

Bharat Heavy Electricals Limited

High Pressure Boiler Plant, Tiruchirappalli - 620 014

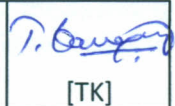
TECHNICAL DELIVERY CONDITIONS FOR SUB - DELIVERY COMPONENTS OF CONTROLS AND INSTRUMENTATION

TDC:TCI:347 / REV. 00

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TECHNICAL SPECIFICATION FOR 2 PAIR x 1.5 SQ.MM CABLE (TYPE - F)

Note: This spec. supersedes spec. GF-158 / Rev.00

00	12/04/2018	Intial Release	 [SK]	 [KV]	 [TK]
Rev. no.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED

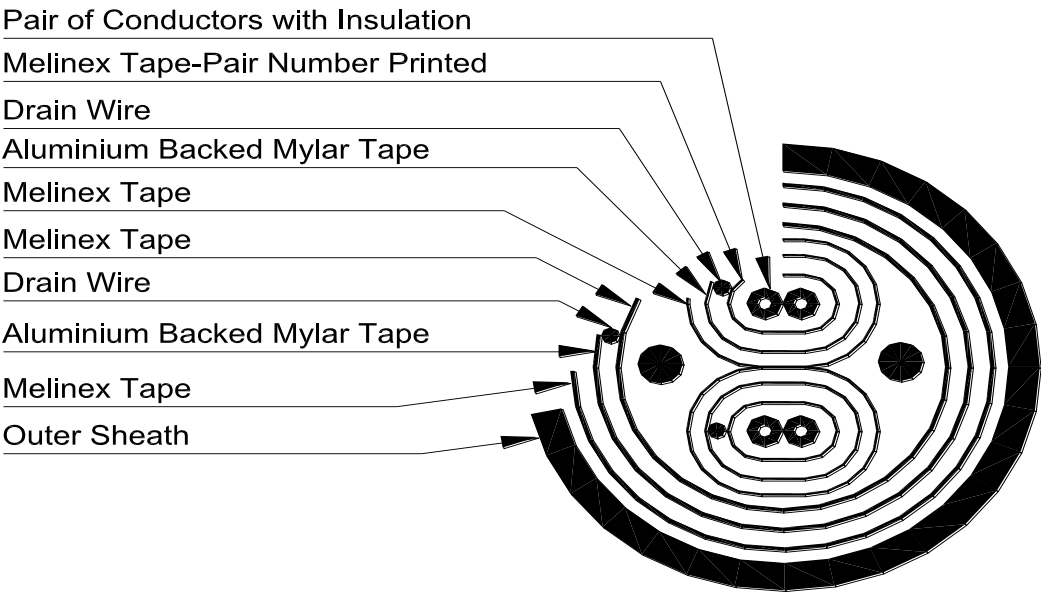
Sl. No.	Parameter		Value/Requirement
	Application		For connecting feeder mounted Tacho generator & Feeder Integral cabinet.
	Applicable Standards		IS-1554, IS-5831, IS-8130, IS-3961, IS-10418, IS-10810, VDE-0815, IEC-332, IEEE-383, IEC-754, ASTM-D-2843, ASTM-D-2863 & SS-4241475
1	Site Conditions		Dusty, Salty, Corrosive & Heavily polluted
2	General		All the parameters shall comply with the respective IS wherever applicable.
3	Voltage grade	V	1100
4	Temperature Rating & Short circuit withstand Rating	°C	85 160
5	Construction of cable		As per Constructional diagram enclosed with this Data sheet
6	Conductor:-		
a	No. Of Pairs and Area of Conductor		2 Pair x 1.5 Sq.mm
b	No. of Strands / Strand Dia. (for finished cable)	No. of Strand / mm	23/0.3 (Stranded & Non-compacted)
c	Material		Annealed Tinned Copper Conductor
d	Grade / Standard		High Conductivity Electrolytic grade Copper to IS 8130
7	Insulation :-		
a	Material		HR PVC
b	Type and Standard		Type-C as per IS-5831
c	Thickness (Nominal)	mm	0.8 mm for 1.5 Sq.mm. Cable
d	Method of application		Extruded
e	Pair Identification		Blue & Red, Grey & Yellow
f	Volume Resistivity as per IS-5831	W cm	1×10^{13} @ 27 °C & 1×10^{10} @ 85 °C
8	Lay for Pairing	Twist/ Metre	20
9	Direction of Lay		Right hand – All pairs shall be in the same direction
10	Binding material		
a	Type of Material		Melinex Tape
b	Thickness (minimum)	mm	0.028
c	Coverage	%	100
d	Overlap (minimum)	%	25
11	Fillers (wherever applicable)		FRLS, Non hygroscopic material, moisture resistance material, suitable for the operating temperature of the cable. Fillers shall not stick to insulation and inner sheath.

