



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
भारत हेवी इलेक्ट्रिकल्स लिमिटेड

Bharat Heavy Electricals Limited

(A Government of India Undertaking)

ELECTRONICS DIVISION

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Addendum for open tender RFQ No: HBSBOS009 due on 22.09.2014

**“Supply of 1 Core X 185sq-mm, 1 Core X 240 sq-mm and 1 Core X 300 sq-mm
Aluminium, armoured, XLPE insulated cable”**

Purchase Specification PS-439-899 for RFQ HBSBOS009 has been revised :

Revision details : Clauses 1.1, 1.2.1 and 1.2.7 revised

The revised Technical Specification PS-439-899 Rev 01 is enclosed herewith.

All vendors are requested to quote in line with the revised Technical Specification.

All other terms and conditions of RFQ remain unchanged.

Sr.MANAGER (SC&PV/MM)

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PURCHASE SPECIFICATION FOR
Supply of 1 core x 185 sq-mm, 1 core x240 sq-mm,
1 core x300 sq.-mm, aluminium , armoured, XLPE
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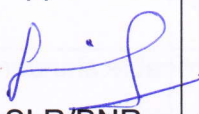
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Technical specification

For Supply of 1 core x185 sq-mm ,1 core x 240 sq-mm and 1 core x300 sq-mm
aluminium , armoured, XLPE insulated cables

Revision details : R 01	Prepared	Approved	Date
Clauses 1.1, 1.2.1 and 1.2.7 revised.	 BKC/LNK	 SLR/BNR	15/9/2014

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1.0 Pre-qualification criteria:

(A) Vendor should have supplied 185sq mm, 240sq mm, 300 sq mm cables as per this specification for a minimum length of 5 km of each type for Solar power projects in India in the last 3 years from the date of opening of bid. Evidence to be produced in the form of copies of purchase orders. **Vendor acceptance (Yes / No).**

(B) Cables shall be manufactured in INDIA. **Vendor acceptance (Yes / No).**

REFER ANNEXURE-1 ATTACHED WITH THIS SPECIFICATION FOR PROJECT DETAILS AND SCOPE OF SUPPLY.

1.1 Item Description

Cable, 1 core x 185 sq-mm ,1 core x 240 sq-mm and 1 core x 300 sq-mm stranded , aluminium conductor with XLPE insulation, Aluminium wire armored, PVC outer sheathed, FR and voltage grade of 1100V.

1.2 Technical specification:

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, 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. Vendor to record deviations if any, in the column meant for vendor compliance. **Vendor acceptance (Yes / No).**

#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.1	Item description	Cable, 1 core x 185 sq-mm, 1 core x 240 sq-mm and 1 core x 300 sq-mm, multi-stranded, compacted plain aluminium conductor, XLPE insulated, aluminium wire armored, PVC outer sheathed, FR, voltage grade of 1100V.	
1.2.2	Application	Suitable for use in outdoor application for transmitting power in Solar PV plants.	
1.2.3	Applicable standards	IS: 7098 (part-1) 1988.	
1.2.4	Voltage grade	1100V	



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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.5	Conductor	As per IS: 8130-1984	
a)	Material	Class 2 flexible plain aluminium conductor (grade H4).	
b)	Cross sectional area	185 sq-mm(For 1Cx185 sq mm) 240 sq-mm(For 1Cx240 sq mm) 300 sq-mm(For 1Cx300 sq mm)	
c)	Maximum DC conductor resistance at 20°C	For 1Cx185 sq mm :0.164 Ohm per Km For 1Cx240 sq mm : 0.125 Ohm per Km For 1Cx300 sq mm :0.100 Ohm per Km	
d)	No of strands (minimum)	30 wires as per IS: 8130-1984.	
1.2.6	Insulation	As per IS: 7098 (part-1) 1988	
a)	Material	Cross linked polyethylene (XLPE)	
b)	Nominal insulation thickness	For 1Cx185 sq. mm : 1.9 mm For 1Cx240 sq. mm : 2.0 mm For 1Cx300 sq. mm : 2.1 mm	
c)	Tolerance on thickness	As per IS: 7098 (part-1) 1988	
d)	Volume resistivity at 27°C	1×10^{14} Ohm-cm (Min).	
e)	Volume resistivity at 90°C	1×10^{12} Ohm-cm (Min).	
f)	Max. conductor temperature	90°C – Normal continuous operation 250°C – Short circuit condition	
g)	Core identification (insulation colour)	As indicated in ANNEXURE-1.	




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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.7	Armouring	As per IS: 3975- 1979.	
a)	Armour material	H4 grade Aluminium wire.	
b)	Armour wire dia (Nom)	As per IS: 7098 (part-1)	
c)	The gap between armour wires shall not exceed one armour wire space and there shall be no cross over/ over-riding of armour wire. The minimum area of coverage of armouring shall be 90%. The breaking load of armour joint shall not be less than 95% of that of armour wire.		
1.2.8	Outer sheath	As per IS: 5831- 1984	
a)	Material	Extruded PVC Type ST2	
b)	Thickness of outer sheath	As per IS: 7098 (part-1)	
c)	Colour of outer sheath	Black	
d)	Overall diameter of cable	Vendor shall indicate dimension. Allowable tolerance shall be +/- 2 mm over declared value.	
1.2.9	Ovality at any cross section shall be kept minimum so as to have circular cross section of cable.		

