

VOLUME II

250 MW RVUNL CHHABRA U#4 ESP RESTORATION

TECHNICAL SPECIFICATION

FOR

LT XLPE POWER CABLES

SPECIFICATION NO: *PE-TS-493-507-E001*

REVISION: 00



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

594729/2021/PS-PEM-EL



DOCUMENT TITLE

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SHEET

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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

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SECTION –I

SPECIFIC TECHNICAL REQUIREMENTS



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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

Type testing and packing on cables shall be conducted as per attached BHEL QP (PE-QP-999-507-E002) along with Annexure-A to QP. The finalized QP during detailed engineering 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.

5.1 DRAWINGS & DOCUMENTS TO BE SUBMITTED

- 5.1 After placement of order, documents shall be submitted for BHEL & customer's approval as specified in NIT.
- 5.2 Drawings/documents shall be submitted through Document Management System (DMS)
- 5.3 After receiving LOI, the vendor shall submit drawings/documents in requisite number of copies as per NIT.



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DATA SHEET-A

CABLE DETAILS OF LT XLPE POWER CABLES

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, ASTM:2843, ASTM:2863, IEC-754-1,IEC:60332-3-23, IEEE:60383,IS-10418	
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		Colour coding as per IS-7098 (Part-I)
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)	



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(h)	Method of application	
(1)	Multi-core cables:	
(i)	With fillers	<i>Pressure/Vacuum extruded</i>
(ii)	Without fillers	<i>Pressure extruded</i>
(2)	Single-core cables:	<i>NA</i>
10.0	ARMOUR	
(a)	<i>Applicable</i>	<i>YES</i>
(b)	Material:	
(i)	Single core cables	<i>NA</i>
(ii)	<i>Multi-core cables</i>	Galvanised Steel Round Wire OR Galvanised Steel Formed Wire/Strip, conforming to (i) Type 'a' / 'b' as per Table-6 of IS 7098 part-I and (ii) IS 3975
(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)	Paint on armour joint	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	<i>Black</i>
(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	<i>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 'RVNUL' Name @5m (by embossing) Progressive sequential marking @ 1m (by embossing/ printing)</i>
12.0	FR-LSH CHARACTERISTICS	
(a)	Oxygen index	Min 29 (As per IS 10810 part-58), ASTM D 2863
(b)	Temperature index	Min. 250°C(As per ASTM D 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)	<i>Flammability test for all cables</i>	<i>As per: IEC-60332 Part-3, CAT-B</i>
13.0	TOLERANCE ON OUTER DIAMETER	+ 2mm
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	

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(a)	Aluminium conductor cable	30 N/ sq. mm.
(b)	Copper conductor cable	50 N/ sq. mm.
16.0	CABLE DRUMS	
(a)	<i>Type of Drum</i>	Wooden as per IS 10418.
(b)	Standard drum length	As per BOQ cum price schedule
(c)	Painting	Entire surface to be painted
(d)	Wooden Drum	The surface of the drum and the outer most cable layer shall be covered with water proof cover. Both the ends of the cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection. Wood preservative anti-termite treatment shall be applied to the entire drum.
(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.

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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		
	(a) Oxygen index		
NAME OF VENDOR			
NAME	SIGNATURE	DATE	SEAL
			REV.

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	(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)		

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

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	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.

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

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GENERAL TECHNICAL SPECIFICATION



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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 naphthenates / zinc naphthenates (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-B to Section-II, may be referred by the bidder. Bidder may modify, to choose appropriate dimensions of steel drums to suite various sizes/weight/ lengths of LT XLPE POWER CABLES.

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE: 55	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.			
		PROJECT:		PO NO.:			
ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 1 OF 12	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	* D	** M C N
					M C/N					

