

Fire Hazard testing —

Part 10: Guidance and test methods for the minimization of the effects of abnormal heat on electrotechnical products involved in fires —

Section 2: Method for testing products made from non-metallic materials for resistance to heat using the ball pressure test

ICS 13.220.40;29.020

National foreword

This British Standard reproduces verbatim IEC 60695-10-2:1995 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee GEL/89, Fire hazard testing, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the IEC title page, pages ii to iv, pages 1 to 3 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 November 1997

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des effets de chaleurs anormales sur
des produits électrotechniques impliqués
dans des feux –

Section 2: Méthode pour vérifier la résistance
à la chaleur des produits en matériaux
non métalliques au moyen de l'essai à la bille

Fire hazard testing –

Part 10:

Guidance and test methods for the minimization
of the effects of abnormal heat on electrotechnical
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from non-metallic materials for resistance
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Foreword

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International Standard IEC 695-10-2 has been prepared by IEC technical committee 89: Fire hazard testing.

It has the status of a basic safety publication in accordance with IEC Guide 104.

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

DIS	Report on voting
89/123/DIS	89/145/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.

1 Scope

This section of IEC 695-10 specifies the ball pressure test as a method for testing parts of non-metallic materials for resistance to heat.

It is applicable to electrotechnical equipment, its sub-assemblies and components, and to solid electrical insulating materials except ceramics.

NOTE The ball pressure test using a depth of indentation rather than diameter of indentation is under consideration.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 695-10. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 695-10 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 216-4-1:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials — Part 4: Ageing ovens — Section 1: Single-chamber ovens.*

ISO 3290:1975, *Rolling bearings — Bearing parts — Balls for rolling bearings.*

3 General description of the test

With the specimen at a temperature determined in the relevant specification, a specified force is applied through a spherical-shaped ball and the diameter of the indentation is measured.

4 Description of the test apparatus

The test apparatus consists essentially of:

- a pressure ball 5 mm in diameter (a ball for rolling bearings in accordance with ISO 3290) and a system designed to produce a $20 \text{ N} \pm 0,2 \text{ N}$ load including the mass of the ball. Examples of typical apparatus are shown in Figure 1;
- a heating oven with an air temperature distribution according to IEC 216-4-1;
- a specimen support of sufficiently large mass, so as not to significantly reduce the temperature within the oven during insertion and withdrawal of the specimen.

5 Test specimens

If possible, cut a specimen from the product in such a way that a test piece at least 2,5 mm thick with approximately parallel upper and lower surfaces is obtained. If necessary, the thickness may be attained by stacking two or more sections. If it is not possible to cut a specimen with parallel surfaces, care shall be taken to support the area of the specimen directly under the ball.

If is impracticable to use a specimen from the product then a plaque of identical material may be used as the specimen. The plaque shall have a thickness of $3,0 \text{ mm} \pm 0,5 \text{ mm}$ and at least a square with 10 mm sides or a diameter of at least 10 mm.

NOTE Care should be taken to ensure that the process or moulding technique used to produce the plaque does not vary greatly from the process used to prepare the part from the product.

6 Conditioning

Unless otherwise required in the relevant specification, the specimen is stored for at least 24 h in an atmosphere having a temperature between 15°C and 35°C and a relative humidity between 45 % and 75 %.

NOTE For materials, the mechanical characteristics of which are significantly affected by moisture content, e.g. polyamides, a more precise or different conditioning may be specified.

7 Test procedure

Conduct the test in air, in a heating cabinet at a temperature specified in the relevant specification, with a tolerance of $\pm 2^\circ\text{C}$. Before introducing the specimen, bring the test apparatus to the temperature required for the test and maintain the apparatus at this temperature for 24 h or until equilibrium conditions are reached, whichever occurs sooner.

Place the specimen in the cabinet, supported so that its upper surface is horizontal and the steel ball is pressed against this surface with a force of $20 \text{ N} \pm 0,2 \text{ N}$. Take care to ensure the ball does not move during the test.

At 60^{+2}_0 min after the ball has been applied, remove the ball and immerse the specimen in ambient temperature water within 10 s. Allow the specimen to cool to approximately room temperature.

Measure the diameter of the indentation caused by the ball. The spherical portion of the indentation left by the ball excludes any material deformation around the spherical indentation, as shown in Figure 2. In case of doubt, make two further tests and measure the diameter of the indentation to two decimal places; both of these tests shall meet the requirements of clause 9.

NOTE An example of a means of measuring the diameter of the indentation caused by the ball to two decimal places is by using an optical device which consists of:

- a lens (approximate magnification $\times 10$) equipped with a reticule;
- a cross-travel measuring table (accuracy 0,01 mm);
- a lighting device to enable the illumination of the surface of the specimen.

For measuring the diameter of the indentation, the reticule is moved from one side to the other.

8 Observations and measurements

The following shall be observed during the test and recorded:

- origin of specimen;
- material type or component/part description;
- thickness of test specimens (and number of any stacked specimens);
- location on specimen where test(s) carried out;
- details of conditioning;

- temperature of the test;
- diameter of the indentation(s).

