

INTERNATIONAL STANDARD



Specifications for particular types of winding wires –
Part 0-8: General requirements – Polyester glass-fibre wound unvarnished
and fused, or resin or varnish impregnated **or not impregnated**, bare or
enamelled rectangular copper wire

IEC 60317-0-8:2019

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

**Part 0-8: General requirements – Polyester glass-fibre
wound unvarnished and fused, or resin or varnish impregnated
~~or not impregnated~~, bare or enamelled rectangular copper wire**

FOREWORD

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International Standard IEC 60317-0-8 has been prepared by IEC technical committee 55: Winding wires.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

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

- a) revision to the title of the standard indicating that the glass fibre covering is fused and unvarnished;
- b) revision to subclause 3.2 adding winding wire requirements for the fibrous covering and a list of covering classifications;
- c) revision to subclause 3.3 requirements for appearance;
- d) revision to subclause 8.2, adherence test requirements.

The text of this standard is based on the following documents:

FDIS	Report on voting
55/1784/FDIS	55/1796/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.

A list of all the 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 numbering of clauses in this standard is not continuous from Clauses 21 through 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 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

This Part of IEC 60317 ~~is one~~ forms an element of a series of standards which deals with insulated wires used for windings in electrical equipment. The ~~series~~ set of standards has three ~~groups~~ series 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 0-8: General requirements – Polyester glass-fibre wound **unvarnished and fused**, or resin or varnish impregnated **or not impregnated**, bare or enamelled rectangular copper wire

1 Scope

This part of IEC 60317 specifies the general requirements of polyester glass-fibre wound fused, unvarnished, or resin or varnish impregnated ~~or not impregnated~~, bare, or grade 1 or grade 2 or enamelled rectangular copper winding wires.

The range of nominal conductor dimensions is given in 4.1 and 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*

ISO 3:~~1973~~, *Preferred numbers – Series of preferred numbers*

3 Terms, definitions and general notes on tests and appearance

3.1 Terms and definition

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 which is deposited on a conductor or wire by a 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
fused**

state of polyester fibres after having been melted then re-solidified for support/adherence of glass fibres

**3.1.7
grade**

range of thickness of the insulation of a wire

**3.1.8
insulation**

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

**3.1.9
nominal conductor dimension**

designation of the conductor size in accordance with IEC 60317 (all parts)

**3.1.10
normal vision**

20/20 vision, with corrective lenses, if necessary

**3.1.11
winding wire**

wire used for winding a coil to provide a magnetic field

**3.1.12
wire**

conductor coated or covered with an insulation

3.2 General notes**3.2.1 Methods of test**

All methods of test to be used for this document are given in the IEC 60851 series.

The clause numbers used in this document are identical with the respective test numbers in the IEC 60851 series.

In case of inconsistencies between the IEC 60851 series and this document, IEC 60317-0-8 shall prevail.

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

Unless otherwise specified, all tests shall be carried out at a temperature from 15 °C to 40 °C and a relative humidity from ~~45~~ 25 % to 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

The fibre covering shall consist of a combination of polyester and glass fibres. The glass fibres shall be electrical-grade continuous-filament glass yarn. The polyester fibre shall be a high-grade yarn resulting from the linear polymerization of ethylene glycol and terephthalic acid. The maximum content by weight of polyester fibre in the yarn shall not exceed 50 %.

The coating shall be characterized by the following different grades of thickness:

- PG1, bare conductor with 1 layer of polyester glass fibre or 2 layers of finer polyester glass fibres that together, comply with the dimensional requirements in Table 1;
- PG2, bare conductor with 2 layers of polyester glass fibre;
- Grade 1 PG1, enamelled grade 1 (grade 1) with 1 layer of polyester glass fibre (PG1);
- Grade 1 PG2, enamelled grade 1 (grade 1) with 2 layers of polyester glass fibre (PG2);
- Grade 2 PG1, enamelled grade 2 (grade 2) with 1 layer of polyester glass fibre (PG1);
- Grade 2 PG2, enamelled grade 2 (grade 2) with 2 layers of polyester glass fibre (PG2).

When reference is made to a winding wire according to a standard of the IEC 60317 series, the following information is ~~included~~ given in the description:

- reference to IEC specification;
- nominal conductor dimensions in millimetres (width × thickness);
- grade.

EXAMPLE IEC 60317-60 – 4,00 × 1,00 Grade 2PG1.

3.3 Appearance

The fibrous covering shall be essentially smooth and ~~continuous~~ uniform as agreed upon between customer and supplier in accordance with good commercial practice, and free from physical damage and foreign material when examined with normal vision, as wound on the original spool or reel. Fibres shall be bound to the underlying enamelled or bare wire.

