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INTERNATIONAL STANDARD

Solderless connections – Part 5: Press-in connections – General requirements, test methods and practical guidance

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CONTENTS

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FOREWORD

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International Standard IEC 60352-5 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

This fifth edition cancels and replaces the fourth edition published in 2012. This edition constitutes a technical revision.

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

a) revising the scope by removing the wording "... telecommunication equipment and in electronic devices employing similar techniques" and replacing it by "... electrical and electronic equipment and components" in the first paragraph;
b) adding terms and definitions for 'board', 'hole' and 'metal board' to recognize that press-in terminations are being used in many non-printed board materials;

c) editorial changes to clarify the difference between the two test schedules for qualification and application;

d) modification of upper limit of copper thickness of the plated-through-hole to reflect actual market trends and manufacturing practices;

e) removal of bending test, as this test is very specific for applications of press-in technology no longer common;

f) adding graphs to document the press-in and push-out force, since this is common testing practice and provides further insight into mechanical performance of the contact zone;

g) reducing the number of test specimens required, since in previous testing scheme a lot of test samples were discarded;

h) new wording in 4.5 for cracked and bent terminations;

i) added Figure 7b to show V and A connection locations when the press-in termination does not protrude through the bottom side of the board.

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

FDIS	Report on voting
48B/2810/FDIS	48B/2822/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

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- withdrawn,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

INTRODUCTION

This part of IEC 60352 includes requirements and relevant tests (normative) as well as a practical guidance in Annex A (informative) for press-in connections.

Two test schedules are provided.

a) The qualification test schedule applies to individual press-in connections to demonstrate the suitability of the press-in zone.

   These press-in connections are tested to the specification provided by the manufacturer of the press-in termination (see 4.6) taking into account the requirements of Clause 4.

   The qualification is independent of the application of the press-in zone in a component.

b) The application test schedule applies to press-in connections which are part of a component and are already qualified to the qualification test schedule.

   Test sequences focus on the performance of the press-in connection which is affected by the implementation in a component.

The requirements and tests apply to all elements involved in the manufacturing of a press-in connection:

- the press-in termination, which may be part of a component (e.g. a multi-pole connector);
- the board, printed board or MID (moulded interconnect device) - (plated-through holes dimensions) for which the termination is suitable;
- the tool(s) required to produce the press-in connection.

As the manufacturer of the press-in termination has to provide the main part of the information needed for qualification, the word "manufacturer" is used throughout this document for simplicity to indicate the manufacturer of the press-in termination. The manufacturers of the other items playing a role in the qualification of press-in connections are specified, if needed, as the board manufacturer or the tool(s) manufacturer.

The practical guidance in Annex A (informative) serves as a guide for the workmanship required in 4.1. Attention is drawn to the fact that some industries (e.g. automotive, aircraft and aerospace, nuclear, military) may have specific workmanship standards and/or quality requirements, which are outside the scope of this document.

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

SOLDERLESS CONNECTIONS –

Part 5: Press-in connections – General requirements, test methods and practical guidance

1 Scope

This part of IEC 60352 is applicable to solderless press-in connections for use in electrical and electronic equipment and components.

The press-in connection consists of a termination having a suitable press-in zone which is inserted into a hole of a board.

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

The object of this document is to determine the suitability of press-in connections under mechanical, electrical and atmospheric conditions as specified by the manufacturer of the press-in termination and to provide a means of comparing test results when the tools used to make the connections 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 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 – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level 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 60512-11-1, *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 60512-11-9, *Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11i: Dry heat*

IEC 61188-5-1, *Printed boards and printed board assemblies – Design and use – Part 5-1: Attachment (land/joint) considerations – Generic requirements*

IEC 62326-4, *Printed boards – Part 4: Rigid multilayer printed boards with interlayer connections – Sectional specification*

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
board
printed board or MID (moulded interconnect device) with plated-through holes or metal board with holes

3.2
hole
finished plated-through hole in a printed board or MID

Note 1 to entry: Finished hole in a metal board may be plated or unplated.

3.3
metal board
board consisting of solid, electrically conductive base material, which may have an electrically insulative coating applied

3.4
moulded interconnect device
MID
injection moulded thermoplastic substrate which incorporates a conductive circuit pattern and integrates mechanical and electrical functions

3.5
press-in connection
solderless connection made by inserting a press-in termination into a hole of a board

[SOURCE: IEC 60050-581:2008, 581-23-38, modified – deleted the words "plated-through" and "printed".]

3.6
press-in termination
press-in post
termination having a specially shaped zone suitable to provide for a solderless press-in connection

[SOURCE: IEC 60050-581:2008, 581-23-31, modified – the word "section" is replaced by "zone" and the word "solderless" is added.]

3.7
solid press-in termination
press-in termination having a solid press-in zone which behaves primarily rigidly and induces a deflection of the through hole

[SOURCE: IEC 60050-581:2008, 581-23-32, modified – added wording "which behaves primarily rigidly and induces a deflection of the through hole".]

3.8
compliant press-in termination
press-in termination having a compliant press-in zone which causes a limited deflection of the through hole and a deformation of the press-in zone

[SOURCE: IEC 60050-581:2008, 581-23-33, modified – added wording "which causes a limited deflection of the through hole and a deformation of the press-in zone".]

3.9
press-in zone
specially shaped section of a press-in termination which is suitable to provide for the press-in connection

[SOURCE: IEC 60050-581:2008, 581-23-43]

3.10
termination insertion tool
device used to insert press-in terminations or components equipped with press-in terminations into a board

[SOURCE: IEC 60050-581:2008, 581-24-29, modified – deleted the word "printed".]

3.11
termination removal tool
device for removing a press-in termination from a board

[SOURCE: IEC 60050-581:2008, 581-24-30, modified – deleted the word "printed".]

3.12
set of parts
one press-in termination and a test board with one or more holes

Note 1 to entry: The press-in termination is not mounted in the board.

3.13
specimen
board, or a part of a board, with a mounted press-in termination, with or without component parts

3.14
manufacturer
manufacturer of the press-in termination, who performs the tests according to this document using a test board

4 Requirements

4.1 General

The 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 may be considered upon agreement between manufacturer and user.

The manufacturer shall provide instructions for the assembly of the connections.

4.2 Tools

4.2.1 General

Tools shall be used and inspected according to the instructions and dimensions provided by the manufacturer.

The tools shall be capable of making uniformly reliable connections, i.e. press-in connections complying with the requirements of this document.

The tools shall be so designed that they do not damage the press-in termination or the board when correctly operated.

4.2.2 Tools evaluation

Tools are evaluated for performance by testing the connections made by them and carrying out tests according to 4.5 and 5.1.2. They shall meet the requirements of 4.6d) and 5.2.1.3.

4.3 Press-in terminations

4.3.1 Materials

Material used in the press-in zone shall be specified by the manufacturer.

For information on materials, see A.4.3.

4.3.2 Dimensions of the press-in zone

The performance of a press-in connection depends on the dimensions of the specially shaped press-in zone and the materials used for the press-in termination together with the dimensions and materials of the plated-through hole in the printed board or MID or dimensions of the hole in the metal board.

4.3.3 Surface finishes

The press-in zone of the press-in termination shall be either unplated or plated. The surface finish shall be specified by the manufacturer.

The surface shall be free of detrimental contamination or corrosion.