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**Plastics — Poly(methyl methacrylate)  
sheets — Types, dimensions and  
characteristics —**

**Part 1:  
Cast sheets**

*Plastiques — Plaques en poly(méthacrylate de méthyle) — Types,  
dimensions et caractéristiques —*

*Partie 1: Plaques coulées*



## 4 Composition

The amounts of plasticizing ingredients (materials that do not undergo chemical reaction to become a part of the polymer), other monomers and crosslinking agents (materials that produce the links between the chains of polymers) present shall be such that the basic properties are not changed from the values given in Table 3. These amounts are in most cases less than a mass fraction of 3 %.

Other additives, e.g. colorants, UV adsorbers and pigments, may be included to give specific properties.

National environmental legislation and regulations shall be followed regarding additives.

## 5 General requirements

### 5.1 Protective coverings

Unless otherwise agreed upon by the interested parties, the surfaces of the sheet, as delivered, shall be protected by suitable materials, for example kraft paper secured with a water-soluble or pressure-sensitive adhesive, or a polyethylene film, which are readily removable without causing surface contamination or damage.

### 5.2 Appearance

#### 5.2.1 Surface defects

The sheet shall have a smooth surface. There shall be no scratches, marks or other surface defects larger than 3 mm<sup>2</sup> each anywhere in the sheet.

#### 5.2.2 Inclusion defects

There shall be no bubbles, inclusions, cracks or other defects that could adversely affect the performance of the sheet in its intended application which are larger than 3 mm<sup>2</sup> each anywhere in the sheet.

#### 5.2.3 Classification of defects

The area of any defect found in the sheets shall be classified as specified in Table 1. Each defect shall be considered separately.

**Table 1 — Classification of defects**

Classification	Area of surface defect	Area of inclusion defect
Negligible	Less than 1 mm <sup>2</sup>	Less than 1 mm <sup>2</sup>
Acceptable	1 mm <sup>2</sup> to 3 mm <sup>2</sup>	1 mm <sup>2</sup> to 3 mm <sup>2</sup>

#### 5.2.4 Distribution of defects

**5.2.4.1** There shall not be a significant number (for the application) of small defects, each of which is defined as negligible in Table 1, within 1 m<sup>2</sup> anywhere in the sheet. What constitutes a significant number shall be agreed between the interested parties.

**5.2.4.2** No defect defined as acceptable in Table 1 shall be within 500 mm of another acceptable defect anywhere in or on the sheet.

### 5.3 Colour

The colour distribution shall be homogeneous, unless otherwise specified. Variations in colour shall be agreed upon between the interested parties.

### 5.4 Dimensions

#### 5.4.1 Length and width

The length and width of the sheet shall be agreed upon between the interested parties. For cut sheets, the tolerances for each sheet shall be as specified in Table 2.

**Table 2 — Tolerances on length and width of cut sheets**

Length or width mm	Tolerance mm
Up to 1 000	+3 0
From 1 001 to 2 000	+6 0
From 2 001 to 3 000	+9 0
3 001 and over	+0,3 % 0

#### 5.4.2 Thickness

The thickness tolerance for sheets in the range from 1,5 mm to 25 mm and up to 6 m<sup>2</sup> in area shall be  $\pm (0,4 \text{ mm} + 0,1h)$ , where  $h$  is the nominal sheet thickness in millimetres.

The tolerances apply within each sheet and from sheet to sheet.

#### 5.4.3 Tolerances for other sheet sizes

Tolerances for sheet sizes and thicknesses outside the above ranges shall be agreed upon between the interested parties.

#### 5.4.4 Conditions of measurement

Measurements of dimensions shall be made at room temperature, except that, in cases of dispute, measurements shall be made under standard conditions, as specified in ISO 291. For measurements made under ambient conditions, due allowance shall be made for dimensional changes due to the differences in temperature and relative humidity between test locations.

### 5.5 Basic and other properties

#### 5.5.1 Basic properties

The basic mechanical, thermal and optical properties of sheets shall be as specified in Table 3.

#### 5.5.2 Other properties

Other properties of sheets shall be agreed upon between the interested parties. Examples of, and test methods for, such properties are presented in Table 4.

**Table 3 — Basic properties of PMMA cast sheets — Required values**

Property	Unit	Test method	Required value	Subclause
Tensile strength	MPa	ISO 527-2/1B/5	min. 70	6.5.2
Tensile strain	%	ISO 527-2/1B/5	min. 4	6.5.2
Modulus of elasticity in tension	MPa	ISO 527-2/1B/1	min. 3 000	6.5.2
Charpy impact strength (unnotched)	kJ/m <sup>2</sup>	ISO 179-1/1fU	min. 13	6.5.3
Vicat softening temperature	°C	ISO 306:—, method B50	min. 105	6.6.1
Dimensional change on heating (shrinkage)	%	Annex A	max. 2,5	6.6.3
Total luminous transmittance <sup>a</sup>	%	ISO 13468-1	min. 90	6.8.1
Light transmittance at 420 nm (thickness 3 mm) <sup>a</sup>				
— before exposure to xenon lamp	%	ISO 13468-2	min. 90	6.8.3
— after exposure to xenon lamp for 1 000 h (ISO 4892-2:1994, method A)	%	ISO 13468-2	min. 88	6.8.3

<sup>a</sup> For transparent, colourless material.

**Table 4 — Other properties of PMMA cast sheets — Typical values**

Property	Unit	Test method	Typical value	Subclause
Flexural strength	MPa	ISO 178	100 to 115	6.5.1
Rockwell hardness		ISO 2039-2	100 to 105	6.5.4
Linear expansion coefficient	K <sup>-1</sup>	ISO 11359-2	$7 \times 10^{-5}$	6.6.4
Temperature of deflection under load	°C	ISO 75-2/A	95 to 100	6.6.2
Haze <sup>a</sup>	%	ISO 14782	0,5 to 1	6.8.2
Refractive index, $n_D^{23}$		ISO 489:1999, method A	1,49	6.8.4
Density <sup>a, b</sup>	g/cm <sup>3</sup>	ISO 1183-1:—, method A or C, or ISO 1183-2	1,19	6.9.1
Water absorption	%	ISO 62:1999, method 1 (24 h, 23 °C)	0,5 <sup>c</sup>	6.9.2

<sup>a</sup> For transparent, colourless material.  
<sup>b</sup> Coloured sheets may have a higher value.  
<sup>c</sup> Value reported refers to a square specimen of edge 50 mm and thickness 3 mm.

## 6 Test methods

### 6.1 General

#### 6.1.1 Sampling

The sampling procedure shall be agreed upon between the interested parties. The sampling procedure given in ISO 2859-1 is widely accepted and frequently used. Hence it is recommended.