

INTERNATIONAL  
STANDARD

**ISO**  
**4211-2**

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**Furniture — Tests for surfaces —**

**Part 2:**

Assessment of resistance to wet heat

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*Ameublement — Essais des finitions de surface —*

*Partie 2: Évaluation de la résistance à la chaleur humide*

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## 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 4211-2 was prepared by Technical Committee ISO/TC 136, *Furniture*, Sub-Committee SC 1, *Test methods*.

ISO 4211 consists of the following parts, under the general title *Furniture — Tests for surfaces*:

- Part 2: *Assessment of resistance to wet heat*
- Part 3: *Assessment of resistance to dry heat*
- Part 4: *Assessment of resistance to impact*
- Part 5: *Assessment of resistance to scratching*
- Part 6: *Assessment of resistance to abrasion*
- Part 7: *Assessment of adhesion of finishes to substrate*

NOTE 1 ISO 4211:1979 was originally published as an independent International Standard, but is now regarded as part 1 of this series.

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# Furniture — Tests for surfaces —

## Part 2:

## Assessment of resistance to wet heat

### 1 Scope

This part of ISO 4211 specifies a method of assessment of surface resistance to wet heat and relates to the hard surfaces of all finished furniture, regardless of material, except for finishes on leather and coated fabrics which are excluded from this part of ISO 4211.

The test may be carried out on finished furniture but is generally carried out on test panels of a size sufficient to meet the requirements of the test and of the same material and finished in an identical manner to the finished furniture.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4211. 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 4211 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 209-1:1989, *Wrought aluminium and aluminium alloys — Chemical composition and forms of products — Part 1: Chemical composition.*

ISO 1770:1981, *Solid-stem general purpose thermometers.*

ISO 3668:1976, *Paints and varnishes — Visual comparison of the colour of paints.*

ISO 4211:1979, *Furniture — Assessment of surface resistance to cold liquids.*

### 3 Principle

A standard aluminium alloy block at a specified test temperature is placed on a damp cloth in contact with the surface of the test panel. After a specified period of time the block and damp cloth are removed. The test area is wiped dry and the test panel left undisturbed for at least 16 h. It is then examined under specified lighting conditions for signs of damage (discoloration, change in lustre, blistering or other defects). The damage is assessed by reference to a descriptive numerical rating code.

### 4 Apparatus and materials

**4.1 Thermometer**, as specified in ISO 1770, capable of insertion to the bottom of the centre bore of the heat source (4.2) or other means of measuring the temperature of the heat source to an accuracy of  $\pm 1$  °C.

**4.2 Heat source**, block as shown in figure 1 manufactured from aluminium alloy to ISO 209-1, Al Mg Si (alloy 6060). The bottom of the block is machined flat.

**4.3 Oven**, or other means of heating the heat source to a temperature at least 10 °C higher than the test temperature.

