INTERNATIONAL STANDARD

ISO 75-2

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Plastics — Determination of temperature of deflection under load —

Part 2: Plastics and ebonite

Plastiques — Détermination de la température de fléchissement sous charge —
Partie 2: Plastiques et ébonite

Reference number
ISO 75-2:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 75-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Sub-Committee SC 2, *Mechanical properties*.

Together with the other parts, it cancels and replaces the second edition of ISO 75 (ISO 75:1987), which has been technically revised.

ISO 75 consists of the following parts, under the general title *Plastics — Determination of temperature of deflection under load*:

— *Part 1: General test method*

— *Part 2: Plastics and ebonite*

— *Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics*

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Plastics — Determination of temperature of deflection under load —

Part 2:
Plastics and ebonite

1 Scope

1.1 This part of ISO 75 specifies three methods for the determination of the temperature of deflection under load (bending stress) of plastics and ebonite:

— method A, using a nominal surface stress of 1,80 MPa;

— method B, using a nominal surface stress of 0,45 MPa;

— method C, using a nominal surface stress of 8,00 MPa.

1.2 The test specimens are tested in one of two positions, flatwise or edgewise, the requirements on test-specimen dimensions being different in each case (see clause 6).

1.3 See ISO 75-1:1993, subclause 1.3.

NOTE 1 The methods give better reproducibility with amorphous plastics than with semi-crystalline ones. With some materials, it may be necessary to anneal the test specimens to obtain reliable results. Annealing procedures, if applied, generally result in an increase in the temperature of deflection under load (see 6.2 and 6.3).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 75. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 75 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 75-1:1993, *Plastics — Determination of temperature of deflection under load — Part 1: General test method.*

ISO 293:1986, *Plastics — Compression moulding test specimens of thermoplastic materials.*

ISO 294:—[1], *Plastics — Injection moulding of test specimens of thermoplastic materials.*

ISO 2818:—[2], *Plastics — Preparation of test specimens by machining.*

ISO 3167:1993, *Plastics — Multipurpose test specimens.*

3 Definitions

See ISO 75-1:1993, clause 3.

4 Principle

A standard test specimen made of plastic or ebonite is subjected to a bending stress to produce one of the nominal surface stresses given in 1.1. The temperature is raised at a uniform rate, and the temperature at which a specified deflection occurs is measured.

1) To be published. (Revision of ISO 294:1975)

2) To be published. (Revision of ISO 2818:1980)

5 Apparatus

5.1 Means of applying a bending stress

See ISO 75-1:1993, subclause 5.1.

The span between the test-specimen supports shall be 64 mm ± 1 mm if the specimen is tested in the flatwise position and 100 mm ± 2 mm if the specimen is tested in the edgewise position.

5.2 Heating equipment

See ISO 75-1:1993, subclause 5.2.

5.3 Weights

See ISO 75-1:1993, subclause 5.3.

5.4 Temperature-measuring instrument

See ISO 75-1:1993, subclause 5.4.

5.5 Deflection-measuring instrument

See ISO 75-1:1993, subclause 5.5.

6 Test specimens

See ISO 75-1:1993, clause 6.

6.1 One of two different types of test specimen shall be used, depending on the orientation of the specimen in the test apparatus.

If the specimen is tested in the flatwise position, its dimensions shall be

length, l :	80 mm ± 2,0 mm
width, b :	10 mm ± 0,2 mm
thickness, h :	4 mm ± 0,2 mm

If the specimen is tested in the edgewise position, its dimensions shall be

length, l :	120,0 mm ± 10,0 mm
width, b :	9,8 mm to 15,0 mm
thickness, h :	3,0 mm to 4,2 mm

The test specimen shall be produced in accordance with ISO 293 and ISO 2818, or ISO 294, or as agreed upon by the interested parties. In the case of compression-moulded specimens, the thickness shall be in the direction of the moulding force. For materials in sheet form, the thickness of the test specimen (this dimension is usually the thickness of the sheet) shall be in the range 3 mm to 13 mm, preferably between 4 mm and 6 mm.

NOTES

2 The test results obtained on specimens approaching 13 mm thick may be 2 °C to 4 °C above those obtained from thin test specimens because of poorer heat transfer.

