

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Specifications for particular types of winding wires –  
Part 55: Solderable polyurethane enamelled round copper wire overcoated with  
polyamide, class 180**

**Spécifications pour types particuliers de fils de bobinage –  
Partie 55: Fil brasable de section circulaire en cuivre émaillé avec polyuréthane  
et avec surcouche polyamide, classe 180**

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## 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.....	6
3.2.1 Methods of test.....	6
3.2.2 Winding wire.....	6
3.3 Appearance.....	7
4 Dimensions.....	7
5 Electrical resistance.....	7
6 Elongation.....	7
7 Springiness.....	7
8 Flexibility and adherence.....	7
9 Heat shock.....	7
10 Cut-through.....	7
11 Resistance to abrasion (nominal conductor diameters from 0,250 mm up to and including 1,600 mm).....	7
12 Resistance to solvents.....	8
13 Breakdown voltage.....	8
14 Continuity of insulation.....	8
15 Temperature index.....	8
16 Resistance to refrigerants.....	8
17 Solderability.....	9
17.1 General.....	9
17.2 Nominal conductor diameters up to and including 0,100 mm.....	9
17.3 Nominal conductor diameters over 0,100 mm.....	9
18 Heat or solvent bonding.....	9
19 Dielectric dissipation factor.....	9
20 Resistance to transformer oil.....	9
21 Loss of mass.....	9
23 Pin hole test.....	9
30 Packaging.....	9
Bibliography.....	10
Table 1 – Resistance to abrasion.....	8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –**

**Part 55: Solderable polyurethane enamelled round  
copper wire overcoated with polyamide, class 180**

FOREWORD

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**IEC 60317-55 edition 2.1 contains the second edition (2013-10) [documents 55/1422/FDIS and 55/1443/RVD] and its amendment 1 (2019-06) [documents 55/1693/CDV and 55/1743/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 60317-55 has been prepared by IEC technical committee 55: Winding wires.

This second edition constitutes a technical revision.

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

- revision to Clause 23, Pin hole test.

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

This International standard is to be read in conjunction with the IEC 60317-0-1:2013.

The numbering of clauses in this standard is not continuous from Clauses 20 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 the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## 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);
- 2) Specifications for particular types of winding wires (IEC 60317);
- 3) Packaging of winding wires (IEC 60264).

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## SPECIFICATIONS FOR PARTICULAR TYPES OF WINDING WIRES –

### Part 55: Solderable polyurethane enamelled round copper wire overcoated with polyamide, class 180

#### 1 Scope

This part of IEC 60317 specifies the requirements of solderable enamelled round copper winding wire of class 180 with a dual coating. The underlying coating is based on polyurethane resin, which may be modified providing it retains the chemical identity of the original resin and meets all specified wire requirements. The superimposed coating is based on polyamide resin.

NOTE 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.

The range of nominal conductor diameters covered by this standard is as follows:

- Grade 1: 0,020 mm up to and including 1,600 mm;
- Grade 2: 0,020 mm up to and including 1,600 mm.

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

#### 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 60317-0-1:2013 *Specifications for particular types of winding wires – Part 0-1: General requirements – Enamelled round copper wire*

#### 3 Terms, definitions, general notes and appearance

##### 3.1 Terms and definitions

Subclause 3.1 of IEC 60317-0-1:2013 applies.

##### 3.2 General notes

###### 3.2.1 Methods of test

Subclause 3.2.1 of IEC 60317-0-1:2013 applies. In case of inconsistencies between IEC 60317-0-1:2013 and this standard, the latter shall prevail.

###### 3.2.2 Winding wire

Class 180 is a thermal class that requires a minimum temperature index of 180 and a heat shock temperature of at least 200 °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 60317-0-1:2013 applies.

### **4 Dimensions**

Clause 4 of IEC 60317-0-1:2013 applies.

### **5 Electrical resistance**

Clause 5 of IEC 60317-0-1:2013 applies.

### **6 Elongation**

Clause 6 of IEC 60317-0-1:2013 applies.

### **7 Springiness**

Clause 7 of IEC 60317-0-1:2013 applies.

### **8 Flexibility and adherence**

Clause 8 of IEC 60317-0-1:2013 applies. For 8.4, the constant  $K$  used for the calculation of the number of revolutions for the peel test shall be 110 mm.

### **9 Heat shock**

Clause 9 of IEC 60317-0-1:2013 applies. The minimum heat shock temperature shall be 200 °C.

### **10 Cut-through**

No failure shall occur within 2 min at 225 °C.

### **11 Resistance to abrasion (nominal conductor diameters from 0,250 mm up to and including 1,600 mm)**

The wire shall meet the requirements given in Table 1.

For intermediate nominal conductor diameters, the value of the next larger nominal conductor diameter shall be taken.

**Table 1 – Resistance to abrasion**

Nominal conductor diameter mm	Grade 1		Grade 2	
	Minimum average force to failure N	Minimum force to failure of each measurement N	Minimum average force to failure N	Minimum force to failure of each measurement N
0,250	2,30	1,95	4,10	3,50
0,280	2,50	2,10	4,40	3,70
0,315	2,70	2,30	4,75	4,00
0,355	2,90	2,50	5,10	4,30
0,400	3,15	2,70	5,45	4,60
0,450	3,40	2,90	5,80	4,90
0,500	3,65	3,10	6,20	5,25
0,560	3,90	3,30	6,65	5,60
0,630	4,20	3,55	7,10	6,00
0,710	4,50	3,80	7,60	6,45
0,800	4,80	4,10	8,10	6,90
0,900	5,20	4,40	8,70	7,40
1,000	5,60	4,75	9,30	7,90
1,120	6,00	5,15	10,0	8,50
1,250	6,50	5,55	10,7	9,10
1,400	7,00	5,95	11,4	9,70
1,600	7,50	6,35	12,2	10,4

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**12 Resistance to solvents**

Clause 12 of IEC 60317-0-1:2013 applies.

**13 Breakdown voltage**

Clause 13 of IEC 60317-0-1:2013 applies. The elevated temperature shall be 180 °C.

**14 Continuity of insulation**

Clause 14 of IEC 60317-0-1:2013 applies.

**15 Temperature index**

Clause 15 of IEC 60317-0-1:2013 applies. The minimum temperature index shall be 180.

**16 Resistance to refrigerants**

Test inappropriate.