



SLOVENSKI STANDARD
SIST EN 13558:2004

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Specifications for impact modified extruded acrylic sheets for shower trays for domestic purposes

Spezifizierung von schlagzäh-modifizierten extrudierten Acrylplatten für Duschwannen für den Hausgebrauch

Spécifications relatives aux feuilles en acrylique extrudées a résistance au choc modifiée pour receveurs de douche a usage domestique

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ICS:

91.140.70 Sanitarne naprave Sanitary installations

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EUROPEAN STANDARD

EN 13558

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2003

ICS 91.140.70

English version

Specifications for impact modified extruded acrylic sheets for shower trays for domestic purposes

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Spezifizierung von schlagzäh-modifizierten extrudierten Acrylplatten für Duschwannen für den Hausgebrauch

This European Standard was approved by CEN on 27 June 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

	Page
Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions.....	4
4 Requirements	4
4.1 General requirements.....	4
4.2 Thickness.....	5
4.3 Heavy metal contents	5
4.4 Colour.....	5
4.5 Thermal stability.....	5
4.6 Colour fastness	5
4.6.1 Resistance to UV light	5
4.6.2 Resistance to hot water.....	6
4.7 Chemical and stain resistance	6
4.8 Resistance to wet and dry cycling.....	6
4.9 Shrinkage.....	6
4.10 Resistance to stress cracking	6
5 Test methods.....	6
5.1 Determination of tensile strength.....	6
5.2 Determination of thermal stability.....	6
5.3 Determination of colour fastness to hot water.....	7
5.4 Determination of resistance to domestic chemicals and stains.....	7
5.4.1 Reagents.....	7
5.4.2 Apparatus	7
5.4.3 Procedure	8
5.4.4 Results	8
5.5 Determination of resistance to wet and dry cycling.....	9
5.5.1 Test pieces.....	9
5.5.2 Procedure	9
5.5.3 Results	9
5.6 Determination of resistance to stress cracking.....	9
5.6.1 General.....	9
5.6.2 Principle	9
5.6.3 Test specimens	9
5.6.4 Conditioning.....	10
5.6.5 Pieces of cloth.....	10
5.6.6 Test fluid	10
5.6.7 Flexural strain.....	10
5.6.8 Test atmosphere	10
5.6.9 Procedure	10
5.7 Determination of water absorption	12
5.7.1 Principle.....	12
5.7.2 Apparatus	12
5.7.3 Test specimens	12
5.7.4 General conditions	13
5.7.5 Procedure	13
5.7.6 Expression of results	13
Bibliography	14

Foreword

This document (EN 13558:2003) 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 March 2004, and conflicting national standards shall be withdrawn at the latest by March 2004.

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

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EN 13558:2003 (E)**1 Scope**

This European Standard specifies the properties of impact modified extruded acrylic sheets from which 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

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 105-A02, *Textiles - Tests for colour fastness – Part A02: Grey scale for assessing change in colour.*

ISO 179, *Plastics - Determination of Charpy impact properties.*

ISO 306, *Plastics - Thermoplastic materials - Determination of the Vicat softening temperature (VST).*

ISO 527, *Plastics - Determination of tensile properties.*

ISO 4892, *Plastics - Methods of exposure to laboratory light sources.*

ISO 7823-2, *Plastics - Poly(methyl methacrylate) sheets - Types, dimensions and characteristics - Part 2: Extruded sheets*

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3 Terms and definitions

For the purpose of this standard, the following term and definition applies:

3.1**Impact modified extruded acrylic sheet**

sheet produced by extrusion of homopolymers and copolymers of methyl methacrylate (MMA) containing at least 80% (m/m) of MMA and not more than 20% (m/m) of acrylic esters or other useful monomers, modified by acrylic elastomers grafted by homopolymers or copolymers of MMA. The polymers may contain lubricants, processing aids, U.V. absorbers, pigments and colours.

4 Requirements**4.1 General requirements**

The impact modified extruded acrylic sheet shall comply with the requirements of table 1 when tested to the methods given in Table 1.

Table 1 - General requirements for impact modified extruded acrylic sheet

Property	Test method	Test conditions	Unit	Value	
				Minimum	Maximum
Tensile yield strength	ISO 527	5 mm/min ¹⁾	MPa	40	-
E modulus	ISO 527	1 mm/min ¹⁾	MPa	1900	-
Elongation at break	ISO 527	5 mm/min ¹⁾	%	15	-
Impact resistance	ISO 179	1fu	kJ/m ²	50	no break
Vicat softening point ²⁾	ISO 306	B 50, (50±5)°C/h	°C	95	-
Water absorption	§ 5.7 of this standard		mg	-	50

1) According ISO 7823-2.
2) After annealing

4.2 Thickness

The impact modified extruded acrylic sheet shall be not less than 2,7 mm thick. The tolerances on thickness shall be ± 3%.

