

INTERNATIONAL STANDARD



**Specifications for particular types of winding wires –
Part 13: Polyester or polyesterimide overcoated with polyamide-imide enamelled
round copper wire, class 200**



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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and general notes on methods of test and appearance	7
3.1 Terms and definitions	7
3.2 General notes on methods of test	7
3.2.1 Methods of test.....	7
3.2.2 Winding wire.....	7
3.3 Appearance.....	7
4 Dimensions	7
5 Electrical resistance	7
6 Elongation	7
7 Springiness	7
8 Flexibility and adherence.....	7
9 Heat shock	8
10 Cut-through	8
11 Resistance to abrasion (nominal conductor diameters from 0,250 mm up to and including 2,500 mm)	8
12 Resistance to solvents.....	8
13 Breakdown voltage	8
14 Continuity of insulation	8
15 Temperature index	9
16 Resistance to refrigerants.....	9
17 Solderability	9
18 Heat or solvent bonding.....	9
19 Dielectric dissipation factor.....	9
20 Resistance to transformer oil.....	9
21 Loss of mass.....	9
23 Pin hole test	9
30 Packaging	9
Table 1 – Resistance to abrasion	8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

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FOREWORD

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IEC 60317-13 edition 3.1 contains the third edition (2010-03) [documents 55/1179/FDIS and 55/1190/RVD] and its amendment 1 (2024-06) [documents 55/1983/CDV and 55/2019/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60317-13 has been prepared by IEC technical committee 55: Winding wires.

This third edition of IEC 60317-13 cancels and replaces the second edition published in 1990, its amendment 1 (1997) and its Amendment 2 (1997). This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- new requirements for appearance;
- reference to new resistance to refrigerants test in IEC 60851-4;
- deletion of high temperature failure requirement;
- new pin hole test requirements.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This International Standard is to be read in conjunction with IEC 60317-0-1 ~~(2008)~~:2013 and its Amendment 1:2019.

A list of all the parts in the IEC 60317 series, under the general title *Specifications for particular types of winding wires*, can be found on the IEC website.

The committee has decided that the contents of this document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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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).

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SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –**Part 13: Polyester or polyesterimide overcoated
with polyamide-imide enamelled round copper wire, class 200****1 Scope**

This Part of IEC 60317 specifies the requirements of enamelled round copper winding wire of class 200 with a dual coating. The underlying coating is based on polyester or polyesterimide resin, which may be modified providing it retains the chemical identity of the original resin and meets all specified wire requirements. The superimposed coating is based on polyamide-imide resin.

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 200 is a thermal class that requires a minimum temperature index of 200 and a heat shock temperature of at least 220 °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 a nominal conductor diameters covered by this standard is as follows:

- Grade 1: 0,050 mm up to and including 2,000 mm;
- Grade 2: 0,050 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 referenced documents are indispensable for the application 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 60317-0-1:2008¹2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*
IEC 60317-0-1:2013/AMD1:2019

IEC 60851-4:19962016, ~~Methods of test for winding wires~~ *Winding wires – Test methods – Part 4: Chemical properties*

~~Amendment 1 (1997)~~

~~Amendment 2 (2005)~~

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

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 60317-13 shall prevail.

3.2 General notes ~~on methods of test~~

3.2.1 Methods of test

~~For general notes on methods of test, see 3.2 of IEC 60317-0-1.~~

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 60317-13 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.~~

Subclause 3.3 of IEC 60317-0-1:2013 applies.

4 Dimensions

See Clause 4 of IEC 60317-0-1.

5 Electrical resistance

~~See Clause 5 of IEC 60317-0-1.~~

Clause 5 of 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 110 mm.

9 Heat shock

See Clause 9 of IEC 60317-0-1, where the minimum heat shock temperature shall be 220 °C.

10 Cut-through

No failure shall occur within 2 min at 320 °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 mm	Grade 1		Grade 2	
	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
0,280	3,25	2,75	5,25	4,45
0,315	3,50	2,95	5,65	4,80
0,355	3,75	3,20	6,05	5,15
0,400	4,05	3,45	6,50	5,50
0,450	4,35	3,70	7,00	5,90
0,500	4,65	3,95	7,50	6,35
0,560	5,00	4,25	8,00	6,80
0,630	5,35	4,55	8,60	7,30
0,710	5,70	4,85	9,20	7,80
0,800	6,10	5,15	9,90	8,40
0,900	6,55	5,55	10,6	9,00
1,000	7,05	5,95	11,3	9,60
1,120	7,60	6,45	12,1	10,2
1,250	8,20	6,95	12,9	11,0
1,400	8,80	7,45	13,9	11,8
1,600	9,45	8,00	14,9	12,6
1,800	10,1	8,60	16,0	13,5
2,000	10,9	9,20	17,1	14,4
2,240	–	–	18,2	15,4
2,500	–	–	19,4	16,4

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 60317-0-1.

13 Breakdown voltage

See Clause 13 of IEC 60317-0-1, where the elevated temperature shall be 200 °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 200.

16 Resistance to refrigerants

When tested according to IEC 60851-4:2016, Clause 4, the percentage of extractable matter shall not exceed 0,5 %. The requirement for breakdown voltage shall be 75 % of the minimum specified value.

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.~~

Test inappropriate.

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.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and general notes on methods of test and appearance	6
3.1 Terms and definitions	6
3.2 General notes.....	7
3.2.1 Methods of test.....	7
3.2.2 Winding wire.....	7
3.3 Appearance.....	7
4 Dimensions	7
5 Electrical resistance	7
6 Elongation	7
7 Springiness	7
8 Flexibility and adherence.....	7
9 Heat shock	7
10 Cut-through	7
11 Resistance to abrasion (nominal conductor diameters from 0,250 mm up to and including 2,500 mm)	7
12 Resistance to solvents.....	8
13 Breakdown voltage	8
14 Continuity of insulation	8
15 Temperature index	8
16 Resistance to refrigerants.....	8
17 Solderability	9
18 Heat or solvent bonding.....	9
19 Dielectric dissipation factor.....	9
20 Resistance to transformer oil.....	9
21 Loss of mass.....	9
23 Pin hole test	9
30 Packaging	9
Table 1 – Resistance to abrasion	8

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IEC 60317-0-1:2013/AMD1:2019

IEC 60851-4:2016, *Winding wires – Test methods – Part 4: Chemical properties*

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 60317-13 shall prevail.

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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 60317-13 shall prevail.

3.2.2 Winding wire

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

3.3 Appearance

Subclause 3.3 of IEC 60317-0-1:2013 applies.

4 Dimensions

See Clause 4 of IEC 60317-0-1.

5 Electrical resistance

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

6 Elongation

See Clause 6 of IEC 60317-0-1.

7 Springiness

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The wire shall meet the requirements given in Table 1.