (package) shall be marked with following:- 1) Name and address of consignee, 2) Project Name 3) Package Name & Vendor Name 4) BHEL-PEM PO No and Date, 5) Gross weight and Net weight of the package, 6) Packing No: (e.g. 1/10, 2/10, 3/10.....when there are 10 packages for one consignment. 7) Packing shall bear a special marking `TOP', `BOTTOM', 'DO NOT TURN OVER", "KEEP DRY", "HANDLE WITH CARE", etc **IMPORTANT: -** Following documents shall be put inside each box:- • One copy of respective standard manufacturer's erection instruction / O&M manual shall be kept in each package / container for immediate reference by BHEL site and same shall be reflected in packing slip also • One copy of the Packing list indicating the item dispatched (with their weights). Items like pumps, Valves, Hoists, Cranes, etc. shall essentially have O&M Manuals and E&C guidelines (wherever applicable) shall be enclosed in the packing box and the same shall also be reflected in packing slip. **Each mandatory spare shall be properly tagged giving details i.e. item number of the equipment in line with the CUSTOMER approved BBU for Mandatory spares & Numbers per item (to match the description given in the packing slip) to facilitate their proper identification by ultimate customer NSPCL. One Copy of Packing list must be put inside the Box along with Manufacturing drawing no. reference, catalogue reference.**
15	**Prior Dispatch Intimation**	One set consisting of dispatch document (Vendor's invoice, LR copy, packing list/challan indicating the items dispatched with their weights, Insurance intimation letter and **photographs of packing/boxes showing dispatch markings as per Sl No 14)** shall be sent to following:- a) BHEL-PEM (PG I-2) – Both in soft as well as hard copy b) BHEL Site Office c) Underwriters (Insurance Company) It is Vendor's responsibility to ensure availability of trucks well in advance where

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Swati

		consignment will require more number of trucks to be deployed for dispatch. No concession for non-availability of trucks, after having given dispatch clearance shall be admissible
16	**Transit Insurance**	**By BHEL**. Vendor to intimate the underwriters quoting the insurance policy no as per Sl No 17
17	**Details of Policy No & Underwriters**	To be informed Later
18	**Unloading at site**	a) By BHEL site office for supply packages. b) By vendor for Turnkey i.e. supply and Erection& Commissioning packages **NOTE: -** Please note that unloading of materials at site shall take at least 3-4 days. As such, transporters to be advised suitably before dispatch of materials in this regard. Also, no claim on a/c of delay in unloading before this period shall be entertained. Prior intimation as mentioned in S. No. 15 above is solicited.
19	**Storage and Movement of material within site**	a) By BHEL site office for supply packages. b) By vendor for Turnkey i.e. supply and Erection& Commissioning packages No movement of loose materials shall be allowed. Items are to be properly packed to ensure proper and safe transportation & storage at site.
20	**Documents Required (For Supply payment)** DIRECT PAYMENT **(Original + 4 copies)**	For payment, the supplier/vendor shall provide following documents to BHEL/PEM – Project Group a) Original Invoice along with copy of Excise Invoice b) LR/GR/RR (Consignee copy) c) Packing List indicating quantity & Gross weight/ Net weight and ref. of LR d) Vendor COC/ Customer Cleared CHP (if applicable) e) BHEL & Customer MDCC (if applicable) f) Guarantee Certificates g) Copy of letter addressed to Insurance Co. **Note:** **i). Four (4) sets of above documents are required for vendor payment in addition to documents required as per GCC of N.I.T**
21	**Concessional Custom Duty against Essentiality Certificate (EC)**	**Essentiality Certificate, issued by NSPCL, shall be passed on to vendors through BHEL** for the items Identified by BHEL during enquiry / NIT stage (Limited to the CIF content indicated in PO) for availing Concessional custom duty as applicable for imported contents under project import route. Vendor shall indicate the list of imported items, quantity, CIF value in Indian Rupee and Foreign currency, Amount of CD, rate of CD along with the country of import in their bid. Request for additional CIF other than the original bid submitted with enquiry/NIT shall not be entertained by BHEL during contract execution stage. If CIF is available for a specific package then, the same shall be mentioned in the NIT of that package.

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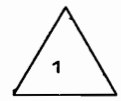
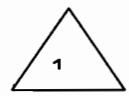
22	**Taxes & Duties**	Vendor shall quote ED separately in the price bid at applicable rate and ED will be reimbursed to vendor by BHEL. For both **Main Supply** and **Mandatory Spares,** consideration of quoted ED in evaluation shall be intimated during techno-commercial evaluation of the bid.  Vendor shall quote CST/ VAT (whichever applicable) separately in the price bid and CST/VAT shall be reimbursed to vendor by BHEL. For both **Main Supply** and **Mandatory Spares,** consideration of quoted CST/ VAT in evaluation shall be intimated during techno-commercial evaluation of the bid.  Form-C for claiming concessional sales tax (CST) shall be provided by BHEL against E I / E II Forms, which shall be submitted by Vendor. VAT on intra –state dispatches shall be paid subject to conditions specified in Annexure – I. Vendor to quote Service Tax at applicable rate & amount and the evaluation criteria for the same shall be as follows: • For Turnkey Package (E&C in vendor's scope): Service Tax on E&C shall not be considered for evaluation but Swachch Bharat Cess will be considered for evaluation. • For Supply (in PEM scope) packages: Service Tax on all jobs shall be considered for evaluation. Following information shall be provided by vendor in the Service Tax Invoice:- a) Vendor Service Tax Registration No. (15 digits) b) Nature of Service and its code c) Name and address of Service provider (Vendor) d) Name and address of Service receiver (BHEL) **Entry tax** is not to be quoted by the vendor as the same shall be paid directly by NSPCL (end customer) to the concerned sales tax authority. In case of Order on foreign supplier, the Taxes Duties in the country of dispatch shall be borne by Foreign Bidder & to be accounted in the prices quoted to BHEL/PEM/NOIDA. The taxes duties applicable in India shall be borne by BHEL/PEM/NOIDA as port clearance/handling in India shall be done by BHEL-PEM/ BHEL ROD Mumbai for the direct order placed by PEM to the foreign bidder.

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23	**Inspection Agency (For Domestic Supplies)**	Vendor shall give inspection call on BHEL-CQS web site to applicable inspection agency with a copy of inspection call to BHEL-PEM (PG-I-2) for arranging Customer participation (if applicable) in inspection / Joint inspection on the proposed date with an advance notice of 15 working days. Inspection charges shall be paid by BHEL-PEM.
24	**Inspection Agency (For International Supplies)**	In case of Imported Supplies, advance notice of 30 days for participation in inspection (if applicable, in line with approved QAP/ Customer Hold Points) shall be given by vendor. Third party inspection agency shall be informed to vendor by BHEL-PEM. Test Certificates / Inspection reports (as applicable) duly accepted by the Inspection agency in line with approved QAP/ Customer Hold Points shall be submitted to BHEL/PEM, NOIDA. The above Inspection reports / Test certificates shall be reviewed by PEM-Engineering in line with the Technical Specifications & Approved Data sheets and then sent to M/s NSPCL for their clearance. The dispatch clearance (MDCC) by Customer shall be given to the Foreign supplier (or their representative in India) through BHEL/PEM after acceptance of above test certificates by Customer. Inspection charges shall be borne by the vendor and the same shall be included in his offer to BHEL-PEM.
25	**Submission of Final Drawings/ Documents along with O & M Manual, Type test certificates (if any)**	As per GCC / Technical Specification / Kick off meeting
36	**Delivery Order document submission**	To effect sale in transit, bidder shall have to obtain format of Delivery Order document (attached with SCC) duly filled in by purchaser at the time of issue of MDCC. The filled in delivery order document shall form part of LR issued and shall be carried by the transporter to the destination along with consignment.

