

Australian/New Zealand Standard™

**Methods for fire tests on building
materials, components and structures**

**Part 3: Simultaneous determination
of ignitability, flame propagation, heat
release and smoke release**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee BD/18, Fire Safety. It was approved on behalf of the Council of Standards Australia on 30 July 1999 and on behalf of the Council of Standards New Zealand on 20 July 1999. It was published on 5 November 1999.

The following interests are represented on Committee BD/18:

Australasian Fire Authorities Council
Australian Building Codes Board
Australian Chamber of Commerce and Industry
Australian Institute of Building
Australian Wool Testing Authority
Building Research Association of New Zealand
Bureau of Steel Manufacturers of Australia
Cement and Concrete Association of Australia
CSIRO Building, Construction and Engineering
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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

RECONFIRMATION

OF

AS/NZS 1530.3:1999

Methods for fire tests on building materials, components and structures
Part 3: Simultaneous determination of ignitability, flame propagation, heat release
and smoke release

RECONFIRMATION NOTICE

Technical Committee FP-018 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.

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NOTES

Australian/New Zealand Standard™

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Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD/18, Fire Safety.

The objective of this revision is to specify procedures for laboratories to adopt when mounting specimen materials in the test apparatus. The basic method of test has not been changed.

The mounting procedures are specific for a range of materials being tested. The adoption of these procedures is designed to improve the consistency of the test results.

The test provides data for assessing the potential hazard of wall linings during the early growth of fire in a compartment. It also provides a discriminating assessment of the fire behaviour of different materials when subjected to the test method described.

Fire is a complex phenomenon and the fire hazard of a building material is a function of the characteristics of the material, how it is installed and used, and the environment in which it is present. No single test method can give a full assessment of fire hazard under all conditions of fire that may apply. There must be a constant awareness of the variables applicable when using this test method to assess the fire hazard of any particular material or component under other fire exposure or when used in applications other than walls.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

The use of Notes in this Standard are of an advisory nature only to give explanation or guidance to the user on recommended design considerations or technical procedures, or to provide an informative cross-reference to other documents or publications. Notes to clauses on this Standard do not form a mandatory part for compliance with this Standard.

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FOREWORD

The results of this fire test may be used to directly assess fire hazard, but it should be recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions.

These results provide information on ignitability, flame propagation, heat release and smoke release which are related to the performance of wall linings in simulated fires in the corner of a compartment. A consumer or regulatory authority should consider the relevance of this information to the fire hazard represented by the intended application of the material or component. The performance in the test applies to the thickness of the specimen in a flat panel shape. The results may not be valid for other shapes or assemblies unless verified by further tests.

The results may also provide a comparison of the fire behaviour of different materials and components. The application of the information obtained from this test to the fire hazard requires consideration of the form and fixing of the specimen as tested and the intended building use of the material or component.

The standard regime of increasing impressed radiant heat applied to the specimens in this test method was originally defined following studies of experimental room fires. The increasing intensity of radiant heat simulates that which could be experienced during the early development of a building fire. Early work was carried out by J.E. Ferris at the Commonwealth Experimental Building Station (now CSIRO) in Sydney in 1955.

Ignition is initiated by a pilot flame that is held near, but which does not touch the specimen. A material that does not ignite during the standard test may ignite if contacted with a pilot flame during the test.

The reaction of thin unsupported flexible materials to flame impingement can be assessed by testing in accordance with [AS 1530.2](#). Materials of thickness less than 2 mm, which are sufficiently flexible to be bent by hand around a mandrel of 2 mm diameter or less, are subjected to the test described herein, should also be subjected to the test in [AS 1530.2](#).

Since the heat source for the test method is a radiator, a reduction in the reflective properties of certain materials by the deposition of dust and soot, by surface damage and by the formation of surface corrosion products, may produce a significant change in the results from those obtained when the materials were tested in a new and a clean condition.

