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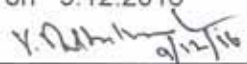
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Technical specification

For Supply of 3 core x 300 sq-mm 33kV (UE) HT Power Cables

Revision details :R 01	Prepared	Approved	Date
Clause no.3.1.1,2.7.c,2.14 modified on 9.12.2016 	 SP	 VRK	05-10-2016

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1.0 Item Description:

- a) 3 core x 300 sq-mm 33kV Un-earthed grade, Aluminum conductor, XLPE insulated, screened, armoured HT Power Cable

2.0 Technical specification of HT Power Cables:

Offer shall be submitted by vendor with clause-wise acceptance as shown below with signature and seal on every page.

In case of conflict between this specification and those (IS Codes, applicable standards etc) referred to herein, the former shall prevail. If the vendors acceptance is 'NO' against any of the clauses mentioned herein, the offer is liable for rejection on technical grounds. In case of any deviations, vendor to record the same in the column meant for vendor compliance.

#	Particular	BHEL specification	Vendor acceptance (Yes / No)
2.1	Description	33kV unearthed grade cable, 3 core, 300 sq-mm, stranded and compacted aluminum conductors, extruded semi-conducting compounding screen, extruded XLPE insulated, extruded semi conducting compound with a layer of non-magnetic metallic tape for insulation screen, extruded PVC (Type ST2) inner sheath, flat steel strip/wire armored, extruded PVC (Type ST2) FRLS outer sheathed confirming to IS 7098 part 2 of 2011 for constructional details and tests.	
2.2	Voltage Grade	33kV, unearthed cable	
2.3	Maximum Temperature		
a)	Maximum conductor temperature under normal operating conditions	90 deg. C	
b)	Maximum conductor temperature at the termination of short circuit	250 deg. C	
2.4	Conductor	As per IS 8130-1984	
a)	Material	Class 2, stranded, plain aluminum conductor - grade H4	

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b)	Cross Sectional Area	300 sq.-mm minimum	
c)	No. of strands (minimum)	As per IS 8130-1984	
d)	Conductor screen material	Extruded semiconducting compound	
e)	Maximum resistance of conductor at 20 deg. C	As per IS 8130-1984	
2.5	Insulation	As per IS 7098 – Part 2 of 2011	
a)	Material	Cross Linked Polyethylene (XLPE) compound	
b)	Nominal Insulation Thickness	10 mm	
c)	Tolerance on Thickness	0.1 + 0.1*t where t is the nominal thickness	
d)	Core identification (insulation color)	Red, Yellow, Blue	
e)	Insulation screen material	Extruded semi-conducting compound with a layer of non-magnetic metallic tape	
f)	Note: The insulation shall be applied through an extrusion process and chemically cross linked in continuous vulcanizing process. The cable shall be shielded with metallic tape over the extruded semi-conducting shield.		
2.6	Inner sheath and fillers	As per IS 7098 – Part 2 of 2011	
a)	Thickness of Inner sheath	As per IS 7098 – Part 2 of 2011	
b)	Color of inner sheath	Black	
c)	Material of inner sheath and filler	Extruded PVC compound Type ST-2 as per IS 7098 – Part 2 of 2011	
2.7	Armour	As per IS 7098 – Part 2 of 2011	
a)	Armour material	Flat steel strips/ steel wire	
b)	Armour size (nominal)	As per IS 7098 – Part 2 of 2011	
c)	Fault rating	25kA for 1 sec, vendor to submit calculation	
2.8	Outer Sheath		
a)	Material	Extruded PVC heat resistant compound Type ST-2, FR-LS confirming to the requirements of IS 5831-1984. The outer sheath shall also be extruded over the steel armoring.	
b)	Thickness of Outer Sheath	As per IS 7098 – Part 2 of 2011	
c)	Color of Outer Sheath	Black	
d)	Overall diameter of cable	Vendor shall indicate dimension with tolerance.	
2.9	Ovality	Ovality at any cross section shall be kept to a minimum so as to have circular cross section of cable	
2.10	Minimum bending radius	As per IS 1255 (1983)	
2.11	FRLS properties		
a)	Oxygen index	as per IS 10810 Part 58	

