

INTERNATIONAL STANDARD



**Specifications for particular types of winding wires –
Part 0-6: General requirements – Glass-fibre wound resin or varnish
impregnated, bare or enamelled round copper wire**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2020 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 Central Office
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 It also gives information on projects, replaced and withdrawn publications.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.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

INTERNATIONAL STANDARD



**Specifications for particular types of winding wires –
Part 0-6: General requirements – Glass-fibre wound resin or varnish
impregnated, bare or enamelled round copper wire**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.10

ISBN 978-2-8322-8513-8

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

CONTENTS

FOREWORD	4
INTRODUCTION	2
1 Scope	7
2 Normative references	7
3 Terms, definitions, general notes on methods of test and appearance	7
3.1 Terms and definitions	7
3.2 General notes on methods of test	8
3.2.1 Methods of test	8
3.2.2 Winding wire	9
3.3 Appearance	9
4 Dimensions	9
4.1 Conductor diameter	9
4.2 Out of roundness of the conductor	13
4.3 Minimum increase in diameter due to the covering	13
4.4 Maximum overall diameter	14
5 Electrical resistance	14
6 Elongation	14
7 Springiness	14
7.1 Nominal conductor diameters up to and including 1,600 mm	14
7.2 Nominal conductor diameters over 1,600 mm	14
8 Flexibility and adherence	14
9 Heat shock	14
10 Cut-through	14
11 Resistance to abrasion	15
12 Resistance to solvents	15
13 Breakdown voltage	15
13.1 Glass-fibre covered bare round copper wires	15
13.2 Glass-fibre covered enamelled round copper wires	15
14 Continuity of covering insulation	15
15 Temperature index	16
16 Resistance to refrigerants	16
17 Solderability	16
18 Heat or solvent bonding	16
19 Dielectric dissipation factor	16
20 Resistance to hydrolysis and to transformer oil	16
21 Loss of mass	16
23 Pin hole test	16
30 Packaging	16
Annex A (informative) Diameters for intermediate nominal conductor diameters (R40)	18
Annex B (informative) Resistance	22
Annex C (informative) High temperature failure test	25
Bibliography	25

Table 1 – Diameters for single glass-fibre covered grade 1 or grade 2 enamelled round wires	10
Table 2 – Diameters for double glass-fibre covered, bare, grade 1 or grade 2 enamelled round wires	11
Table 3 – Elongation	14
Table 4 – Breakdown voltage for glass-fibre covered bare round copper wires	15
Table 5 – Breakdown voltage of glass fibre-covered enamelled round copper wires	15
Table A.1 – Diameters for single glass-fibre covered grade 1 or grade 2 enamelled round wires (R40)	18
Table A.2 – Diameters for double glass-fibre covered, bare, grade 1 or grade 2 enamelled round wires (R40)	19
Table B.1 – Electrical resistances	22

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

**Part 0-6: General requirements –
Glass-fibre wound resin or varnish impregnated,
bare or enamelled round copper 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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60317-0-6 has been prepared by IEC technical committee 55: Winding wires.

This second edition cancels and replaces the first edition published in 2001 and Amendment 1:2006. This edition constitutes a technical revision.

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

- revision to 3.3, Appearance;
- revision to Table 1, maximum overall diameter of grade 1 wire over single-glass fibre covering for nominal conductor diameters 1,600 mm – 5,000 mm;
- revision to Table 2, maximum overall diameter of grade 1 wire over double-glass fibre covering for nominal conductor diameters 1,600 mm – 5,000 mm;
- clarification in Table 3 measurement of elongation as “minimum elongation %”.

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

FDIS	Report on voting
55/1851/FDIS	55/1866/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 read in conjunction with IEC 60851 (all parts). The clause numbers used in this part of IEC 60317 are identical with the respective test numbers of IEC 60851 (all parts).

In case of inconsistencies between IEC 60851 (all parts) and this part of IEC 60317, the latter prevails.

The numbering of clauses in this standard is not continuous from Clauses 21 and 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 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.

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 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 0-6: General requirements – Glass-fibre wound resin or varnish impregnated, bare or enamelled round copper wire

1 Scope

This part of IEC 60317 specifies the general requirements of glass-fibre wound resin or varnish impregnated, bare or enamelled, round copper winding wires.

