भारतीय मानक

Indian Standard

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AMD 1 : 2024 CSV

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भाग 1 पॉलीविनाइल एसीटल एनामेल्ड गोल तांबे के तार, कक्षा 105

(पहला पुनरीक्षण)

Specification for Particular Types of Winding Wires

Part 1 Polyvinyl Acetal Enamelled Round Copper Wire, Class 105

(First Revision)

ICS 29.060.10

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Winding Wire Sectional Committee, ETD 33

NATIONAL FOREWORD

This Indian Standard (Part 1) (First Revision) which is s identical to IEC 60317-1 : 2010 + AMD 1 : 2024 CSV 'Specifications for particular types of winding wires — Part 1: Polyvinyl acetal enamelled round copper wire, class 105' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Winding Wire Sectional Committee and approval of the Electrotechnical Division Council.

This standard is published in various parts. Other parts in this series are:

Part 0	General requirements
Part 2	Solderable polyurethane enamelled round copper wire, class 130, with a bonding layer
Part 3	Polyester enamelled round copper wire, class 155
Part 4	Solderable polyurethane enamelled round copper wire, class 130,
Part 5	Polyester enamelled round aluminium wire, Class 155
Part 6	Oleo-resinous enamelled round aluminium wire, class 105
Part 8	Polyesterimide enamelled round copper wire, class 180
Part 9	Polyester enamelled round aluminium wire, class 138
Part 12	Polyvinyl acetal enamelled round copper wire, class 120
Part 13	Polyester or polyesterimide overcoated with polyamide-imide enamelled round copper wire, class 200
Part 15	Polyesterimide enammelled round aluminium wire, class 180
Part 16	Polyester enamelled rectangular copper wire class 155
Part 17	Polyvinyl acetal enamelled rectangular copper wire, class 105
Part 20	Solderable polyurethane enamelled round copper wire, class 155
Part 21	Solderable polyurethane enamelled round copper wire overcoated with polyamide, class 155
Part 23	Solderable polyesterimide enamelled round copper wire, class 180
Part 25	Polyester or polyesterimide overcoated with polyamide-imide enamelled round aluminium wire, class 200
Part 26	Polyamide-imide enamelled round copper wire, class 200
Part 27	Paper tape covered rectangular copper wire
Part 28	Polyesterimide enamelled rectangular copper wire, class 180
Part 29	Polyester or polyesterimide overcoated with polyamide-imide enamelled rectangular copper wire, class 200
Part 31	Glass fibre wound, resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 180
Part 32	Glass fibre wound, resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 155
Part 33	Glass fibre wound, resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 200
Part 34	Polyester enamelled round copper wire, class 130 L

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INTRODUCTION

This Part of IEC 60317 is one of a series which deals with insulated wires used for windings in electrical equipment. The series has three groups describing

1) winding wires and methods of test (IEC 60851) ;
2) specifications for particular types of winding wires (IEC 60317);
3) packaging of winding wires (IEC 60264).

Indian Standard

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES

PART 1 POLYVINYL ACETAL ENAMELLED ROUND COPPER WIRE, CLASS 105

(First Revision)

1 Scope

This Part of IEC 60317 specifies the general requirements of enamelled round copper winding wires of class 105 with a sole coating based on polyvinyl acetal resin, which may be modified providing 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 105 is a thermal class that requires a minimum temperature index of 105 and a heat shock temperature of at least 155 °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 as follows:

– Grade 1: 0,040 mm up to and including 2,500 mm;
– Grade 2: 0,040 mm up to and including 5,000 mm;
– Grade 3: 0,080 mm up to and including 5,000 mm.

The nominal conductor diameters are specified in Clause 4 of IEC 60317-0-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60317-0-1[1]:2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*.
IEC 60317-0-1:2013/AMD1:2019

3 Terms, definitions and general notes on methods of test and appearance

3.1 Terms and definitions

For terms and definitions, see 3.1 of IEC 60317-0-1. In case of inconsistencies between IEC 60317-0-1 and this standard, IEC 60317-1 shall prevail.

[1] There exists a consolidated edition 4.1:2021 that includes IEC 60317-0-1:2013 and its Amendment 1:2019.

3.2 General notes

3.2.1 Methods of test

Subclause 3.2.1 of IEC 60317-0-1:2013 and IEC 60317-0-1:2013/AMD1:2019 applies.

In case of inconsistencies between IEC 60317-0-1 and this standard, IEC 60317-1 shall prevail.

3.2.2 Winding wire

Subclause 3.2.2 of IEC 60317-0-1:2013 applies.

3.3 Appearance

See 3.3 of IEC 60317-0-1.

4 Dimensions

See Clause 4 of IEC 60317-0-1.

5 Electrical resistance

Clause 5 of IEC 60317-0-1:2013 and IEC 60317-0-1:2013/AMD1:2019 applies.

6 Elongation

See Clause 6 of IEC 60317-0-1.

7 Springiness

See Clause 7 of IEC 60317-0-1.

8 Flexibility and adherence

See Clause 8 of IEC 60317-0-1, where the constant *K* used for the calculation of the number of revolutions for the peel test shall be 175 mm.

9 Heat shock

The minimum heat shock temperature shall be 155 °C.

