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# International Standard



# 4211

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Furniture — Assessment of surface resistance to cold liquids

*Ameublement — Évaluation de la résistance des surfaces aux liquides froids*

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**Descriptors** : furnishing, furniture, tests, determination, resistance to domestic products, liquids.

## 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 4211 was developed by Technical Committee ISO/TC 136, *Furniture*, and was circulated to the member bodies in July 1977.

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

Australia	India	Romania
Austria	Iran	South Africa, Rep. of
Bulgaria	Israel	Spain
Czechoslovakia	Italy	Sweden
Denmark	Japan	United Kingdom
France	Mexico	Yugoslavia
Germany, F.R.	Norway	
Hungary	Poland	

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

Netherlands

# Furniture — Assessment of surface resistance to cold liquids

## 1 Scope and field of application

This International Standard specifies a method of assessment of surface resistance to cold liquids and relates to the surfaces of finished furniture. It can also be applied to test panels with a size sufficient to meet the requirements of the test and of the same material and finished in the identical manner as the finished furniture.

The type and number of test liquids and the test periods (selected from the table in clause 5) shall be stated in requirement specifications or shall be agreed upon between purchaser and supplier.

A selection of suitable test liquids is given in the annex, but others may be used, if necessary.

## 2 Principle

Application of a liquid to a surface by means of saturated paper, covered by a glass basin. After a specified period of time, removal of the paper, washing and drying of the surface and examination for damage (discoloration, change in lustre, blistering, etc.). Assessment of the test results in terms of a descriptive numerical rating code.

## 3. Equipment and products

**3.1 Discs**, diameter approximately 25 mm, of filter paper with a grammage of 400 to 500 g/m<sup>2</sup>.

**3.2 Glass basins** with ground edges and without lips, external diameter approximately 40 mm, height approximately 25 mm.

**3.3 Tweezers.**

**3.4 Filter paper.**

**3.5 Soft, absorbent cloths.**

**3.6 Diffuse light source**, providing evenly diffused light giving an illumination on the test area between 1 000 and 5 000 lx. This may either be diffused daylight or be diffused artificial light.

NOTE — The daylight should be unaffected by surrounding trees, buildings, etc. When artificial light is used, it is recommended that it should have a correlated colour temperature of 5 000 to 6 550 K and an  $R_a$  greater than 92.

**3.7 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 — One suitable way to perform this test is to use a viewing cabinet as shown in figure 1.

**3.8 Test liquid**, temperature  $23 \pm 2$  °C.

**3.9 Deionized or distilled water**, temperature  $23 \pm 2$  °C.

**3.10 Cleansing solution** containing 15 ml/l of the cleansing agent (3.11) in water (3.9). This solution shall be freshly prepared on each occasion.

**3.11 Cleansing agent**, of the following composition:

- 12,5 % (m/m) of a sodium primary (C<sub>10</sub> — C<sub>14</sub>) alkyl aryl sulphionate;
- 12,5 % (m/m) polyethoxylated derivatives of primary or secondary (C<sub>8</sub> — C<sub>16</sub>) alcohols with 5 to 15 ethoxylated groups having a cloud point of 25 to 75 °C in 1 % (m/m) aqueous solution (determination of cloud point is described in ISO 1065);
- 5,0 % (m/m) ethanol;
- 70 % (m/m) water (3.9).

The cleansing agent shall be stored in a glass bottle in a cool, dark place and should be used within 1 year of the day of preparation.

#### 4 Preparation and conditioning of test units

Unless otherwise agreed, the unit shall be allowed to age and shall then be conditioned.

For ageing, the unit shall be stored at a temperature not less than 15 °C with free access of air. Ageing including conditioning before test shall not be less than four weeks.

Conditioning should begin one week before testing and should be carried out in air at a temperature of 23 ± 2 °C and relative humidity of 50 ± 5 %.

The test surface shall be substantially flat and of a size sufficient to meet the requirements of clause 6 regarding the separation of the filter paper discs.

It is recommended that a sufficient area be prepared to allow for extra tests if required.

The test surface shall be carefully wiped with a dry cloth (3.5) before testing.

#### 5 Test periods

Test periods shall be selected from the table according to requirement specifications. The periods have been chosen so as to resemble the range of times that may elapse before a liquid, unintentionally applied to the surface of furniture, would be removed. Longer test periods upon agreement.