	PREPARED BY	CHECKED & REVIEWED BY	VETTED BY	APPROVED BY
NAME	SHASHANK MISHRA	SANJAY KUMAR DUBEY	SWATI NAIR	D SAHA
DESIGNATION	SR ENGR / PG-I-2	SR MGR / PG-I-2	SR A.O./FINANCE	AGM & DH / PG-I-2
SIGNATURE & DATE	27/02/17	27/2/17	vetted for taxes & duties only. 2/3/17	02/03/2017

BHEL / PEM / PG-I-2

SPECIAL CONDITIONS OF CONTRACT (REV -01)

1 X 250 MW ROURKELA PP-II EXPANSION

ANNEXURE - I

In order to avail the benefit of input tax credit available to BHEL in case of VAT leviable on intra-state transaction between BHEL and vendor, & to fulfill the compliances as per requirements of applicable State's VAT law, the following modality shall be applicable:

BHEL has identified a nodal agency in each State to take care of VAT compliances in the State in which project is located. For the subject project nodal agency shall be :

Name of BHEL Unit :- BHEL SITE OFFICE, NALCO CPP

Address:- BANARAL P.O. 1, ANGUL DT, ODISHA- 759128

TIN No. :- 21031301916

Nodal agency is defined as Buyer and BHEL/ PEM shall be paying agency in such cases, where VAT is applicable.

Vendors' original tax invoice for intra State transactions is one of important documents for availing Input Tax credit. In this regard the following may be noted by all vendors for strict compliance:

- As a general rule, a tax invoice must be original, must contain vendor's TIN No with full address, invoice no & date, product description with unit rate, quantity, value, VAT rate, VAT amount, gross value of bill, **buyer i.e. BHEL's address with TIN No**, (as given above) special marking like "Original" and/or "valid for input credit"/ Buyer can take credit against this" etc as per applicable State VAT law.
- Please note that BHEL's address and TIN to be mentioned in vendors tax invoice shall be **principal place of business & applicable TIN No. of nodal agency of BHEL, as given above. In no case the vendors, invoices shall be addressed to BHEL PEM nor shall they contain our TIN.** However for payment purposes, the invoice may mention BHEL PEM as paying authority.
- As original tax invoice of vendors are to be furnished to nodal unit for assessment/VAT audit purposes, extra copy of Original invoice is required to be submitted by vendors for retaining with PEM bank payment voucher.
- Original tax invoice along with extra copy of Original Tax invoice in line with respective state VAT law shall be essential document to be submitted by vendor for claiming payment.
- Vendor shall also furnish a certificate/statement/document as prescribed under applicable State VAT law. Please note that some of the States requires additional certificate/documents e.g. Haryana requires certificate in form C-4 in addition to original tax invoice.
- Please note that reimbursement/payment of VAT shall be subject to furnishing of VAT compliant tax invoice and other certificate/document as per applicable State VAT law.
- Tax invoice must show VAT rate & VAT amount separately and in no case all inclusive prices is to be shown in the tax invoice since input credit is not admissible in case VAT is not indicated separately.
- In case vendor is unable to furnish VAT compliant tax invoice & other certificate/document, VAT shall not be reimbursed by BHEL.
- Where the supplies are made from within the same state where the project is located, the vendor has to provide VAT Tax Invoice for such supplies even if the price quoted is all inclusive.

27/02/17

Project Engineering Management

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
POWER SECTOR, PROJECT ENGINEERING MANAGEMENT
Power Project Engg. Institute, Plot No. 25, Sector 16 - A,
HRDI & ESI Complex, NOIDA 201 301 (UP)

No.: Our Po ref no.
Date: (To be filled by Vendor/supplier)

To,

The _____(Transporter)
_____
_____

M/s _____(supplier) has despatched goods through you covered by RR/LR No._____dated _____.

Under contract goods are to be delivered to M/s _____(customer) since the same has been sold by us to them as subsequent sale.

We authorise you to deliver the said goods to M/s _____ _____(customer) or to his order.

We indemnify you against any loss, claim or whatsoever that may accrue to you in delivering the aforesaid goods to M/s _____(customer)

–(Sign & stamp)_____BHEL

Date –(To be mention by vendor)– Time_____

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.	**Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing**	**Details attached at Annexure – F2.6**
11.	**Manufacturing facilities** **(List of machines, special process facilities, material handling etc.)**	**Details attached at Annexure – F2.7**
12.	**Testing facilities** **(List of testing equipment)**	**Details attached at Annexure – F2.8**
13.	**If manufacturing process involves fabrication then-** **List of qualified Welders** **List of qualified NDT personnel with area of specialization**	**Applicable / Not applicable** **Details attached at Annexure – F2.9** **(if applicable)**
14.	**List of out-sourced manufacturing processes with Sub-Vendors' names & addresses**	**Applicable / Not applicable** **Details attached at Annexure. –F2.10** **(if applicable)**
15.	**Supply reference list including recent supplies**	**Details attached at Annexure – F2.11** **(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*

16.	**Product satisfactory performance feedback letter/certificates/End User Feedback**	**Attached at annexure - F2.12**
17.	**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 – F2.13** **(if applicable)**
18.	**Statutory / mandatory certification for the proposed product**	**Applicable / Not applicable** **Details attached at Annexure – F2.14** **(if applicable)**
19.	**Copy of ISO 9001 certificate** **(if available)**	**Attached at Annexure – F2.15**
20.	**Product technical catalogues for proposed item (if available)**	**Details attached at Annexure – F2.16**

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

Company's Seal/Stamp:-

ON COMPANY LETTER HEAD

To,
M/s Bharat Heavy Electricals Ltd.,
Project Engineering Management,
Power Project Engineering Institute,
HRD & ESI Complex,
Plot No 25, Sector-16 A, Noida-201301

Kind Attn. Mr. Rajeev Kumar/Dy.Manager/PG-III

Dear Sir,

This has reference to:

1. Our offer for LT XLPE POWER CABLE for 1X250 MW NSPCLROURKELA PP-II EXP, Bid No. _____dated _____.
2. Order no. F.No. 6/18/2019-PPD dt. 23.07.2020 issued by Ministry of Finance, Department of Expenditure Public Procurement Division.

I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India; I certify that M/s (Company Name_____) is not from such a country *or, if from such a country, has been registered with the competent authority*.
I hereby certify that M/s (Company Name_____) fulfil all requirements in this regard and is eligible to be considered.
[where applicable, evidence of valid registration by the competent authority shall be attached]

Thanking You,
Yours faithfully,

Director/Properiter/Partner
M/s _____

Guidelines for Remote Inspection of PEM BOIs

1) OBJECTIVE:

To lay down the procedure for carrying out Remote Inspection of Bought-out Items (BOIs) for PEM suppliers wherever applicable.

2) SCOPE:

It will cover suppliers for packages of PEM BOIs for various project requirements.

Invitation is sent to the suppliers for remote inspection on applications like MS Teams, Webex, etc. by BHEL.