1.0 RAW MATERIALS

1.1	Aluminium /Copper Rods	GENERAL :												
	(Conductor/ Armour Wire)	1. Physical properties	MA	Physical Tests	Sample/ Batch	Sample / Batch	IS:8130 (Al), IS:613 (Cu)	IS:8130 (Al), IS:613 (Cu)	Test Cert.	✓	P/ V	V	-	
		2. Elec. Properties	MA	Electrical Tests	Sample/ Batch	Sample / Batch	-do-	-do-	-do-	✓	P/ V	V	-	
		SPECIFIC CHECKS:												
		a) Make	MA	Verify	100%	100%	Manufactur er approved source	Manufactur er approved source	Test Cert.	✓	P	V	-	
		b) Grade	MA	-do-	-do-	-do-	IS:8130 (Al), IS:613 (Cu)	IS:8130 (Al), IS:613 (Cu)	-do-	✓	P	V	-	
		c) Resistivity	MA	Electrical Tests	Manufac turer std.	Manufa cturer std.	IS:613 (Cu), IS:5082 (Al)	IS:613 (Cu), IS:5082 (Al)	-do-	✓	P	V	-	
1.2	XLPE Compound for insulation	GENERAL :												
		1. Physical properties	MA	Physical Tests	Sample/ Batch	Sample / Batch	IS 7098-I	IS 7098-I	Test Cert.	✓	P	V	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>[Signature]</i>	VIKAS KUMAR SINGH	Checked by:	<i>[Signature]</i>	KUNAL GANDHI
Reviewed by:	<i>[Signature]</i>	MANISH SHUKLA	Reviewed by:	<i>[Signature]</i>	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	


FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE: 56
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.	594
		PROJECT:		PO NO.:	
	ITEM: LT XLPE POWER CABLE	SYSTEM: CABLE	SECTION: II		SHEET 2 OF 12

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	D		M C N	
					M C/N							

		2. Elec. Properties	MA	Electrical Tests	Sample/ Batch	Sample / Batch	-do-	-do-	-do-	✓	P	V	-	
		<u>SPECIFIC CHECKS:</u>												
		a) Make	MA	Verify	100%	100%	Manufacturer approved source	Manufacturer approved source	Test Cert.	✓	P/V	V	-	
		b) Type/ Grade	MA	-do-	-do-	-do-	-do-	-do-	-do-	✓	P/V	V	-	
		c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	-do-	-do-	-do-	✓	P/V	V	-	
1.3	PVC Compound (for sheath)	<u>GENERAL:</u>												
		1. Physical properties	MA	Physical Tests	Sample/ Batch	Sample / Batch	IS 5831	IS 5831	Test Cert.	✓	P/V	V	-	
		2. Elec. Properties	MA	Electrical Tests	Sample/ Batch	Sample / Batch	-do-	-do-	-do-	✓	P/V	V	-	
		3. FRLS Properties (as applicable)	CR	Chemical/ Environ.	Sample/ Batch	Sample / Batch	Approved datasheet	Approved datasheet	-do-	✓	P/V	V	-	
		<u>SPECIFIC CHECKS:</u>												

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:		VIKAS KUMAR SINGH	Checked by:		KUNAL GANDHI				Reviewed by:		
Reviewed by:		MANISH SHUKLA	Reviewed by:		RITESH KUMAR JAISWAL				Approved by:		

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE: 57	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.			
		PROJECT:		PO NO.:			
ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 3 OF 12	


Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	

		a) Make	MA	Verify	100%	100%	Manufactur er approved source	Manufactur er approved source	Test Cert.	✓	P	V	-	
		b) Type/ Grade	MA	-do-	-do-	-do-	Approved datasheet	Approved datasheet	-do-	✓	P	V	-	
		c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	Compound Manufactur er std.	Compound Manufactur er std.	-do-	✓	P	V	-	
1.4	Fillers (as applicable)	1. Make	MA	Verify	100%	100%	Manufactur er approved source	Manufactur er approved source	Test Cert.	✓	P	V	-	Fillers material chosen shall be compatible with the temperatur e rating of the cable and shall have no deleterious effect on any other

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>Vikas</i> 18/03/2020	VIKAS KUMAR SINGH	Checked by:	<i>Kunal Gandhi</i> 19/03/20	KUNAL GANDHI
Reviewed by:	<i>Manish</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>Ritesh Kumar</i> 19/03/2020	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE: 58	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.		594	
		PROJECT:		PO NO.:			
ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 4 OF 12	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	* D	** M C N
					M C/N					