12	Shielding :-		
a	Type of Material		Aluminium Backed Mylar Tape
b	Thickness (minimum)	Micron	For Pair Shielding 28 Microns
c	Coverage	%	100
d	Overlap (minimum)	%	25
e	Polyester Tape over Pair Shielding #(See constructional Diagram)		Over the individual pair shielding tape, two laps of 0.05 mm thick (minimum) polyester tape shall be applied with minimum overlap of 25 % and 100 % Coverage.
13	Drain wire for shielding		
a	Material		Annealed Tinned Electrolytic Copper
b	No. Of strands / Dia. of strand	No./ mm	7/0.3
c	Area of cross section	sq.mm	0.5
14	Outer Sheath		
a	Material		HR PVC With FRLS Properties
b	Type and Standard		Type-ST2 as per IS-5831
c	Method of application		Extruded
d	Thickness (minimum)		As per IS-1554
e	Colour		Black
15	Cable Marking on Outer sheath		Manufacturer's Name, Insulation material, Conductor size, Number of pairs, Voltage rating, Type of cable, Year of manufacture @ 1 Metre Interval by Embossing. Embossing shall be legible and indelible.
16	Sequential marking on Outer sheath		Every 1 Metre for Progressive Length by printing. Every 5 Metre to read 'FRLS' by Embossing
17	Tolerance on Outer diameter	mm	± 2
18	Tolerance on Outer diameter for the entire length	mm	1
19	Ovality	mm	1
20	Bending Radius	Minimum	12 times the Outer diameter
21	Standard Packing Length	Metre	1000
22	Tolerance on standard : packing length	%	± 5
23	Over all Quantity Tolerance	%	± 2
24	Non-standard Length		Last length shall be supplied in a single length
25	Electrical Parameters at 20° C :-		
	Parameter	Unit	1.5 Sq.mm
a	Conductor DC loop resistance (max.)	W/km	12.4
b	Short circuit rating of conductor for 1 second	KA	0.156

c	Insulation Resistance (min.)	MW/km	100
d	Mutual Capacitance (max.)	nF/km	120
e	Attenuation (max.) @ 0.8 KHz	dB/km approx.	1.2
f	Cross talk (min.) @ 0.8 KHz	dB	60
g	Test Voltage - Between Conductor- Conductor	KV/ minute	2
h	Test Voltage - Between: Conductor - Shield (min.)	KV/ minute	0.5
26	FRLS Properties of Inner & Outer Sheath :-		
a	Oxygen Index @ ambient temp. as per ASTM-D-2863	%	Not Less than 29
b	Temperature Index @ oxygen index 21 as per ASTM-D-2863	° C	Not Less than 250
c	Smoke density rating as per ASTM-D-2843	%	Shall not be more than 60
d	Acid gas generation as per IEC 60754-Part 1	%	Shall not be more than 20% by weight
e	Flammability Tests (As per quality plan)		Shall pass
f	Outer sheath material shall have		Shall be resistant to water, fungus and anti-rodent & anti-termite properties and pass the relevant tests
27	Quality Plan		QA: CI: STD: QP: 49 (Latest Revision)

28	Packing Details	Cables shall be supplied in Non-returnable wooden drums of heavy construction. The surface of the drum and the outer most cable layer shall be covered with waterproof 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. All ferrous parts used shall be treated with suitable rust preventive finish or coating to avoid rusting during transit or storage. Wooden cable drum shall be treated by immersing in copper-nitrate solution. Wooden drums shall comply with IS-10418. Each drum shall carry Manufacturer's name, Purchaser's name, Address and Contract number, Item number and type, size and length of cable and net, gross weight stencilled on both the 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 of rotation in which it should be rolled.
29	Guarantee	A Guarantee Certificate for 18 months of trouble-free operation/performance from the date of shipment or 12 months from the date of commissioning whichever is earlier shall be furnished.
30	Confirmation to be given by the vendor.	1. Sub-Delivery Enquiry Deviation format filled with "No Deviation", indicating the Data sheet and Quality Plan reference and shall be furnished along with the offer. 2. Technical deviation/non-conformance indicated elsewhere in the offer will not be considered. In the absence of Sub-Delivery Enquiry Deviation format, the vendor's offer will not be evaluated.

TYPICAL CONSTRUCTIONAL DIAGRAM
OF A 2 PAIR, PAIR SHIELDED & OVER ALL SHIELDED CABLE



ANNEXURE TO INSTRUMENTATION CABLE DATA SHEET, TYPE-F, UN-ARMOURED
(Dimensions of cable-To be filled and furnished along with offer)

Type of cable / No. of Pair			2 Pair x 0.5 sq.mm., (Type-F)
1	Dia. over Conductor	mm	
2	Thickness of Insulation	mm	
3	Dia. over insulated	mm	
4	Dia. Over laid up pair	mm	
5	Thickness of outer Sheath (Minimum)	mm	
6	Dia. over Outer Sheath	mm	
7	Weight of cable	kg/km	

SIGNATURE OF THE VENDOR WITH SEAL