

Australian Standard[®]

Refractories and refractory materials—Physical test methods

Method 24: Determination of the resistance to thermal shock

PREFACE

This Standard was prepared by Standards Australia Committee MN-007, Refractories and Refractory Materials, to supersede AS 1774.24—1997, *Refractories and refractory materials—Physical test methods*, Method 24: *Resistance to thermal shock*.

METHOD

1 SCOPE

This Standard describes a procedure for the determination of the resistance to thermal shock of refractory products.

This method is not suitable for carbon containing refractories.

2 REFERENCES

AS

- | | |
|---------|---|
| 1774 | Refractories and refractory materials—Physical test methods |
| 1774.3 | Method 3: Determination of cold modulus of rupture |
| 1774.4 | Method 4: Preparation of test pieces (series) |
| 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 in AS 2780 and those below apply:

3.1 Control specimen

The specimen subjected to the same conditions as the test specimen except for the thermal cycling.

3.2 Required temperature

The required temperature is $1000 \pm 10^{\circ}\text{C}$ or a temperature as agreed between the interested parties.

3.3 Test specimen

The specimen which is subjected to thermal cycling.

3.4 Test zone

An area in the kiln where the temperature at any position does not differ from another by more than 10°C. As far as can be determined the atmosphere and vectors such as radiation and convection shall be the same.

4 PRINCIPLE

Two specimens are prepared one of which is heated to a prescribed temperature and cooled for a specified number of cycles. The other specimen is the control specimen. The modulus of rupture of the two specimens is determined. The thermal shock index is then calculated.

5 SAFETY

Refer to AS 2243 for information on safety in laboratories.

6 APPARATUS

6.1 Kiln

Electric or gas, capable of restoring the kiln temperature to the required temperature after the test specimen is returned to the kiln during thermal cycling.

The test specimen shall be heated uniformly on all sides.

6.2 Lifting device

A suitable device for transferring specimens in and out of the kiln at high temperature.

6.3 Drying oven

A fan forced, ventilated oven, capable of maintaining a temperature of $110 \pm 5^\circ\text{C}$.

6.4 Recording device

Able to record the kiln temperature continuously or at regular short intervals.

6.5 Ceramic marker

Unreactive with the specimen in a manner that would influence the test results, and whose mark will be clearly visible after drying and firing.

7 PREPARATION OF SPECIMENS

7.1 Unshaped refractories

The test shape shall be prepared as follows:

- Form two $230 \times 115 \times 75$ mm test shapes in accordance with the AS 1774.4 series in a mould with a 230×75 mm opening.
- Dry in accordance with AS 1774.30.
- Cut the test shapes in half such that each half is $230 \times 56 \times 75$ mm accurate to ± 2 mm on the shortest dimension, (See Figure 1).
- Discard the as-cast top halves.
- Pre-fire to the required temperature according to AS 1774.30.
- Label one of the remaining bottom half test specimens as the control specimen and the other half the test specimen.
- Mark the tensile faces on each half as shown in Figure 1 with a ceramic marker.

7.2 Shaped refractories

The test shape shall be prepared as follows:

- Cut a $230 \times 115 \times 75$ mm shape.
- Dry in accordance with AS 1774.30.
- For shapes that have not been fired to the required temperature, pre-fire to the required temperature according to AS 1774.30.
- Cut the pre-fired shape in half such that each half is $230 \times 56 \times 75$ mm accurate to ± 2 mm on the shortest dimension.
- Label one half the control specimen and the other half the test specimen, and mark the tensile faces with a ceramic marker as shown in Figure 2.
- Dry in accordance with AS 1774.30.

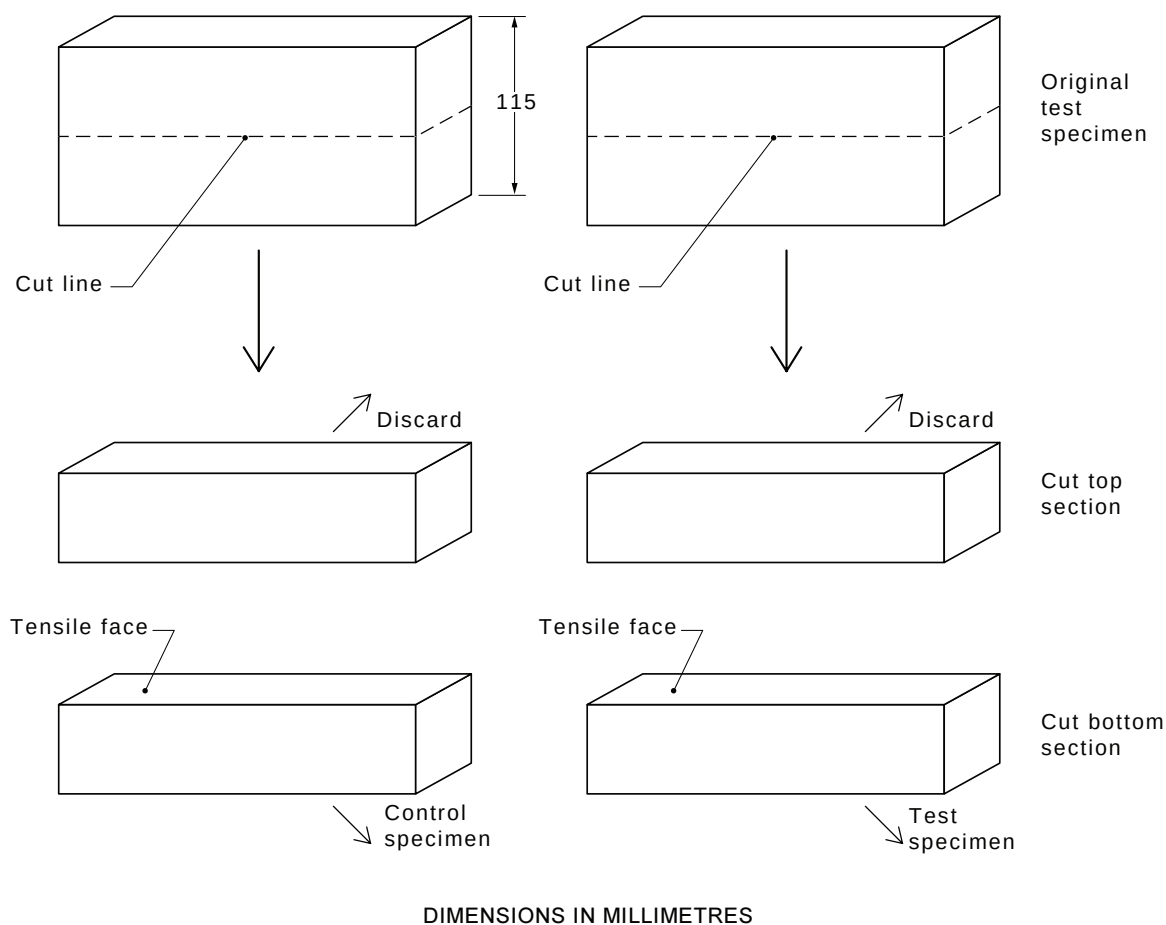


FIGURE 1 PAIR OF TEST SPECIMENS CUT FROM UNSHAPED REFRACTORIES