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

~~When a reference is made to a winding wire according to one of the IEC 60317 series, the following information should be given in the description:~~

- ~~— reference to IEC specification;~~
- ~~— nominal conductor diameter in millimetres;~~
- ~~— grade of coating and glass covering.~~

~~EXAMPLE: IEC 60317-48-0,500-1G2~~

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

IEC 60851-5:1996/2008, *Winding wires – Test methods – Part 5: Electrical properties*¹

IEC 60851-5/AMD1:2011

IEC 60851-5/AMD2:2019

~~IEC 60851-6:1996, *Winding wires – Test methods – Part 6: Thermal properties*~~

ISO 3:1973, *Preferred numbers – Series of preferred numbers*

3 Terms, definitions, general notes ~~on methods of test~~ and appearance

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>

¹ A consolidated edition 3.1 exists (1997) that includes IEC 60851-5 (1996) and its amendment 1 (1997).

- ISO Online browsing platform: available at <http://www.iso.org/obp>:

3.1.1

coating

material deposited on a conductor or wire by suitable means and then dried and/or cured

3.1.2

conductor

bare metal after removal of the insulation

3.1.3

covering

material which is wound, wrapped or braided around a bare or insulated conductor

3.1.4

crack

opening in the insulation which exposes the conductor to view at the stated magnification

3.1.5

enamelled wire

wire coated with an insulation of cured resin

3.1.6

grade

~~range of increase in dimension of the wire due to insulation~~

increase in the overall diameter of glass fibre covered wire due to the glass fibre covering and/or enamel

3.1.7

insulation

coating or covering on the conductor with the specific function of withstanding voltage

3.1.8

nominal conductor ~~dimension~~ diameter

designation of conductor size in accordance with the IEC 60317 series

3.1.9

winding wire

wire used for winding a coil to provide a magnetic field

3.1.10

wire

conductor coated or covered with an insulation

3.1.11

normal vision

20/20 vision, with corrective lenses, if necessary

3.2 General notes ~~on methods of test~~

3.2.1 Methods of test

All methods of test to be used for this document are given in ~~the various parts to~~ IEC 60851 (all parts).

The clause numbers used in this document are identical to the respective test numbers in ~~those parts of~~ IEC 60851 (all parts).

In case of inconsistencies between the IEC 60851 parts concerning methods of test and this document, IEC 60317-0-6 shall prevail.

Where no specific range of nominal conductor diameters is given for a test, the test applies to all nominal conductor diameters covered by the specification sheet.

Unless otherwise specified, all tests shall be carried out at a temperature ranging between 15 °C and ~~35~~ 40 °C and a relative humidity between ~~45~~ 25 % and 75 %. Before measurements are made, the specimens shall be preconditioned under these atmospheric conditions for a time sufficient to allow the specimens to reach stability.

The wire to be tested shall be removed from the packaging in such a way that the wire will not be subjected to tension or unnecessary bends. Before each test, sufficient wire should be discarded to ensure that any damaged wire is not included in the test specimens.

3.2.2 Winding wire

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 diameter in millimetres;
- grade of coating and glass covering.

EXAMPLE IEC 60317-48 – 1,000 Grade 1 GL1

The coating is characterised by the following different grades of thickness:

- GL1, bare conductor with 1 layer of glass fibre;
- GL2, bare conductor with 2 layers of glass fibre;
- grade 1 GL1, enamelled grade 1 (grade 1) with 1 layer of glass fibre (GL1);
- grade 1 GL2, enamelled grade 1 (grade 1) with 2 layers of glass fibre (GL2);
- grade 2 GL1, enamelled grade 2 (grade 2) with 1 layer of glass fibre (GL1);
- grade 2 GL2, enamelled grade 2 (grade 2) with 2 layers of glass fibre (GL2).

3.3 Appearance

The fibrous covering shall be smooth as agreed upon between customer and supplier in accordance with good commercial practice and be free from physical damage and foreign material when examined with normal vision, as wound on the original spool or reel.

4 Dimensions

4.1 Conductor diameter

The series of preferred nominal conductor diameters shall correspond to series R20 according to ISO 3. The actual values and their tolerances are given in Table 1 and Table 2.

The series of intermediate diameters from which the user shall select intermediate nominal conductor diameters, when required for technical reasons, shall correspond to series R40 according to ISO 3. The actual values and their tolerances are given in Annex A.

The conductor diameter shall not differ from the nominal diameter by more than the limit given in Table 1 and Table 2.