Table — Test periods

Period	Case under consideration
10 s	Immediate removal
2 min	Immediate removal
10 min	After a short time
1 h	After a meal or similar
6 h	After work or other activity
16 h	As soon as possible next day
24 h	After one day
7 days	After one week
28 days	Long-term action

#### 6 Procedure

**6.1** The test surface shall be horizontal. It shall be tested with the chosen test liquids at points which shall be not less than 60 mm apart, from centre to centre, and, if possible, with centres not less than 40 mm from any edge of the test surface. If there is any reason to suppose that the properties of the test surface may vary, it shall be given two identical tests simultaneously.

**6.2** Immerse a disc of paper (3.1) into the test liquid (3.8) for 30 s, lift with the tweezers (3.3) and wipe off against the edge of the vessel. Place it on the test area and immediately cover with an inverted glass basin (3.2).

**6.3** After the test period, remove the basin and lift off the paper with the tweezers. Do not remove fibres of paper adhering to the test area. Soak up any remaining test liquid with the dry filter paper (3.4) without rubbing and leave the test surface undisturbed for 16 to 24 h in the test atmosphere without covering it. The test area shall be sufficiently protected against dust without limiting in any way the free access of air.

**6.4** After the 16 to 24 h, wash the test surface by lightly rubbing it with the absorbent cloth (3.5) soaked first in cleansing solution (3.10) and then only water (3.9). Finally wipe the surface carefully with a dry cloth (3.5).

At the same time, wash and dry one point (reference area) on the surface which has not been exposed to the test liquid, in the same way.

Leave the test surface undisturbed, without covering it, for 30 min in the test atmosphere.

**6.5** Examine the test area for damage, i.e. discoloration, change in lustre, blistering and other defects. For this purpose illuminate the surface separately by each of the two light sources (3.6) and (3.7) and examine from different angles, including angle combinations such that the light is reflected from the test surface and towards the observer's eye. Viewing distance shall be 0,25 to 1,0 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 surface of the reference area.

**6.6** If stated in requirement specifications or agreed on, another examination may be done after further 3 or 7 days.

#### 7 Assessment of results

Rate the test areas by comparison with the reference area for each liquid according to the following descriptive numerical rating code :

- 5 No visible changes (no damage).
- 4 Slight change in lustre, visible only when the light source is mirrored in the test surface on or quite near the mark 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 or circle just visible.
- 2 Strong mark, the structure of the surface being however largely unchanged.
- 1 Strong mark, the structure of the surface being changed or the surface material being wholly or partially removed or the filter paper adhering to the surface.

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 largest rating value

which is equalled, or exceeded, by the majority of observers,  
for example :

Individual ratings : 1, 2, 3, 3, 3  
Test area rating : 3

Individual ratings : 1, 2, 2, 3, 3  
Test area rating : 2

Duplicate test areas shall be assessed and reported separately.

### 8 Test report

The test report shall include at least the following information :

a) a reference to this International Standard;

- b) the unit tested (relevant data);
- c) the test liquid or liquids;
- d) the test period or periods;
- e) the assessment of each test area according to clause 7;
- f) the result of the test in terms of the stated requirements, if any;
- g) any deviations from this International Standard;
- h) the date of test.

