

STANDARDS AUSTRALIA

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RECONFIRMATION

OF

AS 1774.2—2001

**Refractories and refractory materials—Physical test methods  
Method 2: Determination of bulk density of granular materials**

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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:

Australian 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

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## NOTES

# Australian Standard™

AS 1774.2

## Refractories and refractory materials— Physical test methods

### Method 2: Determination of bulk density of granular materials

#### PREFACE

This Standard was prepared by the Standards Australia Committee MN-007, Refractories and Refractory Materials, to supersede AS 1774.2—1991. The method is based on procedures presented in ISO 8840:1987, *Refractory materials—Determination of bulk density of granular materials (grain density)* and ASTM C 357-94(1998), *Test method for bulk density of granular refractory materials*.

#### METHOD

##### 1 SCOPE

This Standard specifies two methods for the determination of the bulk density of granular refractory materials as follows:

- (a) The arrested water absorption technique, which is applicable to granular refractory materials that are unaffected by water.
- (b) The kerosene evacuation technique, which is applicable to all granular refractory materials.

##### 2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

|        |                                                         |
|--------|---------------------------------------------------------|
| AS     |                                                         |
| 2165   | Laboratory glassware—Burettes                           |
| 2243   | Safety in laboratories (series)                         |
| 2780   | Refractories and refractory materials—Glossary of terms |
| 4433   | Guide to the sampling of particulate materials          |
| 4433.1 | Part 1: Sampling procedures                             |

##### 3 DEFINITIONS

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

##### 4 SAFETY

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

## 5 SAMPLING AND SAMPLE PREPARATION

### 5.1 General

Sampling shall be carried out in accordance with recognized sampling procedures.

NOTE: Guidance on sampling procedures may be found in AS 4433.1.

The material to be tested shall be produced by sieving and grinding to be in the size range  $-5.6$  mm to  $+2.0$  mm with minimum production of fine material.

Any dust or loose particles adhering to the grains shall be removed before testing by washing or, with materials sensitive to moisture or humidity, by air-blowing or washing with a water-free liquid.

### 5.2 Test sample

The appropriate mass of test sample may be calculated from the following equation:

$$m = 40q_c \quad \dots (1)$$

where

$m$  = mass of test sample, in grams

$q_c$  = expected bulk density, in grams per millilitre

The test sample shall be dried at  $110 \pm 5^\circ\text{C}$  and allowed to cool to ambient temperature in a desiccator. Samples shall be weighed to the nearest 0.1 g.

## 6 ARRESTED WATER ABSORPTION TECHNIQUE

NOTE: This method is not suitable for materials that are hydrated by water.

### 6.1 Principle

The volume of a given mass of a granular material is measured by displacement of water.

### 6.2 Apparatus

The following apparatus is required:

- Beaker*—of capacity 250 mL.
- Funnel*—with wide-mouth discharge
- Burette*—calibrated, Grade B or better, 100 mL, graduated in 0.2 mL intervals, complying with requirements of AS 2165.
- Linen cloth*—washed two or three times in hot water and detergent when new to remove dressing or size.
- Balance*—capable of weighing  $250 \pm 0.1$  g.
- Oven*—a ventilated, fan-forced oven capable of maintaining a temperature of  $110 \pm 5^\circ\text{C}$ .

### 6.3 Procedure

The volume of test sample shall be determined as follows:

- Place the test sample in the beaker, ensuring that the grains are completely covered with water, and boil for 15 min.
- Cool the sample to ambient temperature.
- Introduce approximately 40 mL of water at ambient temperature to the clean burette. Record the level of water in the burette ( $L_0$ ).
- Saturate the linen cloth with water, and wring it out by hand, ensuring that the cloth is sufficiently saturated that only surface water is removed from the grains in Step (c).