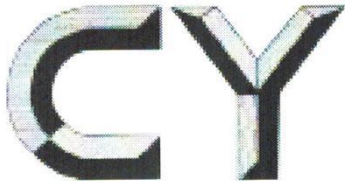


ICS 37.100.01

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Record No: 59769-2017



STANDARD OF THE PRESS AND PUBLICATION INDUSTRY OF THE PEOPLE'S REPUBLIC OF CHINA

CY/T 148-2016

Quality Requirements and Test Methods of Polymethyl Methacrylate (PMMA)

Mirror Decorative Panel

Issued date 2016-07-31

Implementation date 2016-07-31

Issued by State Administration of Press, Publication, Radio, Film and Television of The People's Republic of China

Foreword

The Standard was prepared in accordance with drafting rules specified in GB/T 1.1—2009.

Some contents in the Standard may involve patents. The unit issuing the Standard is not responsible to identify these patents.

The Standard was proposed by and under the jurisdiction of Technical Subcommittee of Screen Printing, the National Technical Committee 170 on Printing of Standardization Administration of China (SAC/TC 170/SC2).

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Quality Requirements and Test Methods of Polymethyl Methacrylate (PMMA)

Mirror Decorative Panel

1 Scope

The Standard specifies the terms, definitions, material requirements, finished product quality requirements and test methods of polymethyl methacrylate (PMMA) mirror decorative panel.

This Standard is applicable to the printing of decorative panel for domestic appliances.

2 Normative References

The following documents are essential for the application of this Standard. For dated reference documents, only dated version is applicable to this Standard. For undated reference documents, the latest version (including all modification lists) is applicable to this Standard.

GB/T 1216 Outside Micrometer

GB/T 1766—2008 Paints and Varnishes — Rating Methods of Coating Degradation

GB/T 2410 Determination of the Luminous Transmittance and Haze of Transparent Plastics

GB/T 2423.17 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test

Ka: Salt Fog

GB/T 7568.2 Specification Requirements for Standard Adjacent Fabrics of Cotton and Viscose

GB/T 9286 Paints and Varnishes - Cross Cut Test of Paint Film

GB/T 9761—2008 Paints and Varnishes - Visual Comparison of the Color of Paints

GB/T 14522—2008 Artificial Weathering Test Methods for Plastics, Coating and Rubber Materials Used for Machinery Industrial Products — Fluorescent UV lamps

GB/T 21389 Vernier, Dial and Digital Display Calipers

GB/T 26125 Electronic and Electrical Products - Detection Methods of Six Restricted Substances.....

GB/T 26572 Quantity Limitation Requirements for Restricted Substances in the Electronic and Electrical Products

GB/T 30775—2014 Pressure Sensitive Adhesive Tapes of PE Protective Film

QB/T 2424 Double-Faced Adhesive Tape

3 Terms and Definitions

The following terms and definitions are applicable to this standard.

3.1

specular gloss

The ratio of luminous flux reflected from object mirror to luminous flux reflected from glass mirror at the refractive index of 1.567.

Note: To determine the scale of specular gloss, the specular gloss is 100 when the polished black glass that has refractive index of 1.567 is 20° , 60° and 85°

[GB/T 9754—2007, Definition 3.1]

3.2

decorative panel

Decorative plates that are processed and installed on the product surface and have identification indication and operation functions.

3.3

mirror decorative panel

Decorative panel that has specular gloss.

3.4

view window

Partial transparent or semitransparent area on the decorative panel to display relevant functional information.

4. Material Requirements

4.1 Polymethyl methacrylate (PMMA) panel

4.1.1 The light transmittance is not less than 92%.

4.1.2 The surface should be applied with PE protective film which is stored at the relative humidity between 40% and 60% and at the temperature of $25^\circ\text{C} \pm 2^\circ\text{C}$.

4.2 Ink

The content of hazardous substance in the ink material should conform to GB/T 26572.

4.3 Double-faced adhesive tape

Double-faced adhesive tape should conform to QB/T 2424.

4.4 Protective film

Protective film should conform to GB/T 30775.

5 Requirements for Finished Product Quality

5.1 Appearance quality

5.1.1 View window area

There shall be no linear defect or any spot defect with diameter greater than 0.2mm.

