Irish Standard
I.S. EN IEC 61238-1-1:2019

# Compression and mechanical connectors for power cables - Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV (Um = 1,2 kV) tested on non-insulated conductors

**I.S. EN IEC 61238-1-1:2019**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

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Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN IEC 61238-1-1:2019 is the adopted Irish version of the European Document EN IEC 61238-1-1:2019, Compression and mechanical connectors for power cables - Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV (Um = 1,2 kV) tested on non-insulated conductors

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 61238-1-1

September 2019

ICS 29.060.20

Supersedes EN 61238-1:2003 (partially) and all of its amendments and corrigenda (if any)

English Version

# Compression and mechanical connectors for power cables - Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on non-insulated conductors (IEC 61238-1-1:2018)

Raccords sertis et à serrage mécanique pour câbles d'énergie - Partie 1-1: Méthodes et exigences d'essai relatives aux raccords sertis et à serrage mécanique pour câbles d'énergie de tensions assignées inférieures ou égales à 1 kV ($U_m$ = 1,2 kV) soumis à essai sur des conducteurs non isolés
(IEC 61238-1-1:2018)

Pressverbinder und Schraubverbinder für Starkstromkabel - Teil 1-1: Prüfverfahren für und Anforderungen an Pressverbinder und Schraubverbinder für Starkstromkabel für Nennspannungen bis zu 1 kV ( $U_m$ = 1,2 kV), geprüft an nicht isolierten Leitern
(IEC 61238-1-1:2018)

This European Standard was approved by CENELEC on 2019-07-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.


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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

# European foreword

This document (EN IEC 61238-1-1:2019) consists of the text of IEC 61238-1-1:2018 prepared by IEC/TC 20 "Electric cables".

The following dates are fixed:

| | | |
|---|---|---|
| • latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2020-07-19 |
| • latest date by which the national standards conflicting with this document have to be withdrawn | (dow) | 2022-07-19 |

This document partially supersedes EN 61238-1:2003 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

# Endorsement notice

The text of the International Standard IEC 61238-1-1:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | |
|---|---|
| IEC 61238-1 | NOTE Harmonized as EN 61238-1. |
| IEC 61238-1-2 | NOTE Harmonized as EN IEC 61238-1-2. |
| IEC 61238-1-3 | NOTE Harmonized as EN IEC 61238-1-3. |
| IEC 62475:2010 | NOTE Harmonized as EN 62475:2010 (not modified). |

# Annex ZA
(normative)
## Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60050-461 | - | International Electrotechnical Vocabulary - Part 461: Electric cables | - | - |
| IEC 60228 | - | Conductors of insulated cables | EN 60228 | - |
| IEC 60493-1 | - | Guide for the statistical analysis of ageing test data - Part 1: Methods based on mean values of normally distributed test results | - | - |
| IEC 60949 +A1 | 1988 2008 | Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects | - | - |

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IEC 61238-1-1

Edition 1.0 2018-05

# INTERNATIONAL STANDARD

## Compression and mechanical connectors for power cables – Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on non-insulated conductors

IEC 61238-1-1:2018-05(en)

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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.

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IEC 61238-1-1

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# INTERNATIONAL STANDARD

## Compression and mechanical connectors for power cables – Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on non-insulated conductors

INTERNATIONAL
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# COMPRESSION AND MECHANICAL CONNECTORS FOR POWER CABLES –

## Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on non-insulated conductors

## 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.
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International Standard IEC 61238-1-1 has been prepared by IEC technical committee 20: Electric cables.

This first edition, together with IEC 61238-1-2 and IEC 61238-1-3, cancels and replaces IEC 61238-1:2003.

This edition includes the following significant technical changes with respect to IEC 61238-1:2003:

a) The scope has been widened to cover connectors for copper conductors from 10 $mm^2$ down to 2,5 $mm^2$ and has been limited to 1 200 $mm^2$ for connectors for copper and aluminium conductors because test experience and applications are rare for conductors of larger cross-sectional areas.

b) Two new mechanical classes have been introduced to satisfy the demand for connectors subjected to no mechanical force and for connectors subjected to higher mechanical forces than those specified in Class 1 for conductors of larger cross-sectional areas.

c) For the electrical test, a maximum elevated heating current has been set in order to avoid unrealistic current densities during testing which may change properties of tested connectors.

d) For the short-circuit test, the method of calculation and requirements have been updated.

e) For the mechanical test, the methods and requirements have been updated.

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

| FDIS | Report on voting |
|---|---|
| 20/1788/FDIS | 20/1803/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.

A list of all parts in the IEC 61238 series, published under the general title *Compression and mechanical connectors for power cables*, 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.

A bilingual version of this publication may be issued at a later date.

# INTRODUCTION

The IEC 61238 series has been divided into the following parts:

Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on non-insulated conductors

Part 1-2: Test methods and requirements for insulation piercing connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on insulated conductors

Part 1-3: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages above 1 kV ($U_m$ = 1,2 kV) up to 30 kV ($U_m$ = 36 kV) tested on non-insulated conductors

This Part 1-1 of IEC 61238 deals with type tests for compression and mechanical connectors for use on copper or aluminium conductors of power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV).

When a design of connector meets the requirements of this document, then it is expected that in service:

a) the resistance of the connection will remain stable within specified limits;

b) the temperature of the connector will be of the same order or less than that of the conductor during current heating;

c) if the intended use demands it, application of short-circuit currents will not affect a) and b);

d) independently from the electrical performance, conforming axial tensile strength will ensure an acceptable mechanical performance for the connections to the cable conductors, when applicable.

It should be stressed that, although the object of the electrical and mechanical tests specified in this document is to prove the suitability of connectors for most operating conditions, they do not necessarily apply to situations where a connector may be raised to a high temperature by virtue of connection to a highly rated plant, to corrosive conditions, or where the connector is subjected to external mechanical stresses such as excessive vibration, shock and large displacement after installation. In these instances, the tests in this document may need to be supplemented by special tests agreed between supplier and purchaser.

This document does not invalidate existing approvals of products achieved on the basis of national standards and specifications and/or the demonstration of satisfactory service performance. However, products approved according to such national standards or specifications cannot directly claim approval to this document.

Once successfully completed, these tests are not repeated unless changes are made in material, manufacturing process and design which might adversely change the connector performance characteristics.

# COMPRESSION AND MECHANICAL CONNECTORS FOR POWER CABLES –

# Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV) tested on non-insulated conductors

## 1 Scope

This part of IEC 61238 applies to compression and mechanical connectors for power cables for rated voltages up to 1 kV ($U_m$ = 1,2 kV), for example buried cables or cables installed in buildings, having

a) conductors complying with IEC 60228 having nominal cross-sectional areas between 2,5 mm$^2$ and 1 200 mm$^2$ for copper and between 16 mm$^2$ and 1 200 mm$^2$ for aluminium;

b) a maximum continuous conductor temperature not exceeding 90 °C.

This document is not applicable to connectors for overhead line conductors nor to connectors with a sliding contact.

The object of this document is to define the type test methods and requirements which apply to compression and mechanical connectors for power cables with copper or aluminium conductors. The reference method is to perform the tests on unused conductors.

## 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 60050-461, *International Electrotechnical Vocabulary – Part 461: Electric cables* (available at http://www.electropedia.org)

IEC 60228, *Conductors of insulated cables*

IEC 60493-1, *Guide for the statistical analysis of ageing test data – Part 1: Methods based on mean values of normally distributed test results*

IEC 60949:1988, *Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects*
IEC 60949:1988/AMD1:2008

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-461 and the following apply.

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