

INTERNATIONAL STANDARD



Specifications for particular types of winding wires –
Part 35: Solderable polyurethane enamelled round copper wire, class 155, with a
bonding layer (<https://standards.iteh.ai>)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

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

FOREWORD

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This consolidated version of the official IEC Standard and its amendments has been prepared for user convenience.

IEC 60317-35 edition 2.1 contains the second edition (2013-10) [documents 55/1416/FDIS and 55/1437/RVD], its amendment 1 (2019-06) [documents 55/1691/CDV and 55/1741/RVC] and its amendment 2 (2024-06) [documents 55/1989/CDV and 55/2024/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. 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 60317-35 has been prepared by IEC technical committee 55: Winding wires.

This second edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- new 3.2.2 containing general notes on winding wire, formerly a part of the scope;
- revision to references to IEC 60317-0-1:2013 to clarify that their application is normative;
- modification to Clause 15 to remove specific wire specimen sizes;
- consolidation of 17.1 and 17.2 of the solderability requirements;
- new Clause 23, Pin hole test.

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

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

This International Standard is to be used in conjunction with IEC 60317-0-1:2013 and its Amendment 1:2019.

The numbering of clauses in this standard is not continuous from Clauses 20 and 30 in order to reserve space for possible future wire requirements prior to those for wire packaging.

The committee has decided that the contents of this document and its amendments 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

- reconfirmed,
- withdrawn, or
- revised.

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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 – Test methods (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 35: Solderable polyurethane enamelled round copper wire, class 155, with a bonding layer

1 Scope

This part of IEC 60317 specifies the requirements of solderable enamelled round copper winding wire of class 155 with a dual coating. The underlying coating is based on polyurethane 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 a bonding layer based on a thermoplastic 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.

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

- Grade 1B: 0,020 mm up to and including 0,800 mm;
- Grade 2B: 0,020 mm up to and including 0,800 mm.

The nominal conductor diameters are specified in Clause 4 of IEC 60317-0-1:2013.

2 Normative references

~~The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application.~~ 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 60317-0-1¹:2013, *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, general notes and appearance

3.1 Terms and definitions

~~Subclause 3.1 of IEC 60317-0-1:2013 applies.~~

For the purposes of this document, the terms and definitions given in IEC 60317-0-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

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 Test methods

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 60317-0-1:2013 and this ~~part of IEC 60317~~ document, ~~the latter~~ IEC 60317-35 shall prevail.

3.2.2 Winding wire

Class 155 is a thermal class that requires a minimum temperature index of 155 and a heat shock temperature of at least 175 °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.

3.3 Appearance

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

4 Dimensions

Clause 4 of IEC 60317-0-1:2013 applies.

5 Electrical resistance

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

6 Elongation

Clause 6 of IEC 60317-0-1:2013 applies.

7 Springiness

Clause 7 of IEC 60317-0-1:2013 applies.

8 Flexibility and adherence

Clause 8 of IEC 60317-0-1:2013 applies.

9 Heat shock

Clause 9 of IEC 60317-0-1:2013 applies. The minimum heat shock temperature shall be 175 °C.

10 Cut-through

No failure shall occur within 2 min at 200 °C.

11 Resistance to abrasion (nominal conductor diameters from 0,250 mm up to and including 0,800 mm)

The wire shall meet the requirements given in Table 1.

For intermediate nominal conductor diameters, the value of the next larger nominal conductor diameter shall be taken.

Table 1 – Resistance to abrasion

Nominal conductor diameter mm	Grade 1B		Grade 2B	
	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	2,30	1,95	4,10	3,50
0,280	2,50	2,10	4,40	3,70
0,315	2,70	2,30	4,75	4,00
0,355	2,90	2,50	5,10	4,30
0,400	3,15	2,70	5,45	4,60
0,450	3,40	2,90	5,80	4,90
0,500	3,65	3,10	6,20	5,25
0,560	3,90	3,30	6,65	5,60
0,630	4,20	3,55	7,10	6,00
0,710	4,50	3,80	7,60	6,45
0,800	4,80	4,10	8,10	6,90

<https://standards.iteh.ai/catalog/standards/iec/953b3723-0446-411c-9f3b-1d13b2ba73b3/iec-60317-35-2013>

12 Resistance to solvents

Test inappropriate.

13 Breakdown voltage

Clause 13 of IEC 60317-0-1:2013 applies. The elevated temperature shall be 155 °C.

14 Continuity of insulation

Clause 14 of IEC 60317-0-1:2013 applies.

15 Temperature index

Clause 15 of IEC 60317-0-1:2013 applies. The minimum temperature index shall be 155.

16 Resistance to refrigerants

Test inappropriate.