9.1 Nominal conductor diameters up to and including 1,600 mm

The coating shall show no crack. The mandrel diameter shall be as specified in Table 1.

Table 1 – Heat shock

Nominal conductor diameter mm		Elongation before winding on mandrel %	Mandrel diameter [b]
Over	Up to and including		
–	0,050	20 [a]	0,150 mm
0,050	1,600	–	*D*

[a] Or to the breaking point of the copper, whichever is less.

[b] *D* is the overall diameter of the wire.

9.2 Nominal conductor diameters over 1,600 mm

See 9.2 of IEC 60317-0-1.

10 Cut-through

No failure shall occur within 2 min at 170 °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 2.

Table 2 – Resistance to abrasion

Nominal conductor diameter mm	Grade 1		Grade 2		Grade 3	
	Minimum average force to failure N	Minimum force to failure of each measurement N	Minimum average force to failure N	Minimum force to failure of each measurement N	Minimum average force to failure N	Minimum force to failure of each measurement N
0,250	3,00	2,55	4,90	4,15	5,80	4,90
0,280	3,25	2,75	5,25	4,45	6,25	5,30
0,315	3,50	2,95	5,65	4,80	6,70	5,70
0,355	3,75	3,20	6,05	5,15	7,20	6,10
0,400	4,05	3,45	6,50	5,50	7,70	6,50
0,450	4,35	3,70	7,00	5,90	8,25	7,00
0,500	4,65	3,95	7,50	6,35	8,85	7,50
0,560	5,00	4,25	8,00	6,80	9,5	8,05
0,630	5,35	4,55	8,60	7,30	10,2	8,65
0,710	5,70	4,85	9,20	7,80	10,9	9,25
0,800	6,10	5,15	9,90	8,40	11,7	9,9
0,900	6,55	5,55	10,6	9,00	12,5	10,6
1,000	7,05	5,95	11,3	9,60	13,3	11,3
1,120	7,60	6,45	12,1	10,2	14,2	12,0
1,250	8,20	6,95	12,9	11,0	15,2	12,9
1,400	8,80	7,45	13,9	11,8	16,4	13,9
1,600	9,45	8,00	14,9	12,6	17,6	14,9
1,800	10,1	8,60	16,0	13,5	18,8	16,0
2,000	10,9	9,20	17,1	14,4	20,2	17,1
2,240	11,7	9,90	18,2	15,4	21,6	18,3
2,500	12,5	10,6	19,4	16,4	23,0	19,5
For intermediate nominal conductor diameters, the value of the next larger nominal conductor diameter shall be taken.						

12 Resistance to solvents

See Clause 12 of IEC 60317-0-1.

13 Breakdown voltage

See Clause 13 of IEC 60317-0-1, where the elevated temperature shall be 105 °C.

14 Continuity of insulation

See Clause 14 of IEC 60317-0-1.

15 Temperature index

See Clause 15 of IEC 60317-0-1, where the minimum temperature index shall be 105.

16 Resistance to refrigerants

Test inappropriate.

17 Solderability

Test inappropriate.

18 Heat and 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.

23 Pin hole test

See Clause 23 of IEC 60317-0-1

30 Packaging

See Clause 30 of IEC 60317-0-1.

(*Continued from second cover*)

Part 35 Solderable polyurethane enamelled round copper wire, class 155, with a bonding layer

Part 36 Solderable polyesterimide enamelled round copper wire, class 180, with a bonding layer

Part 37 Polyesterimide enamelled round copper wire, class 180, with a bonding layer

Part 38 Polyester or polyesterimide overcoated with polyamide-imide, enamelled round copper wire, class 200, with a bonding layer

Part 39 Glass-fibre braided resin or varnish-impregnated, bare or enamelled rectangular copper wire, temperature index 180

Part 43 Aromatic polyimide tape wrapped round copper wire, class 240

Part 44 Aromatic polyimide tape wrapped rectangular copper wire, class 240

Part 45 Polyester enamelled round copper wire, class 130

Part 46 Aromatic polyimide enamelled round copper wire, class 240

Part 47 Aromatic polyimide enamelled rectangular copper wire, class 240

Part 48 Glass-fibre wound resin or varnish impregnated, bare or enamelled round copper wire, temperature index 155

Part 49 Glass-fibre wound, high temperature resin or varnish-impregnated, bare or enamelled round copper wire, class 180

Part 50 Glass-fibre wound, silicone resin or varnish impregnated, bare or enamelled round copper wire, class 200

Part 53 Aromatic polyimide (aramid) tape wrapped rectangular copper wire, temperature index 220

This standard was first published in 1993. This revision has been undertaken to align it with the latest version of IEC 60317-1 : 2010 + AMD1 : 2024 CSV.

The text of the IEC standard has been approved as suitable for publication as an Indian Standard without deviations. 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’ appears 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 the decimal marker.

In this adopted standard, reference appears to International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60317-0-1 : 2013 Specifications for particular types of winding wires — Part 0-1: General requirements — Enamelled round copper wire	IS 13730 (Part 0/Sec 1) : 2018/ IEC 60317-0-1 : 2013 Specifications for particular types of winding wires: Part 0 General requirements, Section 1 Enamelled round copper wire (*second revision*)	Identical

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

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