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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.10	Minimum bending radius	15 D as per IS: 1255-1983	
1.2.11	FR properties		
a)	Minimum Oxygen index	Min 29 %, as per IS 10810 Part 58	
b)	Minimum Temperature index	As per IS 10810 Part 64	
c)	Flammability	As per IEC-60332 Part-3	

1.2.12: Type Tests: Type tests shall be carried out in presence of BHEL's representative for which minimum 15 days prior intimation shall be given by the vendor. The vendor shall obtain BHEL'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, interval of recording etc., for the tests to be carried out.

In case the vendor has conducted such specified type test(s) within last ten years as on date of bid opening, vendor shall submit type test reports to BHEL within seven days of placement of PO for waiver of conducting such type test(s). These reports should be for the tests conducted on the cable with similar specification as ordered and tests should have been conducted at an independent laboratory or should have been witnessed by a client. BHEL reserves the right to waive conducting of any or all specified tests.

Charges for these tests to be conducted if any shall be deemed to be included in the price of the cables ordered.



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1.2.12	Particular	BHEL specification	Vendor acceptance (Yes / No)
a)	Tensile test(*)	* As per IS 7098 part-1: 1988 # Tests on armour shall be conducted as per IS: 3975: 1979 Type test certificate shall be produced by the vendor along with the offer.	
b)	Wrapping test(*)		
c)	Conductor resistance test(*)		
d)	Tests on armour wire(#)		
e)	Test on thickness of insulation and sheath(*)		
f)	Physical tests for insulation and outer sheath (*)		
g)	Insulation resistance test (*)		
h)	HV test (*)		
i)	FR property tests		
	i. Oxygen index test : Min 29 %, as per IS 10810 Part 58		
	ii.FR test on single cables As per IS: 10810 Part 61		
	iv. Temperature index test As per IS 10810 Part 64		



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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.13	Acceptance tests	Prior to dispatch, vendor shall provide inspection call to BHEL to witness the acceptance tests.	
a)	Tensile test (*)		
b)	Wrapping test (*)		
c)	Conductor resistance test (*)	Sampling shall be As per IS 7098 part-1: 1985	
d)	Test for thickness of insulation and sheath (inner & outer) (*)	* As per IS 7098 part-1: 1988	
e)	Hot set test for insulation(*)		
f)	Tensile strength and elongation at break of insulation and sheath(inner & outer) (*)	# Ageing test shall be performed as indicated below: Samples as per IS 7098 part-1: 1988 from the offered lot shall be tested for tensile strength & elongation (before and after ageing) as per IS 7098 part-1: 1988.	
g)	Ageing test on insulation and sheath (inner and outer) (#)		
h)	Thermal stability test for sheath (inner & outer) as per IS 5831-1984		
i)	Tests on armour wire as per IS:3975-1979		
	i. Measurement of Dimensions		
	ii. Tensile test		
	iii. Elongation test		
	iv. Torsion test		




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#	Particular		Vendor acceptance (Yes / No)
	v. Wrapping test		
	vi. Resistance test		
	vii. Zinc coating test (mass & uniformity)		
	viii. Adhesion test		
	ix. Freedom from defects		
j)	Insulation resistance (Volume resistivity) test (*)		
k)	HV test at room temp (*)		
l)	Flammability test As per IEC-60332 Part-3		
m)	FR property tests		
	i. Oxygen index test as per IS 10810 Part 58		
	ii. Temperature index test as per IS 10810 Part 64		
	iii. FR test on single cable As per IS: 10810 Part 61		
1.2.14	Routine tests	As per IS: 7098 (Part-1) 1988.	
a)	Conductor resistance test	To be conducted by the vendor on each drum of finished cables to demonstrate integrity of the cable.	
b)	HV test	Test report shall be submitted to BHEL along with inspection call.	

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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.15	Manufacturing Quality Plan / Quality Assurance Plan	Vendor shall submit Manufacturing Quality Plan / Quality Assurance Plan to BHEL for approval within seven days of placement of purchase order.	
1.2.16	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.	
1.2.17	Cable identification	The printing/ embossing shall be progressive, automatic, in line and marking shall be legible and indelible.	
a)	Identification scheme / printing on the cable.	Printing shall be on outer sheath with following information throughout the length of the cable at interval of 1 meter: Manufacturer name, brand name or trade mark, ISI mark / IS standard, Cable size, Voltage grade, FR and sequential marking of the length of cable at every interval of 1m.	

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#	Particular	BHEL specification	Vendor acceptance (Yes / No)
1.2.18	Packing and marking		
a)	Packing	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 applied to the entire drum. Wooden drums shall comply IS: 10418.	
b)	Marking on the drum	Each drum shall be marked with following information: BHEL PO number and date, BHEL specification number, Cable description, Manufacturer name, Address and contact number, Part number, Size & Length of the cable, Cable code, Voltage grade, Approx gross mass, Year of manufacture etc stenciled 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.	
c)	Drum length	500 meter +/- 5%. In case, the cable length is less than 500m,such cable is to be wound and supplied in separate individual drum.	