3) MINIMUM REQUIREMENTS AT SUPPLIER'S WORKS:

i. Uninterrupted internet services

ii. Good internet bandwidth (Min 100 Mbps)

iii. Good resolution camera (2 nos) – one preferably CCTV (static at one place) and one hand hold (moving)

iv. Smart phone with minimum 8MPi camera front and back both with optical zoom facility suitable for using web applications like Webex, MicroSoft (MS) Teams, etc.

v. Computer and Scanner with good resolution

vi. Digital signatures of supplier's Quality Engineer

vii. Availability of web applications like Webex, MicroSoft (MS) Teams, as required.

viii. All Test certificates, internal test reports, calibration reports, etc. for the items offered for inspection.

ix. Availability of the above to be submitted to BHEL two days in advance before inspection.

x. Dedicated team from supplier side for facilitating inspection requirements.

xi. For ensuring proper visibility, the suggested Portable lighting sources (torch/ electric LED bulb of minimum 15 W) with no glare is to be ensured at offered job, location for remote inspection/testing. This is to be verified before start of the inspection.

xii. The GPS location co-ordinates or any method to locate inspection location shall be captured indicating the location of the Vendor-Premises of remote inspection/testing.

4) MINIMUM REQUIREMENTS AT BHEL and CUSTOMER LOCATION :

i. Uninterrupted internet services

ii. Suitable internet bandwidth

iii. Digital signatures wherever required.

iv. Availability of web applications like Webex, MS Teams, etc. as required.

v. Clearance from customer for conducting remote inspection

5) PROCEDURE:

i. Supplier will raise the inspection call in BHEL - CQIR portal.

ii. Supplier shall ensure availability of minimum requirements at supplier's works as mentioned above at point 3.

iii. Before starting the inspection, the supplier shall submit the documents (TCs, internal test reports and calibration certificates as per approved QAP) two days before the date of inspection for review by BHEL and supplier shall coordinate with BHEL and if found satisfactory, inspection shall be considered for remote.

iv. Prior to commencement of remote inspection a pre inspection meeting shall be organised by BHEL inspector with supplier to ascertain the readiness for remote inspection.

6) During inspection, supplier shall share the location on Google maps for verifying the address of the manufacturer. Location may be captured by BHEL as screenshot.

i. Inspection shall be on the basis of approved Quality Plans and associated reference documents mentioned.

ii. For witnessing inspection, supplier shall bring the mobile video camera near to the surface of the equipment or as per requirement of the inspector for clarity in viewing the test/ equipment which shall be the responsibility of supplier. Supplier shall ensure that proper lighting in available during live video streaming.

iii. Before start of the inspection, inspector shall ensure that all instruments shall have valid calibration report. Supplier shall ensure use of digital instruments preferably for inspection to the extent possible.

iv. Details of suppliers's dedicated team handling the remote inspection shall also be incorporated in the CQIR.

v. All details of inspection/ testing referred documents shall be mentioned in the CQIR. Recording of remote inspection shall be maintained by the BHEL inspector and this recording (unedited) shall be maintained at BHEL system for a minimum period of 3 years or till the warranty period whichever is later.

vi. PEM (Engineering) shall accord final technical clearance, in case of any deviation in inspected item noticed during inspection.

vii. Inspection shall be conducted by PEM-Q&BE assigned inspector along with PEM-Engg (if required). CQIR shall be prepared and maintained by PEM-Q&BE.

viii. PG will issue MDCC on the basis of acceptance of inspected items along with accepted packing photographs as per contract provisions.

7) **UNDERTAKING BY VENDOR:** Material inspected through remote inspections is meeting all technical requirements of BHEL. In case of any discrepancy from the above procedure/ material inspected, if found later, vendor will replace the materials without any cost implication to BHEL.

8) Vendor shall provide the signed and stamped of the above guidelines to BHEL as a token of acceptance.

Ashwani Sahu

From: Ashwani Sahu <ashwanisahu@bhel.in>
Sent: 06 August 2020 10:52
To: 'rakesh.singh@bhel.in'; 'rbajpai@bhel.in'; 'prawat@bhel.in'; 'apsamal@bhel.in'; 'skbaveja@bhel.in'; 'candy@bhel.in'; 'arn@bhel.in'; 'shyam.babu@bhel.in'; 'kumar.surendra@bhel.in'; 'vagrawal@bhel.in'; 'anilpatur@bhel.in'; 'padmaja@bhel.in'; 'avnaga@bhel.in'; 'radhikasista@bhel.in'; 'nalini@bhel.in'; 'mohan.k@bhel.in'; 'sanjeevi@bhel.in'; 'gans@bhel.in'; 'mnkumar@bhel.in'; 'pravi@bhel.in'; 'dina@bhel.in'; 'bhaskar.rao@bhel.in'; 'prasannagk@bhel.in'; 'jayakumarp@bhel.in'; 'ajaysharma@bhel.in'; 'aknived@bhel.in'; 'rbabu@bhel.in'; 'kms@bhel.in'; 'v.jain@bhel.in'; 'kumarrakesh@bhel.in'; 'atul.pandey@bhel.in'; 'sshekhar1@bhel.in'; 'ashuani@bhel.in'; 'shabbir@bhel.in'; 'rksaxena@bhel.in'; 'sbudiyal@bhel.in'; 'virender.gupta@bhel.in'; 'bsandipan@bhel.in'; 'gargi.ray@bhel.in'; 'prchiwarkar@bhel.in'; 'sk@bhel.in'; 'ev@bhel.in'; 'sprabhu@bhel.in'; 'indra.pal.singh@bhel.in'; 'mandvi@bhel.in'; 'minocha@bhel.in'; 'skmohite@bhel.in'; 'rprabha@bhel.in'; 'poongkodi@bhel.in'; 'dvkrsd@bhel.in'; 'aaditya@bhel.in'; 'sunilhaldia@bhel.in'; 'avisharma@bhel.in'; 'rlnagar@bhel.in'; 'anil.singh@bhel.in'; 'drgbhatla@bhel.in'; 'mgarg@bhel.in'; 'marora@bhel.in'; 'mmukundan@bhel.in'; 'neeraj@bhel.in'; 'krl@bhel.in'
Cc: 'anandac@bhel.in'; 'tkbagchi@bhel.in'; 'sgulati@bhel.in'; 'jps@bhel.in'; 'amitkerketta@bhel.in'; 'pjreddy@bhel.in'; 'ratnanav@bhel.in'; 'rpadmanabhan@bhel.in'; 'cmurthy@bhel.in'; 'akjain1@bhel.in'; 'brd@bhel.in'; 'gs@bhel.in'; 'gautam.chaklader@bhel.in'; 'tsmurali@bhel.in'; 'jai@bhel.in'; 'kaushika@bhel.in'; 'shakil@bhel.in'; 'subhas@bhel.in'; 'tlal@bhel.in'; 'aniljoshi@bhel.in'; 'csdeolikar@bhel.in'; 'r_singh@bhel.in'; 'pjreddy@bhel.in'; 'rsharma@bhel.in'; 'btalwar@bhel.in'; 'renuka@bhel.in'; 'pndmas@bhel.in'; 'snair@bhel.in'; 'gmurali@bhel.in'; 'pmgus@bhel.in'; 'pnm@bhel.in'; 'pulak@bhel.in'; 'aksarkar@bhel.in'; 'atuteja@bhel.in'; 'abgupta@bhel.in'; 'cvr@bhel.in'; 'amitpal@bhel.in'; 'sameer@bhel.in'; 'amalhotra@bhel.in'; 'ani@bhel.in'; 'sanju@bhel.in'; 'satyan@bhel.in'; 'bani@bhel.in'; 'saurabh@bhel.in'
Subject: Restrictions under Rule 144 (xi) of GFR 2017 - DoE OM No.6/18/2019-PPD dated 23.07.2020 - Circular no. 09 of 2020-21
Attachments: Restrictions under Rule 144 (xi) of GFR - Circular no. 09 of 2020-21.pdf

Dear Madam/ Sir,

Please find attached Circular No. 09 of 2020-21 on the above subject.

