

# INTERNATIONAL STANDARD



Specifications for particular types of winding wires –  
Part 61: Polyester glass-fibre wound, ~~minimum class 180~~ resin or varnish  
impregnated, bare or enamelled rectangular copper wire, temperature index 180

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# INTERNATIONAL STANDARD



REDLINE VERSION

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**Specifications for particular types of winding wires –  
Part 61: Polyester glass-fibre wound, ~~minimum class 180~~ resin or varnish  
impregnated, bare or enamelled rectangular copper wire, temperature index 180**

INTERNATIONAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

**Part 61: Polyester glass-fibre wound, ~~minimum class 180~~ resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 180**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60317-61 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 of the title of the standard;
- b) revision to Clause 1, Scope;
- c) revision to the descriptions of grades of thickness of polyester glass-fibre coverings in 3.2.2.

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

CDV	Report on voting
55/1771/CDV	55/1819/RVC

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 used in conjunction with the IEC 60317-0-8:2019.

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 20 and 30 in order to reserve space for possible future wire requirements prior to those for wire packaging.

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## 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 61: Polyester glass-fibre wound, ~~minimum class 180~~ resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 180

#### 1 Scope

This part of IEC 60317 specifies the requirements of polyester glass-fibre wound, resin or varnish impregnated bare, grade 1 or grade 2 enamelled rectangular copper winding wires, temperature index 180. The impregnating agent can be, for instance, epoxy, polyester, or polyesterimide resin based.

NOTE For this type of wire, the heat shock test is inappropriate and therefore a heat shock temperature cannot be established. Consequently, a class based on the requirements for temperature index and heat shock temperature cannot be specified.

The range of nominal conductor dimensions covered by this document is:

- width: min. 2,0 mm max. 16,0 mm;
- thickness: min. 0,80 mm max. 5,60 mm.

The specified combinations of width and thickness as well as the specified width/thickness ratio are according to IEC 60317-0-8.

#### 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 60317-0-8:2012/2019, *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*

#### 3 Terms, definitions, general notes and appearance

##### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ~~3.1 of~~ IEC 60317-0-8:2012 ~~shall~~ 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>

## 3.2 General notes

### 3.2.1 Methods of test

Subclause 3.2.1 of IEC 60317-0-8:2012/2019 applies. In case of inconsistencies between IEC 60317-0-8 and ~~this standard, IEC 60317-61~~ this document, the latter shall prevail.

### 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 enamelled wire shall have a temperature index of at least 180 and shall be agreed between purchaser and supplier.

The temperature index of the wire is dependent upon the type of impregnating agent used. The impregnating agent applied to the polyester glass fibres ~~shall not contain silicone and~~ shall have a minimum temperature index of 180.

The covering shall have one of the following grades of thickness:

- PG1: ~~one polyester glass fibre covering over a bare conductor~~ 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 IEC 60317-0-8;
- PG2: ~~two polyester glass fibre coverings over a bare conductor~~ bare conductor with 2 layers of polyester glass fibre;
- Grade 1 PG1: ~~one polyester glass fibre covering (GL1) over grade 1 enamelled conductor (Grade 1)~~ enamelled grade 1 (grade 1) with 1 layer of polyester glass fibre (PG1);
- Grade 1 PG2: ~~two polyester glass fibre coverings (GL2) over grade 1 enamelled conductor (Grade 1)~~ enamelled grade 1 (grade 1) with 2 layers of polyester glass fibre (PG2);
- Grade 2 PG1: ~~one polyester glass fibre covering (GL1) over grade 2 enamelled conductor (Grade 2)~~ enamelled grade 2 (grade 2) with 1 layer of polyester glass fibre (PG1);
- Grade 2 PG2: ~~two polyester glass fibre coverings (GL2) over grade 2 enamelled conductor (Grade 2)~~ enamelled grade 2 (grade 2) with 2 layers of polyester glass fibre (PG2).