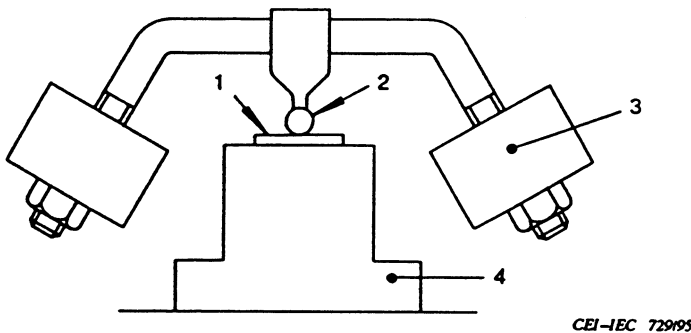
9 Expression of test results

The result is expressed as a pass if the diameter of the indentation(s) does not exceed 2,0 mm.

10 Information to be given in the relevant specification

The relevant specification shall specify, where necessary, the following details:

- a) any conditioning required (clause 6);
- b) the surface to be tested and the point(s) of application (clause 7);
- c) the temperature at which the test is carried out (clause 7).



- 1 Test specimen
- 2 Pressure ball
- 3 Weight
- 4 Specimen support

Figure 1a

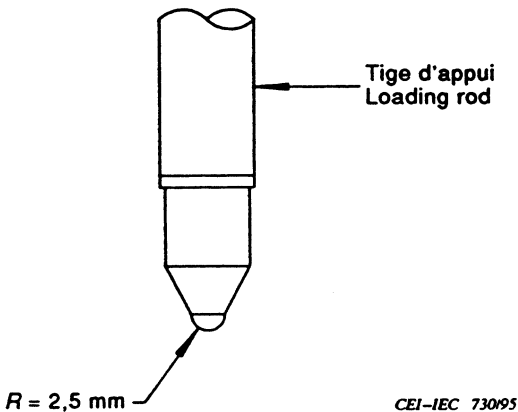
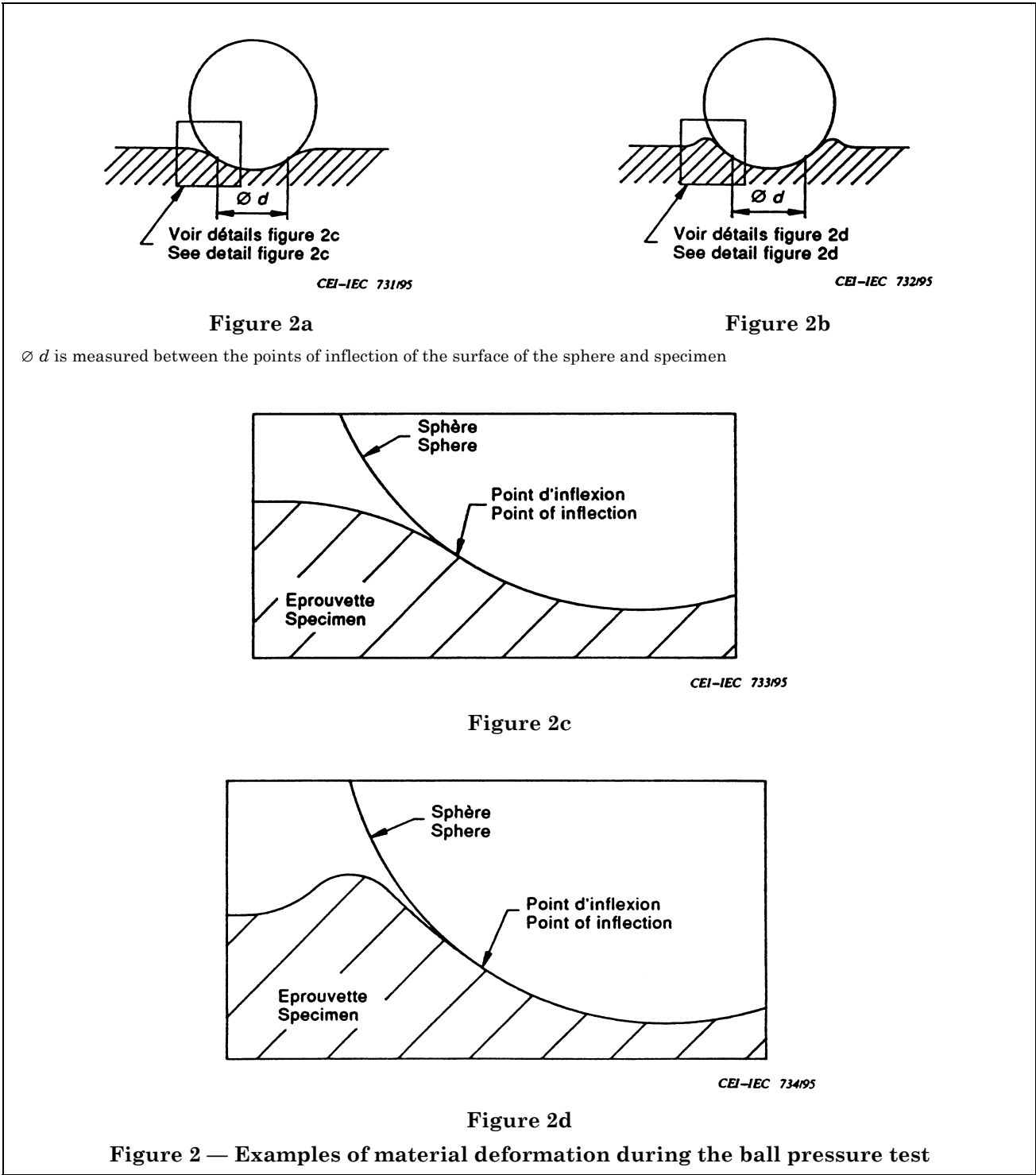


Figure 1b

Figure 1 — Ball pressure apparatuses (examples)



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