BRITISH STANDARD

BS EN 263:2008

Sanitary appliances — Crosslinked cast acrylic sheets for baths and shower trays for domestic purposes

ICS 83.140.10; 91.140.70

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 263:2008. It supersedes BS EN 263:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/503, Sanitary appliances.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Sanitary appliances - Crosslinked cast acrylic sheets for baths and shower trays for domestic purposes

Appareils sanitaires - Feuilles d'acrylique réticulées coulées pour baignoires et receveurs de douche à usage domestique

Sanitärausstattungsgegenstände - Vernetzte gegossene Acrylplatten für Badewannen und Duschwannen für den Hausgebrauch

This European Standard was approved by CEN on 12 January 2008.

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Foreword

This document (EN 263:2008) has been prepared by Technical Committee CEN/TC 163 “Sanitary appliances”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2008, and conflicting national standards shall be withdrawn at the latest by August 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 263:2002.

The performance criteria for baths and shower trays for domestic purposes made from crosslinked cast acrylic sheets are divided into two European Standards as follows:

prEN 198 Sanitary appliances - *Baths made from crosslinked cast acrylic sheets - Requirements and test methods.*

prEN 249 Sanitary appliances - *Shower trays made from crosslinked cast acrylic sheets - Requirements and test methods.*

This revised version of EN 263 includes the following amendments, compared to the version of 2002:

— Deletion of reference to ISO 62 standard for water absorption test and replacement with the description of the test itself.

— Modification of eosine concentration in resistance to chemical and stains test.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements and test methods for cross-linked cast acrylic sheets (called acrylic sheets hereafter) from which baths and shower trays for domestic purposes are manufactured.

NOTE For the purposes of this standard, the term "domestic purposes" includes use in hotels, accommodation for students, hospitals and similar buildings, except when special medical provisions are required.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 20105-A02, *Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993)*

EN ISO 306, *Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST) (ISO 306:2004)*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*

EN ISO 4892-2, *Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2:2006)*

3 Requirements

3.1 General requirements

The acrylic sheet shall comply with the requirements given in Table 1.

Table 1 - General requirements

Property	Test method	Requirement
Vicat softening point	EN ISO 306 1)	≥ 105°C
Water absorption	4.7 of this standard	≤ 40 mg
Tensile strength	EN ISO 527-2 and 4.1 of this standard	≥ 60 MPa
Cross-linking	4.6 of this standard	no sign of dissolving or sticking
1) Method B 50, temperature raised at a rate of (50 ± 5)°C/h.		

3.2 Thickness

The thickness of the acrylic sheet shall be not less than 2,7 mm. The maximum tolerance on thickness Δh shall be $\pm$ (0,4 + 0,1h), *h* being the nominal sheet thickness in mm.

3.3 Heavy metal content

Heavy metal contents of crosslinked cast acrylic sheets for baths and shower trays should be lower than those defined in the European Directive 91/338/EEC.

3.4 Colour

The acrylic sheets shall be transparent or coloured. In the case of coloured sheet, the colourant shall be incorporated during the manufacture of the sheet and the colour shall be throughout the thickness of the material.

3.5 Thermal stability

When tested by the method given in 4.2, the acrylic sheet shall show no evidence of blistering.

3.6 Colour fastness

3.6.1 Resistance to UV light

When tested according to EN ISO 4892-2 with an irradiance of 0,5 GJ/m^2 in the wavelength range of 290 nm to 800 nm, the colour change noted in the acrylic sheet shall be recorded in terms of the grey scale for assessing colour change specified in EN 20105-A02. The fastness rating shall be not less than grade 3.

3.6.2 Resistance to hot water

When tested in accordance with 4.3, the colour change noted in the acrylic sheet shall be recorded in terms of the grey scale for assessing colour change specified in EN 20105-A02. The fastness rating shall be not less than grade 3.

3.7 Resistance to chemicals and stains

When tested in accordance with 4.4, the acrylic sheet shall show no permanent staining or deterioration.

3.8 Resistance to wet and dry cycling

When tested in accordance with 4.5, the acrylic sheet shall not show any adverse changes in appearance such as blisters, crazes, cracks and discoloration.

4 Test methods

4.1 Determination of tensile strength

The test specimen shall be of type 1B according to EN ISO 527-2. The thickness of the test specimen shall be that of the sheet from which it is cut.

The test shall be carried out at a temperature of (23 ± 2)°C and the test specimens shall be conditioned to this temperature for at least two days before testing.

The speed of testing shall be (5 ± 1) mm/min.

The mean of five determinations shall be recorded as the tensile strength of the material but if a test specimen breaks in the grips the result shall be disregarded and a further determination made. The tensile strength shall be calculated by dividing the breaking load by the cross-sectional area of the specimen before testing.