## 3.3 Appearance

Subclause 3.3 of IEC 60317-0-8:2012/2019 applies.

## 4 Dimensions

Clause 4 of IEC 60317-0-8:2012/2019 applies.

## 5 Electrical resistance

Clause 5 of IEC 60317-0-8:2012/2019 applies.

## 6 Elongation

Clause 6 of IEC 60317-0-8:2012/2019 applies.

## **7 Springiness**

Clause 7 of IEC 60317-0-8:20122019 applies.

## **8 Flexibility and adherence**

Clause 8 of IEC 60317-0-8:20122019 applies.

## **9 Heat shock**

Test inappropriate.

## **10 Cut-through**

Test inappropriate.

## **11 Resistance to abrasion**

Test inappropriate.

## **12 Resistance to solvents**

Test inappropriate.

## **13 Breakdown voltage**

Clause 13 of IEC 60317-0-8:20122019 applies.

## **14 Continuity of insulation**

Test inappropriate.

## **15 Temperature index**

Clause 15 of IEC 60317-0-8:20122019 applies.

## **16 Resistance to refrigerants**

Test inappropriate.

## **17 Solderability**

Test inappropriate.

## **18 Heat or solvent bonding**

Test inappropriate.

### **19 Dielectric dissipation factor**

Test inappropriate.

### **20 Resistance to transformer oil**

Test inappropriate.

### **23 Pin hole test**

Test inappropriate.

### **30 Packaging**

Clause 30 of IEC 60317-0-8:~~2012~~2019 applies.

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## Bibliography

IEC 60264 (all parts), *Packaging of winding wires*

IEC 60317 (all parts), *Specifications for particular types of winding wires*

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

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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Specifications for particular types of winding wires –  
Part 61: Polyester glass-fibre wound, resin or varnish impregnated, bare or  
enamelled rectangular copper wire, temperature index 180**

**Spécifications pour types particuliers de fils de bobinage –  
Partie 61: Fil de section rectangulaire en cuivre nu ou émaillé, guipé de fibres  
de verre polyester imprégnées de résine ou de vernis, d'indice  
de température 180**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –****Part 61: Polyester glass-fibre wound, resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 180**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This edition includes the following significant technical changes with respect to the previous edition:

- a) revision of the title of the standard;
- b) revision to Clause 1, Scope;
- c) revision to the descriptions of grades of thickness of polyester glass-fibre coverings in 3.2.2.

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

CDV	Report on voting
55/1771/CDV	55/1819/RVC

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

This International standard is to be used in conjunction with the IEC 60317-0-8:2019.

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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.

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- 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 61: Polyester glass-fibre wound, resin or varnish impregnated, bare or enamelled rectangular copper wire, temperature index 180

#### 1 Scope

This part of IEC 60317 specifies the requirements of polyester glass-fibre wound, resin or varnish impregnated bare, grade 1 or grade 2 enamelled rectangular copper winding wires, temperature index 180. The impregnating agent can be, for instance, epoxy, polyester, or polyesterimide resin based.

NOTE For this type of wire, the heat shock test is inappropriate and therefore a heat shock temperature cannot be established. Consequently, a class based on the requirements for temperature index and heat shock temperature cannot be specified.

The range of nominal conductor dimensions covered by this document is:

- width: min. 2,0 mm max. 16,0 mm;
- thickness: min. 0,80 mm max. 5,60 mm.

The specified combinations of width and thickness as well as the specified width/thickness ratio are according to IEC 60317-0-8.

#### 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 60317-0-8:2019, *Specifications for particular types of winding wires – Part 0-8: General requirements – Polyester glass-fibre wound unvarnished and fused, or resin or varnish impregnated, bare or enamelled rectangular copper wire*

#### 3 Terms, definitions, general notes and appearance

##### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60317-0-8 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>

##### 3.2 General notes

###### 3.2.1 Methods of test

Subclause 3.2.1 of IEC 60317-0-8:2019 applies. In case of inconsistencies between IEC 60317-0-8 and this document, the latter shall prevail.

