

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Specifications for particular types of winding wires –
Part 0-6: General requirements – Glass-fibre wound resin or varnish
impregnated, bare or enamelled round copper wire

Spécifications pour types particuliers de fils de bobinage –
Partie 0-6: Exigences générales – Fil de section circulaire en cuivre nu
ou émaillé, guipé de fibres de verre imprégnées de résine ou de vernis



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.060.10

ISBN 978-2-8322-8427-8

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

**Part 0-6: General requirements –
Glass-fibre wound resin or varnish impregnated,
bare or enamelled round copper wire**

FOREWORD

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International Standard IEC 60317-0-6 has been prepared by IEC technical committee 55: Winding wires.

This second edition cancels and replaces the first edition published in 2001 and Amendment 1:2006. This edition constitutes a technical revision.

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

- revision to 3.3, Appearance;
- revision to Table 1, maximum overall diameter of grade 1 wire over single-glass fibre covering for nominal conductor diameters 1,600 mm – 5,000 mm;
- revision to Table 2, maximum overall diameter of grade 1 wire over double-glass fibre covering for nominal conductor diameters 1,600 mm – 5,000 mm;
- clarification in Table 3 measurement of elongation as “minimum elongation %”.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
55/1851/FDIS	55/1866/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

This International standard is to be read in conjunction with IEC 60851 (all parts). The clause numbers used in this part of IEC 60317 are identical with the respective test numbers of IEC 60851 (all parts).

In case of inconsistencies between IEC 60851 (all parts) and this part of IEC 60317, the latter prevails.

The numbering of clauses in this standard is not continuous from Clauses 21 and 30 in order to reserve space for possible future wire requirements prior to those for wire packaging.

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- replaced by a revised edition, or
- amended.

INTRODUCTION

This part of IEC 60317 forms an element of a series of standards which deals with insulated wires used for windings in electrical equipment. It is composed of the following series:

- 1) *Winding wires – Test methods* (IEC 60851 series);
- 2) *Specifications for particular types of winding wires* (IEC 60317 series);
- 3) *Packaging of winding wires* (IEC 60264 series).

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SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 0-6: General requirements – Glass-fibre wound resin or varnish impregnated, bare or enamelled round copper wire

1 Scope

This part of IEC 60317 specifies the general requirements of glass-fibre wound resin or varnish impregnated, bare or enamelled, round copper winding wires.

The range of nominal conductor diameters is given in the relevant specification sheet.

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 60851 (all parts), *Winding wires – Test methods*

IEC 60851-5:2008, *Winding wires – Test methods – Part 5: Electrical properties*

IEC 60851-5/AMD1:2011

IEC 60851-5/AMD2:2019 <http://standards.iteh.ai/catalog/standards/sist/3682deb6-4ea9-449e-aef6-bdc61ee66cd5/iec-60317-0-6-2020>

ISO 3, *Preferred numbers – Series of preferred numbers*

3 Terms, definitions, general notes and appearance

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1.1

coating

material deposited on a conductor or wire by suitable means and then dried and/or cured

3.1.2

conductor

bare metal after removal of the insulation

3.1.3

covering

material which is wound, wrapped or braided around a bare or insulated conductor

**3.1.4
crack**

opening in the insulation which exposes the conductor to view at the stated magnification

**3.1.5
enamelled wire**

wire coated with an insulation of cured resin

**3.1.6
grade**

increase in the overall diameter of glass fibre covered wire due to the glass fibre covering and/or enamel

**3.1.7
insulation**

coating or covering on the conductor with the specific function of withstanding voltage

**3.1.8
nominal conductor diameter**

designation of conductor size in accordance with the IEC 60317 series

**3.1.9
winding wire**

wire used for winding a coil to provide a magnetic field

**3.1.10
wire**

conductor coated or covered with an insulation

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**3.1.11
normal vision**

20/20 vision, with corrective lenses, if necessary

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3.2 General notes**3.2.1 Methods of test**

All methods of test to be used for this document are given in IEC 60851 (all parts).

The clause numbers used in this document are identical to the respective test numbers in IEC 60851 (all parts).

In case of inconsistencies between the IEC 60851 parts concerning methods of test and this document, IEC 60317-0-6 shall prevail.

Where no specific range of nominal conductor diameters is given for a test, the test applies to all nominal conductor diameters covered by the specification sheet.

Unless otherwise specified, all tests shall be carried out at a temperature ranging between 15 °C and 40 °C and a relative humidity between 25 % and 75 %. Before measurements are made, the specimens shall be preconditioned under these atmospheric conditions for a time sufficient to allow the specimens to reach stability.

The wire to be tested shall be removed from the packaging in such a way that the wire will not be subjected to tension or unnecessary bends. Before each test, sufficient wire should be discarded to ensure that any damaged wire is not included in the test specimens.

3.2.2 Winding wire

When reference is made to a winding wire according to a standard of the IEC 60317 series mentioned under Clause 2, the following information is given in the description:

- reference to IEC specification;
- nominal conductor diameter in millimetres;
- grade of coating and glass covering.

EXAMPLE IEC 60317-48 – 1,000 Grade 1 GL1

The coating is characterised by the following different grades of thickness:

- GL1, bare conductor with 1 layer of glass fibre;
- GL2, bare conductor with 2 layers of glass fibre;
- grade 1 GL1, enamelled grade 1 (grade 1) with 1 layer of glass fibre (GL1);
- grade 1 GL2, enamelled grade 1 (grade 1) with 2 layers of glass fibre (GL2);
- grade 2 GL1, enamelled grade 2 (grade 2) with 1 layer of glass fibre (GL1);
- grade 2 GL2, enamelled grade 2 (grade 2) with 2 layers of glass fibre (GL2).

