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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 7991.10-2024

Replacing GB/T 7991.10-2014

**Test method of vitreous and porcelain enamels - Part 10: Determination
of dissolution of heavy metal ions from enamelled articles used for
preparation and storage of food and limits**

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting is required.

This document is part 10 of GB/T 7991 "Test methods for glass-lined coatings". GB/T 7991 has published the following parts.

Part 1: Determination of corrosion resistance to alkaline solutions;

Part 3: Determination of resistance to sudden temperature changes;

Part 4: Determination of resistance to mechanical impact; -Part 5: Measurement of thickness by electromagnetic method; -Part 6: High voltage test; -Part 7: Determination of the mean linear coefficient of thermal expansion;

Part 9: Determination of tensile strength; -Part 10: Determination and limits of heavy metal ion release from the glass-lined layer of glass-lined equipment for the production and storage of food.

This document replaces GB/T 7991.10-2014 "Test methods for glass-lined layer - Part 10: Determination of lead and cadmium dissolution" Compared with GB/T 7991.10-2014, in

addition to structural adjustments and editorial changes, the main technical changes are as follows.

Added the provisions on the types and limits of heavy metal elements applicable to this document (see Chapter 1, Chapter 1 of the 2014 edition); a) the "Test Principles" has been changed (see Chapter 4, Chapter 3 of the 2014 edition); b) Changed "Reagents" (see Chapter 5, Chapter 4 of the 2014 edition); c) Changed "Test equipment and instruments" (see Chapter 6, Chapter 5 of the 2014 edition); d) Deleted "Preparation of standard solutions" (see Chapter 6 of the 2014 edition); e) the requirements for specimen preparation, cleaning and drying have been changed (see Chapter 7, 7.1 to 7.3 of the 2014 edition); f) Added "Test conditions" (see Chapter 8); g) the "Test Procedure" has been changed (see Chapter 9, 7.4 to 7.7 of the 2014 edition); h) Changed "Result Calculation" (see Chapter 10, 7.8, 7.9 of the 2014 edition); i) Added the limit value of heavy metal ion dissolution from the glass-lined layer of glass-lined equipment (see 10.3). j) this document is modified to adopt ISO 4531:2022 "Glass-lined enamels and glass-lined equipment - Heavy metal ions for glass-lined equipment in contact with foods".

"Determination method and limit of dissolution amount of particles".

Compared with ISO 4531:2022, this document has many structural adjustments. Comparison table of structural number changes between the two documents See Appendix A.

The technical differences between this document and ISO 4531:2022 and their reasons are as follows.

The normative references GB/T 6682 replace ISO 3696 (see 5.1), and HG/T 3115 replace ISO 3585 (see 6.1.2, 6.1.6), GB/T 12804 replaced ISO 4788 (see 6.3.1), GB/T 12808 replaced ISO 648 (see 6.3.2), GB/T 12806 replaced ISO 1042 (see 6.3.3), HG/T 3105 replaced ISO 28764 (see 7.1) to adapt to my country's technical conditions and improve operability;

For "acetic acid" in 5.2 and "beaker" in 6.13 of ISO 4531:2022, quality requirements are added (see 5.2, 6.3.4).

The normative references GB/T 676 (see 5.2) and GB/T 15724 (see 6.3.4) were added to provide the requirements for acetic acid and beaker.

Clearer quality requirements;

Added the provisions for anhydrous ethanol (see 5.4) and added the normative reference GB/T 678 (see 5.4) to clarify the quality requirements of anhydrous ethanol to ensure that the sample can be quickly dehydrated when blown dry;

Added structural diagrams of test device, glass cylinder and flange plate (see 6.1.1, 6.1.2, 6.1.7), which helps to make it more intuitive.

