

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1774.4.5—2002

**Refractories and refractory materials—Physical test methods
Method 4.5: Preparation of test pieces—Gunning refractories**

RECONFIRMATION NOTICE

Technical Committee MN-007 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 4 April 2013.

The following are represented on Technical Committee MN-007:

Australasian Institute of Mining and Metallurgy
Australian Ceramic Society
Bureau of Steel Manufacturers of Australia
Cement Industry Federation
CSIRO Manufacturing & Materials Technology
Institute of Refractories Engineers
Refractories Manufacturers Association of Australia
The University of New South Wales

NOTES

Australian Standard™

AS 1774.4.5

Refractories and refractory materials—Physical test methods

Method 4.5: Preparation of test pieces—Gunning refractories

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the procedures for the preparation of test pieces from refractory materials by dry and wet gunning at ambient temperatures.

NOTE: The values obtained from test pieces prepared using this method may not correspond with those obtained from test pieces of the same material prepared at a gunning installation site.

This Standard does not apply to plastic gunning mixes.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1774 Refractories and refractory materials—Physical test methods

1774.4.1 Method 4.1: Preparation of test pieces—Castable refractories

2243 Safety in laboratories (series)

2780 Refractories and refractory materials—Glossary of terms

4433 Guide to the sampling of particulate materials

4433.2 Part 2: Preparation of samples

1.3 DEFINITIONS

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

1.3.1 Activator

A chemical solution added to the refractory at the gunning nozzle which causes the refractory to set, stiffen or coagulate.

1.3.2 Dry gun assembly

An assembly essentially comprising a chamber into which the refractory is added together with a mechanism that controls the flow from the unit. Depending on the type used, the gun may be open at the top, or be a closed pressurized unit.

1.3.3 Plastic gunning mix

A plastic refractory supplied ready for use for ramming and capable of being installed with specialized gunning equipment.

1.3.4 Rebound

Material that fails to adhere to the surface being sprayed, and ricochets out of the immediate placing area.

1.4 SAFETY

For information of safety in laboratories, reference should be made to the relevant parts of AS 2243.

1.5 GENERAL APPARATUS

1.5.1 Air compressor

Capable of supplying a steady air flow at the required pressure and volume.

1.5.2 Test plate

Flat, having minimum surface dimensions 250 mm × 250 mm and a minimum 100 mm ledge at the top and base (see Figure 1). The plate may be made from metal or timber, or a combination of both. It should be of sufficient thickness that it will not flex when material is sprayed onto it. The plate may incorporate a vertical divider at the centre. Sides may be incorporated, provided that care is taken to avoid entrapment of rebound material.

1.5.3 Air pressure gauge

Capable of measuring pressures up to 690 kPa.

1.5.4 Muffle furnace

Capable of heating to 800°C.

1.5.5 Weighing scale

Capable of weighing masses of the order of 500 g to 0.1 g.

1.5.6 Weighing scale

Capable of weighing masses of the order of 100 kg to the nearest 0.1%, where the amount of rebound is to be determined.

1.5.7 Drying oven

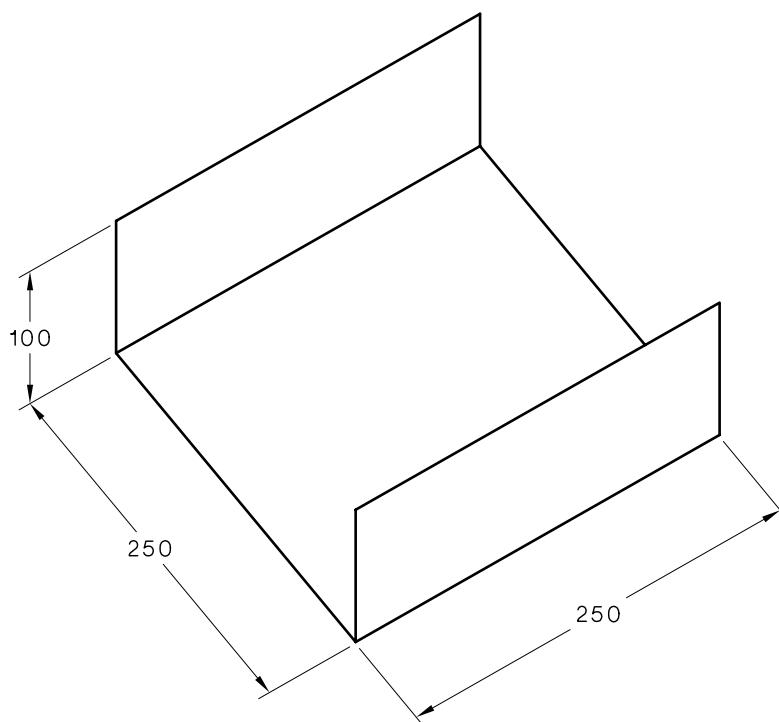
Having fan-forced ventilation and capable of maintaining a temperature of $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

1.5.8 Miscellaneous tools

Trowel, shovel.

1.5.9 Thermometer

Capable of measuring the ambient temperature to the nearest 1°C.



DIMENSIONS IN MILLIMETRES

FIGURE 1 TYPICAL TEST PLATE

1.6 SAMPLING

The sample for preparation of a test panel should be prepared in accordance with established sampling principles, such as those given in AS 4433.2.

SECTION 2 PREPARATION OF TEST PIECES — DRY GUNNING

2.1 SCOPE

This Section specifies the procedure for the preparation of test pieces from refractory materials by dry gunning at ambient temperatures.

2.2 PRINCIPLE

Refractory material is conveyed pneumatically in either dry or damp form to the test site, using gunning equipment. Water is introduced to the refractory at the nozzle and the mixture is projected onto the test plate.

2.3 APPARATUS

2.3.1 Gun

Of the pneumatic-nozzle mixing type

2.3.2 Mixer

For use where predamping is carried out. The mixer shall be capable of producing a homogeneous mixture.

2.3.3 Material hose/nozzle assembly

Reinforced pneumatic hose and a nozzle assembly suitable for the material to be gunned.

The hose diameter shall be at least four times the size of the largest particle. The length of the hose shall be 40 m (i.e. two standard lengths).

2.3.4 Water-measuring device (if predamping)

For measuring the water quantity to the nearest 5%.

2.3.5 Water-pressure gauge

Capable of measuring pressures up to 840 kPa.

2.4 PROCEDURE

The procedure shall be as follows:

- (a) Set up the equipment as outlined in Figure 2. The nozzle and the gun will usually be at the same elevation. If this is not the case, the difference shall be recorded, to the nearest metre.

NOTE: The water pressure should be greater than 150 kPa above the gunning pressure at the nozzle, possibly requiring the use of a water pump. The water ring and nozzle extension will differ for dense and lightweight materials.

- (b) Obtain a sufficient quantity of potable water, between 15°C and 25°C, and record the temperature of the water.

NOTE: Soluble constituents in the water used may affect results. Where this occurs deionized or distilled water is preferred.

- (c) Record the ambient temperature and the temperature of the refractory material to the nearest 1°C.

- (d) If the determination of total water content is required and the material contains an unknown quantity of organic fibre, a representative sample of 100 g shall be set aside.