INTERNATIONAL STANDARD 1775

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Porcelain laboratory apparatus — Requirements and methods of test

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 48 has reviewed ISO Recommendation R 1775 and found it technically suitable for transformation. International Standard ISO 1775 therefore replaces ISO Recommendation R 1775-1970 to which it is technically identical.

ISO Recommendation R 1775 was approved by the Member Bodies of the following countries :

Austria	India	South Africa, Rep. of
Belgium	Iran	Spain
Canada	Ireland	Thailand
Colombia	Israel	Turkey
Czechoslovakia	Italy	United Kingdom
Egypt, Arab Rep. of	Netherlands	U.S.A.
France	New Zealand	U.S.S.R.
Germany	Peru	Yugoslavia
Greece	Poland	

No Member Body expressed disapproval of the Recommendation.

No Member Body disapproved the transformation of ISO/R 1775 into an International Standard.

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Porcelain laboratory apparatus — Requirements and methods of test

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies requirements for a quality of porcelain suitable for all types of porcelain laboratory apparatus (including microchemical apparatus) and describes appropriate methods of test.

NOTE — Some of the tests specified should, for convenience, be carried out only on the articles mentioned, the results being accepted as generally applicable to all articles manufactured under similar conditions from the same batch of material.

2 SAMPLING

The whole articles or pieces of porcelain apparatus selected for the tests shall be representative of the batch or consignment as a whole. The selection should preferably be made by application of a standard sampling procedure, agreed between the parties to the tests.

3 POROSITY

When tested by the method described in annex A, the porcelain shall not show staining as defined in A.4.1.

4 GLAZE

When tested by the method described in annex A, the glaze of the porcelain shall not show crazing or other defects as defined in A.4.2.

5 RESISTANCE TO HEAT AND SUDDEN CHANGE OF TEMPERATURE

When quenched from a temperature of 230 °C above ambient temperature, in the manner described in annex B, the porcelain shall not break, crack or show crazing as defined in B.4.

6 RESISTANCE OF GLAZE TO HIGH TEMPERATURE

When tested by the method described in annex C, the glaze of the porcelain shall not show softening as defined in C.3.

7 CONSTANCY OF MASS ON IGNITION

When tested by the method described in annex D, the porcelain shall not vary in mass by more than 0,1 mg per 10 g of total mass.

8 RESISTANCE OF GLAZE TO ACID OR ALKALI

When tested by the method described in annex E, the porcelain shall not show losses in mass greater than the following amounts :

a) **Hydrochloric acid test**

0,01 mg per square centimetre of the total inner surface of the vessel.

b) **Sodium carbonate test**

0,1 mg per square centimetre of the surface covered by the liquid.

c) **Sodium hydroxide test**

0,6 mg per square centimetre of the surface covered by the liquid.

ANNEX A

METHOD OF TEST FOR POROSITY OF BODY AND IMPERFECTIONS OF GLAZE

A.1 MATERIAL FOR TEST

Cleanly broken pieces.

A.2 REAGENT

Eosin, 5 g/l aqueous solution.

A.3 PROCEDURE

Completely immerse the broken pieces of porcelain in the eosin solution (A.2) and allow them to soak for 18 h. Rinse the pieces thoroughly with water, dry them with a cloth, and examine them with a hand lens.

A.4 INTERPRETATION OF RESULTS

A.4.1 Porosity

Porcelain showing general staining of unglazed portions, indicating penetration of the eosin solution through the body, shall be reported as failing the test.

Porcelain showing a creeping effect of the eosin solution between the glaze and the body, indicating a lack of adhesion between them, shall be reported as failing the test.

A.4.2 Imperfections of glaze

Porcelain showing spots of staining with a shading or fringe around them shall be reported as failing the test.

ANNEX B

METHOD OF TEST FOR RESISTANCE TO HEAT AND TO SUDDEN CHANGE IN TEMPERATURE

B.1 MATERIAL FOR TEST

Complete crucibles not exceeding 46 mm in diameter.

