

INTERNATIONAL STANDARD

NORME INTERNATIONALE



AMENDMENT 1 AMENDEMENT 1

**Connectors for electronic equipment – Product requirements –
Part 4-116: Printed board connectors – Detail specification for a high-speed
two-part connector with integrated shielding function**

**Connecteurs pour équipements électroniques – Exigences de produit –
Partie 4-116: Connecteurs pour cartes imprimées – Specification particulière
pour un connecteur haute vitesse en deux parties avec une fonction de
protection intégrée**





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FOREWORD

This amendment has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

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

FDIS	Report on voting
48B/2452/FDIS	48B/2465/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
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- replaced by a revised edition, or
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Add the following new Annex A.

Annex A (informative)

Vibration and shock testing of connectors mounted to a mechanical structure for electronic equipment according to IEC 60917 and IEC 60297 – Test setup of assemblies with mass loading of printed boards

A.1 General

Dynamic stress tests on connector as defined in 8.5 are carried out according to IEC 60512, tests 6c and 6d. The device under test consists of the connector assembled to a printed board. The printed board under test usually contains the connector but no additional components.

Practice has demonstrated for a long time that this test setup is sufficient for connector qualification and for comparing the results of different arrangements and of different test laboratories. Nevertheless there are concerns that boards with heavy mechanical load, due to heavy components, may cause extra movements between the plug-in unit and the subrack assembly, respectively between the free printed board connector and the fixed connector mounted on the backplane, this would cause micro movements and increase the wear of the precisions metal plating in the contact area of male and female contacts.

IEC 60917 series and IEC 60297 series define the connector interfaces for subracks and associated plug-in units. A plug-in unit in general is a printed board assembly.

IEC 61587-1 and IEC 61587-5 call out the mechanical only shock, vibration and seismic testing of subracks and plug-in units with simulated mass loading. However, the electrical performance of the connector interface is not defined. The connector may pass mechanically but if the connector will pass its electrical capability is not specified.

It is the object of this amendment to provide an evaluation of the combination of connector and heavy printed board assembly (plug-in unit).

This standard contains only the necessary information and test setups to test the electrical performance of printed board connectors that are mounted to mass loaded plug-in units according to IEC 60917 series, IEC 60297 series standards and shock and vibration conditions as defined in IEC 61587-1 and IEC 61587-5.

A.2 General information and objectives

This Annex A establishes only the test setup requirements for mass loaded printed boards (plug-in units) assembled with free connectors and subracks assembled with the corresponding fixed connectors as used in IEC 60917 series and IEC 60297 series equipment practices.

The vibration and shock test severity levels are defined in IEC 61587-1. The seismic severity levels are defined in IEC 61587-5.

The object of this annex is to provide a test method for connector under conditions closer to the intended service condition to provide information of contact resistance under lifetime and expected severity of the intended use.

A.3 Terms and definitions

A.3.1

plug-in unit

plug-in units are defined in IEC 60917 series and consist in their simplest form of a printed board (PB) assembly containing a free connector interfacing with the fixed connector in the subrack

A.3.2

intended use

method of use of a plug-in unit under test that simulates an artificial service condition identified by the manufacturer, and according to which the recommended configuration as described in this standard (such as the physical size of the plug-in unit, the mass loading, the retention, bolt size, quantities, and torque values) is used during testing

A.3.3

simulated load boards

simulated mass attached to plug-in units according to IEC 61587-1. Mass as calculated for a specific application may be used

A.3.4

mated pair under test

the mated pair under test consists of the free connector (PB mounted connector or edge board) and the fixed connector (backplane mounted) and shall be tested mounted onto the centre of the PB (see Figure A.4 and Figure A.5)

Note 1 to entry: The test arrangement consists of multiple connectors that may be placed in an application specific configuration under agreement between the manufacturer and user. The connectors under test shall be mounted to the plug-in unit PB and subrack backplane according to their intended mounting features (press fit, solder, surface, etc.).

