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Dense shaped refractory products — Determination of permanent change in dimensions on heating

Produits réfractaires façonnés denses — Détermination de la variation permanente de dimensions sous l'action de la chaleur

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 2478 was prepared by Technical Committee ISO/TC 33, *Refractories*.

This second edition cancels and replaces the first edition (ISO 2478 : 1973), the principal differences being in the requirements concerning selection, measurement and mounting of test pieces, and the heating schedule applied in the procedure.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Dense shaped refractory products — Determination of permanent change in dimensions on heating

1 Scope and field of application

This International Standard specifies two methods for determining the permanent change in dimensions of a dense shaped refractory product. It does not apply to products containing carbon.

2 References

ISO 5017, *Dense shaped refractory products — Determination of bulk density, apparent porosity and true porosity*.¹⁾

ISO 5022, *Shaped refractory products — Sampling and acceptance testing*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 permanent change in dimensions on heating : The expansion or contraction that remains in a shaped refractory product that is heated to a specified temperature for a specified time and then cooled to ambient temperature.

3.2 dense shaped refractory product : A refractory product having a true porosity of less than 45 % (V/V) when measured in accordance with ISO 5017.

4 Principle

Test pieces in the shape of rectangular prisms or cylinders are cut from each brick or item, then dried, and their linear dimensions (Method 1) or volume (Method 2) measured. The test pieces are heated in a furnace having an oxidizing atmosphere at a prescribed rate to a specified temperature, which is maintained for a specified time. After cooling to ambient temperature, the measurements on the test pieces are repeated, and the permanent change in dimensions or volume is calculated.

5 Apparatus

5.1 Furnace, either electric or gas-fired, capable of heating the test pieces described in 6.2, in a continuously oxidizing atmosphere, at the specified rate (see 7.6), and of maintaining the test temperature for the required time.

NOTE — The use of an electric furnace is recommended, but a gas-fired furnace may be used provided that the furnace atmosphere is continuously oxidizing and there is provision for monitoring this condition.

5.2 Thermocouples, a minimum of three, to measure the temperature and the temperature distribution over the space occupied by the test pieces.

5.3 Temperature/time registration device, for use in conjunction with the thermocouples (5.2), so that a continuous record of the temperature is obtained.

5.4 Length-measuring device (for Method 1), which shall preferably be a dial-gauge apparatus consisting of a dial-gauge or micrometer with an accuracy of 0,01 mm, mounted on a stand which has a surface-ground base plate (figure 1), and a test piece carrier, as shown in figure 2, with three studs to support the test piece and two pins to locate it. The dimensions of the locating pins shall be as shown in figure 2. The under-surface of the carrier shall be ground flat. A diagonal mark shall be inscribed at one corner to enable a rectangular test piece to be placed symmetrically on the studs. A cylinder of known length shall be used to calibrate the device.

The carrier shall be used to support and locate the test piece so that measurements with the dial-gauge or micrometer before and after firing are made at the same points on the test piece surface.

5.5 Volume-measuring device (for Method 2), of the water-displacement type, the bulk volume being determined in accordance with the method specified in ISO 5017.

1) At present at the stage of draft.