**Table 1 – Diameters for single glass-fibre covered grade 1
or grade 2 enamelled round wires**

Nominal conductor diameter mm	Conductor diameter tolerance $\pm$ mm	Minimum increase single-glass-fibre covering mm	Maximum overall diameter single-glass-fibre-covering mm	
			Grade 1G1	Grade 2G1
0,500	0,005	0,064	0,665	0,685
0,560	0,006	0,102	0,776	0,795
0,630	0,006	0,102	0,839	0,864
0,710	0,007	0,102	0,922	0,949
0,800	0,008	0,102	1,020	1,047
0,900	0,009	0,102	1,125	1,155
1,000	0,010	0,102	1,230	1,260
1,120	0,011	0,102	1,352	1,385
1,250	0,013	0,102	1,485	1,518
1,400	0,014	0,102	1,640	1,676
1,600	0,016	0,102	1,841	1,880
1,800	0,018	0,102		2,085
2,000	0,020	0,102		2,285
2,240	0,022	0,102		2,535
2,500	0,025	0,102		2,800
2,800	0,028	0,114		3,130
3,150	0,032	0,114		3,492
3,550	0,036	0,114		3,896
4,000	0,040	0,114		4,353
4,500	0,045	0,114		4,861
5,000	0,050	0,114		5,370
NOTE 1 – For intermediate nominal conductor diameters, the minimum increase figure corresponding to the next larger nominal conductor diameter must be taken.				
NOTE 2 – The dimensions of intermediate nominal conductor diameters for the R40 series are given in annex A.				
NOTE 3 – Grade 1G1 is a single glass-fibre covering over grade 1 enamelled wire. Grade 2G1 is a single glass-fibre covering over grade 2 enamelled wire.				

Nominal conductor diameter mm	Conductor diameter tolerance ± mm	Minimum increase of single glass-fibre covering mm	Maximum overall diameter of single glass-fibre covering mm	
			Grade 1 GL1	Grade 2 GL1
0,500	0,005	0,064	0,665	0,685
0,560	0,006	0,102	0,776	0,795
0,630	0,006	0,102	0,839	0,864
0,710	0,007	0,102	0,922	0,949
0,800	0,008	0,102	1,020	1,047
0,900	0,009	0,102	1,125	1,155
1,000	0,010	0,102	1,230	1,260
1,120	0,011	0,102	1,352	1,385
1,250	0,013	0,102	1,485	1,518
1,400	0,014	0,102	1,640	1,676
1,600	0,016	0,102	1,841	1,880
1,800	0,018	0,102	2,048	2,085
2,000	0,020	0,102	2,247	2,285
2,240	0,022	0,102	2,496	2,535
2,500	0,025	0,102	2,760	2,800
2,800	0,028	0,114	3,088	3,130
3,150	0,032	0,114	3,449	3,492
3,550	0,036	0,114	3,852	3,896
4,000	0,040	0,114	4,308	4,353
4,500	0,045	0,114	4,815	4,861
5,000	0,050	0,114	5,322	5,370
For intermediate nominal conductor diameters, the minimum increase figure corresponding to the next larger nominal conductor diameter shall be taken.				
NOTE 1 The dimensions of the intermediate nominal conductor diameters for the R40 series are given in Annex A.				
NOTE 2 Grade 1G1 is a single glass-fibre covering over grade 1 enamelled wire. Grade 2G1 is a single glass-fibre covering over grade 2 enamelled wire.				

Table 2 – Diameters for double glass-fibre covered, bare, grade 1 or grade 2 enamelled round wires

Nominal conductor diameter mm	Conductor diameter tolerance ± mm	Minimum increase double-glass-fibre covering mm	Maximum overall diameter double-glass-fibre-covering mm		
			Grade G2	Grade 1G2	Grade 2G2
0,500	0,005	0,115	0,670	0,723	0,745
0,560	0,006	0,150	0,802	0,853	0,877
0,630	0,006	0,150	0,873	0,925	0,951
0,710	0,007	0,150	0,958	1,010	1,037
0,800	0,008	0,150	1,048	1,103	1,132
0,900	0,009	0,150	1,149	1,208	1,240
1,000	0,010	0,150	1,249	1,311	1,348
1,120	0,011	0,150	1,370	1,434	1,467
1,250	0,013	0,150	1,511	1,576	1,610
1,400	0,014	0,150	1,662	1,730	1,764
1,600	0,016	0,150	1,867	1,937	1,973
1,800	0,018	0,150	2,068		2,177
2,000	0,020	0,150	2,269		2,381
2,240	0,022	0,150	2,516		2,632
2,500	0,025	0,150	2,782		2,900
2,800	0,028	0,180	3,123		3,246
3,150	0,032	0,180	3,481		3,606
3,550	0,036	0,180	3,883		4,012
4,000	0,040	0,180	4,335		4,483
4,500	0,045	0,180	4,843		4,980
5,000	0,050	0,180	5,345		5,486
NOTE 1—For intermediate nominal conductor diameters, the minimum increase figure corresponding to the next larger nominal conductor diameter must be taken.					
NOTE 2—The dimensions of intermediate nominal conductor diameters for the R40 series are given in annex A.					
NOTE 3—Grade G2 is a double glass-fibre covering over bare wire. Grade 1G2 is a double glass-fibre covering over grade 1 enamelled wire. Grade 2G2 is a double glass-fibre covering over grade 2 enamelled wire.					

