

INTERNATIONAL STANDARD

IEC
60352-7

First edition
2002-08

Solderless connections –

Part 7: Spring clamp connections – General requirements, test methods and practical guidance

Connexions sans soudure –

*Partie 7:
Connexions à ressort –
Règles générales, méthodes d'essai
et guide pratique*



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SOLDERLESS CONNECTIONS –**Part 7: Spring clamp connections – General requirements,
test methods and practical guidance**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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<https://www.internationalstandards.org/iec-60352-7-2002>
International Standard IEC 60352-7 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

The text of this standard is based on the following documents:

FDIS	Report on voting
48B/1228/FDIS	48B/1243/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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- withdrawn;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

INTRODUCTION

This part of IEC 60352 includes requirements, tests and practical guidance information.

Two test schedules are provided.

- a) The basic test schedule applies to spring-clamp connections which conform to all requirements of clause 4. These requirements are derived from experience with successful applications of such spring-clamp connections.
- b) The full test schedule applies to spring-clamp connections which do not fully conform to all requirements of clause 4, for example which are manufactured using materials or finishes not included in clause 4. This approach permits cost and time effective performance verification using a limited basic test schedule for established spring-clamp connections and an expanded full test schedule for spring-clamp connections requiring more extensive performance validation.

The values given in this specification are minimum values, which are harmonized with other IEC documents. Other standards may specify other values.

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SOLDERLESS CONNECTIONS –

Part 7: Spring clamp connections – General requirements, test methods and practical guidance

1 Scope and object

This part of IEC 60352 is applicable to spring-clamp connections made with stripped wire without further preparation:

- solid conductors of 0,32 mm to 3,7 mm nominal diameter (0,08 mm² to 10 mm² cross-section), or
- stranded conductors of 0,08 mm² to 10 mm² cross-section, or
- flexible conductors of 0,08 mm² to 10 mm² cross-section

according to IEC 60228 or IEC 60189-3 for use in telecommunication equipment and in electronic devices employing similar techniques.

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.

The object of this part of IEC 60352 is to determine the suitability of spring-clamp connections under specified mechanical, electrical and atmospheric conditions.

NOTE IEC Guide 109 advocates the need to minimize 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 standard may have a negative environmental impact. As technological advances lead to acceptable alternatives for these materials, they will be eliminated from this standard.

2 Normative references

The following referenced documents are indispensable for the application 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(581):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 581: Electro-mechanical components for electronic equipment*
Amendment 1 (1998)

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
Amendment 1 (1992)

IEC 60189-3:1988, *Low frequency cables and wires with PVC insulation and PVC sheath – Part 3: Equipment wires with solid or stranded conductor, PVC insulated, in singles, pairs and triples*

IEC 60228:1978, *Conductors of insulated cables*
Amendment 1 (1993)

IEC 60512 (all parts), *Connectors for electronic equipment – Tests and measurements*

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 60884-1:1994, *Plug and socket-outlets for household and similar purposes – Part 1: General requirements.*

3 Definitions

For the purpose of this part of IEC 60352, the terms and definitions of IEC 60050(581) and IEC 60512-1 and the following additional terms and definitions apply:

3.1

spring-clamp termination

part of the contact or terminal to which one single conductor only is connected by means of a spring

3.1.1

universal spring-clamp termination

spring-clamp termination intended to accept solid, stranded and flexible unprepared conductors

3.1.2

non-universal spring-clamp termination

spring-clamp termination intended to accept conductors of one class only, for example solid conductors only, or conductors of two classes only, for example solid and stranded but not flexible

3.1.3

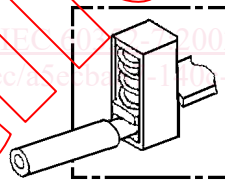
push-in spring-clamp termination

non-universal spring-clamp termination in which the connection is made by pushing in a solid or stranded conductor

3.2

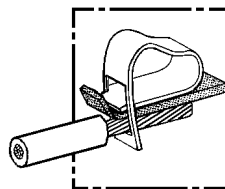
spring-clamp connection

solderless connection achieved by clamping a conductor with a spring-clamp termination, see figure 1



