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Textile glass — Mats — Determination of average thickness, thickness under load and recovery after compression

Verre textile — Mats — Détermination de l'épaisseur moyenne, de l'épaisseur sous charge et de la recouvrance après compression

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3616 was developed by Technical Committee ISO/TC 61, *Plastics*, and was circulated to the member bodies in March 1975.

It has been approved by the member bodies of the following countries :

Austria	India	Portugal
Belgium	Iran	Romania
Canada	Israel	South Africa, Rep. of
Chile	Italy	Sweden
Czechoslovakia	Japan	Switzerland
Finland	Mexico	Turkey
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Germany	New Zealand	U.S.A.
Hungary	Poland	

The member body of the following country expressed disapproval of the document on technical grounds :

Brazil

Printed in Switzerland

Textile glass — Mats — Determination of average thickness, thickness under load and recovery after compression

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the average thickness, the thickness under load and the recovery after compression of textile glass mats.

2 REFERENCES

ISO 291, *Plastics — Standard atmospheres for conditioning and testing.*

ISO 1886, *Textile glass products — Methods of sampling applicable to batches.*

ISO 3374, *Textile glass mats — Determination of mass per unit area.*

3 PRINCIPLE

Measurement of the distance between the outer surfaces of a pile consisting of superimposed layers of mats, having a total thickness of at least 5 mm, under a specified light pressure. Calculation of the average thickness by dividing the value obtained by the number of layers in the pile.

Measurement of the distance between the outer surfaces of the pile both during the application of a specified high pressure and again after a specified interval following removal of the pressure. Calculation of the thickness under pressure and recovery after compression, respectively, by dividing the two values obtained by the number of layers in the pile and expressing the results as percentages of the average thickness.

4 DEFINITIONS

For the purpose of this International Standard, the following definitions apply :

4.1 average thickness : The thickness of the mat, in millimetres, measured in accordance with the specified method, under a specified nominal light pressure.

NOTE — The average thickness, measured by this method, does not necessarily bear a direct relation to the thickness of a single layer. The regularity of thickness of a mat must be measured on a single layer and with apparatus with a much smaller contact area than that specified in this International Standard.

4.2 thickness under load : The thickness of the mat, measured in accordance with the specified method, under a specified heavy pressure applied for a specified time, and expressed as a percentage of the initial average thickness.

4.3 recovery after compression : The thickness to which the mat recovers after a specified interval following removal of the specified heavy pressure, expressed as a percentage of the initial average thickness.

5 APPARATUS

5.1 Sharp knife.

5.2 Template for test pieces, 316 mm × 316 mm or 400 mm × 250 mm (see clause 7).

5.3 Template for test specimens, 158 mm × 158 mm or 200 mm × 125 mm (see clause 7).

5.4 Stand, having a plane base-plate for supporting the test specimens and a suitable support for a dial-gauge micrometer (see figure 1).

5.5 Dial micrometer thickness gauge, graduated in 10 μm and with a stem of length at least 70 mm.

5.6 Positioning jig, to ensure that the test specimens and steel plates A and B (see 5.7 and 5.8) are placed with their centres directly under the foot of the micrometer, and of such thickness that plate B rests on the mats (and not on the jig).

5.7 Polished steel plate, A, (see figure 2), with dimensions either 158 mm × 158 mm × 1,3 mm (plate A_1) or 200 mm × 125 mm × 1,3 mm (plate A_2), having a mass of about 255 g exerting a pressure of 100 Pa on the corresponding test specimens.[1)]

5.8 Polished steel plate, B, (see figure 3), with dimensions either 158 mm × 158 mm × 65,6 mm (plate B_1) or 200 mm × 125 mm × 65,5 mm (plate B_2), having a mass of about 12,25 kg exerting a pressure of 5 kPa on the corresponding test specimens when used together with plate A.[1)] Plates B_1 and B_2 have a cut-out as shown in figure 3.

NOTES

1 The surfaces of the plates A and B shall be plane and parallel.

2 A hydraulic system may be used in place of these plates provided that the same conditions of pressure are assured.

6 SAMPLING

Sampling shall be carried out in accordance with the method specified in ISO 1886.

