

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Solderless connections – Part 3: Accessible insulation displacement (ID) connections – General requirements, test methods and practical guidance**

**Connexions sans soudures – Partie 3: Connexions autodévidantes accessibles – Règles générales, méthodes d'essai et guide pratique**



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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Solderless connections –**  
**Part 3: Accessible insulation displacement (ID) connections – General requirements, test methods and practical guidance**

**Connexions sans soudure –**  
**Partie 3: Connexions autodénudantes accessibles – Règles générales, méthodes d'essai et guide pratique**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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**SOLDERLESS CONNECTIONS –****Part 3: Accessible insulation displacement (ID) connections –  
General requirements, test methods and practical guidance**

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International Standard IEC 60352-3 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

This second edition cancels and replaces the first edition published in 1993. This edition constitutes a technical revision.

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

- a) Subclause 7.2.2: reduce the limit of duration of contact disturbance to 1  $\mu$ s.
- b) Subclause 7.2.3: reduce the limit of duration of contact disturbance to 1  $\mu$ s.
- c) Transferred Clauses 9 to 13 to Annex A (informative).
- d) The figures were revised for clarity.

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

FDIS	Report on voting
48B/2789/FDIS	48B/2802/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 60352 series, published under the general title *Solderless connections*, 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

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## INTRODUCTION

The two following parts of IEC 60352 are available on solderless insulation displacement connections:

- Part 3: Accessible insulation displacement connections – General requirements, test methods and practical guidance;
- Part 4: Solderless non-accessible insulation displacement connections – General requirements, test methods and practical guidance.

NOTE In this document the term "insulation displacement" is abbreviated to "ID", for example "ID connection", "ID termination".

Figure 1 illustrates examples of accessible and non-accessible insulation displacement connections that clarify the difference among them.

Part 3 includes requirements and relevant tests (normative) as well as a practical guidance in Annex A (informative) for accessible ID connections.

Two test schedules are provided:

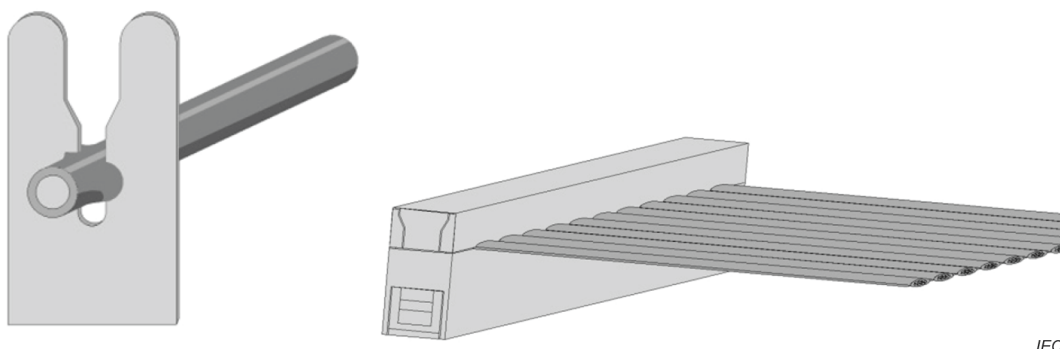
- the basic test schedule which applies to insulation displacement connections which conform to all prerequisites of Clause 5. It is derived from experience with successful applications of such connections;
- the full test schedule which applies to insulation displacement connections which do not fully conform to all prerequisites of Clause 5, for example which are manufactured using materials or finishes not included in Clause 5.

This philosophy permits cost and time effective performance verification using a limited basic test schedule for established insulation displacement connections and an expanded full test schedule for connections requiring more extensive performance validation.

The suitability of the accessible ID connection implies that the specified requirements and tests apply to all factors involved in producing a suitable ID connection, namely:

- the accessible ID termination, which may be part of a single-pole or multipole connector;
- the wire (or range of wires) for which the termination is suitable;
- the tools (if any) required to produce that type of solderless connection.

The practical guidance (informative Annex A) serves as a guideline for the required workmanship. Attention is drawn to the fact that some industries (e.g. automotive, aerospace, nuclear, military) may have specific workmanship standards and/or quality requirements, which are outside the scope of this standard.



IEC

**Figure 1 – Example of accessible and non-accessible insulation displacement connection**

IEC Guide 109 advocates the need to minimise the impact of a product on the natural environment throughout the product life cycle.

It is understood that some of the materials permitted in this document may have a negative environmental impact.

As technological advances lead to acceptable alternatives for these materials, they will be eliminated from the document.

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## SOLDERLESS CONNECTIONS –

### Part 3: Accessible insulation displacement (ID) connections – General requirements, test methods and practical guidance

#### 1 Scope

This part of IEC 60352 is applicable to ID connections which are accessible for tests and measurements according to Clauses 6 through 8 and which are made with:

- appropriately designed accessible ID terminations,
- wires having solid round conductors of 0,25 mm to 3,6 mm nominal diameter,
- wires having stranded conductors of 0,05 mm<sup>2</sup> to 10 mm<sup>2</sup> cross-sectional area,

for use in electrical and electronic equipment and components.

