

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1774.31.1—2000

**Refractories and refractory materials—Physical test methods
Method 31.1: Modulus of elasticity—Flexural method**

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

NOTES

Australian Standard™

AS 1774.31.1

**Refractories and refractory materials—
Physical test methods****Method 31.1: Modulus of elasticity—
Flexural method**

This Standard incorporates Amendment No. 1 (May 2002). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

1 SCOPE

This Standard provides a procedure for determining the modulus of elasticity of refractories by the tensile method at elevated temperatures.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1774	Refractories and refractory materials—Physical test methods
1774.27	Method 27: Modulus of rupture at elevated temperatures
1774.30	Method 30: Drying and firing schedules
2243	Safety in laboratories (series)
2780	Refractories and refractory materials—Glossary of terms

3 DEFINITIONS

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

3.1 Modulus of elasticity

The stress divided by the corresponding strain with no permanent deformation.

3.2 Strain

The ratio of the deformation to the total value of the dimension in which the deformation occurred.

3.3 Stress

The force per unit area tending to produce a deformation.

4 PRINCIPLE

A test specimen is heated to the test temperature at a specified rate and is maintained at that temperature. A force is then applied through a three-point system at a constant rate of increase. The deformation corresponding to the force is recorded. Young's modulus is determined by an appropriate equation.

5 SAFETY

As relatively high temperatures are used in this test, heat-resistant gloves and appropriate eye protection are recommended.

Reference should also be made to the relevant parts of AS 2243.

6 APPARATUS

6.1 Furnace

Either a batch type or a continuous type capable of the following:

- (a) Complying with the requirements for temperature control specified in Clause 8(c), when the test temperatures are measured at a point not greater than 10 mm above the top surface of the test specimen and as close as practicable to the mid-span position.

- (b) Maintaining an oxidizing atmosphere within the heating chamber throughout the test.

NOTE: For carbon-containing refractories, a neutral or reducing atmosphere is required. In this case, a continuous-type furnace may not be suitable.

- (c) Maintaining the test zone, comprising that volume within 20 mm of the specimen, at the required temperature to within 10°C, as measured by the thermocouple specified in Clause 6.6.

6.2 Bearing edges

Manufactured from refractory materials that do not deform or react under the conditions of the test, for example, fused or recrystallized alumina.

Bearing edges shall be straight and of a length at least 5 mm greater than the width of the test specimen. The span between the two lower bearing edges, L_s shall be 125 ± 5 mm, the actual distance being measured at room temperature to an accuracy of ± 0.5 mm. The upper bearing edge shall be located at the mid-span position and the three bearing edges shall be parallel to each other and shall have a maximum radius of curvature (r) of 5 mm (see Figure 1).

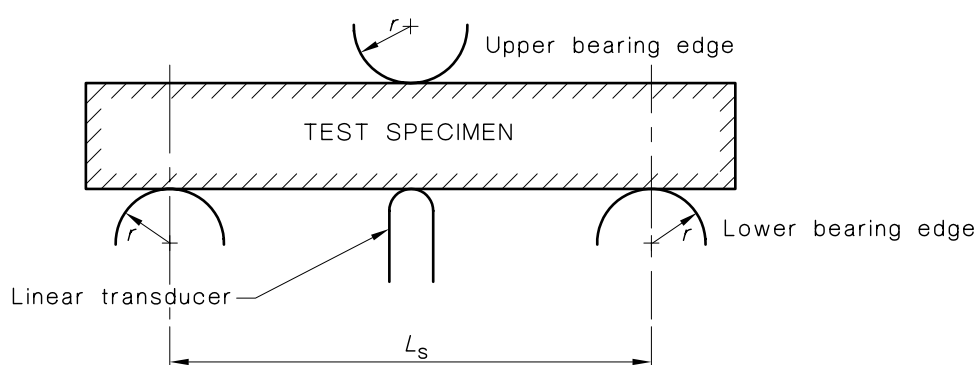


FIGURE 1 ARRANGEMENT OF BEARING EDGES

6.3 Loading device

Capable of—

- (a) applying a force uniformly across the centre-line of the test specimen; and
- (b) increasing the force at a constant rate of 7 ± 0.7 N/s.