NOTE Evidence of physical damage includes gashes, broken fibre strands, and the like.

4 Dimensions

4.1 Conductor dimensions

The dimensions for widths and thicknesses of conductors of winding wires with rectangular cross-section recommended in this part of IEC 60317 shall be in accordance with Table 1, and are taken from the R 20 ~~and R 40~~ series according to ISO 3:1973.

Preferred sizes are combinations of width and thickness both according to the R 20 and R 40 series.

Intermediate sizes are combinations of width or thickness according to the R 20 series with the other dimension according to the R 40 series.

This part of IEC 60317 covers:

- widths from 2,00 mm up to and including 16,00 mm;

- thicknesses from 0,80 mm up to and including 5,60 mm¹.

For thickness over 5,60 mm up to and including 10 mm and for widths over 16 mm up to and including 25 mm where, for technical reasons, additional sizes may be needed, the R 40 series shall be used. The ratio width/thickness shall be within the specified limits and combinations of R 40 and R 40 are not allowed in the case of additional sizes.

The ratio width/thickness shall be greater than or equal to 1,4:1 and shall not exceed 8:1.

The actual values of dimensions are given in Table 1².

The nominal cross-sectional areas for preferred sizes are given in Table 1 and the nominal cross-sectional areas for intermediate sizes are given in Table A.1 of Annex A.

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¹— ~~For thicknesses over 5,60 mm up to and including 10 mm and for widths over 16 mm up to and including 25 mm where, for technical reasons additional sizes may be needed, the R 40 series shall be used. The ratio width/thickness shall be within the specified limits and combinations of R 40; R 40 is not allowed in the case of additional sizes.~~

²— ~~Dimensions according to the R 20 series are printed in larger type.~~

Thickness mm	Width											Corner radius (0,80 mm*)										
	0,80	0,90	1,00	1,12	1,25	1,40	1,60	1,80	2,00	2,24	2,50	2,80	3,15	3,55	4,00	4,50	5,00	5,60				
2,00	1,463	1,626	1,785	2,025	2,285	2,585																
2,24	1,655	1,842	2,205	2,294	2,582	2,921	3,369															
2,50	1,863	2,076	2,285	2,585	2,910	3,285	3,785	4,137														
2,80	2,103	2,346	2,585	2,921	3,285	3,705	4,265	4,677	5,237													
3,15	2,383	2,661	2,935	3,313	3,723	4,195	4,825	5,307	5,937	6,693												
3,55	2,703	3,021	3,335	3,761	4,223	4,755	5,465	6,027	6,737	7,589	8,326											
4,00	3,063	3,426	3,785	4,265	4,785	5,385	6,185	6,831	7,637	8,597	9,451	10,65										
4,50	3,463	3,876	4,285	4,825	5,410	6,085	6,85	7,737	8,631	9,717	10,70	12,05	13,63									
5,00	3,863	4,326	4,785	5,385	6,035	6,785	7,785	8,637	9,637	10,84	12,18	13,45	15,20	17,20								
5,60	4,363	4,866	5,385	6,057	6,785	7,625	8,745	9,717	10,84	12,18	13,45	15,13	17,09	19,33	21,54							
6,30	4,903	5,496	6,085	6,841	7,660	8,605	9,865	10,98	12,24	13,75	15,20	17,09	19,30	21,82	24,34	27,49						
7,10		6,216	6,885	7,737	8,660	9,725	11,15	12,42	13,84	15,54	17,20	19,33	21,82	24,66	27,54	31,09	34,64					
8,00			7,785	8,745	9,785	10,99	12,59	14,04	15,64	17,56	19,45	21,85	24,65	27,85	31,14	35,14	39,14	43,94				
9,00				9,865	11,04	12,39	14,19	15,84	17,64	19,80	21,95	24,65	27,80	31,40	35,14	39,64	44,14	49,54				
10,0					12,29	13,79	15,79	17,64	19,64	22,04	24,45	27,45	30,95	34,95	39,14	44,14	49,14	55,14				
11,2						15,47	17,71	19,80	22,04	24,79	27,46	30,81	34,73	39,21	43,94	49,54	55,14	61,86				
12,5	Not recommended						19,79	22,14	24,64	27,64	30,70	34,45	38,83	43,83	49,14	55,39	61,64	69,14				
14,0	Ratio width/thickness over 8:1							24,84	27,64	31,00	34,45	38,65	43,55	49,15	55,14	62,14	69,14	77,54				
16,0									31,64	35,48	39,45	44,25	49,85	56,25	63,14	71,14	79,14	88,74				

* Nominal thickness.

NOTE Dimensions according to R 20 series are printed in larger type.