With kind regards,

Ashwani Sahu
DGM/ COM-SS&P,
Bharat Heavy Electricals Limited,
Corporate Office, BHEL House,
Siri Fort, New Delhi - 110049
Ph: 011-66337203

SOURCING STRATEGY & POLICY
CORPORATE OPERATIONS MANAGEMENT
BHEL – NEW DELHI

AA:SSP:PPP-MII
Dated: 06.08.2020

(Circular No. 09 of 2020-21)

Sub: Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017 - Dept. of Expenditure OM No.6/18/2019-PPD dated 23.07.2020

Ref: DPE OM No. DPE/7(4)/2017-Fin.(Part-I) dated 30.07.2020 (received vide DHI email dated 03.08.2020)

1. DPE vide OM No. DPE/7(4)/2017-Fin.(Part-I) dated 30.07.2020 has enclosed Department of Expenditure's (DoE) OM and Order (Public Procurement No. 1 and No. 2) vide ref. F.No.6/18/2019-PPD dated 23.07.2020 on Restrictions under Rule 144 (xi) of the GFR and subsequent clarification Order (Public Procurement No. 3) dated 24.07.2020 for compliance by CPSEs.

2. As per para 1 of the DoE Order, any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) **only** if the bidder is registered with the Competent Authority (Registration Committee constituted by DPIIT as per annex I of the Order).

3. The DoE Order shall not apply to cases where orders have been placed or contract has been concluded or letter/ notice of award/ acceptance (LoA) has been issued on or before the date of the Order i.e. **23.07.2020** and cases falling under Annex II of the Order.

4. The DoE Order is not applicable to bidders from those countries (even if sharing a land border with India) to which the GoI has extended lines of credit or in which the GoI is engaged in development projects.

5. Updated lists of countries to which lines of credit have been extended or in which development projects are undertaken are

06/08/2020

available on the Ministry of External affairs website (https://www.mea.gov.in/). The latest list is enclosed for ready reference. Units/ Regions are advised to regularly keep themselves updated in this regard.

6. Model clauses to be inserted in tenders and Model Certificates to be obtained from Bidders has been given in Annex III of the Order.

Accordingly, all Units/ Regions are to ensure compliance of DoE Orders dated 23.07.2020 and clarification dated 24.07.2020.

This issues with the approval of the Competent Authority.

06/08/2020

(C. Venkat Rao)
GM/ SS&P

Encls.: As above

Distribution:

- All Heads of MM of Units/ Regions

Copy to:

- All Heads of Units/ Regions

- SS&P page on Corporate Office intranet - http://intranet.bhel.in

- Director (HR)/(Fin)/(IS&P)/(Power)/(E, R&D) - for kind information
- SA to CMD - for kind information of CMD

BHEL House, Siri Fort, New Delhi
+91 - 11 - 2600 1001

From: "Dinesh Pal Singh" <dineshp.singh@nic.in>
To: "com sec" <com.sec@andrewyule.com>, yuledelhi@gmail.com, cmd@andrewyule.com, "nalinshinghal" <nalinshinghal@bhel.in>, "cmd" <cmd@bhel.in>, cmd@bharatpumps.co.in, bpcdelhi@gmail.com, bpclindia@sancharnet.in, info@bheleml.com, md@bheleml.com, info@bbjconst.com, sundarbanerjee@bbjconst.com, "Bridge Roof" <delhi@bridgeroof.co.in>, "CMD BRIDGEROOF" <cmd@bridgeroof.co.in>, "Bridge Roof" <bridge@bridgeroof.co.in>, bandrdelhi@gmail.com, cmd@cciltd.in, dirf@cciltd.in, "co secy" <co_secy@cciltd.in>, "cci co" <cci_co@cciltd.in>, "CMD EPI" <cmd@engineeringprojects.com>, "pk sahoo" <pk.sahoo@engineeringprojects.com>, "Deepika Mehta" <deepika.mehta@engineeringprojects.com>, "S Girish Kumar" <cmd@hmtindia.com>, girishkumar@hmti.com, "cmd" <cmd@hecltd.com>, "ABHAY KUMAR KANTH" <sect@hecltd.com>, corpmktg@hecltd.com, hecdelhi@hecltd.com, cmdhclkol@gmail.com, hnl@hnlonline.com, cmd@indiansalt.com, "sumona majumdar" <sumona.majumdar@indiansalt.com>, info@indiansalt.com, cmd@ilkota.in, tsocmd@ilkota.in, "ANANDA CHANNAKESHAVAIAH" <cmd@nepamills.nic.in>, "Secretary NEPAMILLS" <secretary@nepamills.nic.in>, "nepa ltd" <nepa_ltd@yahoo.com>, "Shri AVHIJIT CHATTERJEE DELHI" <nepadelhi@nepamills.nic.in>, mdo@reil.co.in, "Rakesh Chopra" <rakesh.chopra@reiljp.com>, "Subhash Agrawal, Addl. General Manager (F&A), REIL" <fin_acct@reiljp.com>, richardsoncruddas@yahoo.co.in, cmd@scootersindia.com, companysecretary@scootersindia.com, info@tsl.in, girishcmd@hpf-india.com, indu@hpf-india.com, sunilkumar@fcriindia.com, director@fcriindia.com, gsvfcri@gmail.com, director@araiindia.com, info@araiindia.com, "PravinAggarwal Director" <fame.india@gov.in>, "sanjay bando" <sanjay.bando@gmail.com>, "Team Natrip" <team@natrip.in>, "Dinesh Vasishta" <dinesh.vasishta@natrip.in>, "Director, CMTI" <director.cmti@nic.in>, "directorate cmti" <directorate.cmti@nic.in>, "Krishna Rathod" <cmti@nic.in>
Cc: "Sukriti Likhi" <sukriti.l@nic.in>, "Office Of JS(SL)" <jssl-dhi@gov.in>, "amit varadan" <amit.varadan@gov.in>, "Amit Mehta" <amitmehta.ofb@nic.in>, "Sujata Sharma" <sujatas@nic.in>, "Sunil Kumar Singh" <sunilsingh.irss@gov.in>, "Ritu Pande" <ritu.pande@nic.in>, "Mohmed Zakir Hussain" <zakir.its@gov.in>, "Rama Kant Singh Director" <singh.ramakant59@nic.in>, "ANAND KUMAR SINGH" <aksingh5.ofb@ofb.gov.in>, "Parveen Gupta (DS)" <parveen.gupta9@nic.in>, "am.manichan" <am.manichan@nic.in>, "Alka Tewari" <alka.tewari@gov.in>, "Ghanshyam Thakur" <ghanshyam.thakur@nic.in>, "Kumar Diwakar Singh" <kdiwakar.singh@nic.in>, "Vijay Kumar" <vkumar.mv@nic.in>, "Madanpal Singh" <madanpal.singh@nic.in>, "dhi_coord" <dhi_coord@nic.in>
Sent: Monday, August 3, 2020 1:26:15 PM
Subject: Fwd: [Secy-admn-dpe] Restrictions under Rule 144(xi) of the General Financial Rules (GFRs), 2017- Dept. of Expenditure OM No.6/18/2019-PPD dated 23rd July, 2020 - regarding

Sir/Madam,

Reference to trailing mail dated 30th July, 2020 on the subject mentioned above.