**4.4 Soft absorbent cloths.**

Dimensions in millimetres  
General tolerance  $\pm 0,1$  mm

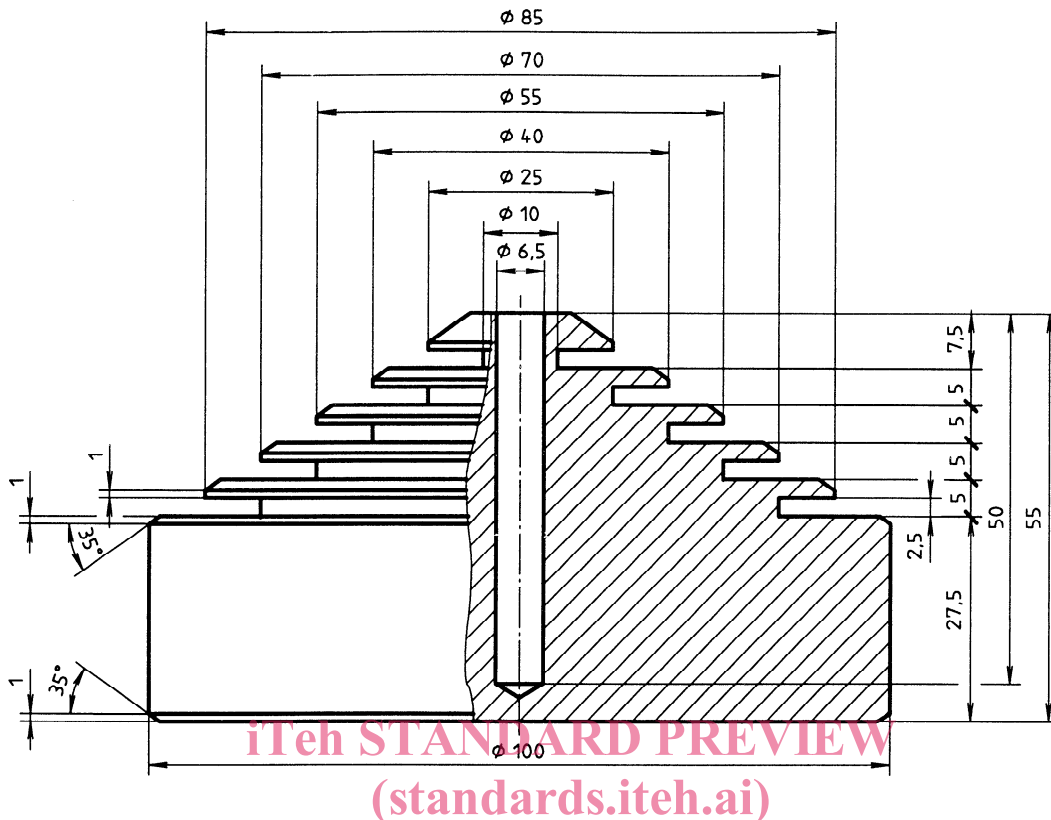


Figure 1 — Aluminium block used as heat source

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**4.5 White polyamide fibre cloth**, in plain weave having approximately 40 threads/cm in both warp and weft direction, weighing approximately 50 g/m<sup>2</sup>, and cut 120 mm  $\pm$  3 mm square.

**4.6 Distilled or deionized water**, at 23 °C  $\pm$  2 °C.

**4.7 Heat-insulating board**, of inorganic material of thickness approximately 25 mm and size approximately 150 mm  $\times$  150 mm or larger.

**4.8 Diffuse light source**, providing evenly diffused light on the test area. This may either be good diffused daylight with an illumination of at least 2 000 lx or diffused artificial daylight in a colour-matching booth in accordance with ISO 3668.

**4.9 Direct light source**, 60 W frosted bulb so screened that light reaches the test area only from the bulb and that the bulb is not in direct view of the tester. The angle between the horizontal and a line between the bulb and the area under examination shall be 30° to 60°.

NOTE 2 A suitable viewing cabinet is shown in figure 2.

## 5 Test temperatures

Test temperatures shall be selected from the following list according to the requirement specifications:

