

	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION 1 core x 6 sq-mm Cu, EBXL XLPO insulated and Sheathed Solar cable	PY55300
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Technical specification

For

**Supply of 1 core x 6 sq-mm Cu, EBXL
XLPO insulated and Sheathed Solar cables**

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This technical specification provides BHEL's requirement for supply of 1CX6 sq-mm cables for the solar photovoltaic (SPV) projects.

A. Technical specification

#	Particular	BHEL specification	
1.0	Item description	Cable, 1 core x 6 sq-mm, 1.8 KV DC (maximum), Annealed tinned copper conductor, EBXL XLPO Insulated and Sheathed Solar Photovoltaic Cable.	
2.0	Application	Suitable for use in outdoor application for interconnection of solar photovoltaic (SPV) modules in SPV power plants.	
3.0	Applicable standard	EN 50618	
4.0	Voltage grade	Maximum permissible voltage = 1800 V DC (conductor – conductor, non-earthed system, circuit not under load)	
5.0	Type of cable	H1Z2Z2-K	
6.0	Conductor		
a)	Material	Flexible Annealed tinned copper conductor as per class 5 of IEC 60228	
b)	Cross sectional area (Nominal)	(i) 6 sq-mm	
c)	Maximum diameter of wires in the conductor	For 6 sq-mm: 0.31 mm	
d)	Maximum conductor resistance at 20 °C (DC)	For 6 sq-mm: 3.39 Ohm per Km	
e)	Current Carrying Capacity	As per EN 50618	
7.0	Insulation		
a)	Material	Electron beam cross link (EBXL) Cross-Linked Polyolefin (XLPO)	
b)	Minimum insulation thickness	0.7 mm	
c)	Max. conductor temperature	120°C – Normal continuous operation 250°C – Short circuit condition for 5 seconds	
8.0	Insulation color for identification	Natural or as per manufacturer's standard.	
9.0	Outer Sheath		
a)	Material	Electron beam cross link (EBXL) Cross-Linked Polyolefin (XLPO)	
b)	Minimum Thickness of outer sheath	0.8 mm	
c)	Colour of outer sheath	Black or Black with red lining, quantity as per individual item requirement of BHEL	
d)	Overall diameter of cable	Vendor shall indicate actual dimension, tolerance for 6 sq-mm cable.	

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10.0	Minimum bending radius	Vendor shall indicate the same with applicable standard for 6 sq-mm cable.	
11.0	Type Tests	As per EN 50618 Type test certificate / provisional certificate issued from NABL accredited laboratories or equivalent to be submitted by the vendor along with the technical offer.	
a)	Electrical Tests		
b)	Constructional and dimensional tests		
c)	Pressure test at high temperature at complete cable		
d)	Damp heat test		
e)	Resistance against acid & alkaline solution		
f)	Test of influence		
g)	Cold impact test at -40°C		
h)	Cold bending test		
i)	Ozone resistance test		
j)	Weathering/ UV-resistance test		
k)	Dynamic penetration test		
l)	Notch propagation test		
m)	Shrinkage test		
n)	Test under fire condition		
12.0	Routine Tests		
a)	High voltage Test	As per EN 50618	
b)	Conductor resistance test	As per EN/IEC 60228	
c)	Spark Test	As per EN 50618	
13.0	Acceptance Tests		
a)	Conductor resistance test	As per EN/ IEC 60228	
b)	High voltage Test	As per EN 50618	
c)	Insulation resistance test	As per EN 50618	
d)	Annealing test	As per EN/ IEC 60228	
e)	Thickness of insulation & sheath	As per EN 50618	
f)	Hot set test	As per EN 50618	
g)	Tensile and elongation at break test for insulation & sheath	As per IEC-60332-1, IEC-60754-1, ASTM D-2843, EN 50618	
h)	Flame retardence test	As per EN 50618	
i)	Ageing Test	As per EN 50618	
j)	Outer finish check	Manufacturers standard	
14.0	Pre-dispatch inspection at Vendor works	Prior to dispatch of the item, vendor shall provide inspection call to BHEL to witness the acceptance tests as per clause 12.0 and 13.0 as above.	
15.0	Manufacturing Quality Plan / Quality Assurance Plan	Vendor shall submit Manufacturing Quality Plan for BHEL/BHEL-customer approval within 1 week of placement of Order.	

