

INTERNATIONAL STANDARD



**Specifications for particular types of winding wires –
Part 17: Polyvinyl acetal enamelled rectangular copper wire, class 105**

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IEC 60317-17

Edition 4.0 2020-06
REDLINE VERSION

INTERNATIONAL STANDARD



Specifications for particular types of winding wires –
Part 17: Polyvinyl acetal enamelled rectangular copper wire, class 105

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.10

ISBN 978-2-8322-8489-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 17: Polyvinyl acetal enamelled rectangular copper wire, class 105

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 60317-17 has been prepared by IEC technical committee 55: Winding wires.

This fourth edition cancels and replaces the third edition published in 2010. This edition constitutes a technical revision.

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

- a) modification of the Scope (Clause 1);
- b) renaming of stretching test to adherence test and a modification of the requirement in 8.2.

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

FDIS	Report on voting
55/1842/FDIS	55/1855/RVD

Full information on the voting for the approval of this document 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 IEC 60317-0-2:2020.

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.

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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 17: Polyvinyl acetal enamelled rectangular copper wire, class 105

1 Scope

This part of IEC 60317 specifies the requirements of enamelled rectangular copper winding wires of class 105 with a sole coating based on polyvinyl acetal resin, which ~~may~~ can be modified provided it retains the chemical identity of the original resin and meets all specified wire requirements.

NOTE 1 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 105 is a thermal class that requires a minimum temperature index of 105 and a heat shock temperature of at least 155 °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.~~

NOTE 2 Polyvinyl acetate is a general name for a family of thermoplastic vinyl resins produced by the condensation of polyvinyl alcohol with an aldehyde. Examples are polyvinyl acetal, polyvinyl formal and polyvinyl butyral.

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

~~– width: min. 2,00 mm max. 16,00 mm;~~
~~– thickness: min. 0,80 mm max. 5,60 mm.~~
 – width: min. 2,0 mm max. 31,5 mm;
 – thickness: min. 0,80 mm max. 10,00 mm.

Wires of grade 1 and grade 2 are included in this specification and apply to the complete range of conductors.

The specified combinations of width and thickness as well as the specified ratio of width/thickness are given in IEC 60317-0-2.

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 60317-0-2:1997/2020, *Specifications for particular types of winding wires – Part 0-2: General requirements – Enamelled rectangular copper wire*

~~Amendment 1 (1999)~~

~~Amendment 2 (2005)~~

~~IEC 60851-4:1996, *Methods of test for winding wires – Part 4: Chemical properties*~~

~~Amendment 1 (1997)~~

~~Amendment 2 (2005)~~

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 60317-0-2.~~

~~In case of inconsistencies between IEC 60317-0-2 and this standard, IEC 60317-17 shall prevail.~~

For the purposes of this document, the terms and definitions given in IEC 60317-0-2 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 ~~on methods of test~~

3.2.1 Methods of test

~~For general notes on methods of test, see 3.2 of IEC 60317-0-2. In case of inconsistencies between IEC 60317-0-2 and this standard, IEC 60317-17 shall prevail.~~

Subclause 3.2 of IEC 60317-0-2:2020 applies. In case of inconsistencies between IEC 60317-0-2 and this document, IEC 60317-17 shall prevail.

3.2.2 Winding wire

Class 105 is a thermal class that requires a minimum temperature index of 105 and a heat shock temperature of at least 155 °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 60317-0-2:2020 applies.

4 Dimensions

Clause 4 of IEC 60317-0-2:2020 applies.

5 Electrical resistance

Clause 5 of IEC 60317-0-2:2020 applies.

6 Elongation

Clause 6 of IEC 60317-0-2:2020 applies.

7 Springiness

Clause 7 of IEC 60317-0-2:2020 applies.

8 Flexibility and adherence

8.1 Mandrel winding test

The coating shall show no crack after the wire has been bent flatwise and edgewise on a mandrel with a diameter as specified in Table 1.

Table 1 – Mandrel winding

Wire bent on		Mandrel diameter
Width	Sizes up to and including 10 mm	2 × width
	Sizes over 10 mm	3 × width
Thickness	All dimensions	2 × thickness

8.2 ~~Stretching~~ Adherence test

The wire shall be stretched by 20 % or until it breaks, whichever is less.

The distance of loss of adhesion shall be less than 1 x ~~width~~ thickness.

9 Heat shock

Clause 9 of IEC 60317-0-2:2020 applies, where the minimum heat shock temperature shall be 155 °C.

10 Cut-through

~~Test inappropriate.~~ Test under consideration.

11 Resistance to abrasion

Test inappropriate.

12 Resistance to solvents

Clause 12 of IEC 60317-0-2:2020 applies.

13 Breakdown voltage

Clause 13 of IEC 60317-0-2:2020 applies, where the elevated temperature shall be 105 °C.

