AS 1774.10—2002
ISO 528:1983

Australian Standard™

Refractories and refractory materials—Physical test methods

Method 10: Pyrometric cone equivalent (refractoriness)

PREFACE

This Standard was prepared by the Standards Australia Committee MN-007 Refractories and Refractory Materials to supersede AS 1774.10—1994, *Refractories and refractory materials—Physical test methods*, Method 10: *Pyrometric cone equivalent (refractoriness)*.

The objective of the Standard is to provide testing laboratories a means of determining the refractoriness of a refractory material.

This Standard is identical with and has been reproduced from ISO 528:1983, *Refractory products—Determination of pyrometric cone equivalent (refractoriness)*.

Statements expressed in mandatory terms in notes to the text are deemed to be requirements of this Standard.

As this Standard is reproduced from an international Standard, the following applies.

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text, 'this International Standard' should read 'this Australian Standard'.

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

References to International Standards should be replaced by references to Australian Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS	
565	Test sieves—Woven metal wire cloth and perforated plate—Nominal sizes of apertures	1152	Specification for test sieves
R 836	Vocabulary for the refractories industry	2780	Refractories and refractory materials—Glossary of terms
R 1046	Pyrometric reference cones	—	
5022	Shaped refractory products—Sampling and acceptance testing	2497	Procedures for acceptance testing of refractory products
		2497.1	Part 1: Batch procedure

NOTES

1 Scope and field of application

1.1 This International Standard specifies a method for determining the pyrometric cone equivalent (refractoriness) of siliceous, low alumina fireclay and fireclay refractory materials and products.

1.2 Its useful range of application depends on the availability of suitable pyrometric reference cones. In the temperature range from 1 500 to 1 800 °C, the pyrometric reference cones specified in ISO/R 1146 are suitable.

1.3 Although pyrometric reference cones are primarily manufactured for estimating the effect of temperature on siliceous, low alumina fireclay and fireclay products with regard to their composition, the method may also be used for determining the refractoriness of other refractory materials and products, but the results may then be not so precise.

2 References

ISO 565, *Test sieves — Woven metal wire cloth and perforated plate — Nominal sizes of apertures.*

ISO/R 836, *Vocabulary for the refractories industry.*

ISO/R 1146, *Pyrometric reference cones.*

ISO 5022, *Shaped refractory products — Sampling and acceptance testing.*

3 Definitions

3.1 refractoriness : The characteristic property of a material of withstanding high temperatures.[1)]

3.2 pyrometric reference cone : A blunt-tipped skew triangular pyramid with sharp edges, of specified shape and dimensions and of such composition that, when mounted and heated under specified conditions, it bends in a known manner with reference to the temperature.

3.3 reference temperature; temperature of collapse : The temperature at which the tip of a pyrometric reference cone reaches the level on which the base of the cone is mounted when the cone is heated at a specified rate under specified conditions.

4 Principle

Test pieces of refractory materials or products are raised in temperature, under specified conditions, alongside pyrometric reference cones of known refractoriness and their behaviour is compared with that of the reference cones.

5 Apparatus

5.1 Furnace.

5.1.1 The furnace used for the determination may be cylindrical or rectangular and vertical or horizontal.

5.1.2 Under the test conditions, the difference in temperature between the coldest spot and the hottest spot of the space occupied by the stand, the test pieces and the pyrometric reference cones shall not exceed 10 °C (equivalent to approximately one-half of an ISO reference cone number.[2)] The uniformity of temperature shall be verified from time to time.[3)]

5.1.3 The furnace shall be capable of reaching the required temperature at the rates of increase specified in 9.2 and 9.3.

5.1.4 The atmosphere in the furnace shall contain free oxygen at all times.[4)]

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1) This definition is taken from ISO/R 836.

2) In order that this requirement should be met when pyrometric reference cones of height 30 mm are used (the conventional height), a cylindrical furnace should have a chamber of at least 80 mm useful diameter and a rectangular furnace should have a chamber at least 60 mm in height and 100 mm in width.

3) The uniformity can be measured by means of thermocouples or by the use of pyrometric reference cones.

4) Certain furnaces (for example, certain types of furnaces fired with hydrocarbon gas and oxygen) are not suitable for this method of determination because of the high content of reducing gases or water vapour in their atmospheres.