B.2 APPARATUS

A suitable type of apparatus is shown in the figure and comprises

B.2.1 Furnace, consisting of a vertical tube, of 100 mm internal diameter and 500 mm long, and provided with a short side tube half-way down to take a thermometer. It is uniformly wound with resistance wire to consume about 1 kW, and is efficiently lagged and fitted with a suitable means of controlling the temperature.

B.2.2 Light wire cage, for carrying the crucible, and suspended from the lid of the furnace in such a manner that it can be released to fall freely.

B.2.3 Thermometer, which may conveniently be graduated at each 2 °C from 0 to 300 °C, and adjusted for use at 100 mm immersion. Any suitable thermometer of similar accuracy may be used.

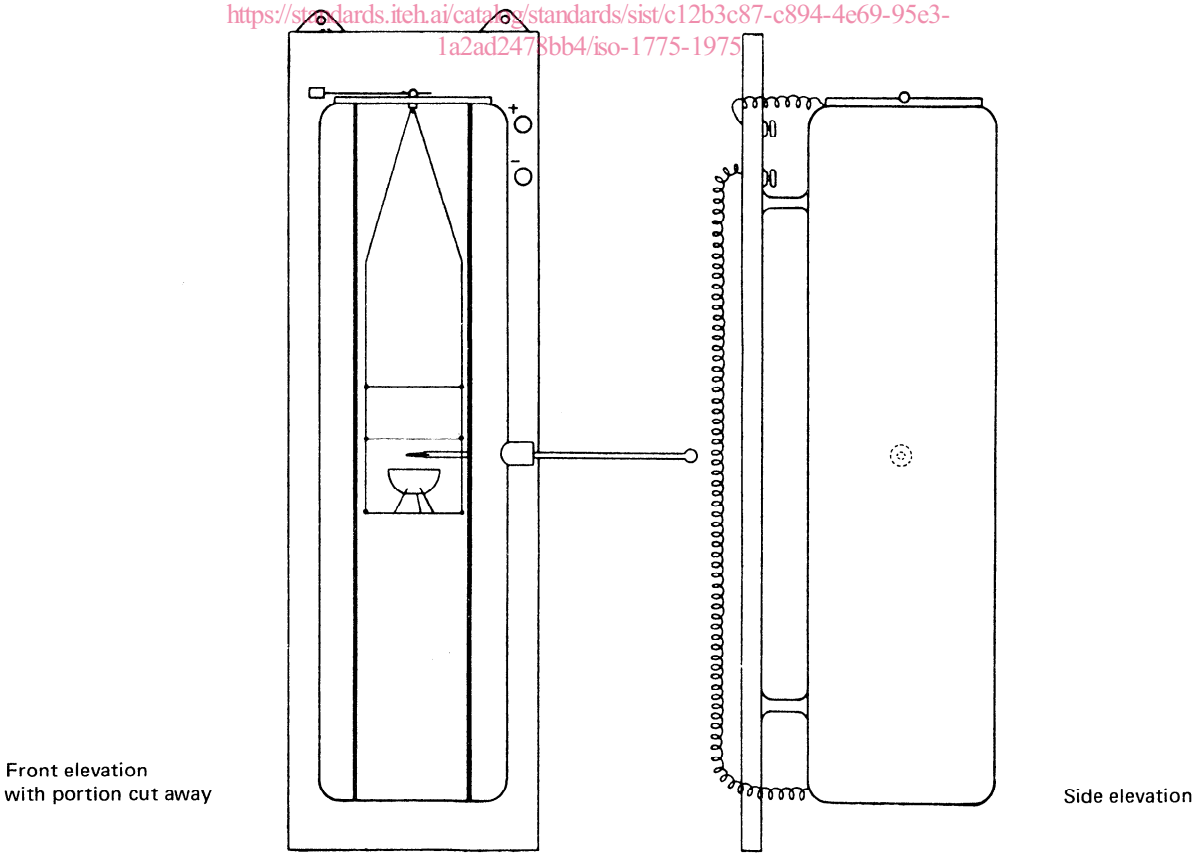
B.3 PROCEDURE

Place the crucible bottom downwards in the cage and heat for 15 min at a temperature 230 °C above room temperature. Remove the thermometer and allow the cage and crucible to fall into a bucket of water at room temperature, the surface of the water being approximately 150 mm below the bottom of the furnace.