7 PREPARATION OF TEST SPECIMENS

The dimensions of the test pieces shall be as specified in ISO 3374, namely 316 mm × 316 mm or 400 mm × 250 mm.

Three test pieces, evenly distributed across the mat, shall be cut using the template (5.2) and the sharp knife (5.1).

For the purpose of this test method, each test piece shall be cut into four test specimens, using the template (5.3) and the sharp knife to provide test specimens 158 mm × 158 mm or 200 mm × 125 mm.

8 CONDITIONING OF TEST SPECIMENS

The test specimens shall be conditioned for at least 16 h in one of the standard laboratory atmospheres specified in ISO 291.

The atmosphere during the test shall be the same as that used for conditioning.

9 PROCEDURE

9.1 Place steel plate A (5.7) on the base-plate of the stand (5.4), under the foot of the dial-gauge micrometer (5.5). Ensure that the axis of the micrometer foot is perpendicular to plate A.

9.2 Record the dial-gauge reading, h_1, in millimetres, to the nearest 0,1 mm.

9.3 Remove plate A.

9.4 Place four test specimens, cut from the same test piece, one above the other on the base-plate and with two adjacent sides contacting the positioning jig (5.6).

9.5 Cover them with plate A, aligning this too in the positioning jig.

9.6 With the micrometer foot resting on plate A, record the dial-gauge reading, h_2, in millimetres, to the nearest 0,1 mm.

9.7 If $h_2 - h_1$ is less than 5 mm, cut a further test piece and add the four new test specimens to the pile on the base plate. Repeat steps 9.5 and 9.6, to obtain a new value for h_2 (to be used in the calculation).

9.8 Place the steel plate B (5.8) on top of plate A, aligning it with the positioning jig.

9.9 Allow 10 s to elapse and then, with the micrometer foot resting on plate A, record the new dial gauge reading, h_3, in millimetres, to the nearest 0,1 mm.

9.10 Immediately after taking the reading, remove plate B.

9.11 Allow 20 s to elapse and then, with the micrometer foot resting on plate A, record the new dial-gauge reading, h_4, in millimetres, to the nearest 0,1 mm.

9.12 Repeat steps 9.4 to 9.11 twice using new test specimens.

10 CALCULATION AND EXPRESSION OF RESULTS

10.1 Average thickness

The average thickness, in millimetres, is given by the formula

$$\frac{h_2 - h_1}{n}$$

Express the result to three significant figures.

10.2 Thickness under load

The thickness under load is given, as a percentage of the average thickness, by the formula

$$\frac{h_3 - h_1}{h_2 - h_1} \times 100$$

Express the result to two significant figures.

1) The plates A_1 and B_1 (disregarding the cut-out) shall each have an area of 158 mm × 158 mm and plates A_2 and B_2 (disregarding the cut-out) shall each have an area of 200 mm × 125 mm. Plates A shall exert a pressure of 100 Pa and plates A plus B a pressure of 5 kPa. Other dimensions or details of construction, given in figures 1, 2 and 3, are only given by way of an example; they may be varied provided that the values for area and pressure given above are complied with.

10.3 Recovery after compression

The recovery after compression is given, as a percentage of the average thickness, by the formula

$$\frac{h_4 - h_1}{h_2 - h_1} \times 100$$

Express the result to two significant figures.

10.4 Notation

In the above calculations,

h_1 is the dial-gauge reading, in millimetres, with the micrometer foot resting on plate A only;

h_2 is the dial-gauge reading, in millimetres, with the micrometer foot resting on plate A, with the test specimens in position;

h_3 is the dial-gauge reading, in millimetres, with the micrometer foot resting on plate A and with the test specimens and plate B in position;

h_4 is the dial-gauge reading, in millimetres, with the micrometer foot resting on plate A and with the test specimens in position after removal of plate B;

n is the number of test specimens in the pile (4 or a multiple of 4).

