

IS 13730 (Part 8) : 1996
IEC 317-8 (1990)

(Reaffirmed 2001)

भारतीय मानक

कुण्डलन तारों के विशेष प्रकारों की विशिष्टि

भाग 8 पॉलीएस्टरइमाईड इन्वैलकृत गोल तारों के तार वर्ग 180

Indian Standard

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES

PART 8 POLYESTERIMIDE ENAMELLED ROUND COPPER WIRE, CLASS 180

ICS 29.060.10

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NATIONAL FOREWORD

This Indian Standard which is identical to IEC 317-8 (1990) 'Specification for particular types of winding wires — Part 8 : Polyesterimide enamelled round copper wire, class 180' issued by the International Electrotechnical Commission was adopted by the Bureau of Indian Standards on the recommendation of the Winding Wires Sectional Committee ET 33 and approval of the Electrotechnical Division Council.

Presently requirements of enamelled round and enamelled rectangular winding wires are covered under IS 4800 (series) and IS 3855 (series) respectively. Over the years, changes in technology and developments, resulted in publishing of number of amendments to these standards. Even though Indian Standards were following the developments in IEC level, but for some specific properties namely resistivity of copper; methods of test, etc, IEC standards were not adopted in totality. Keeping in view the present trend in the industry it has been decided to align the Indian standards on winding wires by adopting the IEC standards in totality.

The series of IEC standards on methods of tests (IEC 851 Series) and particular types of winding wires (IEC 317 Series) were decided to adopt without deviation as follows:

IEC 851 (series) 'Methods of test for winding wires' had already been adopted and published as IS 13778/ IE 851 (series) in 6 parts.

The adoption of IEC 317 (series) on particular types of winding wires is being carried out in phased manner under the series IS 13730/ IEC 317.

With the publication of the new series of standards, corresponding IS 4800 (series) and IS 3855 (series) would be withdrawn.

This standard IS 13730 (Part 8)/IEC 317-8 (1990) covers the requirements of enamelled wires of IS 4800 (Part 9).

The text of IEC standards has been approved as suitable for publication as Indian Standard without deviation. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following :

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard', and
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as a decimal marker.

Only the English text of the International standard had been retained while adopting it as Indian Standard.

CROSS REFERENCES

In this Indian Standard, wherever reference appears to IEC 317-0-1 : 1990 'Specification for particular types of winding wires — Part 0 : General requirements, Section 1 Enamelled round copper wire', shall be read in its respective place as IS 13730 (Part 0/Sec 1) : 1993/ IEC 317-0-1 1990 'Specifications for particular types of winding wires — Part 0 : General requirements, Section 1 Enamelled round copper wire' which is identical to IEC 317-0-1 : 1990.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES

PART 8 POLYESTERIMIDE ENAMELLED ROUND COPPER WIRE, CLASS 180

1 Scope

This International Standard specifies the requirements of enamelled round copper winding wire of class 180 with a sole coating based on polyesterimide resin, which may be modified provided it retains the chemical identity of the original resin and meets all specified wire requirements.

NOTE - A modified resin is a resin that has undergone a chemical change, or contains one or more additives to enhance certain performance or application characteristics.

Class 180 is a thermal class that requires a minimum temperature index of 180 and a heat shock temperature of at least 200 °C.

The temperature in degrees Celsius corresponding to the temperature index is not necessarily that at which it is recommended that the wire be operated and this will depend on many factors, including the type of equipment involved.

The range of nominal conductor diameters covered by this standard is:

- Grade 1: 0,018 mm up to and including 3,150 mm;
- Grade 2: 0,020 mm up to and including 5,000 mm;
- Grade 3: 0,250 mm up to and including 1,600 mm.

The nominal conductor diameters are specified in clause 4 of IEC 317-0-1.

2 Normative references

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid international standards.

IEC 317-0-1: 1990, *Specifications for particular types of winding wires - Part 0: General requirements - Section 1: Enamelled round copper wire.*

3 Definitions and general notes on methods of test

For definitions and general notes on methods of test see clause 3 of IEC 317-0-1.

In case of inconsistencies between IEC 317-0-1 and this standard, IEC 317-8 shall prevail.

4 Dimensions

See clause 4 of IEC 317-0-1.

5 Electrical resistance

See clause 5 of IEC 317-0-1.

6 Elongation

See clause 6 of IEC 317-0-1.

7 Springiness

See clause 7 of IEC 317-0-1.