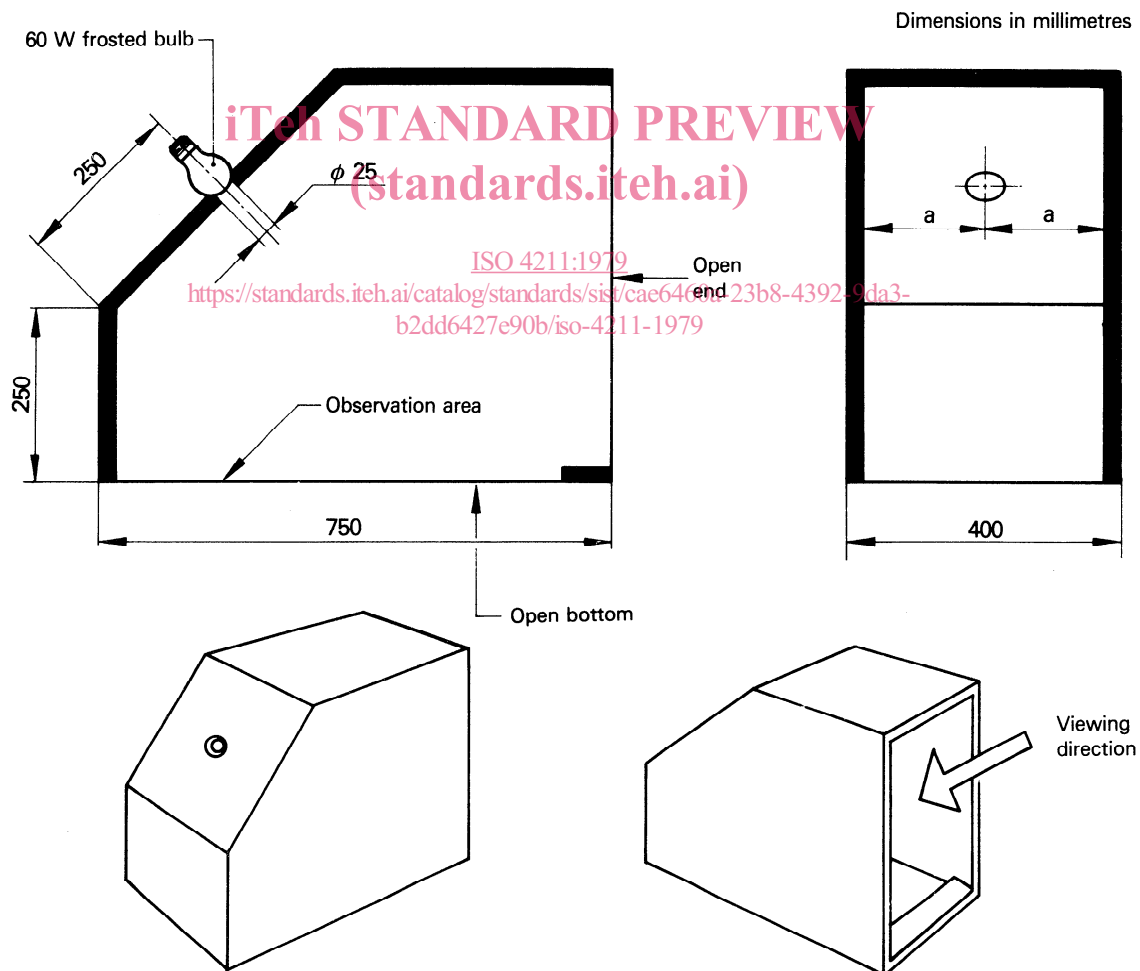


Figure 1 — Viewing cabinet  
(All dimensions are approximate)

## Annex

## Liquids for testing surface

## A.1 Introduction

This annex gives examples of liquids, generally available in the home and places of work, which are suitable for assessment of the resistance to liquids of the surface of furniture. Any other agreed liquids may be used.

## A.2 Liquids

The purity of the chemicals shall be at least equivalent to recognized analytical grade where available.

Deionized or distilled water shall be used for the preparation of aqueous solutions.

The test liquid shall be stored in a sealed glass bottle in a dark place and shall be conditioned to  $23 \pm 2$  °C prior to use.

Designation	No.	Description
Acetic acid	1.1	44 % (m/m) aqueous solution
	1.2	4,4 % (m/m) aqueous solution
Acetone	2	—
Ammonia solution	3	10 % (m/m) aqueous solution
Blackcurrant juice	4	Raw pressed unsweetened juice
Citric acid	5	10 % (m/m) aqueous solution
Cleansing agent	6	See 3.11
Coffee	7	40 g of instant coffee, medium roasted, in 1 litre of boiling water
Disinfectant	8.1	Phenol derivatives, 0,5 % aqueous solution : chlorinated alkyl, cycloalkyl, aryl phenols
	8.2	Chloramine T, 2,5 % aqueous solution : <i>p</i> -toluene sulphone chloramide sodium
Endorsing ink	9	—
Ethanol, non denatured	10.1	96 % (V/V)
	10.2	48 % (V/V) aqueous solution
Ethyl-butyl acetate	11	Proportion 1:1
Iodine	12	5 % (m/m) ethanolic solution
Milk, condensed	13	10 % fat content
Olive oil	14	—
Paraffin oil	15	Medical grade, <i>Paraffinum Liquidum</i>
SBP spirit	16	Medical grade, <i>Benzinum Medicinale</i> , aliphatic hydrocarbon solvent, boiling range ca. 70 – 100 °C
Sodium carbonate	17.1	10 % (m/m) aqueous solution
	17.2	0,5 % (m/m) aqueous solution
Sodium chloride	18.1	15 % (m/m) aqueous solution
	18.2	5 % (m/m) aqueous solution
Tea	19	10 g of tea leaves is infused with 1 litre of boiling water. The tea is allowed to draw for 5 min without being stirred, after which it is decanted
Water	20	Deionized or distilled

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