Australian Standard®

Refractories and refractory materials—Physical test methods

Method 5: The determination of density, porosity and water absorption

1 SCOPE. This Standard sets out the evacuation method and the boiling water method for determining the following properties of a refractory:

(a) Bulk density.

(b) Apparent solid density.

(c) Apparent porosity.

(d) Water absorption.

The evacuation method is applicable to all refractories. The boiling water method is applicable only to refractories which are unaffected by boiling water and should not be used where the resistance to boiling water is in doubt.

In addition it sets out a method for determining bulk density by direct measurement of mass and volume and provides equations from which, after determining true density by AS 1774.6, the following may be calculated:

(i) True porosity.

(ii) Sealed porosity.

The direct measurement method for determining bulk density is applicable only to regular shaped specimens having a volume of at least 0.001 m^3.

2 REFERENCED DOCUMENT. The following document is referred to in this Standard:

AS
1774 Refractories and refractory materials—Physical test methods
1774.6 The determination of true density

3 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

3.1 Volume.

3.1.1 *Bulk volume*—the volume of the solid material plus the volume of the sealed and open pores.

3.1.2 *Apparent solid volume*—the volume of the solid material plus the volume of the sealed pores.

3.1.3 *True volume*—the volume of the solid material only.

3.2 Density.

3.2.1 *Bulk density* (D_b)—the ratio of the mass of the dry material of a porous body to its bulk volume.

3.2.2 *Apparent solid density* (D_{as})—the ratio of the mass of the dry material of a porous body to its apparent solid volume.

3.2.3 *True density* (D_t)—the ratio of the mass of the dry material of a porous body to its true volume.

3.3 Porosity.

3.3.1 *Apparent porosity* (P_a)—the ratio of the volume of the open pores to the bulk volume, expressed as a percentage.

3.3.2 *True porosity* (P_t)—the ratio of the volume of the open and sealed pores to the bulk volume, expressed as a percentage.