Australian Standard®

Refractories and refractory materials—Physical test methods

Method 5: Determination of bulk density, apparent porosity and true porosity (ISO 5017:2013, MOD)

PREFACE

This Standard was prepared by Standards Australia Committee MN-007, Refractories and Refractory Materials, to supersede AS 1774.5—2001, *Refractories and refractory materials—Physical test methods*, Method 5: *The determination of density, porosity and water absorption*.

The objective of this Standard is to specify a method for the determination of the bulk density, apparent porosity and true porosity of refractory products.

This Standard is an adoption with national modifications and has been reproduced from ISO 5017:2013, *Dense shaped refractory products—Determination of bulk density, apparent porosity and true porosity*, and has been varied as indicated to take account of Australian conditions. Appendix ZZ lists the variations to ISO 5017:2013 for the application of this Standard in Australia.

The variations listed in Appendix ZZ address issues including the following:

(a) An alternative method for the determination of bulk density by direct measurement (retained from AS 1774.5—2001) has been added.

(b) The scope has been expanded to include monolithic refractories.

The direct measurement method is presented in the normative Appendix ZA.

As this Standard is reproduced from an International Standard, the following applies:

(i) In the source text ‘this International Standard’ should read ‘this Australian Standard’.

(ii) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard	*Australian Standard*
ISO	AS
5018 Refractory materials—Determination of true density	1774 Refractories and refractory materials—Physical test methods
	1774.6 Method 6: Determination of true density

Only normative references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

METHOD

1 Scope

This International Standard specifies a method for the determination of the bulk density, apparent porosity and true porosity of dense shaped refractory products.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 758, *Liquid chemical products for industrial use — Determination of density at 20 °C*

ISO 5018, *Refractory materials — Determination of true density*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
bulk density
ρ_b
ratio of the mass of the dry material of a porous body to its bulk volume, expressed in grams per cubic centimetre or in kilograms per cubic metre

3.2
bulk volume
V_b
sum of the volumes of the solid material, the open pores and the closed pores in a porous body

Note 1 to entry: The roughness of the surface limits the accuracy of definition of the bulk volume and consequently, that of the bulk density. Also, the concept of bulk density becomes less precise when the volume of the sample diminishes below certain limits or when its texture (size of pores and grains) is too coarse.

3.3
true density
ρ_t
ratio of the mass of the dry material of a porous body to its true volume, expressed in grams per cubic centimetre or in kilograms per cubic metre, determined in accordance with ISO 5018

3.4
true volume
volume of the solid material in a porous body

3.5
open pores
those pores that are penetrated by the immersion liquid in the test described

Note 1 to entry: These pores are, in principle, all those that are connected with the atmosphere, either directly or via one another. Here also the roughness of the surface imposes a limit to the accuracy of the definition of the volume of the open pores.