IEC 62025-2

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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

High frequency inductive components – Non-electrical characteristics and measuring methods –
Part 2: Test methods for non-electrical characteristics

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HIGH FREQUENCY INDUCTIVE COMPONENTS – NON-ELECTRICAL CHARACTERISTICS AND MEASURING METHODS –

Part 2: Test methods for non-electrical characteristics

FOREWORD

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International Standard IEC 62025-2 has been prepared by IEC technical committee 51: Magnetic components, ferrite and magnetic powder materials.

This second edition cancels and replaces the first edition published in 2005. This edition constitutes a technical revision.

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

a) revision of Table 5;

b) revision of normative references.

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

CDV	Report on voting
51/1273/CDV	51/1301/RVC

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 62025 series, published under the general title *High frequency inductive components – Non-electrical characteristics and measuring methods*, 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- withdrawn;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.

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HIGH FREQUENCY INDUCTIVE COMPONENTS – NON-ELECTRICAL CHARACTERISTICS AND MEASURING METHODS –

Part 2: Test methods for non-electrical characteristics

1 Scope

This part of IEC 62025 specifies a test method for the non-electrical characteristics of the surface mounted device (SMD) inductors to be used for electronic and telecommunication equipment. The object of this part of this document is to define methods for measuring mechanical performance only. As the reliability performances and specifications relative to non-electrical performances are defined in IEC 62211, detailed measuring methods for mechanical performance of reliability testing are defined in this document.

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~~:1988~~, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-6:~~1995~~2007, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-20~~:1979~~, *Environmental testing – Part 2-20: Tests – Test T: ~~Soldering~~ Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-21:~~1999~~2006, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-27~~:1987~~, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-45:1980, *Basic environmental testing procedures – Part 2-45: Tests – Test XA and guidance: Immersion in cleaning* solvents
IEC 60068-2-45:1980/AMD1:1993

IEC 60068-2-58:~~2004~~2015, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*
IEC 60068-2-58:2015/AMD1:2017

IEC 60068-2-69, *Environmental testing – Part 2-69: Tests – Test Te/Tc: Solderability testing of electronic components ~~for surface mount technology~~ and printed boards by the wetting balance (force measurement) method*

IEC 60068-2-77~~:1999~~, *Environmental testing – Part 2-77: Tests – Test 77: Body strength and impact shock*

IEC 61188-5-2~~:2003~~, *Printed boards and printed board assemblies – Design and use – Part 5-2: Attachment (land/joint) considerations – Discrete components*

IEC 61190-1-2:~~2002~~2014, *Attachment materials for electronic assembly – Part 1-2: Requirements for soldering pastes for high-quality interconnections in electronics assembly*

IEC 61190-1-3~~:2002~~, *Attachment materials for electronic assembly – Part 1-3: Requirements for electronic grade solder alloys and fluxed and non-fluxed solid solder for electronic soldering applications*

IEC 62211:~~2003~~2017, *Inductive components – Reliability management*

3 Terms and definitions

~~For the purpose of this part of IEC 62025, the terms and definitions given in the normative references apply.~~

No terms and definitions are listed in this document.

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

4 Test conditions

4.1 Standard atmospheric conditions for test

Unless otherwise specified in the detail specification, the tests and measurements shall be carried out under the standard atmospheric conditions for test as given in ~~5.3.1~~ the requirements for standard reference atmosphere of IEC 60068-1:

– temperature: 15 °C to 35 °C;
– relative humidity: 25 % to 75 %;
– air pressure: 86 kPa to 106 kPa.

In the event of dispute or where required, the measurements shall be repeated using the referee temperatures (as given in 4.2) and such other conditions as are ~~prescribed~~ specified in this document.

In addition, when it is difficult to make measurements in standard atmospheric conditions, unless a doubt arises about the validity of the result, the tests and measurements may be performed in non-standard atmospheric conditions.

4.2 Referee conditions

For referee purposes, one of the standard atmospheric conditions for referee tests taken from ~~5.2~~ the requirements for standard atmospheres for referee measurements and tests of IEC 60068-1, shall be selected and shall be as follows:

– temperature: 20 °C ± 2 °C;
– relative humidity: 60 % to 70 %;
– air pressure: 86 kPa to 106 kPa.

