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**Test method for fineness of ink**

油墨细度检验方法

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# Test method for fineness of ink

## 1 Scope

This document describes the test method for fineness of ink.

This document applies to paste ink and liquid ink products.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1724-2019, *Paints, varnishes and printing inks - Determination of fineness of grind*

GB/T 14624.3, *Test method for fluidity of offset ink*

GB/T 18723, *Graphic technology - Determination of tack of paste inks and vehicles by a rotary tack meter*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1 paste ink

The ink that is a dispersion system composed of colorants, binders, auxiliary agents, is the colored substance that is transferred to the substrate during the printing process. Its appearance has a certain shape in a short period of time but has no definite shape after a certain period of time, like pulp.

### 3.2 liquid ink

The ink that is a dispersion system composed of colorants, binders, auxiliary agents, is the pigmented substance that is transferred to the substrate during the printing process. Its appearance is indeterminate, like liquid.

### 3.3 fineness

The degree to which powdery substances such as pigments and fillers in the ink are ground and dispersed in the binder.

[Source: GB/T 15962-2018, 4.37]

### **3.4 tack**

The resistance that the thin layer of ink resists separation between two contact surfaces.

[Source: GB/T 15962-2018, 4.38]

### **3.5 fluidity**

It is an indicator to reflect the ink fluidity. It refers to the expansion of a certain volume of ink into the diameter of a cylinder under a specified pressure and after a certain period of time, expressed in mm.

[Source: GB/T 15962-2018, 4.54, modified]

## **4 Tools and materials**

**4.1 Varnish:** At 25°C, the tack is 140mPa·s~160mPa·s (based on linseed oil).

**4.2 Ink suction tube:** 0.5mL.

**4.3 Graduated pipette (pipette):** capacity is 2mL; division value is 0.02mL.

**4.4 Magnifying glass:** 5 times to 20 times.

## **5 Test conditions**

The test shall be carried out at a temperature of (23±2)°C.

## **6 Test methods**

### **6.1 Ink fineness line trace method (Method One)**

#### **6.1.1 Principle**

Place the ink on the fineness plate whose groove depth varies continuously from 25μm to 0μm in a straight line. Scrape the ink film with a scraper. Judge the size of the ink particles from the lines generated in the ink film, so as to infer the degree of ink grinding and dispersion. Judge the fineness of the ink by the position and number of line traces, expressed in microns (μm).

#### **6.1.2 Scraper fineness meter**

**6.1.2.1** Scraper fineness meter includes scraper and slicker. A schematic diagram of a

typical 0 $\mu$ m~25 $\mu$ m double-slot scraper fineness meter is shown in Annex A.

**6.1.2.2** The scraper is made of hardened steel or stainless steel with a length of about 240mm, a width of about 89mm, and a thickness of about 15.8mm~25.4mm, which has a certain hardness and wear resistance. Polish the upper surface of the scraper. Open one or two grooves with a length of about 158.7mm and a width of about 25.4mm parallel to the long side of the scraper on it. The depth of each groove shall decrease evenly along the long side of the scraper. The deep end of the groove is 25 $\mu$ m. The depth of the other end is 0 $\mu$ m. The graduation value is 2.5 $\mu$ m.

**6.1.2.3** The slicker is made of single-edged or double-edged steel sheet with a length of about 95mm, a width of about 40mm and a thickness of about 6.4mm. The blade on the long side shall be straight and rounded. The corner radius is about 0.38mm.

### 6.1.3 Test steps

**6.1.3.1** Clean the scraper and slicker of the scraper fineness meter with a suitable solvent.

**6.1.3.2** Place the test ink in the test room. Make the temperature constant to indoor temperature of (23 $\pm$ 2) $^{\circ}$ C. Then use the ink knife to take an appropriate amount of the test ink. Place it on the glass plate. The paste ink or liquid ink with tack lower than 7 is directly tested after stirring evenly. For the paste ink with tack greater than 7, use varnish to adjust the tack to 7 $\pm$ 1. Test after stirring evenly (for the test color paste ink, according to its leveling difference, add an appropriate amount of leveling agent, stir evenly and test). The tack is carried out according to the method specified in GB/T 18723.