3.3 Appearance

The fibrous covering shall be smooth as agreed upon between customer and supplier in accordance with good commercial practice and be free from physical damage and foreign material when examined with normal vision, as wound on the original spool or reel.

4 Dimensions

[IEC 60317-0-6:2020](https://standards.iteh.ai/catalog/standards/sist/3682deb6-4ea9-449e-aef6-bdc61ee66cd5/iec-60317-0-6-2020)

4.1 Conductor diameter

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The series of preferred nominal conductor diameters shall correspond to series R20 according to ISO 3. The actual values and their tolerances are given in Table 1 and Table 2.

The series of intermediate diameters from which the user shall select intermediate nominal conductor diameters, when required for technical reasons, shall correspond to series R40 according to ISO 3. The actual values and their tolerances are given in Annex A.

The conductor diameter shall not differ from the nominal diameter by more than the limit given in Table 1 and Table 2.

Table 1 – Diameters for single glass-fibre covered grade 1 or grade 2 enamelled round wires

Nominal conductor diameter mm	Conductor diameter tolerance ± mm	Minimum increase of single glass-fibre covering mm	Maximum overall diameter of single glass-fibre covering mm	
			Grade 1 GL1	Grade 2 GL1
			0,500	0,005
0,560	0,006	0,102	0,776	0,795
0,630	0,006	0,102	0,839	0,864
0,710	0,007	0,102	0,922	0,949
0,800	0,008	0,102	1,020	1,047
0,900	0,009	0,102	1,125	1,155
1,000	0,010	0,102	1,230	1,260
1,120	0,011	0,102	1,352	1,385
1,250	0,013	0,102	1,485	1,518
1,400	0,014	0,102	1,640	1,676
1,600	0,016	0,102	1,841	1,880
1,800	0,018	0,102	2,048	2,085
2,000	0,020	0,102	2,247	2,285
2,240	0,022	0,102	2,496	2,535
2,500	0,025	0,102	2,760	2,800
2,800	0,028	0,114	3,088	3,130
3,150	0,032	0,114	3,449	3,492
3,550	0,036	0,114	3,852	3,896
4,000	0,040	0,114	4,308	4,353
4,500	0,045	0,114	4,815	4,861
5,000	0,050	0,114	5,322	5,370

For intermediate nominal conductor diameters, the minimum increase figure corresponding to the next larger nominal conductor diameter shall be taken.

NOTE 1 The dimensions of the intermediate nominal conductor diameters for the R40 series are given in Annex A.

NOTE 2 Grade 1G1 is a single glass-fibre covering over grade 1 enamelled wire. Grade 2G1 is a single glass-fibre covering over grade 2 enamelled wire.

Table 2 – Diameters for double glass-fibre covered, bare, grade 1 or grade 2 enamelled round wires

Nominal conductor diameter mm	Conductor diameter tolerance ± mm	Minimum increase of double glass-fibre covering mm	Maximum overall diameter of double glass-fibre covering mm		
			GL2	Grade 1 GL2	Grade 2 GL2
			0,500	0,005	0,115
0,560	0,006	0,150	0,802	0,853	0,877
0,630	0,006	0,150	0,873	0,925	0,951

Nominal conductor diameter mm	Conductor diameter tolerance ± mm	Minimum increase of double glass-fibre covering mm	Maximum overall diameter of double glass-fibre covering mm		
			GL2	Grade 1 GL2	Grade 2 GL2
0,710	0,007	0,150	0,958	1,010	1,037
0,800	0,008	0,150	1,048	1,103	1,132
0,900	0,009	0,150	1,149	1,208	1,240
1,000	0,010	0,150	1,249	1,311	1,348
1,120	0,011	0,150	1,370	1,434	1,467
1,250	0,013	0,150	1,511	1,576	1,610
1,400	0,014	0,150	1,662	1,730	1,764
1,600	0,016	0,150	1,867	1,937	1,973
1,800	0,018	0,150	2,068	2,140	2,177
2,000	0,020	0,150	2,269	2,343	2,381
2,240	0,022	0,150	2,516	2,593	2,632
2,500	0,025	0,150	2,782	2,860	2,900
2,800	0,028	0,180	3,123	3,204	3,246
3,150	0,032	0,180	3,481	3,563	3,606
3,550	0,036	0,180	3,883	3,968	4,012
4,000	0,040	0,180	4,335	4,438	4,483
4,500	0,045	0,180	4,843	4,934	4,980
5,000	0,050	0,180	5,345	5,438	5,486

For intermediate nominal conductor diameters, the minimum increase figure corresponding to the next larger nominal conductor diameter shall be taken.

NOTE 1 The dimensions of the intermediate nominal conductor diameters for the R40 series are given in Annex A.

NOTE 2 Grade G2 is a double glass-fibre covering over bare wire. Grade 1G2 is a double glass-fibre covering over grade 1 enamelled wire. Grade 2G2 is a double glass-fibre covering over grade 2 enamelled wire.

4.2 Out of roundness of the conductor

The difference between the minimum and maximum diameter, at any one point, shall not be more than the figure given in column 2 of Table 1 or Table 2.

4.3 Minimum increase in diameter due to the covering

The minimum increase in diameter due to the covering shall not be less than the values given in Table 1 or Table 2.

4.4 Maximum overall diameter

The maximum overall diameter shall not exceed the values given in Table 1 or Table 2.