



**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

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**Plastics - Poly(methyl methacrylate) sheets - Types, dimensions  
and characteristics - Part 3: Continuous cast sheets**

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### 1 Scope

This document specifies the composition, requirements, test methods, retesting and rejections of general-purpose unmodified polymethylmethacrylate (PMMA)

continuous cast sheets. Sheets can be colorless or colored, and can be transparent, translucent or opaque.

This document applies to PMMA continuous cast sheets with a sheet thickness range of 1 mm ~ 10 mm.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

ISO 62, Plastics - Determination of water absorption

ISO 75-2:2013, Plastics - Determination of temperature of deflection under load -Part 2: Plastics and ebonite

ISO 178, Plastics - Determination of flexural properties

ISO 179-1, Plastics- Determination of Charpy impact properties - Part 1: Non-instrumented impact test

ISO 291, Plastics - Standard atmospheres for conditioning and testing

ISO 306:2013, Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST)

ISO 489:1999, Plastics - Determination of refractive index

ISO 527-2, Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics Sheets with two parallel planes based on MMA homopolymer or copolymer of MMA monomer and acrylic acid or methacrylic monomer; the polymer is prepared by bulk polymerization using a suitable initiator.

4 Composition Plasticizers (materials that do not chemically react to become part of the polymer), other monomers and crosslinkers (materials that act as links between polymer chains) shall be added in amounts such that the basic properties given in Table 3 remain constant.

The mass fraction of these components is lower than 5% in most cases.

Other additives, such as colorants, UV absorbers and pigments to provide specific properties, can be added.

Relevant additives shall comply with the requirements of national environmental legislation and regulations.

## 5 Requirements

5.1 Protective layer Unless otherwise agreed between the parties concerned, the surface of sheets shall be protected by suitable materials at the time of delivery, so as to avoid surface contamination or damage. Examples include kraft paper secured with water-soluble or pressure-sensitive adhesives or easily removable polyethylene or polypropylene films.

### 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 with an area greater than 3 mm<sup>2</sup> anywhere on each sheet.

5.2.2 Inclusion defects There shall be no air bubbles, foreign matter, cracks or other defects with a size greater than 3 mm<sup>2</sup> anywhere in the sheet, which may affect the performance of the sheet in its intended application.

5.2.3 Defect categories The area of any defect found on the sheet shall be classified as specified in Table 1.

Each defect shall be counted separately.

The color difference between the reference substance (standard sample) and the test specimen shall be determined by a method agreed by the parties concerned.

#### 6.4 Dimensions

6.4.1 According to the requirements of 5.4.4, measure the length and width with a suitable measuring tool, accurate to 1.0 mm.

6.4.2 According to the requirements of 5.4.4, use a calibrated micrometer or dial gauge or an ultrasonic probe to measure the thickness, to an accuracy of 0.05 mm. The measuring point is at least 100 mm away from the edge of the sheet.

#### 6.5 Mechanical properties

6.5.1 The bending performance shall be tested in accordance with the provisions of ISO 178; it is recommended to use a 4 mm thick specimen for testing. When the specimen is machined to the specified dimensions, the original surface shall be in tension.

6.5.2 Tensile properties shall be tested in accordance with the provisions of ISO 527-2, and Type 1B specimens shall be used. The test speed for tensile strength and tensile strain at break shall be  $(5 \pm 1)$  mm/min, and the test speed for modulus of elasticity shall be  $(1 \pm 0.2)$  mm/min.

6.5.3 Charpy impact strength shall be tested in accordance with the provisions of ISO 179-1/1fU, and an unnotched specimen with a size of 80 mm x 10 mm x 4 mm shall be used. If the thickness direction of the specimen is machined to the specified size, the pendulum shall strike the surface opposite to the original surface.

6.5.4 The Rockwell hardness shall be tested in accordance with the provisions of ISO 2039-2, and the original surface shall be measured with the M scale.

#### 6.6 Thermal properties

6.6.1 The Vicat softening temperature shall be tested in accordance with the provisions of ISO 306:2013/B50, and the test surface shall be the original surface of the sheet. The heating rate is  $(50 \pm 5)$  °C/h. Before the test, the specimen shall be placed at  $(80 \pm 2)$  °C for 16 h, and then cooled to room temperature in a desiccator.

6.6.2 The load deformation temperature shall be measured according to method A in ISO 75-2:2013. Before the test, the sample shall be placed at  $(80 \pm 2)$  °C for 16 h, and cooled to room temperature in a desiccator. The test shall not be performed on specimens with a thickness less than 3 mm.

6.6.3 Shrinkage shall be tested according to Appendix A.

6.6.4 The linear expansion coefficient shall be tested according to the provisions of ISO 11359-2.

6.7 Combustion performance Combustion performance shall meet the provisions of laws and regulations in China.

#### 6.8 Optical properties

6.8.1 The total light transmittance shall be tested according to ISO 13486-1, using D65 light source, and the specimen thickness shall be 1.5 mm ~ 5 mm.

6.8.2 Haze shall be tested according to the provisions of ISO 14782, and the specimen thickness shall be 1.5 mm ~ 5 mm.

6.8.3 420 nm light transmittance, after exposure to xenon arc lamp for 1 000 h according to method A of ISO 4892-2:2013, the light transmittance of the material at 420 nm wavelength shall be measured by spectrophotometer according to ISO 13468-2; the specimen thickness is 1.5 mm ~ 5 mm. By agreement of the interested parties, the light transmittance of the material may also be measured after carbon-arc lamp aging (see ISO 4892-4).

6.8.4 Refractive index shall be tested according to the method stipulated in ISO 489:1999.

#### 6.9 Other properties

6.9.1 Density shall be tested according to method A or C of ISO 1183-1:2019 and ISO 1183-2.

6.9.2 Water absorption shall be tested according to method 1 of ISO 62, where the test temperature is 23°C, and the test time is 24 h.

6.9.3 The natural aging performance shall be tested in accordance with the provisions of ISO 877-1, ISO 877-2 and ISO 877-3; the aging under artificial light shall be tested in accordance with the provisions of method A of ISO 4892-2:2013. Changes in color and properties after exposure are tested in accordance with ISO 4582. The details of the above tests shall be agreed upon by the parties concerned.

7 Retesting and rejection In the event of a failure, the material may be retested by agreement between the parties involved.

#### Appendix NA (Informative)

Correspondence between Chinese documents and international documents normatively cited in this document The documents of our country that have a consistent correspondence with the international documents that are referenced in this document are as follows:

-- GB/T 1033.1-2008, Plastics - Methods for determining the density of non-cellular plastics  
- Part 1: Immersion method liquid pycnometer method and titration method (ISO 1183-1:2004, IDT)