DPE O.M. No.DPE/7(4)/2017-Fin.(Part-I) dated 30th July, 2020 alongwith its enclosures is sent herewith for necessary action.

Regards,

Dinesh Pal Singh,
Under Secretary(Coord.), DHI

From: "Samba Siva Rao" <ps.sivarao@nic.in>
To: secy-admn-dpe@lsmgr.nic.in
Sent: Thursday, July 30, 2020 2:57:09 PM
Subject: [Secy-admn-dpe] Restrictions under Rule 144(xi) of the General Financial Rules (GFRs), 2017- Dept. of Expenditure OM No.6/18/2019-PPD dated 23rd July, 2020 - regarding

Sir/Madam

Please find enclsoed DPE OM dated 30.7.2020 on the above subject for necessary action.

P S S RAO
DD/DPE

DPE_OM_DTD_30.7.20.pdf
13 MB

No. DPE/7(4)/2017-Fin.(Part-I)
Government of India
Ministry of Heavy Industries& Public Enterprises
Department of Public Enterprises
*****

Public Enterprises Bhawan
Block No.14, CGO Complex
New Delhi – 110003

Date: 30th July, 2020

OFFICE MEMORANDUM

Subject: Restrictions under Rule 144(xi) of the General Financial Rules (GFRs),2017- Dept. of Expenditure OM No.6/18/2019-PPD dated 23rd July, 2020 - regarding

The undersigned is directed to enclose Department of Expenditure's (DoE) OMs No. 6/18/2019-PPD dated 23rd July, 2020 & 24th July, 2020 imposing restrictions under Rule 144(xi) of the General Financial Rules (GFRs), 2017 on the grounds of Defence of India and National Security for information and compliance.

2. All the administrative Ministries/ Departments of CPSEs are requested to ensure compliance of the directions issued by DoE by CPSEs under their administrative control.

3. This issues with the approval of competent authority.

K. Mishra

(Kalyani Mishra)
Director
Tel.24362061

Encl.: (DoE's OMs No. 6/18/2019-PPD dated 23rd July, 2020
6/18/2019-PPD dated 23rd July, 2020&
6/18/2019-PPD dated 24th July, 2020)

To
i) All the Secretaries to the Administrative Ministries/Departments of CPSEs
ii) Chief Executives of CPSEs

Copy for information to:
Secretary, D/o Expenditure, North Block, New Delhi

डा. टी. वी. सोमनाथन, आई.ए.एस.
सचिव (व्यय)
Dr. T. V. Somanathan, I.A.S.
Secretary (Expenditure)

सत्यमेव जयते

भारत सरकार
वित्त मंत्रालय
व्यय विभाग
Government of India
Ministry of Finance
Department of Expenditure
नार्थ ब्लाक, नई दिल्ली-110001
North Block, New Delhi-110001
Tel. : 23092929, 23092663
Fax : 23092546
E-mail : secyexp@nic.in
Website : www.finmin.nic.in

स्वच्छ भारत
एक कदम स्वच्छता की ओर

D.O.F.No.6/18/2019- PPD

28th July, 2020

OFFICE OF SECRETARY (EXPENDITURE) 47545 29/7/20

Dear Shri Sailesh,

As you are aware the General Financial Rules (GFRs), 2017 have been amended inserting Rule 144 (xi) which empowers Department of Expenditure to impose restrictions, including prior registration or screening on procurement from bidders from a country or countries on grounds of Defence of India and National Security. The amended Rule provides that no public procurement shall be made in violation of such restrictions. Pursuant to the above, Order (Public Procurement No. 1) and Order (Public Procurement No. 2) were issued vide F.No.6/18/2019-PPD dated 23.7.2020. A clarification was issued in Order (Public Procurement No. 3).

2. Though the GFRs ordinarily do not apply to public sector enterprises, in this instance, as they relate to national security, the orders have consciously been made applicable to all Central Public Sector Enterprises as well. It is, therefore, requested that necessary instructions may be issued by your Department reiterating the applicability of orders stated in Paragraph 1 of this letter to all Central Public Sector Enterprises.

3. Copies of the Orders are attached for ease of reference.

With regards,

Yours sincerely,

(T.V. Somanathan)

Encl: **As above**

AS(RKC)

Shri Sailesh, IAS
Secretary,
Department of Public Enterprises,
160, Udyog Bhawan,
New Delhi: 110011

Copy to: Cabinet Secretary – for information

We may issue instructions today
S
29/7

F.No.6/18/2019-PPD
Ministry of Finance
Department of Expenditure
Public Procurement Division

161, North Block,
New Delhi
23rd July, 2020

Office Memorandum

Subject: Insertion of Rule 144 (xi) in the General Financial Rules (GFRs), 2017

Rule 144 of the General Financial Rules 2017 entitled 'Fundamental principles of public buying', has been amended by inserting sub-rule (xi) as under:

Notwithstanding anything contained in these Rules, Department of Expenditure may, by order in writing, impose restrictions, including prior registration and/or screening, on procurement from bidders from a country or countries, or a class of countries, on grounds of defence of India, or matters directly or indirectly related thereto including national security; no procurement shall be made in violation of such restrictions.

(Sanjay Prasad)
Joint Secretary (PPD)
Email ID: js.pfc2.doe@gov.in
Telephone: 011-23093882

To,

(1) Secretaries of All Ministries/ Departments of Government of India
(2) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

F.No.6/18/2019-PPD
Ministry of Finance
Department of Expenditure
Public Procurement Division

161, North Block,
New Delhi
23rd July, 2020

Order (Public Procurement No. 1)

Subject: Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017

Attention is invited to this office OM no. 6/18/2019-PPD dated 23rd July 2020 inserting Rule 144 (xi) in GFRs 2017. In this regard, the following is hereby ordered under Rule 144 (xi) on the grounds stated therein:

Requirement of registration

1. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority, specified in **Annex I.**

2. This Order shall not apply to (i) cases where orders have been placed or contract has been concluded or letter/notice of award/ acceptance (LoA) has been issued on or before the date of this order; and (ii) cases falling under **Annex II**.

Transitional cases

3. Tenders where no contract has been concluded or no LoA has been issued so far shall be handled in the following manner: -

    a) *In tenders which are yet to be opened, or where evaluation of technical bid or the first exclusionary qualificatory stage (i.e. the first stage at which the qualifications of tenderers are evaluated and unqualified bidders are excluded) has not been completed*: No contracts shall be placed on bidders from such countries. Tenders received from bidders from such countries shall be dealt with as if they are non-compliant with the tender conditions and the tender shall be processed accordingly.

    b) *If the tendering process has crossed the first exclusionary qualificatory stage*: If the qualified bidders include bidders from such countries, the

entire process shall be scrapped and initiated *de novo*. The *de novo* process shall adhere to the conditions prescribed in this Order.

c) As far as practicable, and in cases of doubt about whether a bidder falls under paragraph 1, a certificate shall be obtained from the bidder whose bid is proposed to be considered or accepted, in terms of paras 8, 9 and 10 read with para 1 of this Order.

Incorporation in tender conditions

4. In tenders to be issued after the date of this order, the provisions of paragraph 1 and of other relevant provisions of this Order shall be incorporated in the tender conditions.

Applicability

5. Apart from Ministries / Departments, attached and subordinate bodies, notwithstanding anything contained in Rule 1 of the GFRs 2017, this Order shall also be applicable
   a. to all Autonomous Bodies;
   b. to public sector banks and public sector financial institutions; and
   c. subject to any orders of the Department of Public Enterprises, to all Central Public Sector Enterprises; and
   d. to procurement in Public Private Partnership projects receiving financial support from the Government or public sector enterprises/ undertakings.
   e. Union Territories, National Capital Territory of Delhi and all agencies/ undertakings thereof

Definitions

6. "Bidder" for the purpose of this Order (including the term 'tenderer', 'consultant' 'vendor' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency, branch or office controlled by such person, participating in a procurement process.