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A.3.5

application specific

defines a specific intended use configuration as agreed between manufacturer and user. The user may select a requirement from a standard or specification or define a unique product requirement

A.4 Test setup overview

A.4.1 Existing arrangements for dynamic stress tests – no mass loading (see Figure A.1)

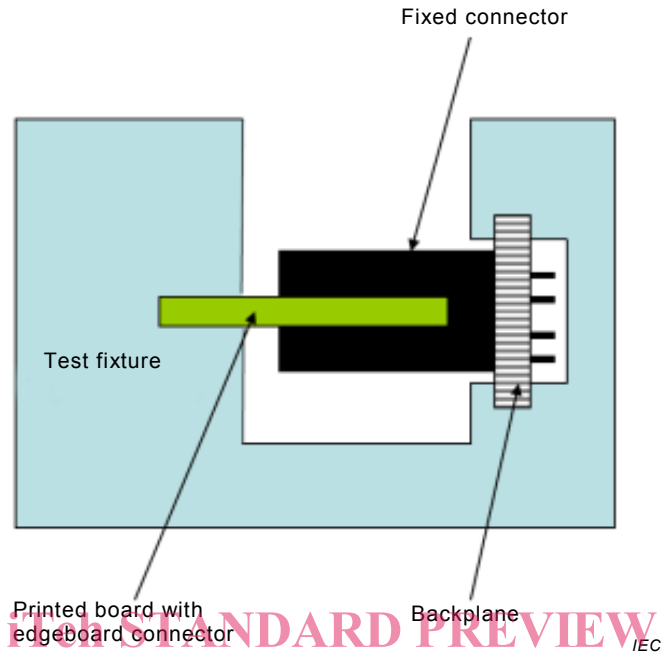


Figure A.1 – Existing test setups for vibration and shock tests – no mass loading

A.4.2 Arrangement for dynamic stress tests – with mass loading (see Figure A.2)

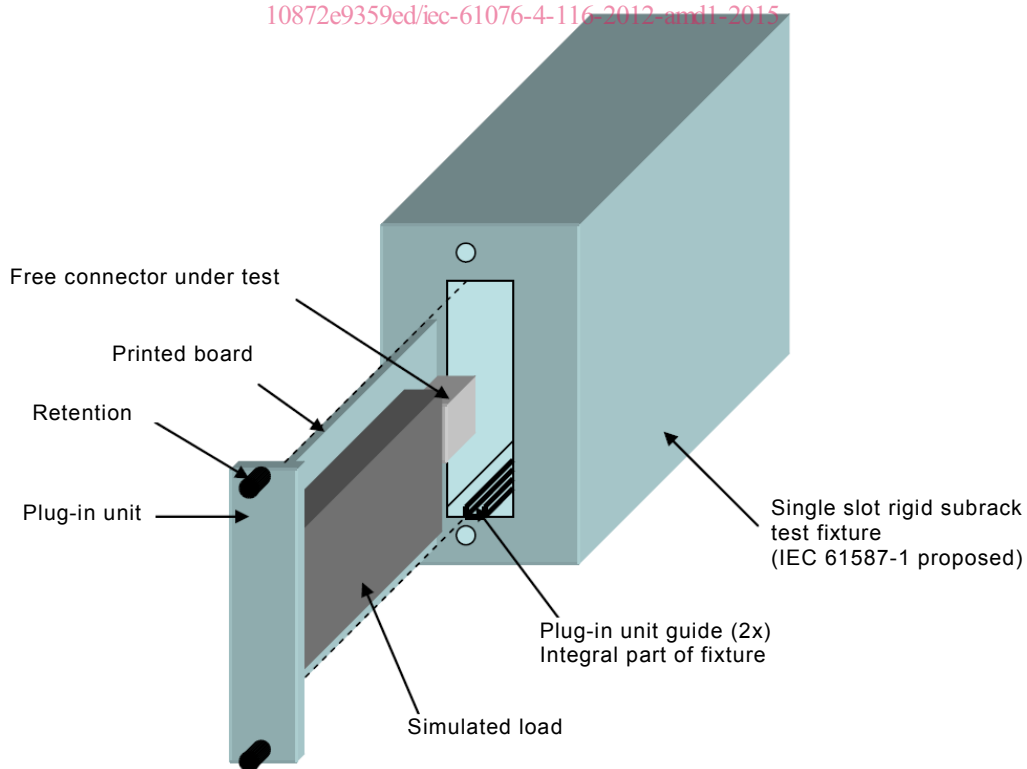


Figure A.2 – Test setups for vibration and shock tests – with mass loading

A.5 Connector vibration and shock test setups for mass loaded plug-in units

A.5.1 Printed board size and mass load consideration

For the purpose of this test the PB sizes and related mass loading as defined in IEC 61587-1 shall be used.