14 Continuity of insulation

Test inappropriate.

15 Temperature index

Clause 15 of IEC 60317-0-2:2020 applies, where the minimum temperature index shall be 105.

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 according to Clause 6 of IEC 60851-4:2016 appropriate. Test requirements are under consideration.

21 Loss of mass

Test inappropriate.

23 Pin hole test

Test inappropriate.

30 Packaging

Clause 30 of IEC 60317-0-2:2020 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*

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

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**Specifications for particular types of winding wires –
Part 17: Polyvinyl acetal enamelled rectangular copper wire, class 105**

**Spécifications pour types particuliers de fils de bobinage –
Partie 17: Fil de section rectangulaire en cuivre émaillé avec acétal
de polyvinyle, classe 105**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –**Part 17: Polyvinyl acetal enamelled rectangular copper wire, class 105**

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- 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 17: Polyvinyl acetal enamelled rectangular copper wire, class 105

1 Scope

This part of IEC 60317 specifies the requirements of enamelled rectangular copper winding wires of class 105 with a sole coating based on polyvinyl acetal resin, which can be modified provided it retains the chemical identity of the original resin and meets all specified wire requirements.

NOTE 1 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.

NOTE 2 Polyvinyl acetate is a general name for a family of thermoplastic vinyl resins produced by the condensation of polyvinyl alcohol with an aldehyde. Examples are polyvinyl acetal, polyvinyl formal and polyvinyl butyral.

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

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- thickness: min. 0,80 mm max. 10,00 mm.

Wires of grade 1 and grade 2 are included in this specification and apply to the complete range of conductors.

The specified combinations of width and thickness as well as the specified ratio of width/thickness are given in IEC 60317-0-2.

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IEC 60317-0-2:2020, *Specifications for particular types of winding wires – Part 0-2: General requirements – 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 60317-0-2 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 of IEC 60317-0-2:2020 applies. In case of inconsistencies between IEC 60317-0-2 and this document, IEC 60317-17 shall prevail.

3.2.2 Winding wire

Class 105 is a thermal class that requires a minimum temperature index of 105 and a heat shock temperature of at least 155 °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 60317-0-2:2020 applies.

4 Dimensions

Clause 4 of IEC 60317-0-2:2020 applies.

5 Electrical resistance

Clause 5 of IEC 60317-0-2:2020 applies.

6 Elongation

Clause 6 of IEC 60317-0-2:2020 applies.

7 Springiness

Clause 7 of IEC 60317-0-2:2020 applies.

8 Flexibility and adherence

8.1 Mandrel winding test

The coating shall show no crack after the wire has been bent flatwise and edgewise on a mandrel with a diameter as specified in Table 1.

Table 1 – Mandrel winding

Wire bent on		Mandrel diameter
Width	Sizes up to and including 10 mm	2 × width
	Sizes over 10 mm	3 × width
Thickness	All dimensions	2 × thickness

8.2 Adherence test

The wire shall be stretched by 20 % or until it breaks, whichever is less.

The distance of loss of adhesion shall be less than 1 x thickness.

9 Heat shock

Clause 9 of IEC 60317-0-2:2020 applies, where the minimum heat shock temperature shall be 155 °C.

10 Cut-through

Test under consideration.

11 Resistance to abrasion

Test inappropriate.

12 Resistance to solvents

Clause 12 of IEC 60317-0-2:2020 applies.

13 Breakdown voltage

Clause 13 of IEC 60317-0-2:2020 applies, where the elevated temperature shall be 105 °C.

14 Continuity of insulation

Test inappropriate.

15 Temperature index

Clause 15 of IEC 60317-0-2:2020 applies, where the minimum temperature index shall be 105.

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 according to Clause 6 of IEC 60851-4:2016 appropriate. Test requirements are under consideration.

21 Loss of mass

Test inappropriate.

23 Pin hole test

Test inappropriate.

30 Packaging

Clause 30 of IEC 60317-0-2:2020 applies.

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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*

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

SPÉCIFICATIONS POUR TYPES PARTICULIERS DE FILS DE BOBINAGE –**Partie 17: Fil de section rectangulaire en cuivre émaillé
avec acétal de polyvinyle, classe 105**

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La Norme internationale IEC 60317-17 a été établie par le comité d'études 55 de l'IEC: Fils de bobinage.

Cette quatrième édition annule et remplace la troisième édition parue en 2010. Cette édition constitue une révision technique.

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

- a) modification du domaine d'application (Article 1);
- b) "essai d'étirement" renommé "essai d'adhérence", et modification de l'exigence en 8.2.

Le texte de cette publication est issu des documents suivants:

FDIS	Rapport de vote
55/1842/FDIS	55/1855/RVD

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

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

La présente Norme internationale doit être utilisée conjointement avec l'IEC 60317-0-2:2020.

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 le présent document n'est pas continue entre les Articles 21 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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