7. "Tender" for the purpose of this Order will include other forms of procurement, except where the context requires otherwise.

8. "Bidder from a country which shares a land border with India" for the purpose of this Order means

a) An entity incorporated, established or registered in such a country; or
b) A subsidiary of an entity incorporated, established or registered in such a country; or
c) An entity substantially controlled through entities incorporated, established or registered in such a country; or
d) An entity whose *beneficial owner* is situated in such a country; or
e) An Indian (or other) agent of such an entity; or
f) A natural person who is a citizen of such a country; or
g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

9. "Beneficial owner" for the purpose of paragraph 8 above will be as under:

(i) In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person(s), has a controlling ownership interest or who exercises control through other means.
Explanation—

a. "Controlling ownership interest" means ownership of, or entitlement to, more than twenty-five per cent of shares or capital or profits of the company;

b. "Control" shall include the right to appoint the majority of the directors or to control the management or policy decisions, including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

(ii) In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

(iii) In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

(iv) Where no natural person is identified under (i) or (ii) or (iii) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

4/12

(v) In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

10. "Agent" for the purpose of this Order is a person employed to do any act for another, or to represent another in dealings with third persons.

Sub-contracting in works contracts

11. In works contracts, including turnkey contracts, contractors shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority. The definition of "contractor from a country which shares a land border with India" shall be as in paragraph 8 above. This shall not apply to sub-contracts already awarded on or before the date of this Order.

Certificate regarding compliance

12. A certificate shall be taken from bidders in the tender documents regarding their compliance with this Order. If such certificate given by a bidder whose bid is accepted is found to be false, this would be a ground for immediate termination and further legal action in accordance with law.

Validity of registration

13. In respect of tenders, registration should be valid at the time of submission of bids and at the time of acceptance of bids. In respect of supply otherwise than by tender, registration should be valid at the time of placement of order. If the bidder was validly registered at the time of acceptance / placement of order, registration shall not be a relevant consideration during contract execution.

Government E-Marketplace

14. The Government E-Marketplace shall, as soon as possible, require all vendors/ bidders registered with GeM to give a certificate regarding compliance with this Order, and after the date fixed by it, shall remove non-compliant entities from GeM unless/ until they are registered in accordance with this Order.

5/12

Model Clauses/ Certificates

15. Model Clauses and Model Certificates which may be inserted in tenders / obtained from Bidders are enclosed as **Annex III**. While adhering to the substance of the Order, procuring entities are free to appropriately modify the wording of these clauses based on their past experience, local needs etc. without making any reference to this Department.

(Sanjay Prasad)
Joint Secretary (PPD)
Email ID: js.pfc2.doe@gov.in
Telephone: 011-23093882

To

(1) Secretaries of All Ministries/ Departments of Government of India for information and necessary action. They are also requested to inform these provisions to all procuring entities.

(2) Secretary, Department of Public Enterprises with a request to immediately reiterate these orders in respect of Public Enterprises.

(3) Secretary DPIIT with a request to initiate action as provided under Annex I

(4) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

6/12

Annex I: Competent Authority and Procedure for Registration

A. The Competent Authority for the purpose of registration under this Order shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT)*.

B. The Registration Committee shall have the following members*:

   i. An officer, not below the rank of Joint Secretary, designated for this purpose by DPIIT, who shall be the Chairman;
   ii. Officers (ordinarily not below the rank of Joint Secretary) representing the Ministry of Home Affairs, Ministry of External Affairs, and of those Departments whose sectors are covered by applications under consideration;
   iii. Any other officer whose presence is deemed necessary by the Chairman of the Committee.

C. DPIIT shall lay down the method of application, format etc. for such bidders as stated in para 1 of this Order.

D. On receipt of an application seeking registration from a bidder from a country covered by para 1 of this Order, the Competent Authority shall first seek political and security clearances from the Ministry of External Affairs and Ministry of Home Affairs, as per guidelines issued from time to time. Registration shall not be given unless political and security clearance have both been received.

E. The Ministry of External Affairs and Ministry of Home Affairs may issue guidelines for internal use regarding the procedure for scrutiny of such applications by them.

F. The decision of the Competent Authority, to register such bidder may be for all kinds of tenders or for a specified type(s) of goods or services, and may be for a specified or unspecified duration of time, as deemed fit. The decision of the Competent Authority shall be final.

G. Registration shall not be granted unless the representatives of the Ministries of Home Affairs and External Affairs on the Committee concur*.

H. Registration granted by the Competent Authority of the Government of India shall be valid not only for procurement by Central Government and its agencies/ public enterprises etc. but **also for procurement by State Governments and their agencies/ public enterprises etc. No fresh registration at the State level shall be required.**

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I. The Competent Authority is empowered to cancel the registration already granted if it determines that there is sufficient cause. Such cancellation by itself, however, will not affect the execution of contracts already awarded. Pending cancellation, it may also suspend the registration of a bidder, and the bidder shall not be eligible to bid in any further tenders during the period of suspension.

J. For national security reasons, the Competent Authority shall not be required to give reasons for rejection / cancellation of registration of a bidder.

K. In transitional cases falling under para 3 of this Order, where it is felt that it will not be practicable to exclude bidders from a country which shares a land border with India, a reference seeking permission to consider such bidders shall be made by the procuring entity to the Competent Authority, giving full information and detailed reasons. The Competent Authority shall decide whether such bidders may be considered, and if so shall follow the procedure laid down in the above paras.

L. Periodic reports on the acceptance/ refusal of registration during the preceding period may be required to be sent to the Cabinet Secretariat. Details will be issued separately in due course by DPIIT.

[*Note:

i. In respect of application of this Order to procurement by/ under State Governments, all functions assigned to DPIIT shall be carried out by the State Government concerned through a specific department or authority designated by it. The composition of the Registration Committee shall be as decided by the State Government and paragraph G above shall not apply. However, the requirement of **political and security clearance as per para D shall remain and no registration shall be granted without such clearance**.

ii. Registration granted by State Governments shall be valid only for procurement by the State Government and its agencies/ public enterprises etc. and shall not be valid for procurement in other states or by the Government of India and their agencies/ public enterprises etc.]

8/12

Annex II: Special Cases

A. Till 31st December 2020, procurement of medical supplies directly related to containment of the Covid-19 pandemic shall be exempt from the provisions of this Order.

B. *Bona fide* procurements made through GeM without knowing the country of the bidder till the date fixed by GeM for this purpose, shall not be invalidated by this Order.

C. *Bona fide* small procurements, made without knowing the country of the bidder, shall not be invalidated by this Order.

D. In projects which receive international funding with the approval of the Department of Economic Affairs (DEA), Ministry of Finance, the procurement guidelines applicable to the project shall normally be followed, notwithstanding anything contained in this Order and without reference to the Competent Authority. Exceptions to this shall be decided in consultation with DEA.

E. This Order shall not apply to procurement by Indian missions and by offices of government agencies/ undertakings located outside India.

9/12

Annex III

Model Clause /Certificate to be inserted in tenders etc.

(While adhering to the substance of the Order, procuring entities and GeM are free to appropriately modify the wording of the clause/ certificate based on their past experience, local needs etc.)