4.2 Determination of thermal stability

Hang two sheets 300 mm square, taken from the acrylic sheet, in a circulating oven at (200 ± 5)°C for 20 min when this nominal temperature is reached. Remove the sheets from the oven, allow them to cool to room temperature while hanging vertically and visually examine them for the presence of blisters. If blistering occurs, repeat the test using two new specimens which have been preconditioned at (80 ± 2)°C for 16 h.

4.3 Determination of colour fastness to hot water

Cut a test specimen 100 mm x 25 mm from the acrylic sheet and fix in a suitable carrier. Immerse the test specimen in a water bath maintained at (60 ± 2)°C for 30 min, remove and allow to drain and dry in air for 30 min.

Repeat the cycle one hundred times without interruption.

Allow 48 h for the test specimen to dry out before it is compared with a sample of the sheet from which it was cut.

The colour fastness of the material shall be recorded in terms of the grey scale for assessing colour change specified in EN 20105-A02.

4.4 Determination of resistance to chemicals and stains

4.4.1 Reagents

The list of reagents is given in Table 2. Each aqueous solution shall be prepared immediately before application. The reagents shall be made up and applied at (23 ± 5) °C.

Table 2 - Reagents

Family	Product	Concentration
Acids	Acetic acid	Volume fraction of 10%
Alkalis	NaOH	Mass fraction of 10%
Alcohol	Ethanol	Volume fraction of 70%
Bleaches	NaOCl	5% available chlorine
Staining agent	Methylene Blue	Mass fraction of 1%

4.4.2 Apparatus

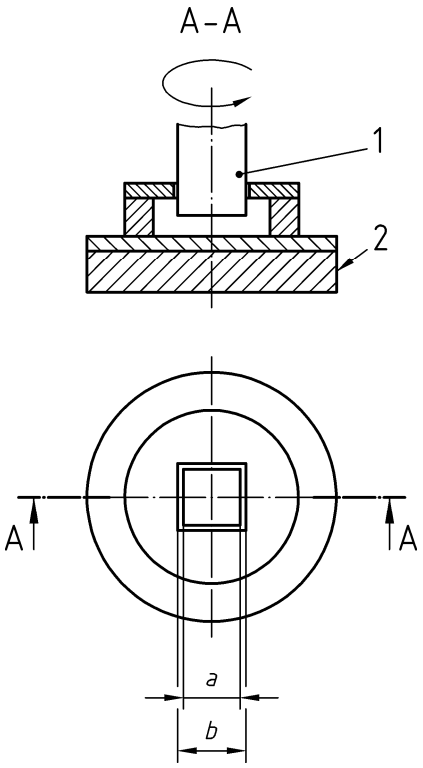
4.4.2.1 Borosilicate watch glasses

40 mm nominal diameter

4.4.2.2 Pipettes

4.4.2.3 Cleaning device

This is shown in Figure 1. It comprises a synthetic flexible open cell foam disc of 75 mm diameter and 15 mm thick. Use any rotating device applying a mass of (1 000 ± 50) g which loosely fits with the device. The lateral cleaning force shall only be that exerted by the mass of the cleaning device; this can be affected by a floating action between the drive shaft and the disc.



Key

1 square axle, a = b – 1 mm
2 foam
a inner dimension
b outer dimension

Figure 1 - Detail of cleaning apparatus

4.4.2.4 Test specimens

Specimens shall measure (100 ± 5) mm x (100 ± 5) mm.

4.4.3 Procedure

Use a separate test specimen for each reagent test. Clean the test area thoroughly with hot soapy water, rinse and dry with a clean soft cloth.

On each test specimen deposit a drop of the test solution. Cover the drop thus formed with a watch glass concave downwards. The drop size shall be determined in order to be completely covered by the watch glass. Allow to act for a time of (120 ± 5) min, at a temperature of (23 ± 5)°C with the test areas protected from the affects of sunlight.

Thoroughly rinse the test specimen with demineralized water and check for adverse changes in appearance by visual examination. If deterioration exists, dip the foam disc of the cleaning device into demineralized water and place it on the surface to be cleaned. Rotate the device at 60 min^{-1}.

Clean for thirty revolutions.

Rinse with demineralized water and visually examine the test area. If deterioration persists repeat the cleaning process with an abrasive agent added to demineralized water. This abrasive agent is defined as follows: alumina used for surface polishing, with particle size comprised between 0,1 μm and 2 μm and centred on 0,5 μm.

4.4.4 Results

Note whether or not the reagent causes a stain or deterioration, whether or not such stain or deterioration is removed and if so with water or water with abrasive agent. If the stain is not removed by the water with abrasive agent record as permanently stained.

