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General Methods for preparation of coating films

漆膜一般制备法

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Table of Contents

Foreword.....	3
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions.....	6
4 Instruments and materials.....	7
5 Samples.....	9
6 Preparation methods of paint films.....	9
Appendix A.....	13

General Methods for preparation of coating films

1 Scope

This document specifies the instruments, materials, samples, and preparation methods involved in the preparation of paint films.

This document is applicable to the preparation of paint films coated on (test panels and test pieces) used for the determination of paint film properties. The preparation methods include commonly-used laboratory methods, such as brushing methods, spraying methods, dip-coating methods, and scraping-coating methods.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 3186 Paints, varnishes and raw materials for paints and varnishes -- Sampling

GB/T 9271 Paints and varnishes standard panels for testing

GB/T 9278 Temperatures and humidity for conditioning and testing of paint specimens

GB/T 13452.2 Paints and varnishes -- Determination of film thickness

GB/T 20777 Paints and varnishes -- Examination and preparation of samples for testing

GB/T 23981.1-2019 Paints and varnishes -- Determination of hiding power -- Part 1: Determination of contrast ratio of white and light paints

GB/T 37356 Paints and varnishes -- Lighting and procedure for visual assessments of coatings

3 Terms and definitions

There are no terms and definitions that need to be defined in this document.

4 Instruments and materials

4.1 Paintbrushes

Width: 25 mm~35 mm.

4.2 Air spray equipment

It consists of a compressed air source, an oil-water separation device, an air storage tank, a hose, a spray gun, etc. Unless otherwise specified, the inner diameter of the gun nozzle is 0.75 mm~2 mm.

4.3 Scraping-coating devices

4.3.1 Putty film doctor-blade coaters

Unless otherwise specified, it consists of mold frames with different thicknesses and a doctor-blade frame. The thickness of the mold frame is selected according to the thickness of the putty film.

4.3.2 Wire rod coaters

It is composed of a rod body and a metal wire, all of which are made of stainless steel. Metal wires of different diameters are tightly wound around the rod to form coaters of different specifications.

4.3.3 Gap-type Wet Film Preparers

It is precisely machined from corrosion-resistant materials. The working surface's two ends are datum planes with the same level, and the middle part has a gap with a certain depth (relative to the datum plane). The geometry of the working surface and the depth of the gap are related to the thickness of the wet film produced by scraping-coating, but the depth of the gap is not equal to the wet film thickness.

4.3.4 Automatic Coaters

A wire rod coater (4.3.2) and a gap-type wet film preparer (4.3.3) can be fixed on the equipment for automatic coating; the coating stroke and coating speed can be set; the maximum coating stroke shall meet the requirements of plate making. When preparing the paint film for polyester film substrate, there shall be a vacuum adsorption device on the coating platform.

4.4 Viscometers

Tu-4 Viscometer or ISO Outflow Cup, etc.

4.5 Stopwatches

The accuracy shall be at least 0.2 s.

4.6 Ovens

It can be tested under safe conditions and can be maintained within ± 2 °C of the specified or agreed temperature. The oven shall be equipped with a forced ventilation.

4.7 Substrates and treatment of substrates

4.7.1 General requirements

Unless otherwise specified, the substrate material and surface treatment shall be carried out in accordance with the provisions of GB/T 9271.

4.7.2 Tinplate

Unless otherwise specified, the dimensions shall be 25 mm×120 mm×(0.2 mm~0.3 mm), 50 mm×120 mm×(0.2 mm~0.3 mm) or 70 mm×150 mm×(0.2 mm~0.3 mm).

4.7.3 Cold-rolled steel plates

Unless otherwise specified, the dimensions shall be 50 mm×120 mm×(0.45 mm~0.55 mm), 70 mm×150 mm×(0.45 mm~0.55 mm) or 70 mm×150 mm×(0.8 mm~1.2 mm).

4.7.4 Hot-rolled steel sheets

Unless otherwise specified, the dimensions shall be 70 mm×150 mm×(3 mm~5 mm).

4.7.5 Glass plates

Unless otherwise specified, the dimensions shall be 90 mm×120 mm×(2 mm~3 mm), 100 mm×100 mm×(4 mm~6 mm) or 100 mm×150 mm×(2 mm~3 mm).

4.7.6 Aluminum plates

Unless otherwise specified, the dimensions shall be 70 mm×150 mm×(1 mm~2 mm), 100 mm×100 mm×(1 mm~2 mm) (center opening) or $\phi 100$ mm (center opening).

4.7.7 Non-asbestos fiber cement slabs

Unless otherwise specified, the dimensions shall be 70 mm × 150 mm × (4 mm~6 mm) or 150 mm × 430 mm × (4 mm~6 mm).

4.7.8 Polyester films

Unless otherwise specified, the thickness shall be 30 μm ~ 50 μm , and its size shall not

according to the above method.

6.2.5 Scraping-coating methods

6.2.5.1 Putty film doctor-blade coating methods

Put a mold frame with suitable thickness and a doctor-blade frame on the substrate, and put an appropriate amount of putty in the mold frame; then, use a metal doctor-blade to spread the putty evenly on the substrate, to form a uniform and flat putty film; finally, remove the mold frame and the doctor-blade frame.

6.2.5.2 Paint film scraping-coating methods

6.2.5.2.1 Using wire rod coaters or gap-type wet film preparers

Place the substrate on the platform and fix it; if the substrate is a polyester film (4.7.8), make preparations as the method specified in 5.3.1.1a) or 5.3.1.1b) of GB/T 23981.1-2019.

Choose a suitable wire rod coater (4.3.2) or a gap-type wet film preparer (4.3.3), and place it on one end of the substrate; the long side of the wire rod coater or the gap-type wet film preparer shall be roughly parallel to the short side of the substrate (or place it in the specified position of the substrate). Then, place an appropriate amount of sample evenly in front of the wire rod coater or the gap-type wet film preparer; hold the wire rod coater or the gap-type wet film preparer, press downward with a certain force, and make it slide across the substrate at a constant speed about 150 mm/s; then, the substrate will be coated by a paint film of required thickness. When moving the wire rod coater or the gap-type wet film preparer, it shall not be rotated and laterally moved.

6.2.5.2.2 Using automatic coaters

Place the substrate on the coating platform of the automatic coater (4.3.4) and fix it; if the substrate is a polyester film (4.7.8), make preparations it by the method specified in 5.3.1.1c) of GB/T 23981.1-2019.

Select an appropriate length of stroke according to the requirements of the product; apply loads to the two ends of the wire rod coater (4.3.2) or the gap-type wet film preparer (4.3.3) as specified or agreed; set an appropriate coating speed according to the characteristics of the sample. If it is to coat on flexible or thin substrates, turn on the vacuum adsorption device of the automatic coater, to make the substrate attach to the coating platform flat and tightly.

6.3 Drying and adjustment of paint films

After coating, each painted test panel or test piece shall be dried (or baked) under the specified conditions and cured according to the specified time. Unless otherwise

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