Model Clauses for Tenders

I. 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.

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -

a. An entity incorporated, established or registered in such a country; or
b. A subsidiary of an entity incorporated, established or registered in such a country; or
c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
d. An entity whose *beneficial owner* is situated in such a country; or
e. An Indian (or other) agent of such an entity; or
f. A natural person who is a citizen of such a country; or
g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

IV. The *beneficial owner* for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.
Explanation—

a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

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b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. *[To be inserted in tenders for Works contracts, including Turnkey contracts]* The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Model Certificate for Tenders (for transitional cases as stated in para 3 of this Order)

"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 this bidder is not from such a country and is eligible to be considered."

Model Certificate for Tenders

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the

11/12

Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

Model Certificate for Tenders for Works involving possibility of sub-contracting

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

Model Certificate for GeM:

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this vendor/ bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this vendor/ bidder fulfills all requirements in this regard and is eligible to be considered for procurement on GeM. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

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F.No.6/18/2019-PPD
Ministry of Finance
Department of Expenditure
Public Procurement Division

161, North Block
New Delhi
23rd July, 2020

Order (Public Procurement No. 2)

Subject: Exclusion from restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017 –regarding.

In Order (Public Procurement No. 1) dated 23rd July 2020, orders have been issued requiring registration of bidders from a country sharing a land border with India in order to be eligible to bid in public procurement.

2. Notwithstanding anything contained therein, it is hereby clarified that the said Order will not apply to bidders from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects.

3. Updated lists of countries to which lines of credit have been extended or in which development projects are undertaken are given in the website of the Ministry of External Affairs.

(Sanjay Prasad)
Joint Secretary (PPD)
Email ID: js.pfc2.doe@gov.in
Telephone: 011-23093882

To,

(1) Secretaries of All Ministries/ Departments of Government of India for information and necessary action. They are also requested to inform these provisions to all procuring entities.

(2) Secretary, Department of Public Enterprises with a request to immediately reiterate these orders in respect of Public Enterprises.

(3) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

F.No.6/18/2019-PPD
Ministry of Finance
Department of Expenditure
Public Procurement Division

161, North Block,
New Delhi
24th July, 2020

Order (Public Procurement No. 3)

Subject: Clarification to Order (Public Procurement No.1) dated 23rd July 2020

Attention is invited to paragraph 3(b) of the Order (Public Procurement No.1), under the heading "Transitional provisions" which reads as follows:

> b) *If the tendering process has crossed the first exclusionary qualificatory stage*: If the qualified bidders include bidders from such countries, the entire process shall be scrapped and initiated *de novo*. The *de novo* process shall adhere to the conditions prescribed in this Order.

It is hereby clarified that for the purpose of paragraph 3 (b), "qualified bidders" means only those bidders who would otherwise have been qualified for award of the tender after considering all factors including price, if Order (Public Procurement No. 1) dated 23rd July 2020 had not been issued.

2. If bidders from such countries would not have qualified for award for reasons unconnected with the said Order (for example, because they do not meet tender criteria or their price bid is higher or because of the provisions of purchase preference under any other order or rule or any other reason) then there is no need to scrap the tender / start the process de novo.

3. The following examples are given to assist in implementation of the Order.

Example1: Four bids are received in a tender. One of them is from a country which shares a land border with India. The bidder from such country is found to be qualified technically by meeting all prescribed criteria and is also the lowest bidder. In this case, the bidder is qualified for award of the tender, except for the provisions of the Order (Public Procurement No. 1) dated 23rd July. In this case, the tender should be scrapped and fresh tender initiated.

Example 2: The facts are as in Example 1, but the bidder from such country, though technically qualified is not the lowest because there are other technically qualified bidders whose price is lower. Hence the bidder from such country would not be

qualified for award of the tender irrespective of the Order (Public Procurement No. 1) dated 23rd July 2020. In such a case, there is no need to scrap the tender.

Example 3: The facts are as in Example 1, but the bidder from a country which shares a land border with India, though technically qualified, is not eligible for award due to the application of price preference as per other orders/ rules. In such a case, there is no need to scrap the tender.

Example 4: Three bids are received in a tender. One of them is a bidder from a country sharing a land border with India. The bidder from such a country does not meet the technical requirements and hence is not qualified. There is no need to scrap the tender.

(Sanjay Prasad)
Joint Secretary (PPD)
Email ID: js.pfc2.doe@gov.in
Telephone: 011-23093882

To,

(1) Secretaries of All Ministries/ Departments of Government of India for information and necessary action. They are also requested to inform the clarification to all procuring entities.
(2) Secretary, Department of Public Enterprises with a request to immediately circulate this clarification among Public Enterprises.
(3) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

2/2

List of Countries to which LoC has been extended w.r.t. Order (Public Procurement no. 2) dated 23 July 2020

Sr. No.	Country
South Asia (4 countries)	
1	Bangladesh
2	Maldives
3	Nepal
4	Sri Lanka
South East Asia (4 countries)	
5	Cambodia
6	Lao PDR
7	Myanmar
8	Vietnam
Asia (3 countries)	
9	Mongolia

10	Iran
11	Syria
Russia and CIS (3 countries)	
12	Belarus
13	Russia
14	Uzbekistan
Africa (41 countries)	
15	Angola
16	Benin
17	Burkina Faso
18	Burundi
19	Cameroon
20	Central African Republic
21	Chad
22	Comoros
23	Cote d'Ivoire
24	D.R.Congo
25	Djibouti
26	Eritrea
27	Eswatini (Swaziland)
28	Ethiopia
29	Gabon
30	Gambia
31	Ghana

32	Guinea
33	Guinea Bissau
34	Kenya
35	Lesotho
36	Liberia
37	Madagascar
38	Malawi
39	Mali
	Mali & Senegal (combined LOC)
40	Mauritania
41	Mauritius
42	Mozambique
43	Niger
44	Nigeria
45	R. Congo
46	Rwanda
47	Senegal
48	Seychelles
49	Sierra Leone
50	Sudan
51	Tanzania
52	Togo
53	Uganda

54		Zambia
55		Zimbabwe
		Ecowas Bank of Investment and Development (EBID)
56		Bolivia
57		Cuba
58		Guyana
59		Honduras
60		Jamaica
61		Nicaragua
62		Suriname
	Pacific Island countries (2 countries)	
63		Fiji Islands
64		Papua New Guinea
	Total (64 countries) US $ 30.595 billion	

List of countries in which development grant projects are undertaken w.r.t. Order (Public Procurement No. 2) dated 23 July 2020

Sr. No.	Country
1	Afghanistan
2	Antigua & Barbuda
3	Argentina
4	Armenia
5	Azerbaijan
6	Bangladesh
7	Barbados
8	Belize
9	Benin
10	Bhutan
11	Bolivia
12	Botswana

13	Burkina Faso
14	Burundi
15	Cambodia
16	Cameroon
17	Cape Verde
18	Central African Republic
19	Chad
20	Commonwealth of Dominica
21	Comoros
22	Cook Islands
23	Costa Rica
24	Cote d'Ivoire
25	Democratic Republic of the Congo
26	Djibouti
27	Ecuador
28	Egypt
29	Equatorial Guinea
30	Eritrea
31	Ethiopia
32	Federated States of Micronesia
33	Fiji Islands
34	Gabon
35	Gambia
36	Ghana

37	Grenada
38	Guinea
39	Guinea-Bissau
40	Guyana
41	Haiti
42	Jamaica
43	Jordan
44	Kazakhstan
45	Kenya
46	Kingdom of Lesotho
47	Kiribati
48	Kyrgyzstan
49	Lao PDR
50	Lebanon
51	Liberia
52	Libya
53	Madagascar
54	Malawi
55	Maldives
56	Mali
57	Marshall Islands
58	Mauritania
59	Mauritius
60	Mongolia