### 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 enamelled wire shall have a temperature index of at least 180 and shall be agreed between purchaser and supplier.

The temperature index of the wire is dependent upon the type of impregnating agent used. The impregnating agent applied to the polyester glass fibre shall have a minimum temperature index of 180.

The covering shall have one of the following 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 IEC 60317-0-8;
- 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).

### 3.3 Appearance

Subclause 3.3 of IEC 60317-0-8:2019 applies.

## 4 Dimensions

Clause 4 of IEC 60317-0-8:2019 applies.

## 5 Electrical resistance

Clause 5 of IEC 60317-0-8:2019 applies.

## 6 Elongation

Clause 6 of IEC 60317-0-8:2019 applies.

## 7 Springiness

Clause 7 of IEC 60317-0-8:2019 applies.

## 8 Flexibility and adherence

Clause 8 of IEC 60317-0-8:2019 applies.

## 9 Heat shock

Test inappropriate.

## **10 Cut-through**

Test inappropriate.

## **11 Resistance to abrasion**

Test inappropriate.

## **12 Resistance to solvents**

Test inappropriate.

## **13 Breakdown voltage**

Clause 13 of IEC 60317-0-8:2019 applies.

## **14 Continuity of insulation**

Test inappropriate.

## **15 Temperature index**

Clause 15 of IEC 60317-0-8:2019 applies.

## **16 Resistance to refrigerants**

Test inappropriate.

## **17 Solderability**

Test inappropriate.

## **18 Heat or solvent bonding**

Test inappropriate.

## **19 Dielectric dissipation factor**

Test inappropriate.

## **20 Resistance to transformer oil**

Test inappropriate.

## **23 Pin hole test**

Test inappropriate.

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### **30 Packaging**

Clause 30 of IEC 60317-0-8:2019 applies.

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## Bibliography

IEC 60264 (all parts), *Packaging of winding wires*

IEC 60317 (all parts), *Specifications for particular types of winding wires*

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

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## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

## SPÉCIFICATIONS POUR TYPES PARTICULIERS DE FILS DE BOBINAGE –

**Partie 61: Fil de section rectangulaire en cuivre nu ou émaillé, guipé de fibres de verre polyester imprégnées de résine ou de vernis, d'indice de température 180**

## AVANT-PROPOS

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La Norme Internationale IEC 60317-61 a été établie par le comité d'études 55 de l'IEC: Fils de bobinage.

Cette deuxième édition annule et remplace la première édition parue en 2012. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) révision du titre de la norme;
- b) révision de l'Article 1, Domaine d'application;

- c) révision des descriptions des grades d'épaisseur des revêtements en fibre de verre en 3.2.2.

Le texte de cette Norme internationale est issu des documents suivants:

CDV	Rapport de vote
55/1771/CDV	55/1819/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

La présente Norme internationale doit être utilisée conjointement avec l'IEC 60317-0-8:2019.

Une liste de toutes les parties de la série IEC 60317, publiées sous le titre général *Spécifications pour types particuliers de fils de bobinage*, peut être consultée sur le site web de l'IEC.

La numérotation des articles dans la présente norme n'est pas continue entre les Articles 20 et 30 afin de permettre l'introduction d'éventuelles futures exigences concernant les fils avant celles concernant le conditionnement des fils.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

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## INTRODUCTION

La présente partie de l'IEC 60317 appartient à une série de normes traitant des fils isolés utilisés pour les enroulements des appareils électriques. L'ensemble est composé des trois séries de normes suivantes:

- 1) *Fils de bobinage – Méthodes d'essai* (série IEC 60851);
- 2) *Spécifications pour types particuliers de fils de bobinage* (série IEC 60317);
- 3) *Conditionnement des fils de bobinage* (série IEC 60264).

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