Some materials are subjected to cleaning treatments throughout their useful life. Some treatments could adversely affect the fire hazard indices by, for example, removal or redeposition of fire-retarding agents. It is advisable that testing also be performed after a number of treatments, in accordance with commercial cleaning practice.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Methods for fire tests on building materials, components and structures****Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard sets out a test method for the assessment of building materials and components according to—

- (a) their tendency to ignite;
- (b) their tendency to propagate flame;
- (c) the heat they release once ignition has occurred; and
- (d) their tendency to release smoke.

NOTE: A guide to the interpretation of the results of this test, together with a full list of references, is given in Appendix A.

1.2 OBJECTIVES The objective this Standard is to establish a test method for assessing the potential fire hazard of wall linings during the early growth of fire in a compartment. The test method also provides a discriminating or ranking assessment of potential fire hazard between a range of materials used in buildings.

1.3 APPLICATION This Standard will be referenced in the Building Code of Australia (BCA) by way of BCA Amendment No. 6 to be published on 1 January 2000, thereby superseding the previous edition, AS 1530.3—1989, which will be withdrawn 12 months from the date of publication of this edition.

1.4 PRINCIPLE The specimen is held in a vertical configuration in a plane parallel to a radiant heater and the specimen moved towards the heater, in steps, over a period of 20 min or until ignition, induced by a pilot flame, occurs.

1.5 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1530 Methods for fire tests on building materials, components and structures

1530.1 Part 1: Combustibility test for materials

1530.2 Part 2: Test for flammability of materials

AS/NZS

2111 Textile floor coverings—Tests and measurements

2111.18 Part 18: Burning behaviour—Tablet test at ambient temperature

ISO

291 Plastics—Standard atmospheres for conditioning and testing

1.6 DEFINITIONS

1.6.1 Backing board—a support material onto which the specimen is mounted for the purpose of the test (see Clause 4.3.1).

1.6.2 Sandwich panel—a building component comprising a core of expanded or extruded polystyrene, polyurethane foam, or similar core materials, faced on both sides with aluminium, steel, plastic or similar type material, the sheeting being bonded to or mechanically fixed to the core.

1.6.3 Sponsor—the person or organization who authorizes the test.

1.6.4 Substrate—a material onto which a finish or a coating to be tested is applied in practice.

SECTION 2 TEST PROCEDURE

2.1 APPLICATION The test is applicable to building materials and components.

2.2 SPECIMENS

2.2.1 General All specimens shall be prepared to represent, as nearly as possible, the material or component for the use for which it is intended.

Thin surfacings and coatings that are usually applied to substrates shall be applied to the appropriate substrates and shall be fixed, where applicable, with the adhesive substance used.

Where a result for a range of colours of a material or component is required, at least two specimens of the lightest and darkest colours of the range shall be included in the first six specimens tested. If the variability of results exceeds that specified in Clause 2.8, additional specimens of the lightest and darkest shall be taken to determine the relevant indices for each colour.

A laminar component shall be tested in the form in which it is to be used. If the exposed surfaces are of different materials, it may be necessary to test both surfaces. Where both surfaces are to be tested, a second set of specimens shall be required (see Clause 2.2.2).

2.2.2 Size and number Nine representative specimens each measuring 600 ± 5 mm $\times$ 450 ± 5 mm and of normal thickness shall comprise a test sample. Six of these specimens shall be tested initially (see Clause 2.5 and Section 4).

NOTES:

- 1 To obtain specimens suitable for the test it may be necessary to flatten, specially fabricate, or join pieces. Any mounting should be carried out in accordance with Section 4 (see Paragraph A6, Appendix A).
- 2 It is recommended that one additional specimen be retained by the testing laboratory for future reference in case of a dispute.

2.2.3 Conditioning Before testing, the specimens shall be conditioned to constant mass at a temperature of $20 \pm 2^\circ\text{C}$ and a relative humidity of $65 \pm 5\%$.

Constant mass is considered to be reached where after two successive weighing operations, carried out at minimum intervals of 24 h, the mass of the test piece has not varied by more than 0.1% or 0.1 g, whichever is the greater (see ISO 291).