61	Morocco
62	Mozambique
63	Myanmar
64	Namibia
65	Nauru
66	Nepal
67	Niger
68	Nigeria
69	Niue
70	Palau
71	Palestine
72	Panama
73	Papua New Guinea
74	Peru
75	Republic of Congo
76	Rwanda
77	Saint Kitts & Nevis
78	Saint Lucia
79	Saint Vincent & the Grenadines
80	Samoa
81	Sao Tome and Principe
82	Senegal
83	Seychelles
84	Sierra Leone

85	Solomon Islands
86	Somalia
87	South Africa
88	South Sudan
89	Sri Lanka
90	Sudan
91	Suriname
92	Swaziland
93	Syria
94	Tajikistan
95	Tanzania
96	The Bahamas
97	The Commonwealth of Dominica
98	Timor Leste
99	Togo
100	Tonga
101	Trinidad & Tobago
102	Turkmenistan
103	Tuvalu
104	Uganda
105	Ukraine
106	Uzbekistan
107	Vanuatu
108	Vietnam

109	Zambia
110	Zimbabwe

No.25-11/6/2018-PG
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi – 110001
Tele Fax: 011-23730264
*****

Dated 02/07/2020

ORDER

Power Supply System is a sensitive and critical infrastructure that supports not only our **national defence**, **vital emergency services** including health, disaster response, **critical national infrastructure** including classified data & communication services, defence installations and manufacturing establishments, logistics services but also the **entire economy** and the **day-to-day life** of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is **a strategic and critical sector.**

The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber attacks through malware / Trojans etc. embedded in imported equipment. Hence, **to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network** in the country, the following directions are hereby issued :-

(1) All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.

(2) All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MoP).

(3) Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India

(4) Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MoP).

This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).

(Goutam Ghosh)
Director
Tel: 011-23716674

To:
1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination),Cabinet Secretariat
3. Vice Chairman, NITI Aayog
4. Comptroller and Auditor General of India
5. Chairperson, CEA
6. CMDs of CPSEs/Chairman of DVC & BBMB/MD, EESL/DG,NPTI/DG,CPRI/DG,BEE/
7. All ASs/JSs/EA, MoP

Copy:
1. PS to Hon'ble PM, Prime Minister's Office
2. PS to Hon'ble MOS(IC) for Power and NRE
3. Sr. PPS to Secretary(Power)

No.25-11/6/2018-PG
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi – 110001
Tele Fax: 011-23730264
*****

Dated 02/07/2020

ORDER

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(2) All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MoP).

(3) Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India

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This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).

(Goutam Ghosh)
Director
Tel: 011-23716674

To:
1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination),Cabinet Secretariat
3. Vice Chairman, NITI Aayog
4. Comptroller and Auditor General of India
5. Chairperson, CEA
6. CMDs of CPSEs/Chairman of DVC & BBMB/MD, EESL/DG,NPTI/DG,CPRI/DG,BEE/
7. All ASs/JSs/EA, MoP

Copy:
1. PS to Hon'ble PM, Prime Minister's Office
2. PS to Hon'ble MOS(IC) for Power and NRE
3. Sr. PPS to Secretary(Power)

No.11/05/2018-Coord.
Government of India
Ministry of Power

Shram Shakti Bhawan, New Delhi
Dated the 23rd July, 2020.

ORDER

Sub: Measures for contributing towards 'Atmanirbhar Bharat' and 'Make in India' through phased indigenisation in Power Sector.

Whereas Ministry of Power after analysis of data relating to import of the equipment in power sector and consultations with the stakeholders engaged in manufacturing of the equipment as well as developers of power projects in generation, transmission, and distribution, has taken note of the fact that despite Government of India policy of 'Make in India', many equipment in this sector are being imported even though sufficient domestic manufacturing capacity and competition exists.

Whereas DPIIT from time to time since 2017 has issued orders with the latest version issued vide No.P-45021/2/2017-PP (BE-II) on 04.06.2020 to promote Make in India and domestic manufacturing of goods and services in India with a view to enhancing income and employment and the said order needs to be fully implemented in power sector.

Whereas, for power sector to become an integral part of national campaign of 'Atmanirbhar Bharat' and to contribute to 'Make in India' policy of Government of India, it is essential that developers in the generation, transmission, and distribution of power, are also encouraged to effectively and wholeheartedly contribute in this endeavor.

Whereas Power is a sensitive and strategically important sector and is a critical infrastructure for development of our country, as our national defense, vital emergency services, critical national infrastructure, communication, data services, health services, logistics, manufacturing etc. all depends on reliable power supply and any possibility of malware/cyber threat in the power systems leads to vulnerability with the potential of bringing down the whole system with consequential impact on all other sectors of our country. Therefore, 'Atmanirbhar Bharat' has a much higher level of significance for this sector. Therefore, there is a need to encourage, adopt and use only 'Make in India' equipment/materials/parts/items in the power sector in order to protect the safety and security of our coun**try.**

Now therefore the following order is issued:

1. This order is issued in consonance with the order of the DPIIT referred above.

2. All equipment/materials/parts/items required in the power sector which are domestically manufactured with sufficient domestic capacity shall necessarily be used from the domestic manufacturers only as per the extant provisions of the Public Procurement (Preference to Make in India) Orders issued by DPIIT and MoP.

Contd……2/-

3. In respect of equipment/materials/parts/items wherein domestic capacity is not available and imports are inevitable, the MoP shall list out all these equipment and prepare an Action Plan for their indigenisation over a specified time frame of 2-3 years. For this an enabling policy framework through support to Start-ups, phased manufacturing programme, vendor development, Research & Development, tax & other incentives needs to be developed.

4. Till such time indigenous manufacturing capacity for all equipment/materials/ parts/items required in the power sector are developed, the goods so imported shall be tested in certified laboratories designated by MoP to check the presence of any embedded malware/trojans or other cyber threats and also to check adherence to Indian Standards. For testing of goods from prior reference countries, the testing protocol shall be approved by Ministry of Power (MoP).

5. Ministry of Power shall prepare an 'Approved list of Models and Manufacturers' (ALMM) in power sector. All Power Projects which are bid out as per the standard bidding guidelines will be required to procure equipment from manufacturers figuring in the approved list.

6. Financing from REC and PFC will be structured in such a manner that lower rates of interest will be charged on the developers who will use domestically manufactured equipment.

This issues with the approval of Hon'ble MoS (IC) for Power and NRE.

(R.K. Das)
Under Secretary to the Government of India
Tel. No.011-23752495

To:

1. All Ministries/ Departments of Government of India (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. PS to Hon'ble PM, Prime Minister's Office
4. Vice Chairman, NITI Aayog
5. Director General, Comptroller and Auditor General of India
6. Secretary, DPIIT, Chairman of Standing Committee for implementation of Public Procurement Order, 2017
7. Joint Secretary, DPIIT, Member-Convener of Standing Committee for implementation of Public Procurement Order, 2017
8. Chairperson, CEA
9. CMDs of CPSEs/ Chairmen of DVC & BBMB/ MD of EESL/ DG(NPTI)/ DG(CPRI)/ DG(BEE)
10. All JSs/ EA, MoP

Copy to:

1. PS to MoS (IC) for Power and NRE
2. Sr. PPS to Secretary (Power)
3. Sr. PPS to Additional Secretaries in MoP