A.5.2 Vibration and shock test fixture requirements

The test fixture shall be as rigid as possible and designed using the practices as outlined in IEC 60068-2-47, see Figure A.3. The nominal dimension between the two plug-in unit guide rails shall be 0,50 mm larger than the nominal dimension of the engaging PCB edges. The tolerance shall be $\pm 0,40$ mm.

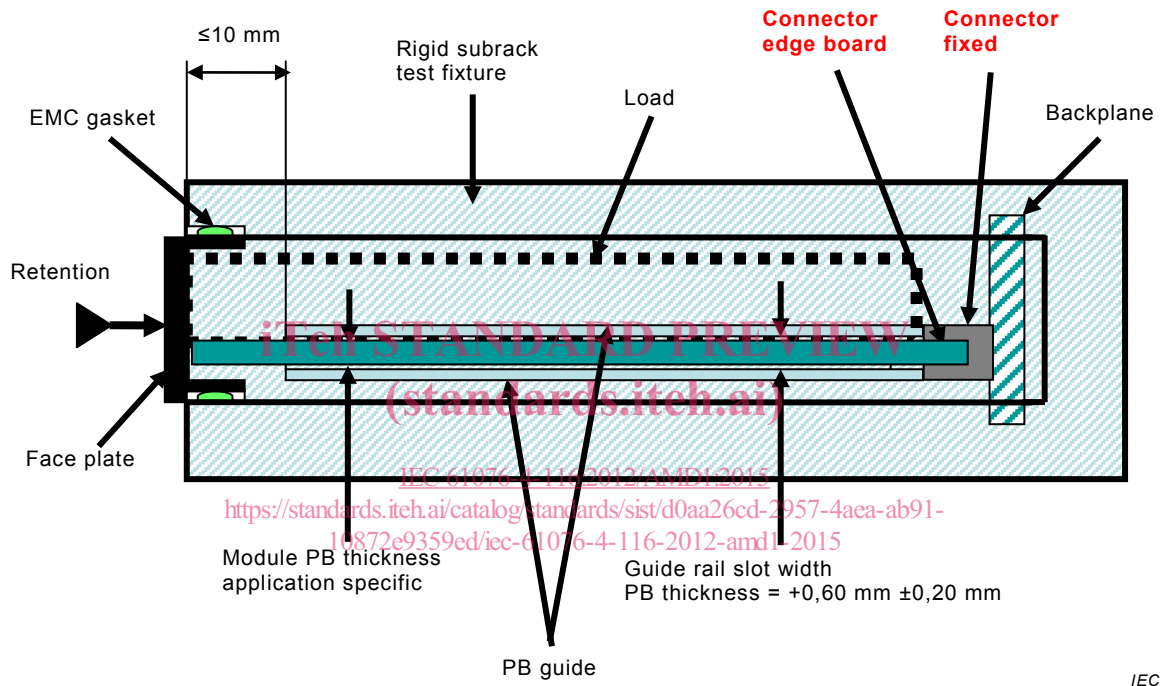


Figure A.3 – Sectional view of the test setup for shock and vibration tests – with mass loadings

A.5.3 Vibration and shock test – mass loading condition

The simulated load of a plug-in unit may be mounted to the PB in two alternative ways. Condition A is more severe than condition B. The vendor may choose the condition (see Figure A.4 and Figure A.5). The nominal dimension of the PCB edges engaging into the plug-in unit guide rails shall be 0,5 mm smaller than the nominal dimension of the two plug-in unit guide rails. The tolerance shall be $\pm 0,1$ mm.

