Australian Standard®

Refractories and refractory materials—Physical test methods

Method 4.1: Preparation of test pieces—Castable refractories

PREFACE

This Standard was prepared by the Standards Australia Committee on Refractories and Refractory Materials under the direction of the Minerals Standard Board to provide a satisfactory procedure for preparing test specimens from castable refractories.

The method of preparation presented in this Standard follows the principles embodied in PRE/R 26, *Preparation of test-pieces from unshaped materials*.

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METHOD

SCOPE. This Standard describes a procedure for laboratory preparation of test pieces from castable refractory materials.

NOTE: The values obtained from test pieces prepared using this method may not correspond with those obtained from test pieces prepared using non-vibratory, or other vibratory, methods.

This Standard applies to dense, mediumweight and lightweight castables containing either hydraulic cements or other binders. It does not apply to castable refractories intended primarily for gun application, or to low-cement castables.

NOTE: Preparation of test pieces from low-cement castables is covered by AS 1774.4.2.

A method for measuring the consistency of unshaped castable refractories is given in Appendix A.

2 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

AS
1141 Methods for sampling and testing aggregates
1141.2 Part 2: Basic testing equipment

1774 Refractories and refractory materials—Physical test methods
1774.4.2 Method 4.2: Preparation of test pieces—Low-cement castable refractories

2646 Sampling of solid mineral fuels
2646.4 Part 4: Hard coal—Sampling from stationary situations

2780 Refractories and refractory materials—Glossary of terms

ASTM
C 230 Specification for flow table for use in tests of hydraulic cement

BS
4551 Methods of testing mortars, screeds and plasters

3 DEFINITIONS. For the purpose of this Standard, the definitions in AS 2780 and those below apply.

3.1 Cast coverage—the mass of dry castable required to yield a given volume of refractory concrete.

3.2 Dense castable—a term applying to refractory materials having a cast coverage greater than 1600 kg/m^3.

3.3 Mediumweight castable—a term applying to refractory materials having a cast coverage no greater than 1600 kg/m^3 and no less than 1200 kg/m^3.

3.4 Lightweight castable—a term applying to refractory materials having a cast coverage less than 1200 kg/m^3.

3.5 Low-cement castable—a castable containing less than 10 percent hydraulic cement by weight.

4 PRINCIPLE. Castable refractory samples are mixed with water until a specified consistency is achieved. They are then consolidated in a mould and allowed to cure and dry under defined conditions prior to testing.

5 APPARATUS.

5.1 Mixer—a planetary or paddle mixer having mixer casing and blades made of a material that is inert to the castable materials.

5.2 Vibrating table—fixed firmly to a rigid base.

The table shall be flat and horizontal, and perform only uniaxial vertical vibrations at a frequency of 50/ ± 5 Hz. When loaded, it shall be capable of operating at a double amplitude of at least 0.5 mm with an accuracy of ± 0.05 mm.

5.3 Moulds—capable of being dismantled, and consisting of, or coated with, a material that is inert to the test sample.

NOTE: Only mould release agents which preclude retention of air at the mould-castable interface should be used.

The internal measurements of the moulds shall be 230 mm × 115 mm × 75 mm. A tolerance of ± 1.0 mm is permitted in these dimensions. Moulds shall be arranged so that the 230 mm × 75 mm surface is the horizontal surface during the consolidation process.

5.4 Clamps—for clamping the mould to the vibrating table.

The mould and the clamp(s) shall have sufficient rigidity to ensure that only the induced vibrations of the required frequency and amplitude will occur.

5.5 Drying oven—a fan-forced, ventilated oven capable of maintaining a temperature of 110°C to an accuracy of ±5°C.

5.6 Weighing scale—capable of weighing the required mass to an accuracy of ± 0.1 percent.

5.7 Riffler—having a partition opening of 1$^1/_2$ times the maximum particle size of the aggregate, or at least 7 mm, whichever is the greater.

5.8 Thermometer—capable of measuring temperatures in the range 0°C to 50°C, to an accuracy of 1°C.

5.9 Timing device.