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16.0	Test certificate	Three copies of test certificate shall be supplied with BHEL PO number and date, BHEL specification number, Cable description, Manufacturer name, Part number, Size & Length of the cable, Batch / Lot number. Test certificate shall contain test description, measured values of dimensions and cable properties, and acceptance limits.
17.0	Cable identification	Printing/embossing shall be done on outer sheath with following information throughout the length of the cable: Manufacturer name, brand name or trade mark, Cable size, Voltage grade and sequential marking of the length of cable. The printing/embossing shall be at an interval of 1 meter. Drum no/extrusion lot no. shall be printed/embossed on the outer sheath at least every 5 m of the cable length.
18.0	Packing and marking	
a)	Packing	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. Alternatively, supplier can do alternative packaging of whole Drum/Spool to eliminate ingress of water during transportation, storage and erection. Wood preservative anti-termite treatment shall be applied to the entire drum.
b)	Drum	Drum shall be as per IS:10418-1972 or equivalent, with suitable size.
c)	Marking on the drum	Each drum shall be marked with following information: BHEL PO number and date, Cable description, Manufacturer name, Part number, Size & Length of the cable, Cable code, Voltage grade, Approx gross mass, Year of manufacture.
d)	Cable length in each drum	1000 meter (A tolerance of +3 %, -0% shall be permissible for each drum and overall quantity)

B. Documents to be submitted along with offer without which offer is likely to be rejected.

1. Type test certificate / provisional certificate as per EN 50618 issued from NABL accredited laboratories or equivalent.
2. Filled in values/details wherever the same is asked for in BHEL technical specifications.
3. Vendor has to enclose the deviation sheet clause wise separately in case any deviations are sought by the vendor. Absence of any deviation sheet shall be taken as compliance of BHEL specification in total without any deviation.

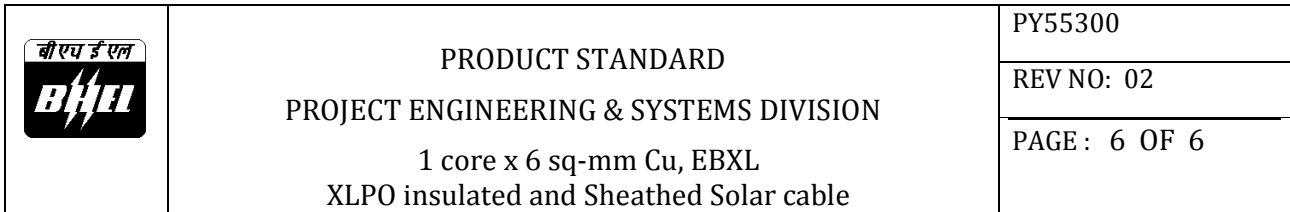
C. Documents to be submitted within 1 week after receipt of Purchase order for approval

1. Technical datasheet of the cable with cable cross section sketch.
2. Manufacturing Quality Plan (MQP) indicating all tests/checks regarding raw material, in-process and final product as per relevant standards, as called in this document and any other relevant standards shall be submitted to BHEL/BHEL's customer for approval.

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D. Material Codes

Sl No	Material Description	Material Code
1	6 sqmm Cu EBXL XLPO - Black	PY9755300007
2	6 sqmm Cu EBXL XLPO Black with Red line	PY9755300015
3	6 sqmm Cu EBXL XLPO – Black(Outer sheath shall be FRLS)	PY9755300023
4	6 sqmm Cu EBXL XLPO Black with Red line(Outer sheath shall be FRLS)	PY9755300031

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