**6.1.3.3** Use the ink knife to take the appropriate amount of the above ink. Place at the groove depth of 25 $\mu$ m (10 scale) of the scraper. Place the slicker vertically on the ink at the groove of the scraper. Keep the slicker vertical. Pinch the upper ends of the slicker with both hands. Scrape down evenly with appropriate force. The paste ink is scraped to 0 $\mu$ m (0 scale) within 7s~10s, while the liquid ink is scraped to 0 $\mu$ m (0 scale) within 1s~2s. Fill the two-slot groove with ink. No residual ink is left on the flat surface.

**6.1.3.4** After scraping, immediately observe the surface of the two-slot groove of the scraper at an angle of 15 $^{\circ}$ ~30 $^{\circ}$ . Read the number of scribe marks and the corresponding scale value of the ink on the two-slot groove. If the fluidity of the test ink makes it impossible to obtain a flat pattern after scraping, add a minimum amount of suitable diluent and mix well. Repeat the test. Sometimes, dilution of the test ink may flocculate and affect the test results.

**6.1.3.5** Test the scratch line with a length greater than 10mm by the scraping of the slicker. Observe the number of line marks on the surface of the ink film of a groove. At any position, the scale position that first appears more than 3 lines (including 3 lines) is a. The position of the scale with more than 10 lines (including 10 lines) is b (see Figure 1). Read these two values according to the accuracy requirements of 1/2 the minimum

### 6.2.3 Test steps

**6.2.3.1** Use a suitable solvent to clean the scraper and slicker of the scraper fineness meter.

**6.2.3.2** Place the test ink in the test room. Make the temperature constant to indoor temperature ( $23\pm 2$ )°C. Then use the ink suction tube to take 0.5mL of the test ink. Or use the ink knife to take 0.5g of the test ink. Place on a glass plate. Evenly stir the paste ink and liquid ink with fluidity above 46mm. Then test directly. But for the paste ink with fluidity below 46mm, according to the size of its fluidity, add varnish or suitable solvent to dilute. When the fluidity is below 24mm, use a dropper to add 18 drops (or add 0.36mL with a pipette). Add 14 drops (or 0.28mL) at 25mm~30mm, 12 drops (or 0.24mL) at 31mm~35mm, 10 drops (or 0.20mL) at 36mm~45mm. Stir evenly and test. The fluidity is carried out according to the method specified in GB/T 14624.3.

**6.2.3.3** Take the appropriate amount of the above ink with the ink knife. Place at the deep end of the groove of the scraper. Place the slicker vertically across the ink at the deep end of the groove at the upper end of the scraper. Keep the slicker vertical. Pinch the upper ends of the slicker with both hands. Scrape down evenly with appropriate force. Within 3s, scrape to 0 $\mu$ m. Make the ink fill the groove, and leave no residual ink on the flat surface.

**6.2.3.4** After scraping, immediately observe the surface of the scraper at an angle of 15°~30°. Check the groove surface visually or with a 5x~20x magnifying glass. Accurately read the particle density point value presented by the ink on the groove within 5s. If the fluidity of the test ink makes it impossible to obtain a flat pattern after scraping, appropriate diluents can be added in minimum amounts. Stir evenly. Repeat the test. Sometimes, dilution of test ink may flocculate and affect the test results.

**6.2.3.5** Observe the number of particles on the surface of the ink film of the groove. Dense grains appear first, especially where 5~10 grains are contained within a 3mm wide strip spanning the groove (see Figure 2). The possible scattered dots above where the dense particle dots appear can be disregarded. Determine the position of the upper limit of this strip. Read with the following accuracy requirements.

- The scraper fineness meter with a range of 25 $\mu$ m is 1 $\mu$ m;
- The scraper fineness meter with a range of 50 $\mu$ m is 2 $\mu$ m;
- The scraper fineness meter with a range of 100 $\mu$ m is 5 $\mu$ m.

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