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# NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA



# GB/T 7991.4-2019

## Test method of vitreous and porcelain enamels - Part 4: Determination of resistance to impact

搪玻璃层试验方法 第4部分：耐机械冲击性能的测定

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## Foreword

GB/T 7991 "Test method for glass lined layer" is divided into 10 parts.

--- Part 1. Determination of corrosion resistance of alkaline solutions;

--- Part 2. Determination of resistance to boiling acids and their vapor corrosion;

--- Part 3. Determination of resistance to sudden changes in temperature difference;

--- Part 4. Determination of mechanical shock resistance;

--- Part 5. thickness measurement by electromagnetic method;

--- Part 6. High voltage test;

--- Part 7. Determination of the average linear thermal expansion coefficient;

--- Part 8. Determination of scratch resistance;

--- Part 9. Determination of tensile strength;

--- Part 10. Determination of lead and cadmium dissolution. This part is Part 4 of GB/T 7991. This section is drafted in accordance with the rules given in GB/T 1.1-2009. This section replaces GB/T 7990-2013 "Test method for resistance to mechanical shock of glass lined layer". Compared with GB/T 7990-2013, The main technical changes outside the editorial changes are as follows:

--- Modified Chapter 4 "Instruments and Equipment", the steel ball clamping release was changed from "mechanical clamping" to "electromagnetic clamping" (see 4.1, 4.7,.2013 Version 4.1);

--- Increased the storage requirements of steel balls "should be placed in a dry dish when not in use" (see 4.8);

--- Added "The thickness of the sample glass-lined layer shall comply with the provisions of HG/T 3105, or as agreed by the relevant parties, in accordance with GB/T 7991.5 regulations Measurement method "(see 5.4);

## 1 Scope

Part 4 of China's national test methods for vitreous and porcelain enamel, determining resistance to impact. Enamel is glass fused onto steel, and its virtues and its single weakness both come from that. It is as chemically resistant and as cleanable as glass while having steel's strength behind it, which is why it lines cookware, water heaters, chemical reactors and architectural panels. But it is glass: it does not dent, it chips, and a chip exposes bare steel that then corrodes underneath the coating and lifts more of it. In a glass-lined reactor a chip is a failure of containment; in a water heater it is where the tank will perforate. So impact resistance is the property that determines service life, and it is measured by dropping a defined mass on the surface and finding the energy at which the coating fails. This part specifies the test principles, apparatus, specimens, procedure, calculation and report, and applies to the determination of mechanical impact resistance on flat enamelled specimens.

This part of GB/T 7991 specifies the test principles, equipment, test specimens, test procedures, and calculation methods for the mechanical impact resistance of glass-lined layers. Calculation formula and test report. This section applies to the determination of the mechanical impact resistance of glass-lined flat specimens.



## 2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this article Pieces. For undated references, the latest version (including all amendments) applies to this document.

GB/T 308.1 Rolling bearing balls Part 1. Steel balls

GB/T 7991.5 Test methods for glass-lined coatings. Part 5. Measurement of thickness by electromagnetic method

GB/T 7991.6 Test method for glass lined layer-Part 6. High voltage test Preparation of

HG/T 3105 steel plate lined glass specimen

## 3 Principle

A steel ball of a specified quality and diameter falls freely and impacts the glass-lined layer of the sample vertically, and the glass-lined layer is cracked, powdered, peeled, and broken. The falling height of the steel ball during the cracking phenomenon is calculated by the falling impact energy of the steel ball.

## 4 Equipment

4.1 The instrument and equipment are shown in Figure 1. The functions of each component

are shown in 4.2 ~ 4.14.

4.2 Electromagnetic control switch. It can control the adsorption and release of steel balls.

4.3 Support rod. support steel ball release, height at least 600mm, diameter 30mm, material. carbon steel, chrome-plated outer surface.

4.4 Set screw. Fix the steel ball release at a certain height.

4.5 Connecting rod. connect the supporting rod and the electromagnetic release.The connecting rod should have sufficient strength to ensure that the electromagnetic release will not occur after the steel ball is adsorbed. bending.

4.6 Laser rangefinder. used to measure the falling height of the steel ball and the impact position of the positioning steel ball, the accuracy should reach. ± 1.5mm.

4.7 Electromagnetic release (see Figure 2). It can provide at least 120g of electromagnetic adsorption force, which is controlled by an electromagnetic control switch (4.2) for adsorption and release Put the steel ball.

4.8 Steel ball. The diameter is 30mm, the weight is about 110g, and it should meet the requirements of GB/T 308.1. Store in a dry dish when not in use.

4.9 Sand layer. quartz sand, thickness. 6mm ~ 7mm, particle size range. 0.4mm ~ 0.8mm, the sand layer is set to ensure that the sample is placed horizontally. Place in the sample holder (4.10).

4.10 Specimen holder (see Figure 3). steel parts, chrome-plated on the outer surface, outer dimensions are 160mm x 160mm x 50mm, and the inner hole size is 82mm x 82mm x 10mm, the inner hole is located in the center of the chassis. The specimen holder can move freely on the base.

4.11 base (see Figure 4). steel parts, the outer surface is chrome-plated. The dimensions are 370mm x 270mm x 20mm.