

PLANT PURCHASING SPECIFICATION BHOPAL

BP 28575

Rev No. 05

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SUPERSEDES
BP 28575 Rev.04

PVC INSULATED MULTI-CORE UNTINNED COPPER CABLE (Grade 1100 Volt)

1. GENERAL :

This specification governs the quality of PVC insulated multi-core cable made of annealed plain (untinned) stranded copper wires, cores colour coded, bedded armour with single layer of galvanized round steel wire and overall PVC sheathed for use on A.C. earthed or unearthed systems for rated voltages upto and including 1100 Volts.

2. APPLICATION : Used for transformers & other electrical equipments.

3. COMPLIANCE WITH NATIONAL STANDARDS :

This specification is generally based on IS:1554 (Part.I)-1988 Reaffirmed 2005 with Type-A, "General Purpose insulation" and Type - ST 1 "General purpose sheath for 70 deg.c operation" together with armoring.

4. SIZES : No. of cores and the size of cable shall be as stated on order.

4.1 No. of cores : 2, 3, 4, 5, 7, 10, 12 & 19.

However any other No. of cores in line with Table 3 of IS : 1554 (Part.I) can also be ordered.

4.2 Nominal cross section area of conductor : 2.5 mm²

5. CONDUCTOR :

The conductor shall consist of untinned annealed high conductivity copper wires with electrical and mechanical properties in accordance with class 2 of IS : 8130.

For 2.5 mm² cross section size, seven parallel conductors of 0.67 mm dia. shall be used.

Resistance of the conductor at 20 deg.c. shall not exceed 7.41 Ohm / km.

Revision :

Reviewed & Reaffirmed

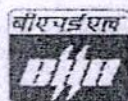
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Rev. 05

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ISO 9001 A

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6. INSULATION :

6.1 Type of insulation :

The insulation provided shall be Polyvinyl Chloride Compound conforming to type - 'A' compound, (General purpose insulation for 70 ° c operation) of IS : 5831.

6.2 Thickness of insulation :

The radial thickness of insulation (t_i) shall be in accordance with Table - 2 of IS 1554 (Part-I).

6.3 Tolerance on thickness of insulation :

The thickness at one place may be less than the value specified provided that the difference does not exceed 0.1 mm + 10% of the nominal value (t_i in mm) specified.

6.4 Application of insulation :

The insulation shall be applied by extrusion method in such a way that it fits closely on the conductor and it shall be possible to remove it easily without damage to the conductor.

7. METHOD OF TEST :

As per relevant parts of IS:10810.

8. CORE IDENTIFICATION :

Cores of cable shall be identified by different colouring of PVC insulation/numbers as per Cl.10 of IS:1554(Part-1).

9. LAYING OF CORES :

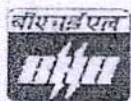
The laying up of cores shall be in accordance with Table-3 of IS 1554 (Pt.I).

10. SHEATH AND ARMOURING :

10.1 The sheath shall be as per type ST1 of IS:5831.

10.2 Inner sheath, armouring and outer sheath of the multicore cable shall be in accordance with Cl.12, 13 and 14 of IS:1554 (Part.1) - 1988 Reaffirmed 2005 respectively. Armouring shall consist of galvanized steel wire to IS:3975-1999 Reaffirmed 2004.

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11. ELECTRICAL TESTS :

11.1 General :

Unless otherwise specified tests shall be made with alternating voltage, of approximately sine wave form having a frequency in the range of 50 – 60 Hz and the r.m.s. values given.

11.2 High voltage test (Cl 16 of IS:1554-Part.I)

11.2.1 At room temp.

The cable when tested at room temperature shall be able to withstand an A.C. Voltage of 3 kV (rms) or a DC voltage of 7.2 kV. The Duration of test shall be 5 minutes for each connection.

11.2.2 After water immersion (Type Test) :

The core (s) shall be carefully removed from a sample approximately 3 metre long from the finished cable. The cores shall be so immersed in water bath at $60 \pm 3^\circ\text{C}$ that their ends protrude at least 200 mm above the water level. After 24 ± 1 hours a voltage of 3 kV (rms) shall be applied between the conductor and water. This voltage shall be raised to 6 kV (rms) within 10 seconds and held constant at this value for 5 minutes. If the sample fails in this test one more sample shall be subjected to this test. There shall be no failure in the repeat test.

11.3 Insulation resistance:(IS:5831)

Insulation resistance test shall be carried out as per IS:5831 at 500 Volt D.C. The value of volume resistivity when calculated from the measured insulation resistance value shall not be less than 1.0×10^{13} ohm-cm at 27°C and 1.0×10^{10} ohm-cm. at 70°C .

12 FLAMMABILITY TEST :

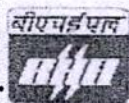
Period of burning after removal of flame shall not exceed 60 seconds & the ineffect (uncharred) portion from the lower edge of the top clamp shall be at least 50 mm.

13. COLD BEND TEST :

Test shall be carried out on individual cores after removal from the cable as per IS 10810 Part 20 except that the temperature of test shall be -10°C .

The samples when examined while still on the madrel, shall show no signs of cracks or scale visible to the naked eye.

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14. TEST CERTIFICATE :

Unless otherwise specified, three copies of test certificates shall be supplied with each consignment.

In addition, the supplier shall ensure to enclose one copy of the test certificate alongwith their despatch document to facilitate quick clearance of the material.