														component of cable)
		2. Type/ Grade	MA	-do-	-do-	-do-	Appd. Data Sheet	Appd. Data Sheet	-do-	✓	P/V	V	-	
1.5	Galvanised steel wire/strip for Armour (as applicable)	GENERAL:												
		1. Make	MA	Verify	Manuf acturer std.	Manufa cturer std.	Manufactur er approved source	Manufactur er approved source	Test Cert.	✓	P	V	-	
		2. Dimension	MA	Measur ement	-do-	-do-	Appd. Data Sheet	Appd. Data Sheet	-do-		P/V	-	-	
		3. Phy.and Elec. Properties	MA	Physical & Electrical Tests	Sample*	Sample *	-do-	-do-	-do-	✓	P/V	V	-	
		4. Galvanization Quality	MA	Galv. Tests	-do-	-do-	IS 3975	IS 3975	-do-		P/V	-	-	
1.6	Wooden Drum	1. Phy. & Constructional checks	MA		Mfr's Plant Std.	Mfr's Plant Std.	IS 10418	IS 10418	Test Cert.	✓	P	V	-	


BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	<i>Vikas</i> 18/03/2020	VIKAS KUMAR SINGH	Checked by:	<i>Kunal</i> 19/03/20	KUNAL GANDHI			Reviewed by:			
Reviewed by:	<i>Manish</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>Ritesh</i> 19/03/20	RITESH KUMAR JAISWAL			Approved by:			

	MANUFACTURER/ BIDDER/	STANDARD QUALITY PLAN			SPEC. NO :			DATE: 59	
	SUPPLIER NAME & ADDRESS	CUSTOMER :			QP NO.: PE-QP-999-507-E002, REV 02.			594	
		PROJECT:			PO NO.:				
		ITEM: LT XLPE POWER CABLE			SYSTEM: CABLE			SECTION: II	
SHEET 5 OF 12									

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	*	**
					M C/N				D	M C N

		2. Anti termite treatment	MA	Chem.	Mfr's Plant Std.	Mfr's Plant Std.	Mfr's Plant Std.	Mfr's Plant Std.	-do-	✓	P	V	-	
1.7	Steel Drum #	1. Dimension	MA	Meas.	Mfr's Plant Std.	Mfr's Plant Std.	Approved drg	Approved drg	Test Cert.	✓	P	V	-	# If required, as per spec.
		2. Surface finish	MA	Visual	-do-	-do-	-	Surface shall be smooth	-do-	✓	P	V	-	
2.0	IN PROCESS													
2.1	Wire Drawing	1. Size	MA	Dimension al	Plant Mfg. Std.	Plant Mfg. Std.	Approved datasheet	Approved datasheet	Inspe ction Repor t/ Test report	✓	P	V	-	
		2. Surface finish	MA	Visual	-do-	-do-	Surface shall be smooth	Surface shall be smooth	-do-	✓	P	V	-	


BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	<i>Vikas</i> 18/03/2020	VIKAS KUMAR SINGH	Checked by:	<i>Kunal</i> 19/3/20	KUNAL GANDHI			Reviewed by:			
Reviewed by:	<i>Manish</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>Ritesh</i> 19/3/20	RITESH KUMAR JAISWAL			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE: 60
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.		594
		PROJECT:		PO NO.:		
ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE	SECTION: II		SHEET 6 OF 12	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	*	**
					M C/N				D	M C N

		3. % of Elongation	MA	Mechanical	-do-	-do-	IS 8130	IS 8130	-do-	✓	P	V	-	
2.2	Stranding of wires	1. No. of wires	MA	Counting	Plant Mfg. Std.	Plant Mfg. Std.	Appd. Datasheet	Appd. Datasheet	Inspection Report/ Test report	✓	P	V	-	
		2. Resistance	CR	Electrical	-do-	-	-do-	-do-	-do-	-do-	P	-	-	
		3. Sequence, lay length & Direction	MA	Visual, Meas.	One Sample of each size/ lot	-	Mfrs Std.	Mfrs Std.	-do-		P	-	-	
		4. Surface Finish	MA	Visual	100%	-	Surface shall be smooth	Surface shall be smooth	-do-		P	-	-	
		5. Dimension	MA	Measurement	One Sample of each size/ lot	-	Appd. Datasheet	Appd. Datasheet	-do-		P	-	-	
2.3	Core Insulation (XLPE) (No repair permitted)													