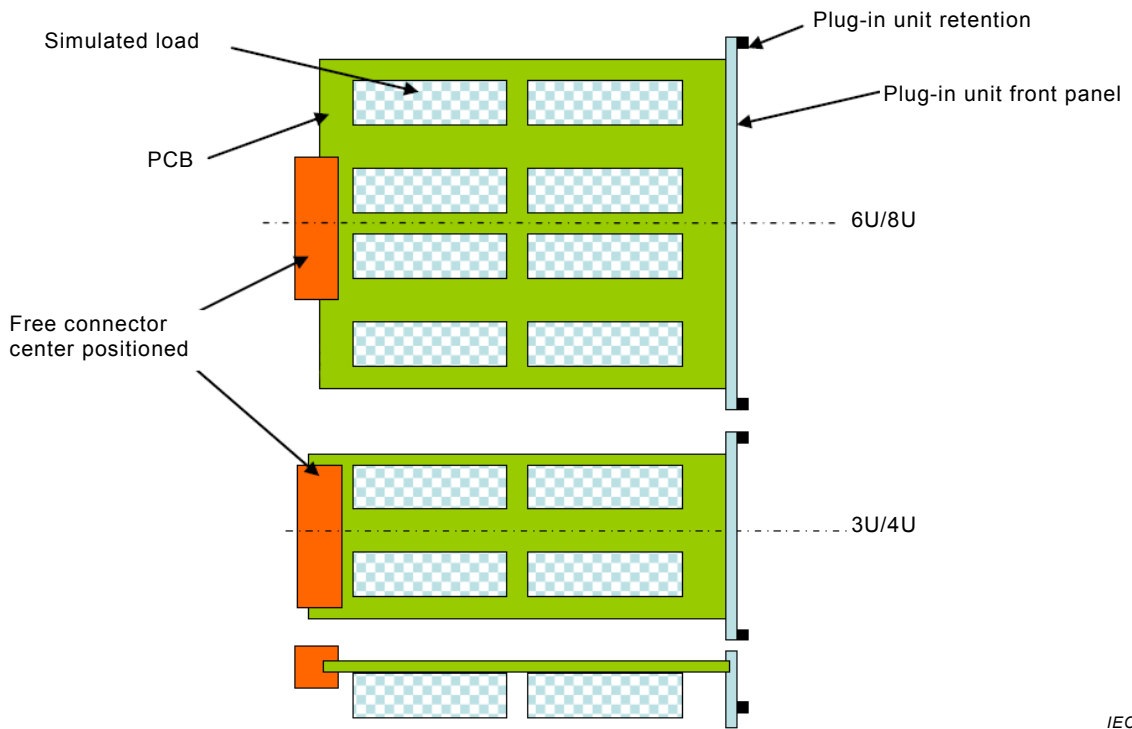


Figure A.4 – Mass loaded plug-in unit – Condition A

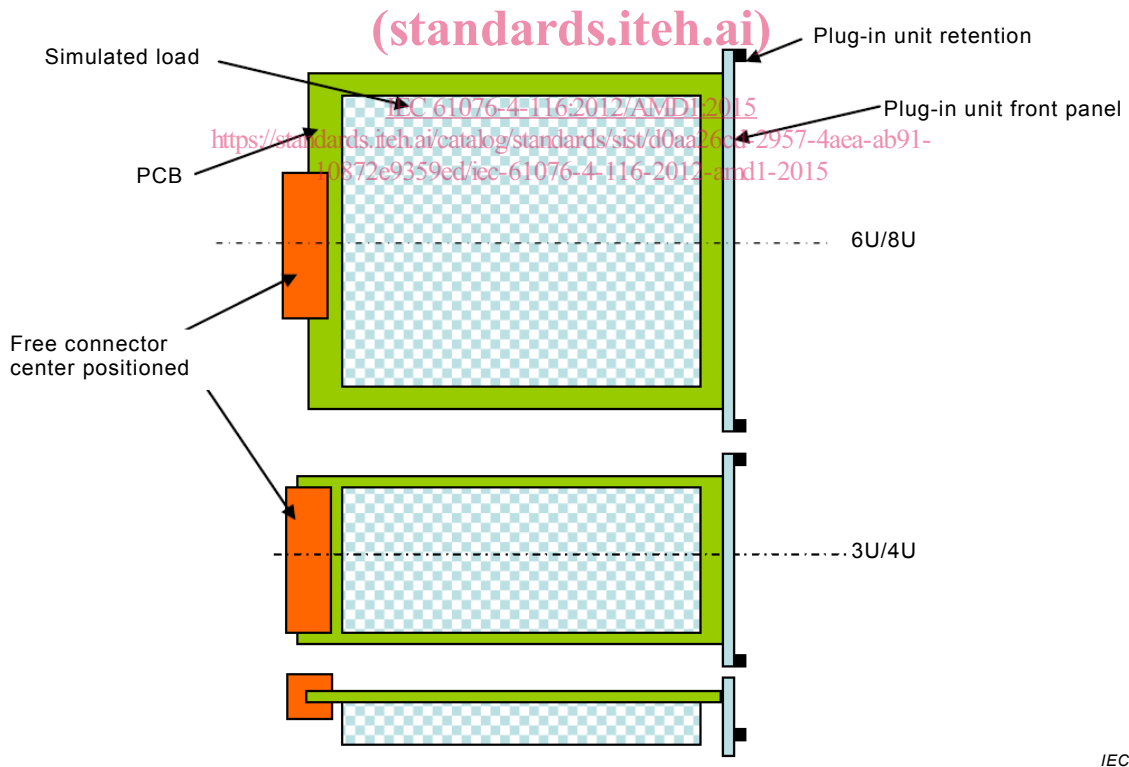


Figure A.5 – Mass loaded plug-in unit – Condition B

A.6 Test schedule

A.6.1 General

This mass loaded plug-in unit test may be carried out on agreement between manufacturer and user, it is not part of the connector qualification test as specified in Clause 8 and shall be carried out on connector specimens in addition to those specified in Table 10.