11 TEST REPORT

The test report shall include the following particulars :

a) a reference to this International Standard;

b) a complete identification of the material tested;

c) the dimensions of the test specimens used;

d) the number of test specimens in the pile (4 or a multiple of 4);

e) the conditioning and testing atmosphere;

f) mention of hydraulic system if used (see note 2 to clause 5);

g) the average value of the average thickness, obtained as indicated in 10.1;

h) the average value of the thickness under load, obtained as indicated in 10.2;

i) the average value of the percentage recovery after compression, obtained as indicated in 10.3;

j) any circumstances that might have influenced the results;

k) the date of the test.

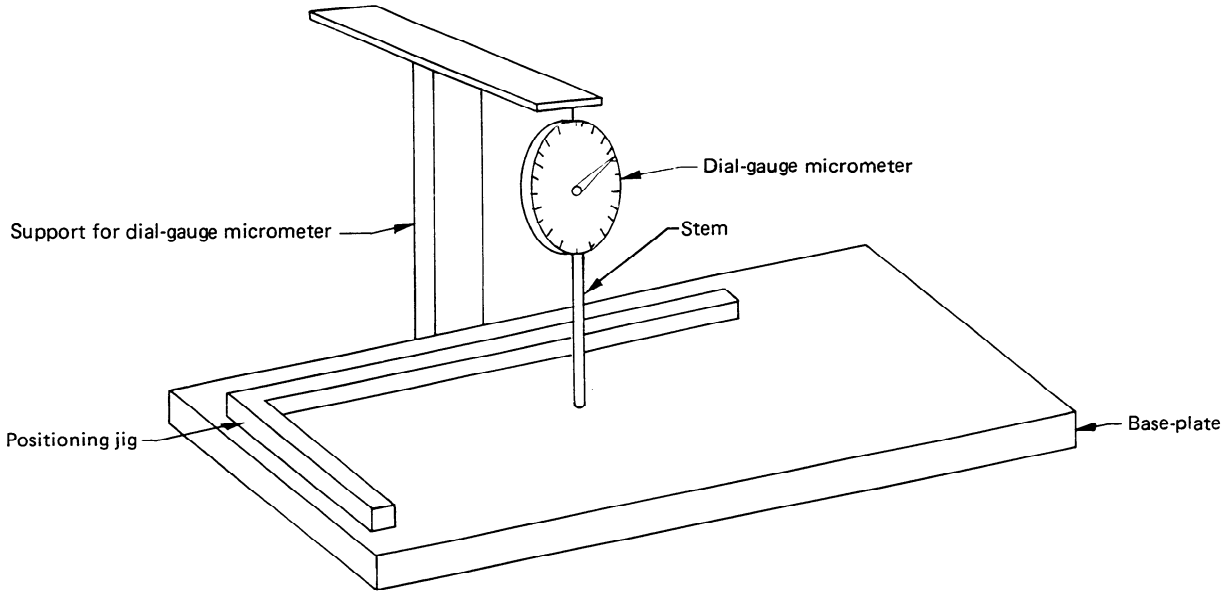

FIGURE 1 — **Stand for supporting test specimens and dial-gauge micrometer**

Dimensions in millimetres

Density of mild steel 7,84 Mg/m^3

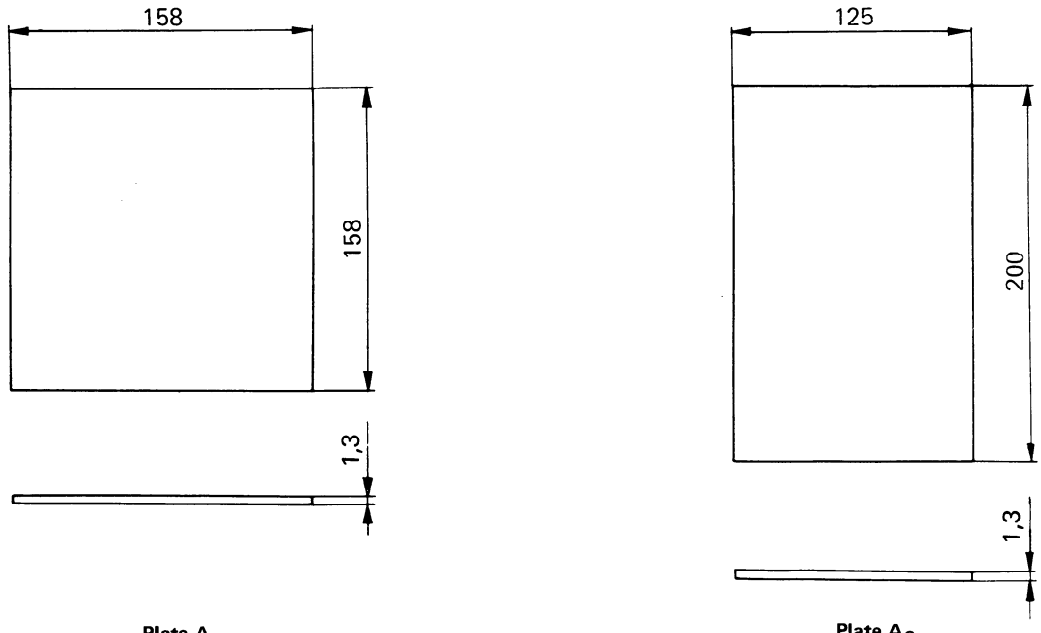

Plate A_1 Plate A_2

FIGURE 2 – Light mild steel plate for determination of average thickness

Dimensions in millimetres

Density of mild steel 7,84 Mg/m^3

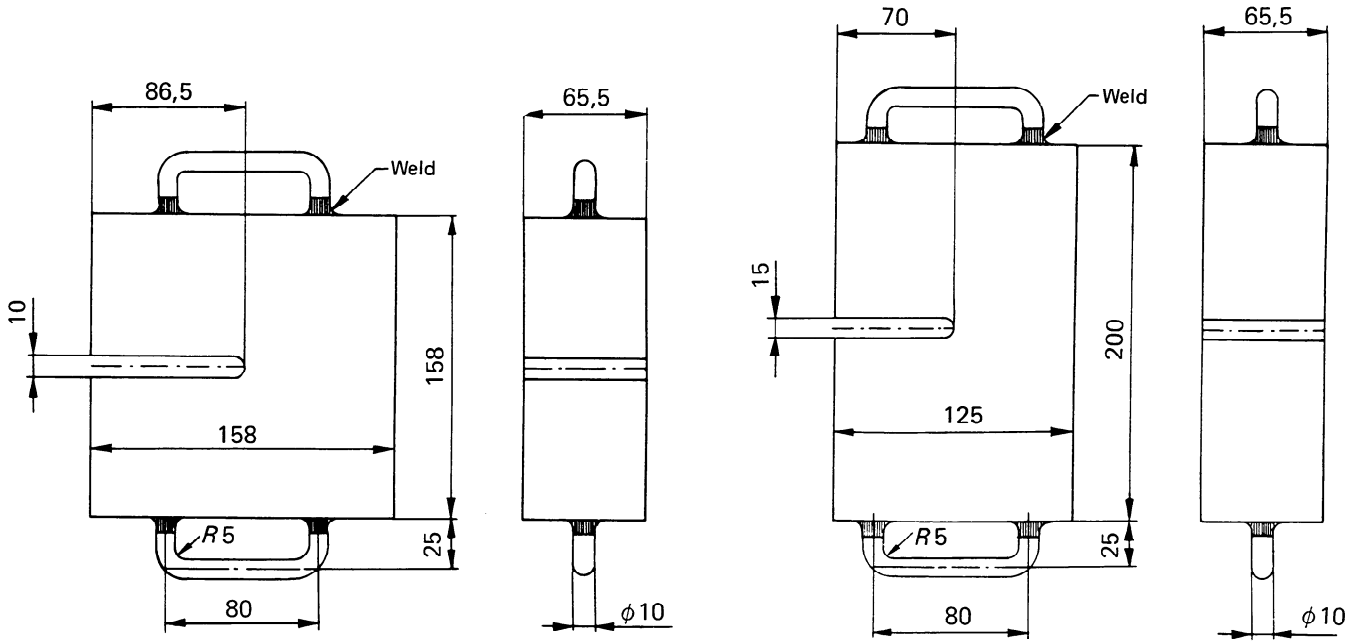

Plate B_1 Plate B_2

FIGURE 3 – Heavy mild steel plate for determination of thickness under load and recovery after compression

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