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal			Sign & Date	Name	Seal
	<i>Vikas</i> 18/03/20	VIKAS KUMAR SINGH		<i>Kunal</i> 18/3/20	KUNAL GANDHI						
Reviewed by:	<i>Manish</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>Ritesh</i> 18/3/20	RITESH KUMAR JAISWAL						

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE: 61	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.			
		PROJECT:		PO NO.:			
		ITEM: LT XLPE POWER CABLE	SYSTEM: CABLE	SECTION: II		SHEET 7 OF 12	


Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	* D	**
					M C/N					M C N

		1. Surface finish	MA	Visual	100%	100%	Free from bulging, burnt particles, lumps, cuts & scratches	Free from bulging, burnt particles, lumps, cuts & scratches	Inspe ction Repor t/ Test report	✓	P	V	-	
		2. Eccentricity & Ovality #	CR	Measur em ent	One Sample of each size/ lot	One Sample of each size/ lot	Mnfr's Std	Mnfr's Std	-do-	✓	P	V	-	
		3. Insulation Thickness	CR	Measur em ent	-do-	-	Appd. Datasheet	Appd. Datasheet	-do-		P	-	-	
		4. Dia over insulation	MA	Measur em ent	-do-	-	-do-	-do-	-do-		P	-	-	
		5. Tensile Strength & % Elongation	MA	Mechanical	100%	-	IS:1554-I, IS:5831	IS:1554-I, IS:5831	-do-		P	-	-	
		6. Spark Test or Water immersion test	CR	Electrical	100%	-	Mnfr's Std	Mnfr's Std	-do-	Mn fr's Std	P	-	-	
2.4	Core Laying	1. Dia over laid up core	MA	Measur em ent	One Sample of each size/ lot	-	Appd. Datasheet	Appd. Datasheet	Inspe ction Repor t/ Test report		P	-	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>Manish</i> 18.03.2020	VIKAS KUMAR SINGH	Checked by:	<i>Kunal Gandhi</i> 19/3/20	KUNAL GANDHI
Reviewed by:	<i>Manish</i> 19/03/20	MANISH SHUKLA	Reviewed by:	<i>Ritesh Kumar</i> 19/3/2020	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/	STANDARD QUALITY PLAN				SPEC. NO :		DATE: 62	
	SUPPLIER NAME & ADDRESS	CUSTOMER :				QP NO.: PE-QP-999-507-E002, REV 02.		594	
		PROJECT:				PO NO.:			
		ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 8 OF 12	


Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	* D	** M C N
					M C/N					

		2. Sequence of lay & direction	MA	Visual & Meas.	-do-	-	IS 7098-I & Mfr. Std.	IS 7098-I & Mfr. Std.	-do-		P	-	-	
						-								
2.5	Inner Sheath Extrusion (as applicable)	1. Surface finish	MA	Visual	100%	-	Surface shall be smooth	Surface shall be smooth	Inspection Report/ Test report		P	-	-	
		2. Thickness	CR	Measurement	One Sample of each size/ lot	-	Appd. Datasheet	Appd. Datasheet	-do-		P	-	-	
		3. Dia over inner sheath	MA	-do-	-do-	-	-do-	-do-	-do-		P	-	-	
2.6	Armour(as applicable)	1. No.of wires/Strips	MA	Counting	At the start of the process	-	Mnfr's Std	Mnfr's Std	Inspection Report/ Test report		P	-	-	
		2. Lay length / Direction	MA	Visual & Meas.	-do-	-	Mfr. Std.	Mfr. Std.	-do-		P	-	-	
		3. Dia over armouring	MA	Measurement	-do-	-	Appd. Datasheet	Appd. Datasheet	-do-		P	-	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>Vikas</i> 18/03/2020	VIKAS KUMAR SINGH	Checked by:	<i>Kunal</i> 19/03/2020	KUNAL GANDHI
Reviewed by:	<i>Manish</i> 18/03/2020	MANISH SHUKLA	Reviewed by:	<i>Ritesh</i> 19/03/2020	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE: 63	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.		594	
		PROJECT:		PO NO.:			
		ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II	
						SHEET 9 OF 12	


Sl. No.	COMPONENTS & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	* D	** M C N
					M C/N					