5 Mechanical characteristics test

5.1 Body strength test

5.1.1 Body strength test procedures

The body strength test procedure, as ~~referenced~~ specified in IEC 60068-2-77, shall be as follows:

a) Preconditioning

If required, preconditioning shall be performed on the specimens in accordance with the detail specification.

b) Initial measurement

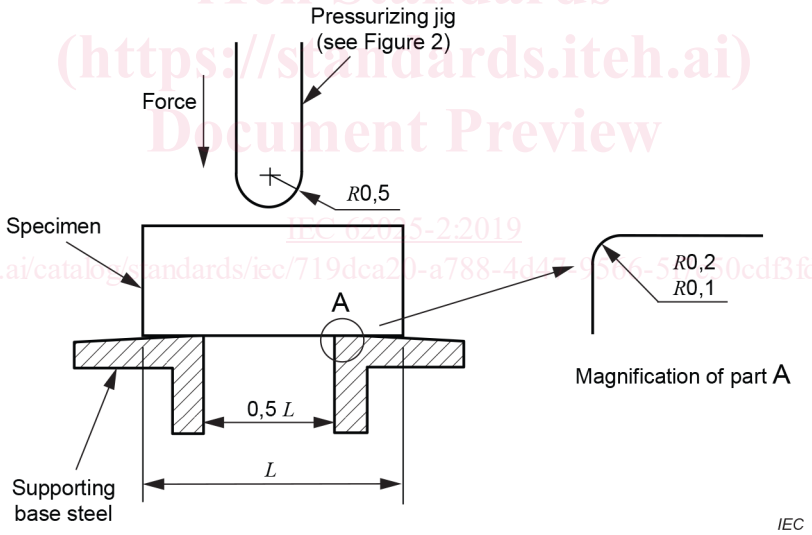
The appearance of the specimen shall be checked with a magnification of at least 10× under adequate light.

If specified in the detail specification, the electrical performances shall be measured.

c) Layout

Unless otherwise specified in the detail specification, the specimen shall be placed on the supporting base, as shown in Figure 1, so that both ends of the specimen are symmetrically positioned on the supporting base. The test table shall be placed on a plane, robust platform so that the test result ~~shall~~ is not ~~be~~ affected when a force is applied.

Dimensions en millimètres



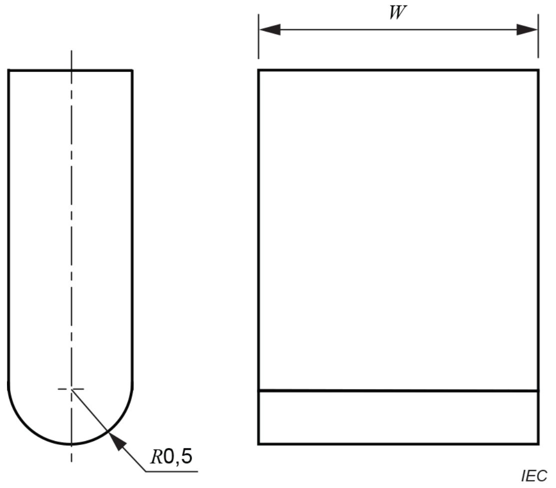
NOTE The angle of the taper in part A shall be between 70° and 90°.

Figure 1 – Method for pressurizing the body

d) Applied force

The force shall be applied to the centre of the specimen by the pressurizing jig as shown in Figure 2, for a duration of (10 ± 1) s. Unless otherwise specified in the detail specification, the force shall be selected from either (one of) 10 N, 20 N or 30 N. If specified in the detail specification, the electrical performances shall be measured during the application of the force.

Dimensions in millimetres



NOTE 1 Dimension *W* of the pressurizing jig is wider than the width of the specimen.

NOTE 2 Hardness: HV 500 and more.

~~NOTE 3~~ When the length of the specimen is 2 mm or less, the radius of the pressurizing jig should be 0,2 mm.

Figure 2 – Pressurizing jig

e) Recovery

If required, recovery conditioning shall be performed for the specimens in accordance with the detail specification.

f) Final measurement

After the test, the appearance of the specimen shall be checked with a magnification of at least 10× under adequate light. There shall be no signs of damage such as cracks or flaws. If specified in the detail specification, the electrical performances shall be measured.

5.1.2 Information to be given in the detail specification

The following information shall be given in the detail specification:

a) preconditioning (if required) – see 5.1.1.a);

b) initial measurement items, final measurement items (if required) – see 5.1.1.b) and f);

c) measurement during applied force (if required) – see 5.1.1.d);

d) recovery (if required) – see 5.1.1.e).