8 Flexibility and adherence

See clause 8 of IEC 317-0-1, where the constant *K* used for the calculation of the number of revolutions for the peel test shall be 110 mm.

9 Heat shock

See clause 9 of IEC 317-0-1, where the minimum heat shock temperature shall be 200 °C.

10 Cut-through

No failure shall occur within 2 min at 300 °C.

11 Resistance to abrasion (nominal conductor diameters from 0,250 mm up to and including 2,500 mm)

The wire shall meet the requirements given in table 1.

Table 1 - Resistance to abrasion

Nominal conductor diameter	Grade 1		Grade 2		Grade 3	
	Minimum average force to failure	Minimum force to failure of each measurement	Minimum average force to failure	Minimum force to failure of each measurement	Minimum average force to failure	Minimum force to failure of each measurement
mm	N	N	N	N	N	N
0,250	2,85	2,45	4,70	4,00	5,80	4,90
0,280	3,10	2,60	5,05	4,30	6,25	5,30
0,315	3,35	2,80	5,45	4,60	6,70	5,70
0,355	3,60	3,05	5,85	4,95	7,20	6,10
0,400	3,85	3,25	6,25	5,30	7,70	6,50
0,450	4,15	3,50	6,75	5,70	8,25	7,00
0,500	4,45	3,75	7,20	6,10	8,85	7,50
0,560	4,75	4,05	7,70	6,50	9,50	8,05
0,630	5,10	4,35	8,25	7,00	10,2	8,65
0,710	5,45	4,65	8,85	7,50	10,9	9,25
0,800	5,85	4,95	9,50	8,05	11,7	9,90
0,900	6,30	5,35	10,2	8,60	12,5	10,6
1,000	6,75	5,75	10,9	9,20	13,3	11,3
1,120	7,35	6,20	11,6	9,80	14,2	12,0
1,250	7,90	6,70	12,5	10,5	15,2	12,9
1,400	8,50	7,20	13,3	11,3	16,4	13,9
1,600	9,20	7,80	14,3	12,1	17,6	14,9
1,800	9,95	8,40	15,4	13,0	-	-
2,000	10,6	9,00	16,4	13,9	-	-
2,240	11,7	9,90	17,5	14,8	-	-
2,500	12,8	10,8	18,6	15,8	-	-

NOTE - For intermediate nominal conductor diameters, the value of the next largest nominal conductor diameter shall be taken.

12 Resistance to solvents

See clause 12 of IEC 317-0-1, however, the change shall not exceed three grades of pencil hardness.

13 Breakdown voltage

See clause 13 of IEC 317-0-1, where the elevated temperature shall be 180 °C.

14 Continuity of insulation

See clause 14 of IEC 317-0-1.

15 Temperature index

See clause 15 of IEC 317-0-1, where the minimum temperature index shall be 180.

16 Resistance to refrigerants

This test is only applicable to wires used in refrigerants systems.

16.1 Extraction with trichloroethylene or with methanol

The percentage of extractable matter shall not exceed the figure given in table 2.

The solvent shall be agreed between purchaser and supplier.

Table 2 - Extraction

Nominal conductor diameter mm		Extractable matter %
Over	Up to and including	
-	0,500	1,5
0,500	1,000	1,0
1,000	3,000	0,8

16.2 Extraction with monochlorodifluoromethane (refrigerant 22)

The percentage of extractable matter shall not exceed the figure given in table 3.

Table 3 - Extraction (R22)

Nominal conductor diameter mm		Extractable matter %
Over	Up to and including	
-	0,500	1,0
0,500	1,000	0,8
1,000	3,000	0,6

16.3 Blistering in monochlorodifluoromethane (refrigerant 22)

This test is made only when agreed between purchaser and supplier.

None of the specimens shall show more than four blisters. Any blister less than half the diameter of the wire shall be ignored when the piece of coating affected is still firmly attached to the rest of the coating.

The adherence of the coating after the blister test is checked by winding the wire on a mandrel of $4D^*$, the wire shall then show no cracks.

* D is the overall diameter of the wire.

17 Solderability

Test inappropriate.

18 Heat or solvent bonding

Test inappropriate.

19 Dielectric dissipation factor

Test inappropriate.

20 Resistance to transformer oil

Test appropriate but no requirements specified.

21 Loss of mass

Test inappropriate.

22 High temperature failure

Test appropriate but no requirements specified.

30 Packaging

See clause 30 of IEC 317-0-1.