Information on materials and data from industrial experience is included in addition to the test procedures to provide electrically stable connections under prescribed environmental conditions.

There are different designs and materials for accessible ID terminations in use. For this reason only fundamental parameters of the termination are specified, while the performance requirements of the wire and the complete connection are specified in full detail.

The purpose of this document is: [IEC 60352-3:2020  
https://standards.iteh.ai/catalog/standards/sist/35f71d5d-54e9-41c1-9cfc-10db69b6d97f/iec-60352-3-2020](https://standards.iteh.ai/catalog/standards/sist/35f71d5d-54e9-41c1-9cfc-10db69b6d97f/iec-60352-3-2020)

- to determine the suitability of accessible ID connections under specified mechanical, electrical and atmospheric conditions;
- to provide a means of comparing test results when the tools used to make the connections, if any, are of different designs or manufacture.

#### 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 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60228, *Conductors of insulated cables*

IEC 60512-1, *Connectors for electrical and electronic equipment – Tests and measurements – Part 1: Generic specification*

IEC 60512-1-1, *Connectors for electronic equipment – Tests and measurements – Part 1-1: General examination – Test 1a: Visual examination*

IEC 60512-1-2, *Connectors for electronic equipment – Tests and measurements – Part 1-2: General examination – Test 1b: Examination of dimension and mass*

IEC 60512-2-1, *Connectors for electronic equipment – Part 2: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60512-2-2, *Connectors for electronic equipment – Tests and measurements – Part 2-2: Electrical continuity and contact resistance tests – Test 2b: Contact resistance – Specified test current method*

IEC 60512-2-5, *Connectors for electronic equipment – Tests and measurements – Part 2-5: Electrical continuity and contact resistance tests – Test 2e: Contact disturbance*

IEC 60512-6-4, *Connectors for electronic equipment – Tests and measurements – Part 6-4: Dynamic stress tests – Test 6d: Vibration (sinusoidal)*

IEC 60512-9-2, *Connectors for electronic equipment – Tests and measurements – Part 9-2: Endurance tests – Test 9b: Electrical load and temperature*

IEC 60512-11-1, *Connectors for electrical and electronic equipment – Tests and measurements – Part 11-1: Climatic tests – Test 11a – Climatic sequence*

IEC 60512-11-4, *Connectors for electronic equipment – Tests and measurements – Part 11-4: Climatic tests – Test 11d: Rapid change of temperature*

IEC 60512-11-7, *Connectors for electronic equipment – Tests and measurements – Part 11-7: Climatic tests – Test 11g: Flowing mixed gas corrosion test*

IEC 60512-11-9, *Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11i: Dry heat*

IEC 60512-11-10, *Connectors for electronic equipment – Tests and measurements – Part 11-10: Climatic tests – Test 11j: Cold*

IEC 60512-11-12, *Connectors for electronic equipment – Tests and measurements – Part 11-12: Climatic tests – Test 11m: Damp heat, cyclic*

### 3 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/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

##### **conductor**

part of the cable or wire intended to carry electric current

Note 1 to entry: The conductor may be

- a) solid – made of a single strand of circular cross-section;
- b) stranded – made of several strands of circular cross-section assembled either by laying up concentrically or by bunching, and without insulation between them.

Note 2 to entry: The properties of the copper are in accordance with IEC 60228

[SOURCE: IEC 60189-1:2018, 3.1, modified – Note 2 to entry has been added]

### 3.2 wire

insulated conductor or assembly of several insulated conductors, laid up together and which may be provided with a screen

Note 1 to entry: The wire may be

- a) single – consists of a single insulated conductor;
- b) multiple – consists of several insulated conductors

[SOURCE: IEC 60189-1:2018, 3.2 modified – "low frequency" has been deleted in the term defined and Note 2 to entry has been deleted]

### 3.3 insulation displacement connection ID connection

solderless electrical connection made by inserting a single wire into a precisely controlled slot in a termination such that the sides of the slot displace the insulation and deform the conductor of a solid wire or the strands of a stranded wire to produce a gas-tight connection

Note 1 to entry: See Figure 2.

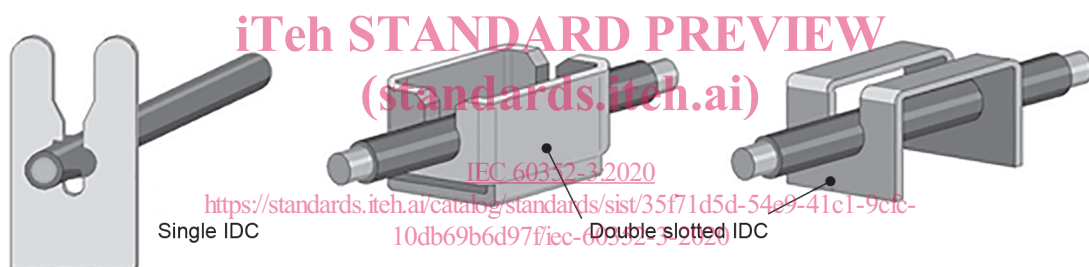


Figure 2 – Insulation displacement connection

#### 3.3.1 accessible insulation displacement connection accessible ID connection

ID connection in which it is possible to access test points for carrying out mechanical tests (for example, transverse extraction force) and electrical measurements (for example, contact resistance) without deactivation of any design feature intended to establish and/or maintain the ID connection