5.2 Robustness of terminations (electrodes)

5.2.1 Resistance to bending of printed-circuit board

5.2.1.1 General

The test for the resistance of terminations and electrodes mounted on a printed-circuit board shall be as follows.

5.2.1.2 Specification of soldering lands

The soldering lands of multi-layer chip inductors shall be designed according to Table 1, as specified in ~~11.5 of~~ IEC 61188-5-2. With regard to inductors, except for those specified in IEC 61188-5-2, the size of the solder lands shall be specified in the detail specification.

Table 1 – Size of soldering lands ~~by~~ according to the code of multi-layer chip inductors

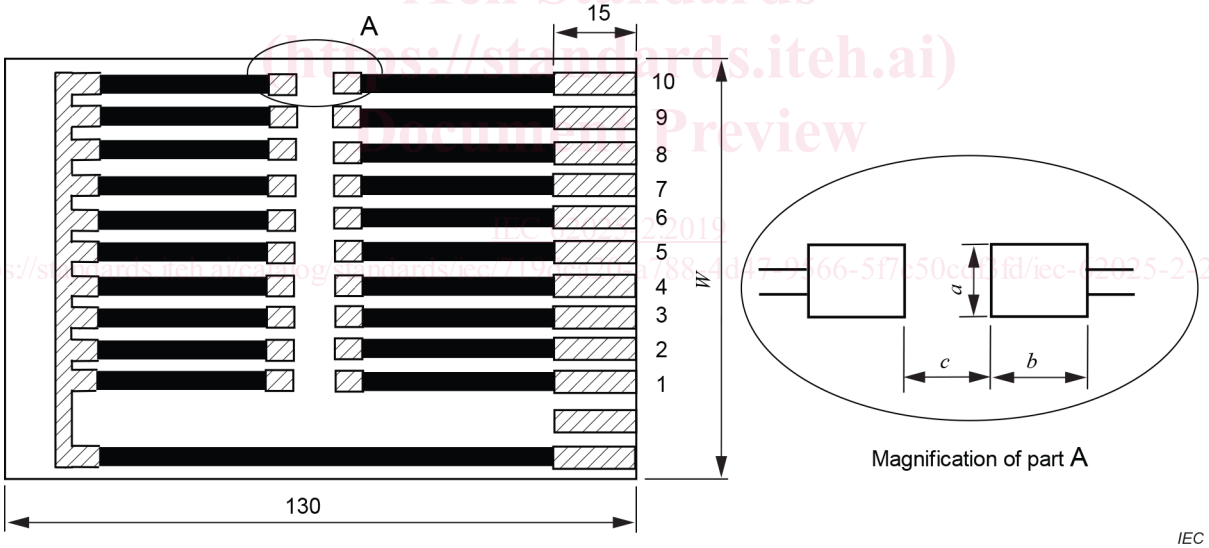
Dimensions in millimetres

Size code	*a*	*b*	*c*
1005	0,65	0,55	0,50
1608	0,95	0,85	0,50
2012	1,45	1,10	0,50
3216	1,80	1,30	1,20
3225	2,70	1,05	1,80
4532	3,40	1,10	3,00
5650	5,30	1,30	3,70
NOTE Tolerance: 0,05 mm; see Figure 3.			

5.2.1.3 Specification of printed-circuit board

The printed-circuit board shall be made of epoxide woven glass (FR4) as specified in IEC 60068-2-21, and, unless specified in the detail specification, the printed-circuit board shall be as shown in Figure 3. The dimension of *W* shall be specified in the detail specification.

Dimensions in millimetres



Key

solderable areas

non-solderable areas (covered with non-solderable lacquer)

Materials of substrate: epoxide woven glass (FR4)

Thickness: 1,6 mm ± 0,2 mm (for size code from 1608)

Thickness: 0,8 mm ± 0,1 mm (for size code up to 1005)

Conductors: copper

Thickness: 0,035 mm ± 0,010 mm

~~NOTE~~ When the board is designed to mount more than two specimens, allow sufficient space between specimens so as not to influence the test result. Dimensions not given shall be chosen according to the design and size of the specimen to be tested.

Figure 3 – Example of printed-circuit board

5.2.1.4 Mounting of specimen

The specimen shall be mounted on the printed-circuit board in accordance with Annex A and other specifications as mentioned below.

a) The solder paste shall be placed on the soldering lands. The applied solder paste shall cover the soldering lands completely. The thickness of the solder paste ~~by~~ according to the size code of inductors is recommended in Table 2. The appropriate height of the filet should be the smaller value of either 50 % of the thickness of the specimen or 0,5 mm.