The test certificate shall bear the following information.

BP 28575 : PVC Insulated Multi-Core Untinned Copper Cables (Grade 1100 Volt)
Rev.05

BHEL Order No.

Supplier's Name.

Size & Length of Cable.

Batch/Lot No.

Test results obtained for all the properties (including dimensional tolerances) as per the specification.

15. IDENTIFICATION OF CABLE :

'BHEL' shall be marked on every metre on the outer sheath of the entire length of cable either by indentation or embossing in addition to manufacturer's name, brand name or trade mark if any.

16. PACKING AND MARKING:

The cables shall be either wound on reels, drums or supplied in packed coils. Each drum or reel should be marked with the following information:

BP 28575 : PVC Insulated Multi-Core Untinned Copper Cables, (Grade 1100 Volt.)

BHEL Order No.

Manufacturer's / Supplier's Name.

Size (No. of Cores & Area of Cross Section).

Length.

Weight

Batch / Lot No.

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Form No 2038

उत्पाद मानक
परिणामित्र
शाप/अभि. निर्देश

PRODUCT STANDARD
TRANSFORMER
SHOP/ENGG INSTRUCTIONS

TR 24157 C

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**SPECIFICATION OF PVC INSULATED MULTICORE AND ARMOURD
COPPER CABLES WITH F.R.L.S. PROPERTIES
(GRADE 1100 VOLTS)**

1 GENERAL

Cable as per below table shall generally conform to our spec. BP 28575 Rev 04 and IS 1554 Pt.1 (1988) with additional requirement of FLAME RETARDANT LOW SMOKE (FRLS) properties (by using special PVC compound), and each core having seven parallel conductors of Dia as under.

IT NO	DESCRIPTION	COND. DIA.	STYLE NO.
1	2C X 4 mm ² FRLS CU CABLE	0.85 mm	JS 900627266
2	3C X 4 mm ² FRLS CU CABLE	0.85 mm	JS 900627267
3	4C X 4 mm ² FRLS CU CABLE	0.85 mm	JS 900627268
4	2C X 2.5 mm ² FRLS CU CABLE	0.65 mm	
5	3C X 2.5 mm ² FRLS CU CABLE	0.65 mm	
6	4C X 2.5 mm ² FRLS CU CABLE	0.65 mm	
7	12C X 1.5 mm ² FRLS CU CABLE	0.53 mm	JS 9006281920

2. TESTING

Following test shall be carried out on materials used and on finished cables

- Conductor : Conductor shall consist of annealed high conductivity copper wires with electrical & mechanical properties in accordance with IS 8130 (1984).
- Insulation & sheath material : All type and routine tests as per IS 5831 (1984)
- Finished cable : All type and routine tests as per BP 28575 Rev. 04 & IS 1554 Pt 1 (1988)
- in addition to above, tests as mentioned below shall be carried out to prove FRLS properties of the cable.

SPECIAL TESTS

	TEST	FUNCTION OF TEST	SPECIFICATION	SPECIFIED VALUE
a)	Critical Oxygen Index	To determine percentage of Oxygen required for supporting combustion at room temperature of sheathing material.	ASTM-D 2863-1974	Oxygen Index Min 29
b)	Temp index	To determine at what temperature normal oxygen content of 21% in air will support combustion of sheathing	ASTM-D 2863-1974	Min Temperature index 250 °C

IN TABLE IT NO 7
ADDED 21/2/18

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DISTRIBUTION
TRF/TRM/FTM
TRX/TFG
QC/TCB/QA/TCB

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CHECKED &
APPROVED

तैयार किया
PREP'D
Amulva Deota

Sanjay Panikar

जाँची किया ISSUED
तैयार किया / मानक
TRF/STD

DATE
5/12/16



		material.		
c)	Smoke density	To determine visibility (light transmission) under fire of sheathing material.	ASTM-D 2843-1977	Min. average light transmission of 40%
d)	Acid gas generation	To ascertain the amount of Hydrochloric acid gas evolved from PVC sheath of cable under fire conditions.	IEC 754-1	Hydrochloric acid gas released max. 20%
e)	Flammability	To determine ignition resistance and flame propagation under specified conditions	1) Swedish std. No. SS 424-1475 class F3 2) IEC 332-1	From test sample of 850 mm length unburnt portion shall be more than 300mm from top. In the calculated time duration of burning the cable sample of 600 ± 25 mm length, the length unburnt portion to be min. 50mm from top.
f)	Fire resistance	To determine the fire resistance property of cable	IS 5831 IS 1554	In the time duration of 60 sec. of burning of cable sample of 600mm length, length of burnt portion to be max. of 200 mm.
g)	Anti termite & anti rodent properties of outer sheath	—	—	Content of Anti termite & anti rodent chemical i.e. copper rapthanate to be checked & reported in T.C.

Notes

- Supplier shall specifically confirm that cable offered shall meet the complete requirement of our specification.
- T.C.s for all type & routine tests shall be furnished.
- Cable shall be inspected / tested by BHEL or by its authorized agency at source.
- Dia. over inner & outer sheath and wt/ meter for each size of cable shall be furnished.

DRG-NOWAS TR 20157B

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DISTRIBUTION.TRE/TRM/FTM
TRX/TTG/
QC-TCB/QA-TCB/
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TR 24157C

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