Nominal conductor diameter mm	Conductor diameter tolerance ± mm	Minimum increase of double glass-fibre covering mm	Maximum overall diameter of double glass-fibre covering mm		
			GL2	Grade 1 GL2	Grade 2 GL2
0,500	0,005	0,115	0,670	0,723	0,745
0,560	0,006	0,150	0,802	0,853	0,877
0,630	0,006	0,150	0,873	0,925	0,951
0,710	0,007	0,150	0,958	1,010	1,037
0,800	0,008	0,150	1,048	1,103	1,132
0,900	0,009	0,150	1,149	1,208	1,240
1,000	0,010	0,150	1,249	1,311	1,348
1,120	0,011	0,150	1,370	1,434	1,467
1,250	0,013	0,150	1,511	1,576	1,610
1,400	0,014	0,150	1,662	1,730	1,764
1,600	0,016	0,150	1,867	1,937	1,973
1,800	0,018	0,150	2,068	2,140	2,177
2,000	0,020	0,150	2,269	2,343	2,381
2,240	0,022	0,150	2,516	2,593	2,632
2,500	0,025	0,150	2,782	2,860	2,900
2,800	0,028	0,180	3,123	3,204	3,246
3,150	0,032	0,180	3,481	3,563	3,606
3,550	0,036	0,180	3,883	3,968	4,012
4,000	0,040	0,180	4,335	4,438	4,483
4,500	0,045	0,180	4,843	4,934	4,980
5,000	0,050	0,180	5,345	5,438	5,486
For intermediate nominal conductor diameters, the minimum increase figure corresponding to the next larger nominal conductor diameter shall be taken.					
NOTE 1 The dimensions of the intermediate nominal conductor diameters for the R40 series are given in Annex A.					
NOTE 2 Grade G2 is a double glass-fibre covering over bare wire. Grade 1G2 is a double glass-fibre covering over grade 1 enamelled wire. Grade 2G2 is a double glass-fibre covering over grade 2 enamelled wire.					

4.2 Out of roundness of the conductor

The difference between the minimum and maximum diameter, at any one point, shall not be more than the figure given in column 2 of Table 1 or Table 2.

4.3 Minimum increase in diameter due to the covering

The minimum increase in diameter due to the covering shall not be less than the values given in Table 1 or Table 2.

4.4 Maximum overall diameter

The maximum overall diameter shall not exceed the values given in Table 1 or Table 2.

5 Electrical resistance

No minimum and maximum resistance values are specified.

For nominal resistance values see Annex B.

6 Elongation

The minimum elongation shall not be less than the values given in Table 3. These requirements shall apply to nominal conductor diameters over 0,630 mm.

Table 3 – Elongation

Nominal conductor diameter mm		With glass-fibre covering Minimum elongation %
Over	Up to and including	
–	0,630	–
0,630	1,250	15
1,250	2,800	20
2,800	5,000	30

7 Springiness

7.1 Nominal conductor diameters up to and including 1,600 mm

No requirements specified.

7.2 Nominal conductor diameters over 1,600 mm

The wire shall not exceed the maximum springback of:

- 5° for wires with a glass-fibre covering over a bare conductor;
- 5,5° for wires with a glass-fibre covering over an enamelled conductor.

8 Flexibility and adherence

The covering shall not open sufficiently to expose the bare or enamelled wire after bending on a mandrel diameter of ten times the nominal conductor diameter.

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

13.1 Glass-fibre covered bare round copper wires

Method of test according to 4.6 of IEC 60851-5:2008 ~~extended to this standard~~ shall apply.

The wire shall meet the requirements of Table 4.

Table 4 – Breakdown voltage for glass-fibre covered bare round copper wires

Nominal conductor diameter Mm		Mandrel diameter mm	Minimum breakdown voltage V	
Over	Up to and including		GL1 single glass-fibre covering	GL2 double glass-fibre covering
–	0,500	25	–	200
0,500	2,500	25	–	260
2,500	5,000	50	–	300

13.2 Glass-fibre covered enamelled round copper wires

Method of test according to 4.6 of IEC 60851-5:2008 ~~extended to this standard~~ shall apply.