Examine the crucible; if it is not broken or cracked, dip it into a 5 g/l solution of eosin in water.

B.4 INTERPRETATION OF RESULTS

A crucible which is fractured or which shows staining, indicating damage to the glaze, shall be reported as failing the test.



Front elevation with portion cut away

Side elevation

FIGURE – **Suitable apparatus for test for resistance to heat and sudden change of temperature**

ANNEX C

METHOD OF TEST FOR RESISTANCE OF GLAZE TO HIGH TEMPERATURE

C.1 MATERIAL FOR TEST

Complete articles or broken pieces.

C.2 PROCEDURE

Place some small clean broken pieces of the porcelain in a crucible or dish of the same make in such a way that the glazed surfaces are in contact as far as possible. Heat the porcelain for 2 h in a muffle furnace at a temperature of 900 °C, allow it to cool and examine for adhesion of the pieces to each other or to the containing vessel.

C.3 INTERPRETATION OF RESULTS

Porcelain showing adhesion shall be reported as failing the test.

ANNEX D

METHOD OF TEST FOR CONSTANCY OF MASS ON IGNITION

D.1 MATERIAL FOR TEST

Complete articles or broken pieces.

D.2 PROCEDURE

Wash the articles or pieces in cold N hydrochloric acid followed by distilled water, then dry and ignite them at a dull red heat. Allow the articles or pieces to cool, weigh them, and repeat the ignition until constant mass is attained. Then heat them for 2 h in a muffle furnace at a temperature of 950 to 1 000 °C, allow them to cool and weigh them again.

D.3 REPORTING OF RESULTS

Report any change in mass of the article or pieces in milligrams per 10 g of total mass.

ANNEX E

METHOD OF TEST FOR RESISTANCE OF GLAZE TO ACID AND ALKALI

E.1 MATERIAL FOR TEST

Complete articles (vessels).

E.2 REAGENTS

E.2.1 Hydrochloric acid, constant boiling point.

Dilute 600 ml of pure hydrochloric acid (ρ 1,16 g/ml) to 1 l with distilled water.

E.2.2 Sodium carbonate solution 50 g/l.

Dissolve in distilled water pure sodium carbonate equivalent to 50 g of the anhydrous salt and dilute to 1 l with distilled water.

E.2.3 Sodium hydroxide solution, 50 g/l.

Dissolve 50 g of pure sodium hydroxide in distilled water and dilute to 1 l with distilled water.

E.3 PREPARATION OF TEST SPECIMEN

Wash the porcelain vessel in cold N hydrochloric acid followed by distilled water, heat it to constant mass at 120 °C and, when cold, tare it against a similar vessel.

E.4 PROCEDURE

E.4.1 Hydrochloric acid test

Fill the vessel to three-quarters of its total capacity with the hydrochloric acid (E.2.1), cover it with a clock-glass and heat it on a steam bath for 4 h. Wash the vessel with distilled water and dry it to constant mass at 120 °C, taring against the same vessel as before.

E.4.2 Sodium carbonate test

Test as in E.4.1, but using the sodium carbonate solution (E.2.2). After heating, wash the vessel with N hydrochloric acid followed by distilled water before drying.

E.4.3 Sodium hydroxide test

Test as in E.4.2, but using the sodium hydroxide solution (E.2.3).

NOTE — In the tests described in E.4.2 and E.4.3, the volume of solution shall be measured before and after heating and the result of the test shall be ignored if the change in volume exceeds 10 %.

E.5 REPORTING OF RESULTS

Calculate the loss in mass of the vessel, in milligrams per square centimetre of the total inner surface of the vessel (for the hydrochloric acid test), or in milligrams per square centimetre of the surface of the vessel covered by the test liquid (for the sodium carbonate and sodium hydroxide tests).

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