Table 2 – Thickness of solder paste by the size code of inductors

Size code	Thickness of solder paste μm
Up to 1608	100 to 150
From 2012	150 to 200

b) The specimen shall then be placed on the printed-circuit board. The terminations of the specimen shall be placed on the soldering lands symmetrically in both horizontal and vertical directions.

c) The printed-circuit board with the specimen shall be reflow soldered. Care shall be taken when mounting the inductor on the printed-circuit board so that warp or twist does not occur.

d) If specified in the detail specification, the printed-circuit board shall be cleaned according to Annex A.

5.2.1.5 Preconditioning

Preconditioning shall be carried out as specified in the detail specification when pre-conditioning is necessary.

5.2.1.6 Initial measurement

Prior to conducting the mechanical test, the appearance of the specimen and the soldered parts shall be checked by using a magnifier with a magnification of at least 10× under adequate light. If an abnormal or rejectable appearance is found, the specimen shall be excluded from the evaluation on this test. The electrical performances shall be measured if specified in the detail specification.

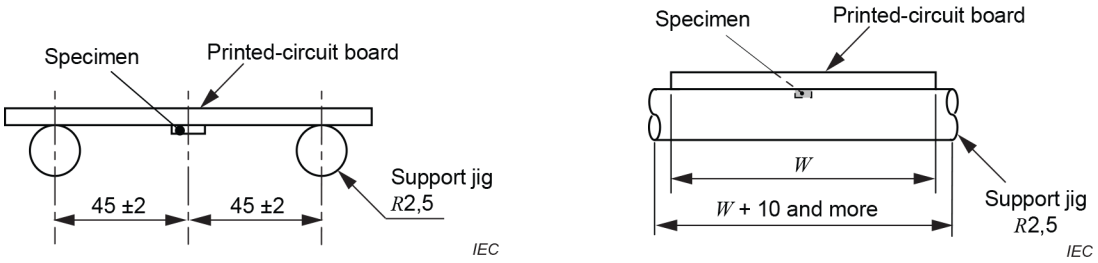
5.2.1.7 Bending tool

The bending tool shall be a support jig as shown in Figure 4 and a pressurizing jig as shown in Figure 5. The radius of the pressurizing jig should be 5 mm. If specified in the detail specification, the radius of the pressurizing jig may be 340 mm or 230 mm.

5.2.1.8 Layout

The printed-circuit board with the soldered specimen is placed on the support jig as shown in Figure 4.

Dimensions in millimetres



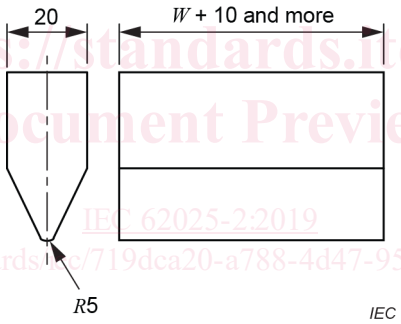
(a) Front **(b) Side**

Figure 4 – Layout

5.2.1.9 Test

The printed-circuit board shall be bent by using the pressurizing jig as shown in Figure 5 at a rate of (1 ± 0,5) mm/s and to the bending depth of 1 mm, 2 mm, 3 mm or 4 mm (see Figure 6). The bending depth shall be specified in the detail specification. After reaching the specified bending depth, it shall be maintained for (20 ± 1) s. Then the bending force shall be relaxed. Unless specified in the detail specification, the number of bends shall be one.

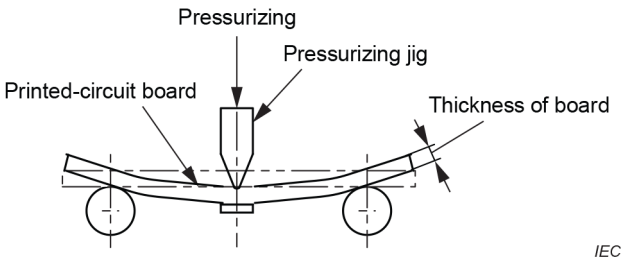
Dimensions in millimetres



Key

R radius

Figure 5 – Pressurizing jig



NOTE The relative position between the centre of the specimen on the soldering land of the printed-circuit board and the contact-line of the pressurizing jig on the printed-circuit board ~~should~~ does not exceed 0,5 mm.

Figure 6 – Pressurizing