

TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS FOR ESP
ITEM : LV POWER CABLES.
CUSTOMER : BIFPCL KHULNA MAITREE 2X660MW

NAME		DESIGNATION	SIGNATURE	DATE
PREPARED	SRITHARUN	AE		01.11.2018
CHECKED	A K PALANISAMY	DM		01.11.2018
APPROVED	M JEYAMURUGANAND	AGM		01.11.2018

ISSUED BY

EDC – ECI

INITIAL RELEASE 28.04.18

REVISION 02

CL.19 to 22 added

DATE: 01.11.18

REVISION 01

CL.10.0 CORRECTED

DATE: 28.05.18

TECHNICAL SPECIFICATION OF LV XLPE POWER CABLES

1.0	Type of Cable	Flame Retardant Low Smoke (FRLS)
2.0	Standard applicable in general (Latest amendment to be referred if any)	IEC 60502-1, IEC 60228, IEC 60287, IEC 60949, ASTM D:2843, ASTM D:2863, IEC-754-1, IEC:60332 (Part-1), IEC:60332-3-23, IEEE:60383 & other relevant IEC
3.0	Voltage Grade	0.6 /1.0 (1.2) kV
4.0	Number of cores, cross sectional area of conductors and quantities	As per enquiry
5.0	FAULT CHARACTERISTICS	
	Fault Level	50kA
	Fault Clearing Time	1 sec
6.0	CONDUCTOR	
(a)	Material	Copper
	Grade and Class	Stranded, annealed plain high conductivity, Class 2
(b)	Standard Applicable	IEC 60228
(c)	Shape	Circular / shaped as per IEC 60228
(d)	Min. number and diameter of strands for main and neutral conductor	As per Table-2 of IEC-60228
7.0	INSULATION	
(a)	Material	Cross-Linked Polyethylene(XLPE)
(b)	Standard Applicable	IEC-60502 (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)	Method of curing	Dry/ Steam/ Gas/ Sioplas
(g)	Nominal Thickness of insulation	As per IEC-60502 (Part-1)
8.0	CORE IDENTIFICATION	Colour coding as per relevant IEC
9.0	INNER SHEATH	
(a)	Material	PVC Type ST-2
(b)	Standard Applicable	IEC-60502 (Part-1)
(c)	Colour	Black
(d)	Whether FRLS	Yes
(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	No
11.0	OUTERSHEATH	
(a)	Material	PVC Type ST2 as per IEC-60502 (Part-1)
(b)	Colour	Black
(c)	Whether FRLS	Yes
(d)	Method of application	Extruded
(e)	Thickness of outer sheath	As per IEC-60502 (Part-1)
(f)	Marking	Cable size (cross section area and no. of cores) and voltage grade @ 5m (by embossing) Word "XLPE" "FRLS" @ 5m (by embossing) Manufacturer's name and/ or trade name, and year of manufacture @ 5m (by embossing) 'BHEL-BAP' and 'CUSTOMER' Name @5m (by embossing) Progressive sequential marking @ 1m (by embossing/ printing)
12.0	FRLS CHARACTERISTICS	
(a)	Oxygen index	Min 29 (As per Relevant IEC / ASTM D 2863)
(b)	Temperature index	Min. 250 C (As per Relevant IEC / ASTM D 2863)
(c)	Acid gas generation	Max. 20% by weight (As per IEC 60502-1/ IEC 60754-1)
(d)	Smoke density rating	Max. 60% (As per IEC 60502-1/ IEC 61034-2 / ASTM D 2843)
(e)	Flammability Test	
(i)	Flammability test for single cable	YES As per IEC-60332 Part-1
(ii)	Flammability test as per IEEE: 60383	YES
(iii)	Swedish Chimney test SEN-SS-424-1475-F3	YES
13.0	Anti-rodent and Termite repulsion Test	YES
14.0	TOLERANCE ON OUTER DIAMETER	Up to 30mm; + 2mm Above 30mm; + 5% or + 2mm, whichever is less.
15.0	MINIMUM BENDING RADIUS	
(a)	Single core cables	15 x O.D.
(b)	Multi core cables	12 x O.D.
16.0	SAFE PULLING FORCE	
(a)	Copper conductor cable	50 N/ sq. mm.
17.0	CABLE DRUMS	
(a)	Type of Drum	Steel
(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 with epoxy resin paint.
(d)	Outermost Layer	To be covered with waterproof polyethylene
18.0	SEA WORTHY PACKING	YES. Over the cables polythene sheet shall be wrapped & then sealed properly. Cable ends shall be carefully protected before packing

19.0.0 GENERAL REQUIREMENTS:

- 19.1.0 The cable shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operation conditions. The cable shall be suitable for laying in wet & dry locations in trays, conduits, ducts, trenches etc.
- 19.1.1 The cable shall comply with latest edition of standards including the amendments, read along with this specification. However the voltage grade of the cable shall be 1100V AC.
- 19.1.2 Allowable tolerance on overall diameter of the cable shall be +/- 2 mm (max.) over the declared value in the technical data sheet. The variation in diameter & the ovality at any cross section shall not be more than 1.0 mm.
- 19.1.4 Repaired cables shall not be offered and the same will not be accepted.
- 19.1.5 Progressive automatic on line sequential marking of the length of cable in metres at Every one metre shall be provided on the outer sheath of all cables.
- 19.1.6 Progressive marking at 5 meter interval with Manufacturers name, type of insulation, FRLS, Cable Size (Cross-section & No. of cores), Voltage grade, Year of Manufacture, BHEL-BAP by embossing.
- 19.1.7 The cores of cable shall be identified by colour coding as per applicable IEC standard.
- 19.1.8 Cable accessories such as harnessing components, markers, bedding, binding tape etc. shall also have flame retardant quality.

20.0.0 PACKING AND MARKING:

- 20.1.0 Sea Worthy packing as per specification ref:PE-TS-888-100-A001 shall be provided. The cable shall be wound on a non-returnable steel drum in length of 1000 metres $\pm 5\%$ and packed. Cut bits or not acceptable. Over all quantity tolerance against each size shall be +0%, -2%.
- 20.1.1 The steel drum shall be provided as per relevant IEC & entire surface to be painted.
- 20.1.2 The ends of the cable shall be sealed by means of non-hygroscopic sealing material.
- 20.1.3 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.

21.0.0 DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT:

The data sheet shall be submitted in SOFT MEDIA for approval, within 10 days from the date of order.

22.0.0 INSPECTION AND TESTING:

22.1.0 The cable shall be inspected and tested based on the following documents.

1. Approved Quality Plan.
2. BHEL Technical Specification (TEP).
3. BHEL Purchase order.
4. BHEL/Customer approved supplier's data sheet.

22.2.0 This specification meets customer contract specification. Hence no deviation shall be taken by the supplier.