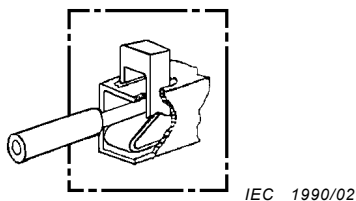
IEC 1988/02

Figure 1a – Spring-clamp connection, operated without a tool



IEC 1989/02

Figure 1b – Spring-clamp connection, operated with a tool



IEC 1990/02

Figure 1c – Spring-clamp connection, operated with an actuating element

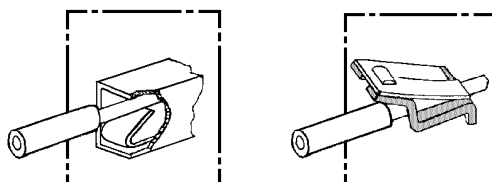


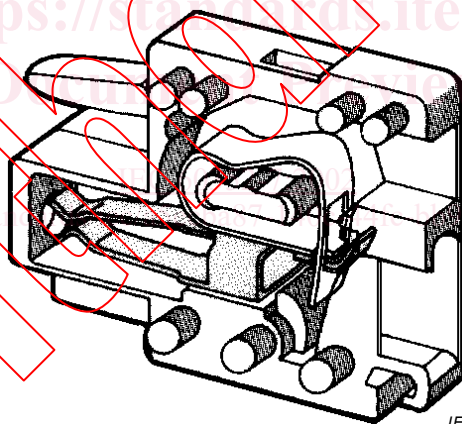
Figure 1d – Spring-clamp connections, with a push-in spring-clamp termination, with solid wires

Figure 1 – Examples of spring-clamp connections

3.3

spring-clamp terminal

terminal designed to accept a conductor for the purpose of establishing a spring-clamp connection, see figure 2



IEC 1992/02

Figure 2 – Example of a spring-clamp terminal

3.4

spring-clamp connecting device

device for the electrical connection of one or more conductors comprising one or more spring-clamp terminations and, if necessary, insulation and/or auxiliary parts

3.5

actuating element

part of a spring-clamp termination or terminal to which an external force is to be applied. Movement of the actuating element provides a means for activating or deactivating the spring.

[IEV 581-11-09, modified]

4 Requirements

4.1 Workmanship

The connection shall be processed in a careful and workmanlike manner, in accordance with good current practice.

4.2 Tools

Tools, if necessary, shall be used and inspected according to the instructions given by the manufacturer.

4.3 Spring-clamp terminations

4.3.1 Materials

- Materials for the current-carrying parts:
suitable grades of copper or copper alloy shall be used.
- Materials for the spring-clamp parts:
suitable grades of copper alloy or steel shall be used.

4.3.2 Surface finishes

The contact area of the current-carrying parts shall be plated with tin or tin-alloy.

The surface shall be free of detrimental contamination or corrosion.

4.4 Design features

Spring-clamp terminations shall be designed so that the spring-clamp parts establish a sufficient force to produce a reliable connection.

In a spring-clamp connecting device, each conductor shall be clamped individually.

The openings for use of a tool intended to assist the insertion or withdrawal of the conductor shall be clearly distinguishable from the conductors entry hole.

Dimensions

The suitability of a spring clamp connection depends on the dimensions of the termination together with the characteristics of the materials used.

The dimensions shall be chosen so as to be suitable for the wire or the range of wires for which the termination is designed.

The suitability is verified by applying the test schedules given in clause 5.

4.5 Wires

Wires with solid, stranded and flexible conductors according to IEC 60228 or IEC 60189-3 shall be used depending on the type of spring-clamp terminations.

4.5.1 Materials

The conductor used shall be made of annealed copper.

4.5.2 Dimensions

Wires with the following dimensions shall be used:

- solid wires of 0,32 mm to 3,7 mm nominal diameter (0,08 mm² to 10 mm² cross-section), or
- stranded wires of 0,08 mm² to 10 mm² cross-section, or
- flexible wires of 0,08 mm² to 10 mm² cross-section.

4.5.3 Surface finishes

The conductor shall be unplated or plated with tin or tin-alloy.

The conductor surface shall be free of contamination and corrosion which degrades performance.

4.5.4 Wire insulation

The insulation shall be capable of being readily stripped from the conductor without changing the physical characteristics of the conductor or strands.

4.6 Spring-clamp connections

- a) The combination of wire and spring-clamp termination shall be compatible.
- b) The wire shall be stripped to the correct length specified by the manufacturer. The stripped part of the conductor shall not be damaged and shall be clean and free from particles of insulation.
- c) The conductor shall be correctly located in the spring-clamp termination at the correct depth specified by the manufacturer.

All strands of the wire shall be within the spring-clamp termination.

5 Tests

5.1 Testing

5.1.1 General

As explained in the introduction, there are two test schedules which shall be applied according to the following conditions.

- spring-clamp connections which conform to all the requirements of clause 4 shall be tested in accordance with and meet the requirements of the basic test schedule, see 5.3.2;
- spring-clamp connections which do not fully conform to all the requirements of clause 4, for example which are made with different wire types and/or termination sizes and/or materials, shall be tested and meet the requirements of the full test schedule given in 5.3.3.

5.1.2 Standard conditions for testing

Unless otherwise specified, all tests shall be carried out under standard conditions for testing as specified in IEC 60512-1.

The ambient temperature and the relative humidity at which the measurements are made shall be stated in the test report.

In case of dispute about test results, the test shall be repeated at one of the referred conditions of IEC 60068-1.