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IS 11239-6 (1985): Methods of Test for Rigid Cellular Thermal Insulation Materials, Part 6: Heat Distortion Temperature [CHD 27: Thermal Insulation]



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Indian Standard

METHODS OF TEST FOR RIGID CELLULAR
THERMAL INSULATION MATERIALS

PART 6 HEAT DISTORTION TEMPERATURE

UDC 678.077—405.8 : 536.072.35 : 662.998



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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*Indian Standard***METHODS OF TEST FOR RIGID CELLULAR
THERMAL INSULATION MATERIALS****PART 6 HEAT DISTORTION TEMPERATURE**

Thermal Insulation Materials Sectional Committee, CDC 37

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DR B. C. RAYCHAUDHURI

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ASSISTANT RESEARCH OFFICER

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(Ministry of Railways), Lucknow

Fibreglass Pilkington Ltd, Bombay

Hyderabad Asbestos Cement Products Ltd,
Hyderabad

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National Thermal Power Corporation, New Delhi

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Indian Standard

METHODS OF TEST FOR RIGID CELLULAR THERMAL INSULATION MATERIALS

PART 6 HEAT DISTORTION TEMPERATURE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 25 March 1985, after the draft finalised by the Thermal Insulation Materials Sectional Committee had been approved by the Chemical Division Council.

0.2 In the preparation of this standard, considerable assistance has been drawn from BS 4370 Part 3 : 1974 'Methods for measurement of heat distortion temperature, determination of friability and measurement of coefficient of linear thermal expansion at low temperatures issued by the British Standards Institution.

0.3 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2 - 1960*.

1. SCOPE

1.1 This standard prescribes the method for determination of the heat distortion temperature of rigid cellular thermal insulation materials using a cantilever test specimen.

1.1.1 The test is useful for the initial screening of rigid cellular thermal insulation materials.

NOTE — The heat distortion temperature values obtained are dependent on the specified method of test and the loading conditions used and no correlation with the maximum temperature of use of a material in service is implied.

2. TERMINOLOGY

2.1 For the purpose of this standard the definition given in IS : 3069-1965† and the following shall apply.

*Rules for rounding off numerical values (revised).

†Glossary of terms, symbols and units relating to thermal insulation materials.

2.1.1 Heat Distortion Temperature—The temperature at which a cantilever test specimen under the specified loading conditions deforms by specified amount when its temperature is raised at a uniform rate.

3. CONDITIONING

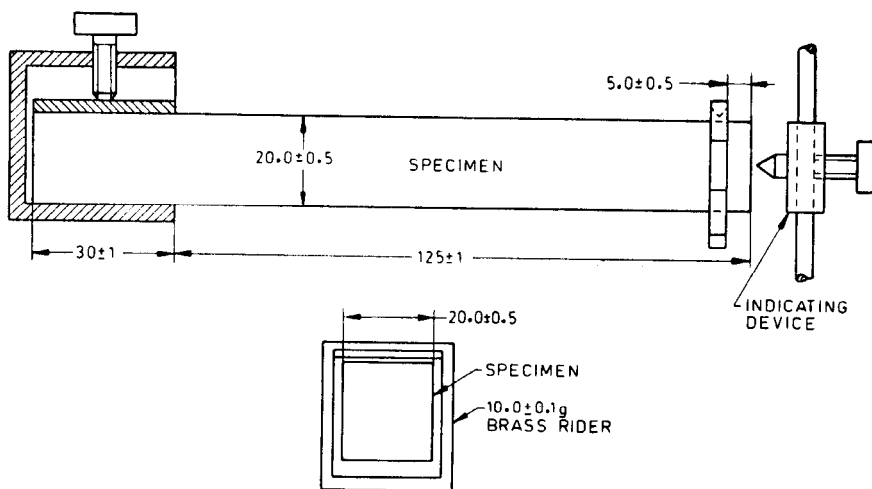
3.1 The test specimen shall be conditioned for a period of not less than 16 hours at $27 \pm 2^\circ\text{C}$ and 65 ± 5 percent relative humidity.

4. APPARATUS

4.1 Circulating-Air Oven — In which a linear temperature rise of $50 \pm 1^\circ\text{C/h}$ can be maintained and such that the temperature in the vicinity of the test specimen is uniform to within $\pm 2^\circ\text{C}$.

4.2 Clamp — To support the test specimen horizontally inside the oven.

4.3 Weights and Weight Holder — Such that a mass of 10 ± 0.1 g can be attached to the free end of the test specimen, as shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 DIAGRAM OF TEST APPARATUS

4.4 Indicating Device — To determine when the free end of the test specimen has fallen by 10 ± 1 mm, as shown in Fig. 1.

4.5 Means for measuring the temperature of the air in the immediate vicinity of the test specimen to an accuracy of $\pm 1^\circ\text{C}$.

4.6 Means for measuring the dimensions of the test specimen as specified in IS : 11239 (Part 1) - 1985*.

5. TEST SPECIMENS

5.1 The test specimens shall be rectangular bars of the following dimensions:

Length	155 ± 2 mm
Width	20 ± 0.5 mm
Thickness	20 ± 0.5 mm

5.2 The test specimen shall be cut without deformation of the original cell structure and shall be free of surface skins, voids or blemishes. Hot wire cutting is not permissible.

NOTE — A V-Notch may be provided to locate the rider 5 ± 0.5 mm from the free end of the specimen.

5.3 A minimum of three test specimens shall normally be tested from each sample. If the samples are suspected of being anisotropic, one set of specimens shall be taken such that their length is parallel to the suspected directions of anisotropy of the material and a second set shall also be taken such that their length is perpendicular to the suspected direction of anisotropy.

6. PROCEDURE

6.1 Determine the dimensions of the test specimen in accordance with IS : 11239 (Part 1) - 1985* to ensure that they meet the requirement of 5.

6.2 Clamp the test specimen horizontally inside the oven so that there is no significant deformation of the cell structure and the effective length of the cantilever is 125 ± 1 mm.

6.3 Attach a total mass of 10 ± 0.1 g at a distance of 5 ± 0.5 mm from the free end of the test specimens as shown in Fig. 1. Position and adjust the indicating device so that the deflection of the free end of the test specimens may be noted.

6.4 Starting at room temperature, raise the temperature of the oven at a uniform rate of $50 \pm 1^\circ\text{C/h}$ as measured by the air temperature adjacent to the test specimen. When the free end of the test specimen has dropped by 10 ± 1 mm as shown by the indicating device, record the temperature of the air surrounding the specimen as the heat distortion temperature of the specimen.

*Methods of test for cellular thermal insulation materials : Part 1 Dimensions.

NOTE — In the case of consecutive tests the oven and test apparatus should be allowed to return to room temperature before a new test specimen is introduced.

7. REPORT

7.1 The test report shall include the following:

- a) Reference to this standard;
- b) Description and identity of the materials;
- c) Individual test results for each direction of test;
- d) Median test results for each direction of test reported as the heat distortion temperature of the material for that direction; and
- e) Direction of anisotropy, if any, relative to the length of the test specimens.