

INTERNATIONAL STANDARD



**Specifications for particular types of winding wires –
Part 27-4: Paper tape covered rectangular aluminium wire**

(<https://standards.iteh.ai>)

Document Preview

[IEC 60317-27-4:2020](https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020)

<https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

International
Standards
Document Preview
standards.iteh.ai

[IEC 60317-27-4:2020](https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020)

<https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>



IEC 60317-27-4

Edition 1.1 2024-06
CONSOLIDATED VERSION

INTERNATIONAL STANDARD



Specifications for particular types of winding wires –
Part 27-4: Paper tape covered rectangular aluminium wire

[iTech Standards
\(https://standards.iteh.ai\)](https://standards.iteh.ai)
Document Preview

[IEC 60317-27-4:2020](https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020)

<https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.10

ISBN 978-2-8322-9191-7

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms, definitions, general notes and appearance.....	6
3.1 Terms and definitions.....	6
3.2 General notes	7
3.2.1 Methods of test.....	7
3.2.2 Winding wire.....	7
3.3 Appearance	7
4 Dimensions.....	7
4.1 Conductor dimensions	7
4.2 Tolerance on conductor dimensions	7
4.3 Rounding of corners.....	7
4.4 Increase in dimensions due to paper tape covering.....	7
4.5 Maximum overall dimensions	8
5 Electrical resistance	8
6 Elongation	8
7 Springiness	8
8 Flexibility and adherence.....	8
9 Heat shock	8
10 Cut-through	8
11 Resistance to abrasion	9
12 Resistance to solvents.....	9
13 Breakdown voltage	9
14 Continuity of insulation	9
15 Temperature index	9
16 Resistance to refrigerants.....	9
17 Solderability	9
18 Heat or solvent bonding.....	9
19 Dielectric dissipation factor.....	9
20 Resistance to hydrolysis and to transformer oil.....	9
21 Loss of mass	9
23 Pin hole test	9
30 Packaging	10
Bibliography.....	11
Table 1 – Increase in dimensions.....	8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 27-4: Paper tape covered rectangular aluminium wire

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60317-27-4 edition 1.1 contains the first edition (2020-05) [documents 55/1837/FDIS and 55/1859/RVD] and its amendment 1 (2024-06) [documents 55/1987/CDV and 55/2025/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60317-27-4 has been prepared by IEC technical committee 55: Winding wires.

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 60317-0-9:2015 and its Amendment 1:2024.

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 and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

Document Preview

[IEC 60317-27-4:2020](#)

<https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>

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).

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[IEC 60317-27-4:2020](https://standards.itih.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020)

<https://standards.itih.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 27-4: Paper tape covered rectangular aluminium wire

1 Scope

This part of IEC 60317 specifies the requirements of paper tape covered rectangular aluminium 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 dimensions covered by this document is:

- width: min. 2,00 mm max. 16,0 mm;
- thickness: min. 0,80 mm max. 5,60 mm.

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 60317-0-9:2015, *Specifications for particular types of winding wires – Part 0-9: General requirements – Enamelled rectangular aluminium wire*

IEC 60317-0-9:2015/AMD1:2024 [IEC 60317-27-4:2020](https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020)

<https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>

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 60317-0-9 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 60317-0-9:2015/AMD1:2024 applies. In case of inconsistency between IEC 60317-0-9:2015 and this document, IEC 60317-27-4 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 60317-27-4;
- nominal conductor dimensions in millimetres (width × thickness);
- nominal increase in dimensions due to paper.

EXAMPLE: IEC 60317-27-4 4,00 × 1,00 + 0,20

- (Eventually) Proof stress minimum (and maximum) value

EXAMPLE: IEC 60317-0-9 4,00 × 1,00 + 0,20

IEC 60317-0-9 7,00 × 2,50 + 1,00 R p0,2 = 150 MPa

3.3 Appearance

The conductor shall be essentially free from aluminium 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.

<https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020>

4 Dimensions

4.1 Conductor dimensions

Subclause 4.1 of IEC 60317-0-9:2015 applies.

4.2 Tolerance on conductor dimensions

Subclause 4.2 of IEC 60317-0-9:2015 applies.

4.3 Rounding of corners

Subclause 4.3 of IEC 60317-0-9:2015 applies.

4.4 Increase in dimensions due to paper tape covering

The increase in width or thickness 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 increase in width due to the paper covering shall be equal to or less than the increase in thickness.

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

Table 1 – Increase in dimensions

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

4.5 Maximum overall dimensions

The overall dimensions shall not exceed the sum of the maximum bare dimensions given in 4.2 and the maximum increase in dimensions permitted in 4.4.

5 Electrical resistance

Clause 5 of IEC 60317-0-9:2015 and IEC 60317-0-9:2015/AMD1:2024 applies.

6 Elongation

Clause 6 of IEC 60317-0-9:2015 applies.

NOTE When the value of the proof strength of the aluminium is specified between minimum and maximum limits, the requirements are agreed upon between the purchaser and supplier. The description of the term “proof strength” and the method of determination are given in ISO 6892-1:2016. [E:2020](https://standards.iteh.ai/catalog/standards/iec/70269cb7-338f-404d-bacd-4fda89c3ad1c/iec-60317-27-4-2020)

7 Springiness

~~Test appropriate but no requirements specified.~~

Test inappropriate.

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.