4.3 Heavy metal contents

Limit values for heavy metal contents of impact modified extruded sheets for shower trays are given in the European Directive 91/338/EEC.

Informative note : 91/338/CEE: Council Directive of 19 June 1991 amending for the tenth time Directive 76/769/CEE The Approximation of the laws, regulations and administrative provisions of the member states relating to restriction of the marketing and use of certain dangerous substances and preparations.

4.4 Colour

The impact modified extruded 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. Colour standards shall be agreed between sheet manufacturer and fabricator.

4.5 Thermal stability

When tested according to the method given in 5.2 the impact modified extruded sheet shall show no evidence of blistering.

4.6 Colour fastness

4.6.1 Resistance to UV light

When tested in apparatus complying with the requirements of the xenon arc lamp method of ISO 4892 for 250 h the colour change noted in the impact modified extruded sheet shall be recorded in terms of the grey scale for assessing colour change specified in ISO 105-A02. The fastness rating shall be not less than grade 3.

The xenon lamp shall only be used when its age is between the limits stated by the manufacturer of the lamp to be the useful life of the lamp or, where the useful life is not stated, is between 10 h and 600 h.

EN 13558:2003 (E)

4.6.2 Resistance to hot water

When tested in accordance with 5.3, the colour change noted in the impact modified extruded sheet shall be recorded in terms of the grey scale for assessing colour change specified in ISO 105-A02. The fastness rating shall be not less than grade 3.

4.7 Chemical and stain resistance

When tested in accordance with 5.4 the impact modified extruded sheet shall show no permanent staining or deterioration.

4.8 Resistance to wet and dry cycling

When tested in accordance with 5.5 the impact modified extruded sheet shall not show any adverse changes in appearance such as blisters, crazes, cracks and discoloration.

4.9 Shrinkage

Annex B of ISO 7823-2 applies.

4.10 Resistance to stress cracking

The impact modified extruded sheet shall be tested in accordance with 5.6. The time at which the first crack appears shall be reported.

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5 Test methods

5.1 Determination of tensile strength

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5.1.1

The test pieces shall be as described in ISO 527, Type 1 B. They shall be cut so that their length is parallel to extrusion direction. The thickness of the test piece shall be that of the sheet from which it is cut and the width and the thickness shall be measured on the parallel portion of the test piece by means of a micrometer to the nearest 0,025 mm.

5.1.2

The test shall be carried out at a temperature of $(23 \pm 2)^\circ\text{C}$ and the test pieces shall be conditioned to this temperature for at least two days before testing.

5.1.3

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

5.1.4

The mean of three determinations shall be recorded as the tensile strength of the material but if a test piece breaks in the grips the result shall be disregarded and a further determination made. The tensile strength shall be determined according to ISO 527.

5.2 Determination of thermal stability

Hang two sheets 300 mm square, taken from the impact modified extruded acrylic sheet, in a circulating oven at $(165 \pm 5)^\circ\text{C}$ for 20 minutes 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 defects are present, repeat the test on new samples with pre-conditioning at $(80 \pm 2)^\circ\text{C}$ for 16h.

5.3 Determination of colour fastness to hot water

5.3.1

Cut a test piece 100 mm x 25 mm from the impact modified extruded acrylic sheet and fix in a suitable carrier. Immerse the test piece in a water bath maintained at $(60 \pm 2)^\circ\text{C}$ for 30 min, remove and allow to drain and dry out in air for 30 min.

5.3.2

Repeat the cycle 100 times without interruption.

5.3.3

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

5.3.4

The colour fastness of the material shall be recorded in terms of the grey scale for assessing colour change specified in ISO 105-A02.

5.4 Determination of resistance to domestic chemicals and stains

5.4.1 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 $(23 \pm 5)^\circ\text{C}$.

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Table 2 - Reagents

Family	Product	Concentration
Acids	Acetic acid	10% v/v
Alkalis	NaOH	10% m/m
Alcohol	Ethanol	30% v/v
Bleaches	NaOCl	5% available chlorine
Staining agent	Methylene Blue	1% m/m

5.4.2 Apparatus

5.4.2.1 Borosilicate watch glasses

40 mm nominal diameter

5.4.2.2 Pipettes

5.4.2.3 Cleaning device

The cleaning device 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 $(1000 \pm 50)\text{g}$ 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 effected by a floating action between the drive shaft and the disc.