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**CHEMICAL INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

HG/T 2377-2009

**Virteous and porlelain enamels. Determination of resistance to
boiling water and vapouy**

搪玻璃层耐沸腾水及水蒸汽腐蚀性能的测定

(English Translation)

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1 Scope

This standard specifies the method for measuring the corrosion resistance of vitreous and porcelain enamels to boiling water and water vapor.

This standard applies to the determination of the corrosion resistance of vitreous and porcelain enamels to boiling water or water vapor.

This standard is also applicable to the determination of the corrosion resistance of vitreous and porcelain enamels to other corrosive media in liquid phase and gas phase.

Note 1: When the test temperature is lower than the boiling point of water, it shall be indicated in the test report.

Note 2: The pH value of water and the substances contained in it determine the corrosion resistance of the vitreous and porcelain enamel to water. In addition, the corrosion products of the vitreous and porcelain enamel and the corrosion products of borosilicate glass instruments used in the test will also affect the measurement results under liquid phase conditions. Therefore, different test results will be obtained depending on the corrosion time (see note in 8.1).

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the

referenced document applies.

GB/T 676-2007 Chemical reagent - Acetic acid (neq ISO 6353-2:1983, Reagents for chemical analysis - Part 2: Specifications - First series)

GB/T 678-2002 Chemical reagent - Ethanol (neq ISO 6353-2:1983, Reagents for chemical analysis - Part 2: Specifications - First series)

GB/T 7989-2003 Vitreous and porcelain enamels - Determination of resistance to condensing hydrochloric acid vapor (mod ISO 2743:1986, Vitreous and porcelain enamels - Determination of resistance to condensing hydrochloric acid vapor)

GB/T 12804-1991 Laboratory glassware - Graduated measuring cylinders (neq ISO 4788:1980, Laboratory glassware - Graduated measuring cylinders)

HG/T 3105-1987 Vitreous and porcelain enamels for sheet steel - Production of specimens for testing (neq ISO 2723:1973, Vitreous and porcelain enamels for sheet steel - Production of specimen for testing)

3 Principles

The vitreous and porcelain enamel is corroded by boiling water and vapor for 48 h (2 d) or 336 h (14 d); the corrosion weight loss is measured, to calculate the corrosion rate.

The lower the corrosion rate, the better the water corrosion resistance of the vitreous and porcelain enamel.

4 Reagents

It shall use the proven and qualified reagents.

4.1 Distilled water or demineralized water

Freshly prepared distilled or demineralized water is used for each test.

4.2 Acetic acid solution

The concentration of acetic acid solution, which is used in the test, is 5% (volume fraction), which meets the requirements of GB/T 676 and is used to clean test devices and test pieces.

4.3 Cleaning agent

The cleaning agent is absolute ethanol (C_2H_5OH), which meets the requirements of GB/T 678, OR use water containing a little liquid cleaning agent to clean the specimen or remove oil stains on the surface of the specimen.

4.4 Neutral detergent

Neutral detergent is used to clean the stains on the surface of the test piece.

5 Instruments and devices

5.1

Test device

The same as the test device, which is specified in Chapter 5 of GB/T 7989.

5.2

Oven

0 °C ~ 150 °C.

5.3

Dryer

The inner diameter is greater than 200 mm.

5.4

Graduated cylinder

500 mL, which meets the requirements of GB/T 12804.

5.5

Balance

Accuracy 0.2 mg.

5.6

Sponge

Soft.

6.1 Preparation of specimens

Prepare specimens, according to HG/T 3105. The number of specimens shall be sufficient for the test. Single-sided vitreous and porcelain enamel specimens are only suitable for short-term tests (48 h).

6.2 Selection of test pieces

Remove the specimens, which have uneven surface, cracked porcelain, cracks, powder tumors and other defects. Make it subject to and pass the 10 kV high-voltage testing.

Finally, grind off all the vitreous and porcelain enamels that may be peeled off around and on the back of the specimen. The number of selected specimens shall not be less than 4.

6.3 Treatment of specimens

Use a sponge, which is dipped in neutral detergent (see 4.4), to scrub the first. Use tap water to rinse it clean. Then use distilled water (see 4.1) to rinse it. Use absolute ethanol (see 4.3) to wash it 2 ~ 3 times. Use hair dryer to blow it dry. Dry it in an oven, at $110\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ (see 5.2) for 2 hours. Then move it into a desiccator (see 5.3) AND place it for more than 4 hours. Use a balance (see 5.5), to weigh the initial mass m_0 , accurate to 0.2 mg.

6.4 Number of specimens

There are 4 specimens in total, two for liquid phase test and two for gas phase test.

7 Test steps

7.1

Place the specimen in the test device (see 5.1). The side with the vitreous and porcelain enamel faces the inner side of the glass cylinder. Tighten the three wing nuts evenly, to ensure that the test device is watertight.

7.2

Install the reflux condenser. Inject 450 mL of distilled water (see 4.1) into the test device, through the interface of the reflux condenser. Turn on the power, to start heating.

When the test solution boils, start timekeeping. Adjust the temperature controller, so

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