		4. Coverage	MA	Measurement	-do-	-	-do-	-do-	-do-		P	-	-	
2.7	Outer Sheath Extrusion (No repair permitted)	1. Surface finish	MA	Visual	100%	-	Surface shall be smooth	Surface shall be smooth	Inspection Report/ Test report		P	-	-	
		2. Sheath Thickness	CR	Measurement	One Sample of each size/ lot	-	Appd. Datasheet	Appd. Datasheet	-do-		P	-	-	
		3. Dia over outer sheath	MA	-do-	-do-	-	-do-	-do-	-do-		P	-	-	
		4. Embossing/ Sequential Marking	MA	Visual	100%	-	Approved data sheet	Approved data sheet	-do-		P	-	-	
3.0	Final Inspection (INTERNAL)	1. Routine Test (Refer Note-H)	CR	Electrical Tests & Measurement	100%	100%	#	#	-do-	✓	P	V	V	#: Refer Annexure-A to QP

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>Kunal</i> 18-03-2020	VIKAS KUMAR SINGH	Checked by:	<i>Kunal</i> 19/3/20	KUNAL GANDHI
Reviewed by:	<i>Manish</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>Ritesh</i> 19/3/20	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
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Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :		DATE:	
		CUSTOMER :		QP NO.: PE-QP-999-507-E002, REV 02.			
		PROJECT:		PO NO.:			
		ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II	
						SHEET 10 OF 12	


Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	* D	** M C N
					M C/N					

4.0	Final Inspection (EXTERNAL)	1. Finish & Length (Cable & cable drum)	MA	Visual	One drum in each Lot	One drum in each Lot	Appd. Datasheet	Free from Porosity, Bulging, Burnt particles, lumps, cuts & scratches	Inspe ction Repor t/ Test report	✓	P	W	W	
		2. Dimension	MA	-do-	IS 7098-I	IS 7098-I	Appd. Datasheet	Appd. Datasheet	-do-	✓	P	W	W	
		3. Armouring - Coverage & No.of Wires/Strips	MA	Visual & Meas.	-do-	-do-	-do-	-do-	-do-	✓	P	W	W	
		4. Marking & Colour Coding	MA	Visual	-do-	-do-	-do-	-do-	-do-	✓	P	W	W	
		5. Acceptance Tests (Refer Note-H)	CR	Phy, Elect. Tests & FRLS Tests	Sample #	Sample #	#	-do-	-do-	✓	P	W	W	
		6. Type Tests (Refer Note-H)	CR	Physical & Electrical Tests	Sample #	Sample #	-do-	-do-	-do-	✓	P	W	W	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>[Signature]</i> 18-03-2020	VIKAS KUMAR SINGH	Checked by:	<i>[Signature]</i> 19/3/20	KUNAL GANDHI
Reviewed by:	<i>[Signature]</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>[Signature]</i> 19/3/20	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN				SPEC. NO :		DATE:		
			CUSTOMER :				QP NO.: PE-QP-999-507-E002, REV 02.				
			PROJECT:				PO NO.:				
			ITEM: LT XLPE POWER CABLE		SYSTEM: CABLE		SECTION: II		SHEET 12 OF 12		
SI. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLAS S	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6		7	8	9	*	**
					M	C/N				D	M C N

*RECORDS, IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B:** MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER,

P: PERFORM, **W:** WITNESS, **V:** VERIFICATION, AS APPROPRIATE

MA: MAJOR, **MI:** MINOR, **CR:** CRITICAL


D: DOCUMENTATION

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>[Signature]</i> 18.03.2020	VIKAS KUMAR SINGH	Checked by:	<i>[Signature]</i> 19/3/20	KUNAL GANDHI
Reviewed by:	<i>[Signature]</i> 18/03/20	MANISH SHUKLA	Reviewed by:	<i>[Signature]</i> 19/3/20	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

594729/2021/PS-PEM-EL

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER:
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R02	SPECIFICATION TITLE:
	SHEET 1 OF 3	SYSTEM: CABLE	ITEM: LT XLPE POWER CABLE	DOC. NO.

TYPE/ ACCEPTANCE/ ROUTINE TEST REQUIREMENTS

A. Type Test Conduction:

- Tests for which "T" is indicated in the 'Test Conduction Required As' column below shall be conducted as Type Test.
- Sampling:
 - Type test to be conducted on one size of cable for every lot and type of cable (CU/AL conductor)
 - FRLS & Flammability Test to be conducted only on one sample/ lot.

