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Australian Standard
Methods for Physical Testing of Refractories and Refractory Materials

AS 1774.9—1979
THE DETERMINATION OF RESISTANCE TO THE DISINTEGRATING EFFECT OF CARBON MONOXIDE

9.1 SCOPE. This standard describes the procedure for determining the resistance of refractory materials to the disintegrating effect of carbon monoxide.

9.2 APPARATUS. A diagram of a suitable apparatus is shown in Fig. 1.

9.2.1 Furnace. An electrically heated furnace capable of maintaining the test zone at a uniform temperature to within ± 5°C at 500°C. It shall be of such a size that it can accommodate the reaction vessel in the manner described in Clause 9.2.2 and shall be fitted with windows to observe the specimen during the test.

9.2.2 Reaction Vessel. The reaction vessel shall be of heat-resistant glass, sealed at one end. The other end shall be capable of being made gas-tight after the introduction of the specimen. The size of the vessel shall be large enough to comply with the conditions given in Clause 9.4.

The end sealing plate and tubes shall be of heat-resistant material which is not affected by carbon monoxide.

The tubes shall perform the following functions:

(a) Two tubes shall allow the ingress of carbon monoxide or nitrogen gas and shall act as a support for the specimen.

(b) A third tube, sealed at one end, shall allow the insertion of a base metal thermocouple adjacent to the specimen in the reaction vessel.

(c) The fourth tube, fitted near the top of the end sealing plate and extending just inside the vessel shall act as an outlet for the exhaust gases.

9.2.3 Temperature Controller. A controller of sufficient accuracy to ensure that the temperature of the test zone during the whole of the test period complies with the conditions of Clause 9.2.1.

9.2.4 Atmosphere Control. The apparatus shall incorporate means of controlling the atmosphere, as follows:

(a) Gas pressure shall be reduced by a regulator made for that purpose and the flow of gas adjusted by means of a sensitive needle valve.

(b) A purification train is required after the needle valve. It shall consist of a silica gel drying tower followed by a soda-asbestos (Ascarite) tower to remove iron carbonyl.

(c) The gas flow rate shall be measured on a suitable non-aqueous flowmeter fitted between the purification train and the furnace inlet tube.

9.2.5 Furnace Pressure Control. A bubbling bottle or sensitive gauge shall be fitted to the outlet and the flow of gas through the system observed to ensure that a positive pressure exists within the system at all times.

9.2.6 Drying Oven. A drying oven capable of being controlled within the range 105°C to 110°C.

9.2.7 Gas Supply.

(a) A suitable supply of carbon monoxide gas of at least 99 percent purity.

(b) A suitable supply of nitrogen, industrial grade.

9.2.8 Desiccator.

9.3 TEST SPECIMEN.

9.3.1 Shape. The test specimen shall be a prism approximately 50 mm × 50 mm × 75 mm cut from the sample. Alternatively a cylinder of dimensions approximately 50 mm diameter and 75 mm long may be used. In either case only one face shall be an original face, except in the case of unfired samples.

9.3.2 Pre-fired Samples. Cut the specimen direct from the sample to the dimensions as indicated in Clause 9.3.1.

9.3.3 Castable Refractories. Cast to the dimensions specified in Clause 9.3.1, cure and completely dry. Alternatively, cut or core the specimen from the cured and dried precast shape. Heat the specimen in an oxidizing atmosphere at a rate not exceeding 5°C/min to a temperature of 540°C and maintain this temperature for 5 h. Cool and store in a desiccator.

9.3.4 Mouldables and Ramming Refractories. Mould the specimen to the dimensions specified in Clause 9.3.1 and to a bulk density as close as possible to that recommended by the manufacturer. Heat the dried specimen

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