2.2.4 Specimen mounting For procedures applying to the restraint and mounting of specimens, refer to Section 4.

2.3 TEST APPARATUS

2.3.1 General The apparatus shall be in accordance with Figure 2.1 and shall consist essentially of a specimen support of timber framing that is thermally insulated and arranged to be facing and parallel to a gas-fired radiant panel and mounted in such manner that it can be progressively moved toward the radiant panel during the course of the test. The specimen support frame shall have a nominal size of 710 mm $\times$ 610 mm $\times$ 50 mm and shall be constructed from 100 mm $\times$ 50 mm (nominal) timber battens. The frame shall be fully sheeted with thermal insulation on the side furthest from the radiant panel. The remaining face and edges of framing battens shall also be protected by cover strips of thermal insulation.

2.3.2 Thermal insulation The thermal insulation shall be 6 mm thick and shall have a value of $\sqrt{(k\rho c)}$ not greater than 600 at 150°C, where—

k = thermal conductivity, in watts per metre kelvin

ρ = density, in kilograms per cubic metre

c = specific heat capacity, in joules per kilogram kelvin.

2.3.3 Shields Lateral shields faced with thermal insulation complying with Clause 2.3.2 shall be provided as shown in Figure 2.1. A second test specimen support and set of lateral shields shall be provided for use with alternate specimens.

2.3.4 Hood and flue A hood and flue located so as to collect the products of combustion discharged from specimens under test shall be fixed over the apparatus as shown in Figure 2.1. The hood shall be lined with thermal insulation complying with the requirements of Clause 2.3.2. The flue shall terminate within the laboratory atmosphere under a vent which safely discharges the combustion products from the laboratory. The vent shall be no closer than 450 mm from the top of the flue and shall be designed to minimize the influence of external air movements on the draught in the flue.

WARNING: THERE IS A POSSIBILITY THAT TOXIC OR HARMFUL GASES MAY EVOLVE DURING COMBUSTION OF SPECIMENS. PRECAUTIONS SHOULD BE TAKEN TO ENSURE THAT PRODUCTS FROM THE FLUE ARE DISCHARGED SAFELY TO OUTDOORS AND THAT OPERATORS ARE PROTECTED BY PERSONAL AIR HOODS OR RESPIRATORS.

2.3.5 Radiant panel The face of the radiant panel shall measure 300 +3, -0 mm square and, together with its surround, shall not exceed 330 mm square. The radiant panel shall be supplied with a controllable gas/air mixture, which shall be burnt at the porous fire-brick surface of the panel, heating the latter to comply with the requirements of Clause 2.4.1.

2.3.6 Radiometer A radiometer fitted with a fluorite window and having an angle of complete vision of 60 +10, -0° and a cut-off angle of 90 ±10° shall be mounted as shown in Figure 2.1, sighting on a point 50 mm vertically above the centre of the specimen face when the plane of the specimen face is 485 mm distant from the sensing element of the radiometer and the buffers are in contact. In order that the radiometer will be at a constant distance from the face of the specimen throughout the period when ignition is to occur, the radiometer shall be mounted on slides in such a manner that it will move with the specimen carriage once the buffers are in contact.

NOTE: A Land Type M/RAD/P/W miniature thermopile with a range of 0 to 10 Kw/m² and fitted with a JRG fluorite window and water jacket is suitable.

2.3.7 Pilot flame A small pilot flame shall be located so that the centre-line of the orifice discharging gas is 15 ±1 mm from the front face of the specimen, and 50 mm above the centre of the specimen as shown in Figure 2.1. A spacer shall be attached to the pilot flame tube so that the centre-line of the orifice discharging gas can be maintained at 15 ±1 mm from specimens whose faces move or change during the test. The luminous portion of the pilot flame shall be set to be approximately 6 mm in diameter and 12 mm long when the tube is vertical with the orifice uppermost. A second and similar pilot flame shall be provided which can be similarly positioned approximately 15 mm from the front face of the specimen at any location judged to be evolving a significant quantity of smoke or vapours during a test.

NOTE: The pilot flame with town gas issuing from an orifice 4 mm in diameter at the end of a tube not more than 8 mm in diameter is suitable. For propane gas, a Bray pilot jet catalogue 242 size 00 is suitable.