4.5 Determination of resistance to wet and dry cycling

4.5.1 Test specimens

The specimens to be tested shall be (100 ± 2) mm^2. Prior to commencing the test examine the show faces of the samples and mark any surface defects.

4.5.2 Procedure

Place a maximum of ten specimens to be tested vertically in a suitable carrier and place the carrier in a suitable open container. The carrier shall be arranged to avoid contact of one test specimen with another.

Pour 2 l of boiling water into the container. Test specimens must be covered.

Leave the test specimens in the water for (8 ± 0,25) h whilst allowing cooling to room temperature.

Remove the test specimens from the water, wipe the surfaces with a soft dampened cloth and place the test specimens for drying into an oven for (16 ± 0,5) h at a temperature of (50 ± 2) °C. When placing the test specimens in the oven ensure they do not touch the oven walls or each other.

Repeat this cycle twenty times using the same test specimens. In the event of an interruption of the test procedure, e.g. over the weekend, leave the test specimens in the oven at a temperature of (50 ± 2)°C.

After twenty cycles brush over the show face of each test specimen with a solution of eosine (100 g/l in water) to which is added 1 cm^3/l of liquid detergent using a soft sponge or a paint brush. Leave the solution for (5 ± 1) min, then remove from the surface by wiping with a clean soft dampened cloth.

4.5.3 Results

Verify and record any adverse changes in appearance (blisters, crazing, cracks etc.) by visual examination and by the presence of traces of eosine.

When making the visual inspection, ignore the 3 mm width along each side to exclude any influence caused by the cut edges.

4.6 Verification of crosslinking

Cut a sample approximately (30 ± 5) mm x (20 ± 5) mm from the sheet under test. Place this in a sealed glass container with 100 ml of methyl-methacrylate or chloroform. Leave for at least 16 h (methyl methacrylate) or 2 h (chloroform) at (23 ± 5) °C. After immersion check if the specimen is dissolved or sticks to the walls of the container. When touched with a glass rod or a spatula, check if the sample sticks to it or shows signs of stringing as the rod or spatula is removed.

4.7 Determination of water absorption

4.7.1 Principle

Complete immersion of test specimens in water for a specified period of time and at a specified temperature. Determination of changes in the mass of the test specimens after immersion in water.

4.7.2 Apparatus

4.7.2.1 Balance, with an accuracy of 0,1 mg.

4.7.2.2 Oven, capable of being controlled at 50 ± 2°C.

4.7.2.3 Containers, containing distilled water, or water of equivalent purity, equipped with a means of heating and capable of being controlled at the temperature specified.

4.7.2.4 Desiccators.

4.7.3 Test specimens

Three specimens shall be tested. They may be obtained by machining. The cut surface shall be smooth and shall not show any trace of charring that may be due to the method of preparation.

Each specimen shall be square, the side having the following dimension: (50 ± 1) mm.

The thickness of the test specimen shall be the same as that of the sheet under test if the nominal thickness of the sheet is equal to or less than 25 mm.

If the nominal thickness is greater than 25 mm and in the absence of special provisions in the relevant specification, the thickness of the test specimen shall be reduced to 25 mm by machining on one surface only.

4.7.4 General conditions

4.7.4.1 The volume of water used shall be at least 8 ml per square centimetre of the total surface of the test specimens, so as to avoid any extraction product becoming excessively concentrated in the water during the test.

4.7.4.2 In general, place each set of three test specimens in a separate container with the specimens immersed completely in the water.

However, when several samples of the same composition have to be tested, it is permissible to place several sets of test specimens in the same container.

In no case shall any significant area of the surface of a test specimen come into contact with the surface of other test specimens, or with the walls of the container.

4.7.5 Procedure

Dry three test specimens for (24 ± 1) h in the oven, controlled at (50 ± 2)°C, allow to cool to ambient temperature in the desiccators and weigh each specimen to the nearest 0,1 mg (mass m_1). Place the specimens in a container containing distilled water.

Immerse the specimens for (24 ± 1) h in distilled water at (23 ± 1) °C. Take the specimens from the water and remove all surface water with a clean, dry cloth or with filter paper. Re-weigh the specimens to the nearest 0,1 mg within 1 min of taking them from the water (mass m_2).

4.7.6 Expression of results

Calculate for each test specimen the mass, in milligrams, of water absorbed, according to the formula.

$$m = m_2 - m_1$$

Where

m_1 is the mass, in milligrams, of the test specimen before immersion,

m_2 is the mass, in milligrams, of the test specimen after immersion.

Express the result as the arithmetic mean of the three values of m obtained.

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