The wire shall meet the requirements of Table 5.

Table 5 – Breakdown voltage of glass fibre-covered enamelled round copper wires

Nominal conductor diameter mm		Mandrel diameter Mm	Minimum breakdown voltage V			
Over	Up to and including		Grade 1 GL1 single glass-fibre covering	Grade 1 GL2 double glass-fibre covering	Grade 2 GL1 single glass-fibre covering	Grade 2 GL2 double glass-fibre covering
0,50	1,00	25	750	1 000	1 000	1 200
1,12	2,50	25	1 000	1 200	1 260	1 500
2,50	5,00	50	1 200	1 500	1 600	1 800

14 Continuity of ~~covering~~ insulation

Test inappropriate.

15 Temperature index

The temperature index is dependent on the type of impregnating agent used. The method of test used shall be agreed between purchaser and supplier. The maximum service temperature shall be determined by experience.

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 inappropriate.

21 Loss of mass

Test inappropriate.

23 Pin hole test

Test inappropriate.

30 Packaging

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

The wire shall be evenly and compactly wound on spools or placed in containers. No spool or container shall contain more than one length of wire unless agreed to between purchaser and supplier. The marking of the label when there is more than one length and/or identification of the separate lengths in the package shall be agreed to between purchaser and supplier.

Where wires are delivered in coils, the dimensions and the maximum mass of such coils shall be agreed between purchaser and supplier. Any additional protection for coils shall also be agreed between purchaser and supplier.

Labels shall be securely attached to the flange of each spool and (where applicable) container and shall include the following information:

- a) manufacturer's name and/or trademark;
- b) type of wire and insulation;
- c) net mass of wire;
- d) diameter(s) of wire and grade of insulation;
- e) date of manufacture;
- f) appropriate IEC specification number.

Annex A (informative)

Diameters for intermediate nominal conductor diameters (R40)

Annex A sets out intermediate nominal conductor diameters from which the user may select intermediate sizes only for technical reasons (see Table A.1 and Table A.2).

**Table A.1 – Diameters for single glass-fibre covered
grade 1 or grade 2 enamelled round wires (R40)**

Nominal conductor diameter	Conductor diameter tolerance $\pm$	Minimum-increase single-glass-fibre covering	Maximum-overall-diameter single-glass-fibre-covering	
			mm	
mm	mm	mm	Grade-1G1	Grade-2G1
0,530	0,006	0,102	0,746	0,765
0,600	0,006	0,102	0,809	0,834
0,670	0,007	0,102	0,882	0,909
0,750	0,008	0,102	0,970	0,997
0,850	0,009	0,102	1,075	1,105
0,950	0,010	0,102	1,170	1,210
1,060	0,011	0,102	1,290	1,325
1,180	0,012	0,102	1,412	1,448
1,320	0,013	0,102	1,560	1,596
1,500	0,015	0,102	1,741	1,780
1,700	0,017	0,102		1,985
1,900	0,019	0,102		2,185
2,120	0,021	0,102		2,415
2,360	0,024	0,102		2,660
2,650	0,027	0,114		2,990
3,000	0,030	0,114		3,342
3,350	0,034	0,114		3,696
3,750	0,038	0,114		4,103
4,250	0,043	0,114		4,611
4,750	0,048	0,114		5,120

Nominal conductor diameter mm	Conductor diameter tolerance $\pm$ mm	Minimum increase of single glass-fibre covering mm	Maximum overall diameter of single glass-fibre covering mm	
			Grade 1 GL1	Grade 2 GL1
0,530	0,006	0,102	0,746	0,765
0,600	0,006	0,102	0,809	0,834
0,670	0,007	0,102	0,882	0,909
0,750	0,008	0,102	0,970	0,997
0,850	0,009	0,102	1,075	1,105
0,950	0,010	0,102	1,170	1,210
1,060	0,011	0,102	1,290	1,325
1,180	0,012	0,102	1,412	1,448
1,320	0,013	0,102	1,560	1,596
1,500	0,015	0,102	1,741	1,780
1,700	0,017	0,102	1,948	1,985
1,900	0,019	0,102	2,147	2,185
2,120	0,021	0,102	2,376	2,415
2,360	0,024	0,102	2,620	2,660
2,650	0,027	0,114	2,948	2,990
3,000	0,030	0,114	3,299	3,342
3,350	0,034	0,114	3,652	3,696
3,750	0,038	0,114	4,058	4,103
4,250	0,043	0,114	4,565	4,611
4,750	0,048	0,114	5,072	5,120