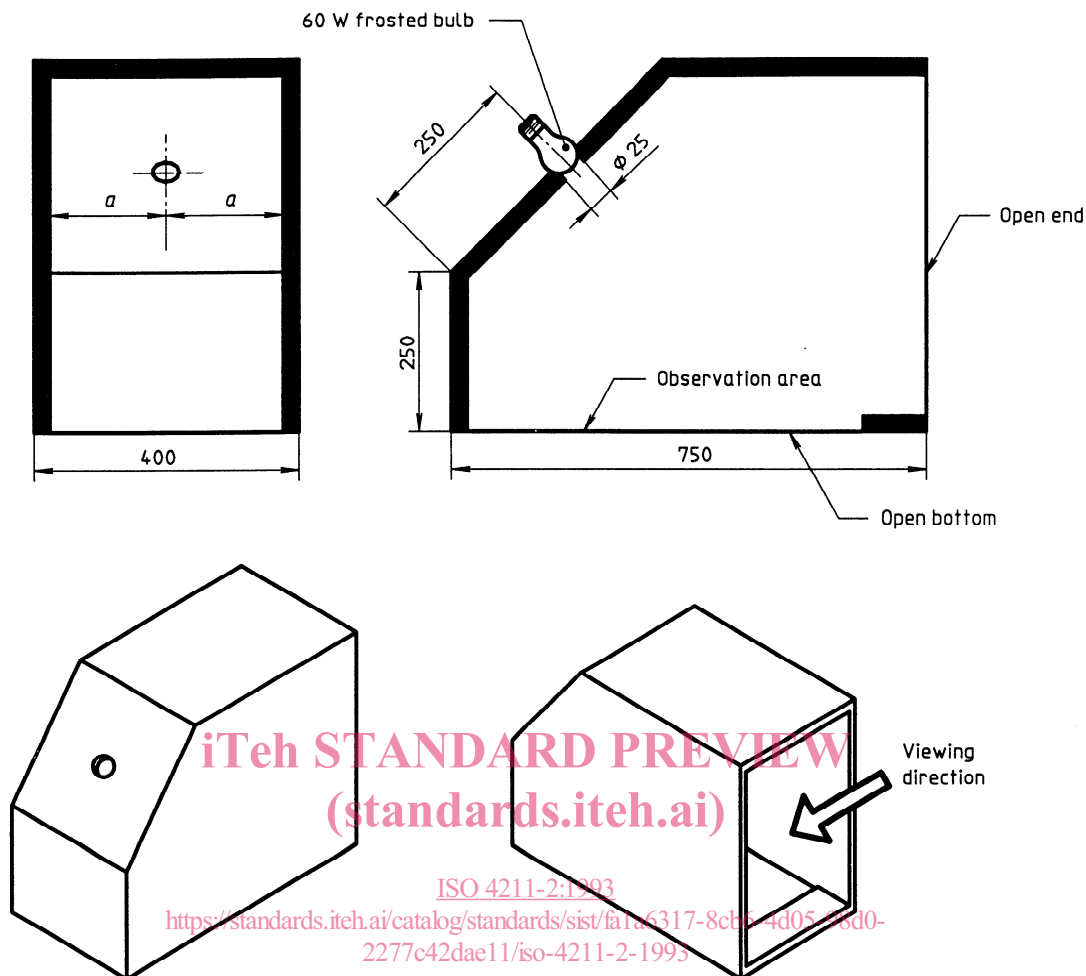
55 °C, 70 °C, 85 °C, 100 °C

## 6 Test panel

The test panel shall be practically flat and of a size sufficient to accommodate the required number of tests with at least 15 mm spacing between the perimeter of adjacent test areas and between the perimeters of the test areas and the edges of the panel. Where tests are carried out simultaneously, the perimeters of the test areas shall be separated by a minimum of 50 mm.

If necessary, the surface of the test panel shall be cleaned by wiping with a soft absorbent cloth (4.4) moistened with a mild cleaning solution (ISO 4211:1979, subclause 3.10). The surface shall then be wiped with a clean soft absorbent cloth (4.4) moistened with distilled or deionized water (4.6).

Dimensions in millimetres



Note - Interior surfaces are painted black. All dimensions are approximate.

**Figure 2 — Viewing cabinet**

The test panel before test shall be allowed to age at a temperature of not less than 15 °C with free access to air for a minimum of 28 days unless otherwise specified.

The test panel shall be conditioned at a temperature of 23 °C ± 2 °C and relative humidity of (50 ± 5) % for at least 7 days immediately before commencing the test. These 7 days may form part of the ageing period.

NOTE 3 The test panel may be part of an article of furniture, in which case clause 6 should be followed where feasible.

## 7 Procedure

Place the thermometer (4.1) or other means of measuring temperature in the centre bore of the heat source (4.2).

Using the oven (4.3), raise the temperature of the heat source to a temperature at least 10 °C higher than the specified test temperature.

Wipe the test area with the soft absorbent cloth (4.4).

Place the polyamide fibre cloth (4.5) centrally on the test area. Spread 2 cm<sup>3</sup> of distilled or deionized water (4.6) uniformly over the whole area of the polyamide fibre cloth.

NOTE 4 A graduated eye dropper is suitable for dispensing the distilled or deionized water.

When the heat source is at a temperature at least 10 °C higher than the specified test temperature, transfer it to the heat-insulating board (4.7).

When the heat source reaches the specified test temperature ± 1 °C, immediately place it on the centre of the polyamide fibre cloth. After 20 min in this

position, remove the block. Wipe the test area dry with the soft absorbent cloth.

Mark the test temperature on the surface of the test panel close to the test area using any suitable means.

Allow the panel to stand undisturbed for at least 16 h.

Wipe each test area with soft absorbent cloth and examine the test panel.

**8 Examination of test panel**

Carefully examine each test area for damage, i.e. discoloration, change in lustre, blistering or other defects using normal vision, corrected if necessary. For this purpose illuminate the surface separately by each of the two light sources (4.8 and 4.9) and examine from different angles, including angle combinations such that the light is reflected from the test surface and towards the observer's eye. The viewing distance shall be 0,25 m to 1 m.

Place the test surface in different positions with the light parallel and perpendicular to the direction of the grain, if any. In each position, compare the test area with the untested surface as a reference.

If stated in the requirement, another examination shall be made after a further specified period.

**9 Assessment of results**

Rate the test areas according to the descriptive numerical rating code in table 1.

It is recommended that each test area be rated by more than one observer experienced in this type of assessment. The reported rating for the test area shall be the rating value which is equalled or exceeded by the majority of observers.

If the results obtained with the two light sources differ, the lowest rating shall be reported.

**10 Test report**

The test report shall include at least the following information:

- a) a reference to this part of ISO 4211;
- b) the unit or panel tested including relevant data (wherever possible the substrate and the finishing system shall be identified);
- c) the test temperature or temperatures;
- d) the assessment of each test area in accordance with clause 9;
- e) the result of the test in terms of the stated requirements, if any;
- f) any deviations from this part of ISO 4211;
- g) the name and address of the test facility;
- h) the date of test.

**Table 1 — Descriptive numerical rating code**

Rating	Description
5	No visible changes (no damage).
4	Slight change in lustre, visible only when the light source is mirrored in the test area and is reflected towards the observer's eye, or a few isolated marks just visible.
3	Slight mark, visible in several viewing directions, for example almost complete disc just visible.
2	Strong mark, distinctly visible or region of slight discoloration or region of slight disturbance of the test surface.
1	Strong mark, or region of distinct discoloration or region of distinct disturbance of the test surface.



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