IEC 60317-27-1

Edition 1.0 2020-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Specifications for particular types of winding wires – Part 27-1: Paper tape covered round copper wire

Spécifications pour types particuliers de fils de bobinage – Partie 27-1: Fil de section circulaire en cuivre recouvert de ruban papier

IEC 60317-27-1:2020-05(en-fr)

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CONTENTS

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FOREWORD

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International Standard IEC 60317-27-1 has been prepared by IEC technical committee 55: Winding wires.

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

FDIS	Report on voting
55/1838/FDIS	55/1863/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 used in conjunction with IEC 60317-0-1:2013 and IEC 60317-0-1:2013/AMD1:2019.

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 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- withdrawn,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.

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).

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 27-1: Paper tape covered round copper wire

1 Scope

This part of IEC 60317 specifies the requirements of paper tape covered round copper winding wires. This covering consists of two or more layers of paper tape and is primarily intended for winding coils for oil immersed transformers.

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

– 0,500 mm up to and including 5,000 mm.

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

The paper tapes included in this document are restricted to those specified in IEC 60554-1 and IEC 60554-3-5.

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 60317-0-1:2013, *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*
IEC 60317-0-1:2013/AMD1:2019

IEC 60554-1, *Specification for cellulosic papers for electrical purposes – Part 1: Definitions and general requirements*

IEC 60554-3-5, *Specification for cellulosic papers for electrical purposes – Part 3: Specifications for individual materials – Sheet 5: Special papers*

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 60317-0-1 and the following 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
covering
material which is wound, wrapped or braided around a bare or insulated conductor

[SOURCE: IEC 60317-0-6:2020, 3.1.3]

3.2 General notes

3.2.1 Methods of test

Subclause 3.2.1 of IEC 60317-0-1:2013 and IEC 60317-0-1:2013/AMD1:2019 applies. In case of inconsistency between IEC 60317-0-1 and this document, IEC 60317-27-1 shall prevail.

3.2.2 Winding wire

The number of paper tapes, type of paper, paper tape thickness, and the degree of overlap shall be agreed upon between the purchaser and supplier.

When a reference is made to winding wire according to this document, the following information shall be given in the description:

– reference to IEC 60317-27-1;
– nominal conductor diameters in millimetres;
– nominal increase in diameters due to paper.

EXAMPLE: IEC 60317-27-1 3,200 + 0,30

3.3 Appearance

The conductor shall be essentially free from copper dust and other extraneous matter when examined with normal vision, as wound on the original spool or reel. The paper covering shall be of one or more tapes wrapped firmly, closely, evenly, and continuously around the conductor.

No bonding or adhesive material shall be used except to anchor the ends of paper tapes.

4 Dimensions

4.1 Conductor diameter

Subclause 4.1 of IEC 60317-0-1: 2013 applies.

4.2 Out of roundness of conductor

Subclause 4.2 of IEC 60317-0-1: 2013 applies.

4.3 Increase in diameter due to paper tape covering

The increase in diameter due to the paper tape covering shall be agreed between purchaser and supplier and the minus tolerance shall not exceed the values given in Table 1.

The maximum increase may be exceeded, provided that the maximum overall diameter does not exceed the sum of the maximum diameters of the conductor plus the maximum increase given in Table 1.

Table 1 – Increase in diameters

Increase in diameters due to the paper covering mm		Tolerance %
Over	Up to and including	
-	0,50	−10 0
0,50	1,25	−7.5 0
1,25	-	−5 0

4.4 Maximum overall diameter

The overall diameters shall not exceed the sum of the maximum bare diameters given in 4.1 and the maximum increase in diameters permitted in 4.3.

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

Test appropriate but no requirements specified.

8 Flexibility and adherence

Because of the great variation in the number and the thickness of papers applied, the requirements for flexibility shall be agreed between purchaser and supplier at the time of placing the order.

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

Test inappropriate.

14 Continuity of insulation

Test inappropriate.

15 Temperature index

Test requirements under consideration.

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 hydrolysis and to transformer oil

Test appropriate but no requirements specified.

21 Loss of mass

Test inappropriate.

23 Pin hole test

Test inappropriate.

30 Packaging

The kind of packaging can influence certain properties of the wire, for example flexibility and adherence. Therefore, the kind of packaging, for example the type of spool, shall be agreed between purchaser and supplier.

The wire shall be evenly and compactly wound on spools. Where wires are delivered in coils, the dimensions and the maximum masses of such coils shall be agreed between purchaser and supplier. Any additional protection for coils shall also be agreed between purchaser and supplier.

A clearance of at least 25 mm shall be arranged between the outermost layer and the periphery of the spool flange. Where there is a requirement for a protective paper between the layers and between the wire and the spool, this shall be agreed between the purchaser and the supplier. Marking of the label when there is more than one length, identification of the separate lengths and identification of joints shall also be by agreement between the purchaser and supplier.

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*