

This is a preview - click here to buy the full publication



IEC 60317-0-9

Edition 1.1 2024-06
CONSOLIDATED VERSION

INTERNATIONAL STANDARD



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.10

ISBN 978-2-8322-9187-0

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

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, general notes and appearance.....	7
3.1 Terms and definitions.....	7
3.2 General notes	8
3.2.1 Methods of test.....	8
3.2.2 Winding wire.....	8
3.3 Appearance	8
4 Dimensions.....	8
4.1 Conductor dimensions	8
4.2 Tolerance on conductor dimensions	9
4.3 Rounding of corners.....	9
4.4 Increase in dimensions due to the insulation.....	11
4.5 Overall dimensions	11
4.5.1 Nominal overall dimensions	11
4.5.2 Minimum overall dimensions.....	11
4.5.3 Maximum overall dimensions	11
5 Electrical resistance	11
6 Elongation	12
7 Springiness	12
8 Flexibility and adherence.....	12
8.1 Mandrel winding test.....	12
8.2 Adherence test.....	12
9 Heat shock	12
10 Cut-through	12
11 Resistance to abrasion	13
12 Resistance to solvents.....	13
13 Breakdown voltage	13
14 Continuity of insulation	13
15 Temperature index	13
16 Resistance to refrigerants.....	13
17 Solderability	14
18 Heat or solvent bonding.....	14
19 Dielectric dissipation factor.....	14
20 Resistance to transformer oil	14
21 Loss of mass	14
23 Pin hole test	14
30 Packaging	14
Annex A (informative) Nominal cross-sectional areas for preferred and intermediate sizes.....	15
Annex B (informative) Special tolerances.....	24
Bibliography.....	25

[This is a preview - click here to buy the full publication](#)

Table 1– Conductor tolerances 9

Table 2 – Nominal cross-sectional areas of preferred sizes..... 10

Table 3 – Corner radii 11

Table 4 – Increases in dimensions 11

Table 5 – Mandrel winding 12

Table 6 – Breakdown voltage 13

Table A.1 – Nominal cross-sectional areas (*1 of 9*) 15

Table B.1 – Overall dimensional tolerances for grade 2 24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 0-9: General requirements – Enamelled 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 60317-0-9 edition 1.1 contains the first edition (2015-05) [documents 55/1519/FDIS and 55/1525/RVD] and its amendment 1 (2024-06) [documents 55/1978/CDV and 55/2014/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 60317-0-9 has been prepared by IEC technical committee 55: Winding wires.

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

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.

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 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.

INTRODUCTION

This part of IEC 60317 is one of a series which deals with insulated wires used for windings in electrical equipment. The series has three groups describing:

- 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 0-9: General requirements – Enamelled rectangular aluminium wire

1 Scope

This part of IEC 60317 specifies the general requirements of enamelled rectangular aluminium winding wires.

The range of nominal conductor dimensions is given in the relevant specification sheet.

When reference is made to a winding wire according to a standard of the IEC 60317 series mentioned under Clause 2, the following information is given in the description:

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

EXAMPLE IEC 60317-16 – 4,00 x 1,00 Grade 1

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60172¹, *Test procedure for the determination of the temperature index of enamelled and tape wrapped winding wires*

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

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

ISO 3, *Preferred numbers – Series of preferred numbers*

EN 1715-2, *Aluminium and aluminium alloys – Drawing stock – Part 2: Specific requirements for electrical applications*

ASTM B233-97, *Standard Specification for Aluminum 1350 Drawing Stock for Electrical Purposes*

¹ Fourth edition to be published.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, general notes and appearance.....	7
3.1 Terms and definitions.....	7
3.2 General notes	8
3.2.1 Methods of test.....	8
3.2.2 Winding wire.....	8
3.3 Appearance	8
4 Dimensions.....	8
4.1 Conductor dimensions	8
4.2 Tolerance on conductor dimensions.....	9
4.3 Rounding of corners.....	9
4.4 Increase in dimensions due to the insulation.....	11
4.5 Overall dimensions	11
4.5.1 Nominal overall dimensions	11
4.5.2 Minimum overall dimensions.....	11
4.5.3 Maximum overall dimensions	11
5 Electrical resistance	11
6 Elongation	12
7 Springiness	12
8 Flexibility and adherence.....	12
8.1 Mandrel winding test.....	12
8.2 Adherence test.....	12
9 Heat shock	12
10 Cut-through	12
11 Resistance to abrasion	12
12 Resistance to solvents.....	13
13 Breakdown voltage	13
14 Continuity of insulation	13
15 Temperature index	13
16 Resistance to refrigerants.....	13
17 Solderability	13
18 Heat or solvent bonding.....	14
19 Dielectric dissipation factor.....	14
20 Resistance to transformer oil	14
21 Loss of mass	14
23 Pin hole test	14
30 Packaging	14
Annex A (informative) Nominal cross-sectional areas for preferred and intermediate sizes.....	15
Annex B (informative) Special tolerances.....	24
Bibliography.....	25

[This is a preview - click here to buy the full publication](#)

Table 1– Conductor tolerances 9

Table 2 – Nominal cross-sectional areas of preferred sizes..... 10

Table 3 – Corner radii 11

Table 4 – Increases in dimensions 11

Table 5 – Mandrel winding 12

Table 6 – Breakdown voltage 13

Table A.1 – Nominal cross-sectional areas (*1 of 9*) 15

Table B.1 – Overall dimensional tolerances for grade 2 24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

Part 0-9: General requirements – Enamelled 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 60317-0-9 edition 1.1 contains the first edition (2015-05) [documents 55/1519/FDIS and 55/1525/RVD] and its amendment 1 (2024-06) [documents 55/1978/CDV and 55/2014/RVC].

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60317-0-9 has been prepared by IEC technical committee 55: Winding wires.

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

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.

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 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.

INTRODUCTION

This part of IEC 60317 is one of a series which deals with insulated wires used for windings in electrical equipment. The series has three groups describing:

- 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 0-9: General requirements – Enamelled rectangular aluminium wire

1 Scope

This part of IEC 60317 specifies the general requirements of enamelled rectangular aluminium winding wires.

The range of nominal conductor dimensions is given in the relevant specification sheet.

When reference is made to a winding wire according to a standard of the IEC 60317 series mentioned under Clause 2, the following information is given in the description:

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

EXAMPLE IEC 60317-16 – 4,00 x 1,00 Grade 1

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60172¹, *Test procedure for the determination of the temperature index of enamelled and tape wrapped winding wires*

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

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

ISO 3, *Preferred numbers – Series of preferred numbers*

EN 1715-2, *Aluminium and aluminium alloys – Drawing stock – Part 2: Specific requirements for electrical applications*

ASTM B233-97, *Standard Specification for Aluminum 1350 Drawing Stock for Electrical Purposes*

¹ Fourth edition to be published.