Understand the structural types of the test device, glass cylinder and flange plate;

Added the requirement that the two end surfaces of the glass cylinder should be flat (see 6.1.2) to increase the sealing reliability of the test device;

Added the provisions for hexagon nuts (see 6.1.8), wing nuts (see 6.1.9) and studs (see 6.1.10), clarifying their materials, Quantity and specification requirements to ensure the stability and safety of the test device during the test;

The provisions for drying ovens (see 6.4) have been added to ensure that the specimens are treated uniformly and stably during the drying process, thereby reducing the risk of Experimental errors caused by differences in equipment performance;

Provisions for desiccators (see 6.5) have been added to ensure that the desiccators can accommodate an adequate number of samples and, at the same time, help maintain the air in the dryer circulates to improve the drying effect of the sample;

The requirement for single-marked volumetric flasks of 100 mL or other specifications in 6.2 of ISO 4531:2022 and single-marked pipettes in 6.3 have been deleted.

The volumetric flask may also adopt other specifications, the measuring cylinder in 6.4 may also adopt other specifications, and the test liquid and sample in 6.6 may also adopt other specifications.

The calculation process of the ratio (S/V) of the contact area (S) to the volume (V) of the test fluid, as these contents are not applicable to glass-lined Determination of heavy metal ion dissolution in the glass-lined layer of equipment;

Added requirements for specimen selection (see 7.2) to ensure that specimens do not contain unacceptable defects before testing; -Deleted 6.5, 6.14, paragraph 3 of Chapter 7, paragraph 2 of Chapter 8, paragraphs 3 and 6 of Chapter 9 of ISO 4531:2022 and 10.1.2, because these contents are technical regulations for enameled products and are not applicable to glass-lined equipment.

The following editorial changes were made to this document.

The name of the standard has been changed to "Test methods for glass-lined layers - Part 10: Medium and heavy glass-lined layers of glass-lined equipment for the production and storage of food".

Determination and Limit of Metal Ion Dissolution";

The mass concentration symbol of the element to be measured is represented by, and the mass concentration symbol of the element to be measured in the test solution is changed from "M3" to " ", the symbol of mass concentration of the element to be measured in the blank solution is changed from "B3" to " ";

Deleted the informative Appendix A; -Removed references. -

Introduction

GB/T 7991 aims to accurately measure the performance data of the glass-lined layer and is intended to consist of 10 parts.

Part 1: Determination of corrosion resistance to alkaline solutions. The purpose is to test the corrosion resistance of the glass-lined layer to alkaline solutions.

Part 2: Determination of resistance to corrosion by boiling acid and its vapor. The purpose is to test the resistance of the glass-lined layer to corrosion by boiling acid and its vapor.

Corrosion performance.

Part 3: Determination of resistance to sudden temperature changes. The purpose is to test the resistance to sudden temperature changes of the glass-lined layer.

Part 4: Determination of mechanical impact resistance. The purpose is to test the mechanical impact resistance of the glass-lined layer.

Part 5: Measurement of thickness by electromagnetic method. The purpose is to detect the thickness of the glass-lined layer.

Part 6: High voltage test. The purpose is to detect defects and weak points in the glass lining layer.

Part 7: Determination of the average linear thermal expansion coefficient. The purpose is to determine the average linear thermal expansion coefficient of glass enamel.

Part 8: Determination of scratch resistance. The purpose is to test the scratch resistance of the glass-lined layer.

Part 9: Determination of tensile strength. The purpose is to test the tensile strength of the glass-lined layer.

Part 10: Determination and limits of heavy metal ion release from the glass-lined layer of glass-lined equipment for the production and storage of food.

To detect the dissolution of heavy metal ions in the glass-lined layer.

Glass-lined equipment used in food, medicine, biopharmaceuticals and other fields has very high requirements for the dissolution of heavy metal ions, because the heavy metal ions released will pollute the medium, reduce product quality, and further affect human health.

The test method is consistent with international standards, achieving comparability of domestic and foreign test data, improving the accuracy of the test results, and increasing the requirements for ion limits are very important for improving the formula of glass enamel and reducing the glass enamel of glass enamel equipment used in food, medicine, biopharmaceuticals and other fields.