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Screen Printing — Operating Requirements and Test Methods for Polyurethane Squeegee

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Foreword

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

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/SC 2).

Main drafting units: Wuxi Kehong Label Co., Ltd., Shenzhen Polytechnic, Tianjin Fudong Printing Material Factory, Shijiazhuang Jimei Rubber & Plastic Products Co., Ltd., Gaomi Zhonghe Clothing Co., Ltd., Fujian Jinjiang Jilong Machine Industry Co., Ltd., Wenzhou Changs Machinery Co., Ltd., Shantou Guoxing Printing Co., Ltd. and Zhongshan Textile Engineering Society.

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Screen Printing — Operating Requirements and Test Methods for Polyurethane Squeegee

1 Scope

The Standard specifies the terms, definitions, operating requirements and test methods of polyurethane squeegee.

The Standard is applicable to polyurethane squeegee for screen printing.

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 531 Test Methods of Indentation Hardness by Means of Pocket Rubber Hardness Meters

GB/T 1689 Determination for Abrasion Resistance of Vulcanized Rubber

GB/T 9056 Straight Steel Ruler

GB/T 22523 Feeler Gauge

JB/T 5384 Scanning Electron Microscope

JB/T 7974 Cast Iron Surface Plate

3 Terms and Definitions

The following terms and definitions are applicable to this standard.

3.1 squeegee

A device that keeps the screen printing plate against substrate closely to transfer printing ink to substrate through holes on the plate and also scrapes residual printing ink from the plate.

［Definition in 4.7 of GB/T 9851.6—2008］

3.2 squeegee blade

Rubber blade of squeegee, commonly known as squeegee

Note: adapt the definition in 4.8 of GB/T 9851.6—2008.

3.3 polyurethane

Polyurethane is fully named as polyamine urethane and collectively called as macromolecular compounds that contain repeated carbamate perssad (NHCOO) on the main chain. It is the polyaddition of organic diisocyanate or polyisocyanates and dyhydroxy or polyhydroxy compounds.

4. Requirements

4.1 Appearance

4.1.1 The cutting edge shall be free from pockmark, bubble, hollow, bulge, impurity or stain that has diameter equal to or greater than 0.05mm.

4.1.2 The surface shall be free from scratch that has the depth equal to or greater than 0.03mm, width equal

to or greater than 0.05mm and length equal to or greater than 5mm.

4.1.3 The flatness of cutting edge shall be less than 0.08%.

4.2 Physical properties

4.2.1 Hardness tolerance

Shore Hardness HA tolerance is ±2.

4.2.2 Abrasion resistance

Akron abrasion loss is not greater than 0.06cm3/1.61km.

4.3 Chemical resistance

4.3.1 Printing ink resistance

Samples are soaked in the printing ink for 24h. The ink resistance should conform to the regulations in Table 1.

Table 1 Printing Ink Resistance

No.	Name	Mass addition rate %	Shore hardness HA reduction
1	Solvent based heat curing ink	＜6	＜4
2	UV-light curing ink	＜2	＜4
3	Optical imaging and electroplate resistance corrosion inhibitor	＜8	＜4
4	Cold-setting solvent ink	＜10	＜6
5	Conductive ink	＜6	＜5

4.3.2 Solvent resistance

Samples are soaked in the solvent for 24h. The solvent resistance should conform to the regulations in Table 2.

Table 2 Solvent Resistance

No.	Name	Mass addition rate %	Shore hardness HA reduced by
1	Acetone	＜35	＜14
2	Cyclohexanone	＜16	＜9
3	Ethyl alcohol	＜2	＜3

4	Isophorone	＜8	＜6
5	Butyl glycol ether	＜4	＜5

4.4 Storage

4.4.1 It is not allowed to store together with solvent and acid-base.

4.4.2 Store in the dry condition within 12 months and avoid direct sunlight or heat source.

4.4.3 Squeegee should be kept spread and flat.

5 Test Methods

5.1 Appearance

5.1.1 Scratch on cutting edge and surface

Inspect with scanning electron microscope that complies with JB/T 5384.

5.1.2 Flatness of cutting edge

Take the squeegee that meets the requirement of 4.4 and has the length 1,000mm. As shown in Figure 1, naturally put it on the cast iron surface plate that meets the requirement of JB/T 7974. Measure the gap between squeegee and plate with feeler gauge that meets the requirement of GB/T 22523. Measure the gap length with straight steel ruler that meets the requirement of GB/T 9056 and has the division value equal to 1mm. Calculate the flatness of cutting edge according to the following formula.

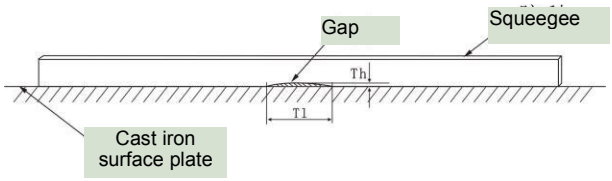

Figure 1 Schematic Diagram of Cutting Edge Flatness Test

$$Sm = \frac{Th}{Tl} \times 100\% \quad \text{……(1)}$$

In the formula:

Sm - flatness of cutting edge in the unit of percent (%);

Th - height of gap between squeegee and plate in the unit of millimeter (mm);

Tl - length of gap between squeegee and plate in the unit of millimeter (mm).

5.2 Physical indexes

5.2.1 Hardness

Test with the method in GB/T 531.

5.2.2 Abrasion resistance

Test as per GB/T 1689.

5.3 Chemical resistance

5.3.1 Printing ink resistance

5.3.1.1 Take and number 5 samples with the volume (25 mm × 25 mm × net thickness). Weigh them with the balance that has sense 0.01g. Respectively record the mass mo.

5.3.1.2 Respectively measure and record the hardness Ho of samples.

5.3.1.3 Soak the five measured samples in the ink completely. After 24h, take them out and wipe off the ink.

5.3.1.4 Respectively weigh these samples and record mi.

5.3.1.5 Respectively measure the hardness Hi of samples.

5.3.1.6 Mass addition rate

The mass addition rate (Δm) of a single sample is calculated according to Formula 2.

$$\Delta m = \frac{mi - mo}{mo} \times 100\% \quad \text{……(2)}$$

In the formula:

Δm - mass addition rate with the unit of percent (%);

mo - mass before sample soak with the unit of gram (g);

mi - mass after sample soak with the unit of gram (g).

Take the average of mass addition rates of 5 samples as the test result.

5.3.1.7 Hardness reduction

Calculate the hardness reduction value (ΔH) according to Formula 3.

$$\Delta H = Ho - Hi \quad \text{……(3)}$$

In the formula:

ΔH - Hardness reduction value;

Ho - Hardness before sample soak;

Hi - Hardness after sample soak.

Take the average of hardness reduction values of 5 samples as the test result.

5.3.2 Solvent resistance

Test with the method in 5.3.1.

Reference

[1] GB/T 9851.6—2008 Terminology of Printing Technology Part 6: Terminology of Porous Printing

Standardized instructional technical documents for the press and publishing industry
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