#### 3.3.2 non-accessible insulation displacement connection non-accessible ID connection

ID connection in which it is not possible to access test points for carrying out mechanical tests such as transverse extraction force and some electrical measurements (for example, contact resistance) without deactivation of any design feature intended to establish and/or maintain the ID connection, mainly where the ID connection is enclosed in a component (see IEC 60352-4)

### 3.4 insulation displacement termination ID termination

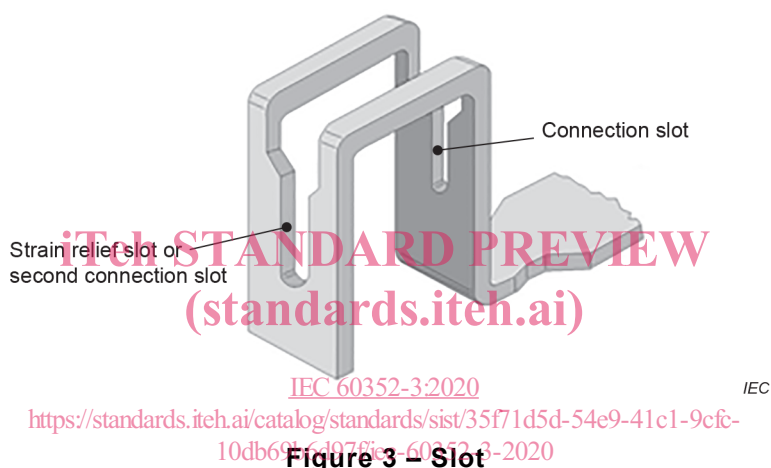
termination designed to accept a wire for the purpose of establishing an ID connection

**3.4.1**  
**reusable insulation displacement termination**  
**reusable ID termination**  
 ID termination that can be used more than once

**3.4.2**  
**non-reusable insulation displacement termination**  
**non-reusable ID termination**  
 ID termination that can be used only once

**3.5**  
**slot**  
 specially shaped opening in an ID termination suitable to provide either connection or strain relief

Note 1 to entry: See Figure 3.



**Figure 3 – Slot**

**3.5.1**  
**connection slot**  
 specially shaped opening in an ID termination suitable to displace the insulation of a wire and to ensure a gas-tight connection between the termination and the conductor(s) of the wire

Note 1 to entry: In certain cases, a second connection slot is used to provide for a double connection.

**3.5.2**  
**strain relief slot**  
 specially shaped opening in an ID termination suitable to provide for strain relief

**3.6**  
**beam**  
 specially shaped metallic part of an ID termination on each side of the slot

Note 1 to entry: See Figure 4.

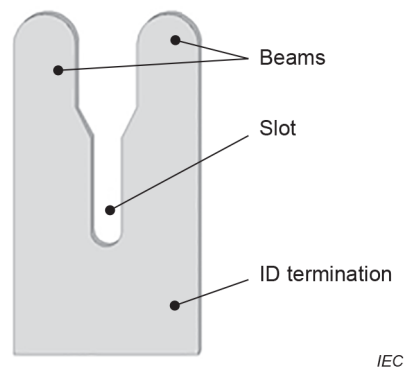


Figure 4 – Beam

### 3.7

#### **apparent diameter <of a stranded conductor>**

diameter of the circumscribing circle of the bundle of strands

### 3.8

#### **wire insertion tool**

hand or power-operated tool for producing an ID connection by inserting the wire(s) in a controlled manner to a predetermined position into the slot(s)

[SOURCE: IEC 60050-581: 2008, 581-24-27]

### 3.9

#### **wire extraction tool**

device for extracting the wire(s) from the ID termination

[SOURCE: IEC 60050-581: 2008, 581-24-28]

## 4 Workmanship

The manufacturer of accessible ID terminations or of a component (e.g. multipole connectors) using such terminations shall provide an instruction for the assembly of accessible ID connections.

Accessible ID connections shall be processed in a careful and workmanlike manner, in accordance with good current practice.

Annex A (informative) provides practical guidance and may constitute a benchmark for the assessment of workmanship.

NOTE Some industry sectors (e.g. automotive, aerospace, marine, nuclear, military) use workmanship standards which can be considered upon agreement between manufacturer and user.

## 5 Prerequisites for basic test schedule

### 5.1 General

Accessible ID connections which fulfil the following prerequisites, which are based on the experience by the industry, shall be assessed in accordance with the basic test schedule.