B. Acceptance Test Conduction:

- Tests for which "A" is indicated in the 'Test Conduction Required As' column below shall be conducted as Acceptance tests.
- Sampling:
Sampling for acceptance tests shall be as per Appendix-B (Clause 15.2.2) of IS: 7098 Part-I.
- Flammability Test to be conducted only on one sample/ lot.

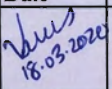
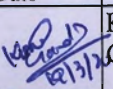
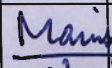
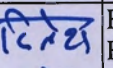
C. Routine Test Conduction:

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

D. Tests listed in S.No-7.0 & 8.0 shall be conducted only on one sample / lot.

Note: LOT shall be considered as per IS: 7098 Part-I, appendix-B.


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	<u>Internal in process Test Report to be furnished for acceptance test</u>
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	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		VIKAS KUMAR SINGH	Checked by:		KUNAL GANDHI
Reviewed by:		MANISH SHUKLA	Reviewed by:		RITESH KUMAR

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

594729/2021/PS-PEM-EL

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER:
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R02	SPECIFICATION TITLE:
	SHEET 2 OF 3	SYSTEM: CABLE	ITEM: LT XLPE POWER CABLE	DOC. NO.


S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
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	
V.	Winding / Adhesion Test	For GS strip only	T, A	IS 10810 Pt 39	
VI.	Resistivity test	Applicable for Aluminium wire & GS wire	T, A	IS 10810 Pt 42	
VII.	Uniformity of Zinc coating test	For G. S. wires/Strip only	T, A	IS 10810 Pt 40	
VIII.	Mass of Zinc coating test	For G. S. wires/Strip only	T, A	IS 10810 Pt 41	
IX.	Wrapping Test	Applicable for Aluminium wire & GS wire	A	IS 10810 Pt 3	
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	
4.0	Improved Fire performance (FR-LSH) Tests				

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	<i>[Signature]</i>	VIKAS KUMAR SINGH	Checked by:	<i>[Signature]</i>	KUNAL GANDHI
Reviewed by:	<i>[Signature]</i>	MANISH SHUKLA	Reviewed by:	<i>[Signature]</i>	RITESH KUMAR

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

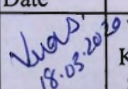
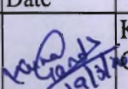
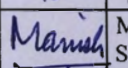
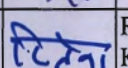
594729/2021/PS-PEM-EL

	ANNEXURE-A TO QP	CUSTOMER:	PROJECT TITLE	SPECIFICATION NUMBER:
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E002, R02	SPECIFICATION TITLE:
		SYSTEM: CABLE	ITEM: LT XLPE POWER CABLE	DOC. NO.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
I.	Oxygen index test	For PVC outer sheath only	T, A	IS 10810 Pt 58 / ASTM D 2863/ NES 715-I	<u>Applicable for Inner Sheath also, if the same is indicated in Datasheet-A</u>
II.	Smoke density test	For PVC outer sheath only	T	IS 10810 Pt 63 / ASTM D 2843	
III.	Acid gas generation test	For PVC outer sheath only	T, A	IS 10810 Pt 59 / IEC-754-1	
IV.	Temperature Index Test	For PVC outer sheath only	T	IS 10810 Pt 64 / ASTM D 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)	<u>Test & Category applicable as indicated in Datasheet-A</u>
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	
7.0	Anti-rodent and Termite Repulsion test	For PVC outer sheath only	A	Refer Note	<u>Test applicable if indicated in Datasheet-A</u>
8.0	Anti-Fungal Test	For PVC outer sheath only	A	--	
9.0	Special Tests				
I.	Hydrolytic Stability Test	For complete cable	**	ASTM D 3137:81	<u>Test applicable if indicated in Datasheet-A</u>
II.	Ultraviolet Radiation Test	For complete cable	**	BS EN ISO 4892-2	

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

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

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		VIKAS KUMAR SINGH	Checked by:		KUNAL GANDHI
Reviewed by:		MANISH SHUKLA	Reviewed by:		RITESH KUMAR

BIDDER/ SUPPLIER	
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Seal	

FOR CUSTOMER REVIEW & APPROVAL			
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