Unless otherwise specified, mated sets of connectors shall be tested. Care shall be taken to keep a particular combination of connectors together during the complete test sequence; when un-mating is, for example, necessary for a certain test, the same connectors shall be mated for the subsequent tests.

A.6.2 Test schedule specific to the existing connector

The vibration and shock test severity level as defined in the connector standards are based on test setups as shown in Figure A.1.

This annex defines the vibration and shock test setups and severity levels for plug-in units with mass loading as shown in Figure A.2.

A.6.3 Plug-in unit vibration and shock test severity levels

The vibration and shock severity levels as defined in IEC 61587-1 shall be used.

A.7 Plug-in unit vibration and shock test considerations

A.7.1 General

The following procedure may be used with plug-in unit connectors that are mounted on boards and mass loaded to provide an intended use condition. It therefore provides an evaluation of the combination of connector and board.

A.7.2 Plug-in unit vibration and shock test procedure

- a) Configure the connector/PB assembly for contact resistance measurements with 4-wire low level contact resistance (LLCR) measurements according to Clause 8, Test Phase P3.
- b) Measure contact resistance according Test 2a of IEC 60512 (LLCR method).
- c) Preload the samples according to Table 13, for a 50 % specified lifecycle wear and perform inspection and measurements according to Test Phase B2.
- d) Additional preloading tests (e.g. dust) may be applied on agreement of manufacturer and user, by selecting an appropriate test method as defined in IEC 60512-11-x: Climatic tests.
- e) Mount one half of the connector pair (typically the backplane portion) rigidly on the surface of the vibration table to model the way it is installed in service.
- f) Measure contact resistance according Test 2a of IEC 60512 (LLCR method).
- g) Subject the connector assembly to a vibration test according 60512-6-4, Test 6d, with 1 g from 5 Hz to 100 Hz and monitoring the system function during the vibration. The duration for vibration on each axis shall be 2 h.
- h) Measure contact resistance according Test 2a of IEC 60512 (LLCR method).
- i) Repeat the vibration test for each of three mutually perpendicular axes of the equipment.
- j) Mount the assembly to the shock table similar to the way it is installed in service.
- k) Subject the assembly to 3 shocks in each direction along the test axis.
- l) Measure contact resistance according Test 2a of IEC 60512 (LLCR method).
- m) Repeat the shock test for each of the 3 mutually perpendicular axes of the equipment.

A.8 Sample size and acceptance criteria for plug-in unit/connector assemblies

A.8.1 General

At least 10 contacts per specimen shall be taken into account for measurement of the test values as specified in 8.1

If the test specimen contains fewer than 10 contacts, then all contacts shall be tested

The contacts to be measured shall be selected such that they are representative of all zones within the connector, e.g. end points, different rows of multiple row connectors, both near and away from the attachment points between the connector housing and the PWB, etc.

Vibration and shock test measurements shall be made on no fewer than 30 contacts selected from no fewer than 3 connectors.

A.8.2 Acceptance criteria for vibration and shock tests

- a) If no system performance requirements are provided or if it is not practical to perform system performance monitoring, then no rise of resistance above $10\ \Omega$ for more than 10 ns as specified in Table 12, test A7 applies. Continuity shall be established by continuous monitoring during the mechanical vibration and shock testing of A7.
- b) If system performance requirements are provided and it is practical to perform system performance monitoring, then system specifications for bit errors and continuity of system performance shall be satisfied during the system test sequence.
- c) Visual inspection according Table 12, test A13 shall be performed at the end of the mechanical vibration and shock testing, there shall be no damage that would impair normal operation.

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A.9 Reference documents

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IEC 60068-2-47, *Environmental testing – Part 2-47: Test – Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 61587-1, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 series – Part 1: Environmental requirements, test set-up and safety aspects for cabinets, racks, subracks and chassis under indoor conditions*

IEC 61587-5, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 5: Seismic tests for chassis, subracks and plug-in units*