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b)	FR properties	as per IS 10810 Part 61, 62	
c)	Specific optical density of smoke	as per relevant standard	
d)	Smoke density	as per IS 10810 Part 63	
e)	Halogen acid gas evolution	as per IS 10810 Part 59	
f)	Temperature index	As per IS 10810 Part 64	
g)	Flammability	As per IEC 60332 Part – 3	
2.12	Application	Cable shall be suitable for continuous use under sun light and for direct burial.	
2.13	Applicable Standards	As per IS 7098 – Part 2 (2011) for manufacturing and testing.	
2.14	Identification/Surface marking.(Modified)	The printing/ embossing shall be progressive, automatic, in line and marking shall be legible and indelible. Printing/embossing shall be on outer sheath with following information throughout the length of the cable at an interval of every 5 m: Manufacturer name, brand name or trade mark, BHEL, IS symbol, IS 7098 Part 2: 2011, Cable size & type (Unearthed), Voltage grade, FRLS, Cable code, lot number, year of manufacture. Embossing/ printing shall be done for sequential marking of the length of cable at an interval of every 1 m.	
2.15	Pre dispatch inspection	Inspection shall be witnessed by BHEL and/or BHEL customer. Prior to dispatch of the item, vendor shall provide inspection call to BHEL to witness the tests as detailed in Clause 3.0 and accordingly inspection reports, test certificates/reports shall be submitted to BHEL/BHEL customer.	
2.16	Packing and Marking	The cable shall be supplied in non-returnable wooden or steel drum of heavy construction. The surface of the drum and the outermost cable layer shall be covered with water proof cover. Both the ends of the cable 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	

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		applied to the entire drum. Wooden drums shall comply IS: 10418-1982. 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 on both sides of the drum. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled. Drum Length shall be 500 meter +/- 5%. Drum details shall be provided by the bidder.	
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3.0 Type, Acceptance and Routine Tests: Vendor Compliance – Yes/No

3.1 Type Tests:

Type tests shall be carried out in presence of BHEL's & BHEL customer's representative for which minimum 15 days prior intimation shall be given by the vendor. The vendor shall obtain BHEL's/BHEL customer's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set-up, instruments to be used, procedure, accepted norms, recording of different parameters, and interval of recording etc. for the tests to be carried out. Copy of type test certificates and reports shall be submitted to BHEL/BHEL customer for approval. Charges for these tests to be conducted shall be deemed to be included in the price of the cables ordered.

Vendor Acceptance – Yes/No

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3.1.1	Particular	BHEL specification	Vendor acceptance (Yes / No)
a)	Tensile test	As per IS 7098 – Part 2 – 2011	
b)	Wrapping test		
c)	Conductor resistance test	FRLS properties tests shall be as per relevant IS/IEC	
d)	Physical test for insulation		
e)	Test for thickness of insulation (eccentricity) and sheath		
f)	Physical tests for sheath		
g)	Test on extruded semi-conducting screens		
h)	Test for armour steel strip/wire		
i)	Flammability test		
j)	High voltage test		
k)	Thermal Ageing test		
l)	Partial discharge test		
m)	Bending test		
n)	Dielectric Power factor test		
o)	Test for insulation resistance test		
p)	Heat cycle test		
q)	Impulse withstand test		
r)	Oxygen index		
s)	FR properties		
t)	Deleted		
u)	Smoke density		
v)	Halogen acid gas evolution		
w)	Temperature index		
x)	Flammability		

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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
3.2	Acceptance tests	Prior to dispatch, vendor shall provide inspection call to BHEL/BHEL CUSTOMER to witness the acceptance tests.	
a)	Tensile test	Tests and Sampling shall be as per IS 7098 part-2: 2011 FRLS properties tests shall be as per relevant IS/IEC	
b)	Wrapping test		
c)	Conductor resistance test		
d)	Test for thickness of insulation and sheath		
e)	Hot set test for insulation		
f)	Tensile strength and elongation at break test for insulation and outer sheath		
g)	Partial discharge test		
h)	High Voltage test		
i)	Insulation resistance (volume resistivity) test		
j)	Oxygen index		
k)	FR properties		
l)	Specific optical density of smoke		
m)	Smoke density		
n)	Halogen acid gas evolution		
o)	Temperature index		
p)	Flammability		
q)	Test for cross linking for extruded semi-conducting screen		
3.3	Routine tests	As per IS: 7098 (Part-2) 2011.	
a)	Conductor resistance test	To be conducted by the vendor on each drum of finished cables to demonstrate integrity of the cable. Test report shall be submitted to BHEL/BHEL customer along with inspection call.	
b)	Partial discharge test		
c)	HV test		

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C. Documents to be submitted along with offer

1. Technical datasheet of the offered cable with cable cross section sketch.
2. Type Test Certificate and reports for cable with similar construction.
3. Filled in values/details wherever the same is asked for in BHEL technical specifications
4. 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.

D. Documents to be submitted within 1 week after receipt of Purchase order

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