5.1.2 Non-view window area

5.1.2.1 There shall be no spot defect with diameter greater than 0.5mm. The quantity of spot defect with

diameter greater than 0.2mm in the area 30mm × 30mm shall not exceed 1.

5.1.2.2 There shall be no linear defect that has width greater than 0.1mm or length greater than 1.5mm. The minimum space between two linear defects which have width not greater than 0.1mm and length not greater than 1.5mm shall not be less than 100mm.

5.2 Dimensional tolerance

The dimensional tolerances of length and width shall meet requirements in Table 1. The thickness tolerance shall meet requirements in Table 2.

Table 1 Dimensional Tolerance of Length and Width

Unit: mm

Length or width	Tolerance
(0,200]	±0.1
(200,500]	±0.3
(500,800]	±0.5
(800,1200]	±1.0
(1200,1500]	±1.5
(1500,2000]	±2.0
Note: (a,b] means a value greater than a and equal to or less than b. Same in other tables.	

Table 2 Dimensional Tolerance of Thickness

Unit: mm

Thickness	Tolerance
(0,1.00]	±0.05
(1.00, 3.00]	±0.10
(3.00, 5.00]	±0.15
>5.00	±0.20

5.3 Requirement of color in the non-specular gloss area

The color difference between finished products and standard samples shall be less than or equal to Level 2 in Table B.1 of GB/T 9761—2008.

5.4 Light transmittance of view window

The tolerance of light transmittance is $\pm 3\%$.

Note: The allowable light transmittance is between 7% and 13% when the nominal value is 10%.

5.5 Resistance to heat and humidity

Decorative panel shall be free from peeling, falling, crack and deformation after heat and humidity resistance test.

5.6 Thermocycling resistance

Decorative panel shall be free from peeling, falling, crack and deformation after thermocycling resistance test.

5.7 Aging resistance

Decorative panel shall meet Level 2 requirements in Table 1 of GB/T 1766~2008 after aging resistance test.

5.8 Ethanol resistance

Words and symbols on the surface of decorative panel should be complete, clear and recognizable without peeling after ethanol resistance test.

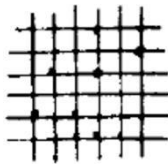
5.9 Salt fog resistance

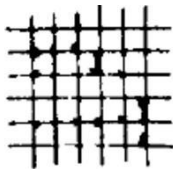


Decorative panel shall be free from peeling, falling, crack and deformation after salt fog resistance.

5.10 Coating adhesion

The degree of coating peeling of decorative panel shall be less than or equal to Level 2 in Table 3 after coating adhesion test.

Table 3 Classification of Adhesion Performance Test Results

Level	Description	Cross where peeling occurs Appearance of cutting area
0	Cutting edge is very smooth without any peeling.	-
1	A little coating peels off at the cutting cross but the affected cross cutting area is not obviously greater than 5%.	

2	Coating peels off at the cutting cross and/or cutting edge and the affected cross cutting area is obviously greater than 5%, but is not obviously greater than 15%.	
3	Partial or all coatings peel off in the form of large fragment along the cutting edge and/or in different grid areas. The affected cross cutting area is obviously greater than 15%, but is not obviously greater than 35%.	
4	Coating peels off in the form of large fragment along the cutting edge and/or partially or fully in some grids. The affected cross cutting area is obviously greater than 35%, but is not obviously greater than 65%.	
5	The degree of peeling exceeds Level 4.	

5.11 Requirements for environmental protection

Decorative panel shall meet GB/T 26572 Quantity Limitation Requirements for Restricted Substances in the Electronic and Electrical Products.

6 Test Methods

6.1 Appearance quality

Dimensions of spot defect and linear defect are measured with reading microscope at the division value 0.01mm.

6.2 Dimensional tolerance

6.2.1 Test conditions

Ambient temperature: $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$; relative humidity: 40%~80%.

6.2.2 Length and width

Measure with vernier caliper at the division value 0.02mm as specified in GB/T 21389.

6.2.3 Thickness

Measure with outside micrometer at the division value 0.001mm as specified in GB/T 1216.

6.3 Color

Detect the color in the same part of specimen and standard sample as per Article 8.2 in GB/T 9761—

2008.