3 The possibility of carrying out the test with a smaller (80 mm × 10 mm × 4 mm) specimen in the flatwise position has been introduced because it gives the following advantages:

— the specimen can be taken from the narrow central part of the multipurpose test specimen specified in ISO 3167;

— it is more stable on the supports;

— it does not tend to stand on one edge like the edgewise test specimen.

6.2 The test results obtained on moulded test specimens depend on the moulding conditions used in their preparation. Moulding conditions shall be in accordance with the standard for the material, or shall be agreed upon by the interested parties.

6.3 Discrepancies in test results due to variations in moulding conditions may be minimized by annealing the test specimens before testing them. Since different materials require different annealing conditions, annealing procedures shall be employed only if required by the materials standard or if agreed upon by the interested parties.

7 Conditioning

See ISO 75-1:1993, clause 7.

8 Procedure

8.1 Calculation of force to be applied

See ISO 75-1:1993, subclause 8.1.

The maximum nominal surface stress applied shall be one of the following:

1,80 MPa, in which case the method is designated method A;

0,45 MPa, in which case the method is designated method B;

8,00 MPa, in which case the method is designated method C.

The dimensions of the test specimen are given in 6.1. The span between the test-specimen supports is given in 5.1.

8.2 Initial temperature of the heating equipment

See ISO 75-1:1993, subclause 8.2.

8.3 Measurement

See ISO 75-1:1993, subclause 8.3.

Apply one of the nominal surface stresses specified in 8.1 of this part of ISO 75.

Note the temperature at which the bar reaches the standard deflection given in table 1 or 2 for the test-specimen height concerned (thickness h for specimens tested in the flatwise position and width b for specimens tested in the edgewise position). This temperature is the temperature of deflection under load.

NOTES

4 The initial flexural strain due to the loading of the specimen at room temperature is neither specified nor measured in these methods. The specified quantity, the standard deflection s, is essentially a deflection difference, corresponding to a flexural-strain difference. The ratio of this flexural-strain difference to the initial flexural strain depends on the modulus of elasticity, at room temperature, of the material under test. This method is not suitable, therefore, for comparing the temperatures of deflection under load of materials with widely differing elastic properties.

5 The standard deflections given in tables 1 and 2 correspond to a flexural strain of 0,2 % at the surface of the test specimen.

9 Expression of results

See ISO 75-1:1993, clause 9.

If the individual results for amorphous plastics or ebonite differ by more than 2 °C, or those for semi-crystalline materials by more than 5 °C, repeat tests shall be carried out.

Table 1 — Standard deflection for different test-specimen heights — 80 mm × 10 mm × 4 mm specimen tested in the flatwise postion

Test-specimen height (thickness h of specimen) mm	Standard deflection mm
3,8	0,36
3,9	0,35
4,0	0,34
4,1	0,33
4,2	0,32

Table 2 — Standard deflection for different test-specimen heights — 120 mm × (3,0 to 4,2) mm × (9,8 to 15,0) mm specimen tested in the edgewise position

Test-specimen height (width b of specimen) mm	Standard deflection mm
9,8 to 9,9	0,33
10,0 to 10,3	0,32
10,4 to 10,6	0,31
10,7 to 10,9	0,30
11,0 to 11,4	0,29
11,5 to 11,9	0,28
12,0 to 12,3	0,27
12,4 to 12,7	0,26
12,8 to 13,2	0,25
13,3 to 13,7	0,24
13,8 to 14,1	0,23
14,2 to 14,6	0,22
14,7 to 15,0	0,21

10 Precision

See ISO 75-1:1993, clause 10.

11 Test report

See ISO 75-1:1993, clause 11.

The information on

h) the orientation of the test specimen (flatwise or edgewise);

i) the nominal surface stress;

may be given as follows:

Use method A, B or C to designate the nominal surface stress and the letters "e" and "f" to designate the test-specimen orientation.

Thus a test using a nominal surface stress of 1,80 MPa and flatwise test-specimen orientation would be referred to as "method Af". Similarly, a test using a nominal surface stress of 0,45 MPa and edgewise orientation would be called "method Be".

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Descriptors: plastics, ebonite, tests, high temperature tests, bend tests, determination, mechanical properties, deflection, test equipment.

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