6.4 Light transmittance of view window

Test with the method in GB/T 2410.

6.5 Resistance to heat and humidity

Keep samples in the heat and humidity test chamber for 48 hours at the temperature $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and relative humidity $95\% \pm 2\%$. Then, take them out. Observe 2 hours later.

6.6 Thermocycling resistance

Put samples in the controlled temperature cabinet with proper space. Keep temperature cycling between $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ as shown in Figure 1. Keep steady for 2 hours at least under each extreme temperature. Circulate five times, at most 6 hours for each time. Then, take out and naturally cool to room temperature. Observe after 30 minutes.

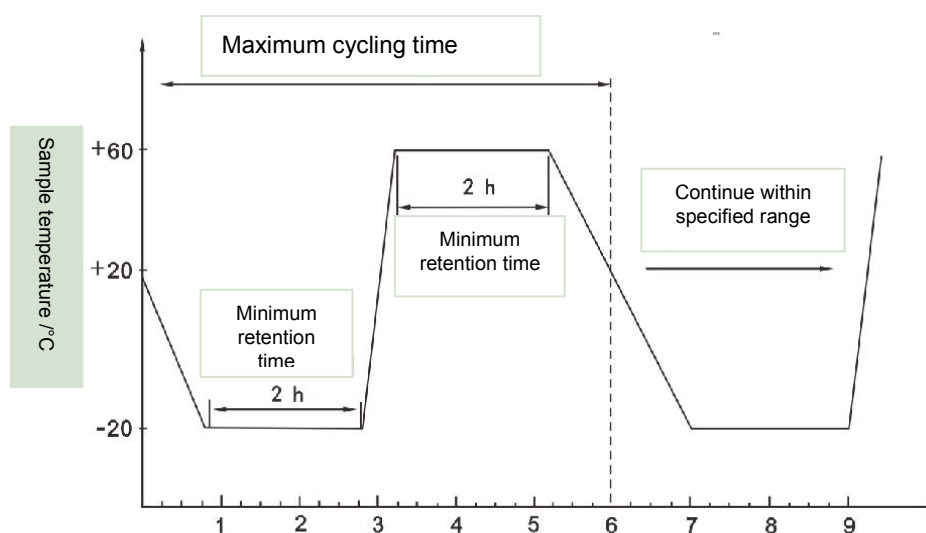


Figure 1 Thermocycling Resistance Test

6.7 Aging resistance

Test with UVA-351 fluorescent UV lamp that meets the requirements of GB/T 14522—2008 in the illumination aging mode as specified in GB/T 14522—2008. Take out after irradiation for 96 hours. Then, observe 2 hours later.

6.8 Ethanol resistance

6.8.1 Weight

500g standard cylindrical weight.

6.8.2 Rubbing cloth

Adopt square cotton rubbing cloth ($100\text{mm} \pm 2\text{mm}$) X ($100\text{mm} \pm 2\text{mm}$) as specified in GB/T 7568.2.

6.8.3 Test procedure

Lay a layer of rubbing cloth under the flat base of 500g standard cylindrical weight. Wet the bottom of rubbing cloth with ethyl ester at the level of reagent. Then, put it on the surface coating of sample to be

tested without additional pressure. Rub 100 times back and forth in parallel at the speed of once every second. A round trip is regarded as once. After test, remove sample. Then, observe after natural drying.

6.9 Salt fog resistance

Test samples as specified in GB/T 2423.17. After 48 hours, take out from test chamber and then clean. Visually inspect after natural drying.

6.10 Adhesion

Randomly select three different positions from a coating sample. Both the mutual space of their edges and the minimum space of coating edges are not less than 5mm. Test with the method in GB/T 9286. Keep cutting space at 2mm.

6.11 Requirements for environmental protection

Test as per GB/T 26125.

Reference

- [1] GB/T 9754—2007 Paints and Varnishes - Determination of Specular Gloss of Non-metallic Paint Films at 20° , 60° and 85°
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Standardized instructional technical documents for the press and publishing industry
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CY/T 148—2016

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Format 880 mm × 1230 mm 1/16 Sheet 1 Number of words 14 kwords
May 2017 1st edition May 2017 1st printing

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