



Methods for fire tests on building materials, components and structures

Part 8.1: Tests on elements of construction for buildings exposed to simulated bushfire attack—Radiant heat and small flaming sources



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 - Australian Institute of Building
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 - Building Research Association of New Zealand
 - Bureau of Steel Manufacturers of Australia
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 - Insurance Council of Australia
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 - Property Council of Australia
 - Society of Fire Protection Engineers
-

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Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Australian Standard[®]

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

**Part 8.1: Tests on elements of
construction for buildings exposed to
simulated bushfire attack—Radiant heat
and small flaming sources**

Originated as AS 1530.8.1—2007
Second edition AS 1530.8.1:2018.

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PREFACE

General

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee FP-018, Fire Safety, to supersede AS 1530.8.1—2007.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The major changes in this edition are as follows:

- (a) Allowance for the use of stainless steel radiant plates that have more uniform radiation distribution.
- (b) Improved specification of test and specimen configurations in regard to weepholes in walls, skylights in roof construction and penetrations.
- (c) Inclusion of provisions for the determination of the impact of weathering of exposed timber construction treated with chemicals or coatings that improve its fire performance.
- (d) Inclusion of roof valley details for roof construction.
- (e) Clarification of the applicability of results for base of wall details.
- (f) Inclusion of test procedure for windows with screens and shutters.
- (g) Inclusion of alternate crib design based on original debris research and industry testing.
- (h) Clarification of reporting requirements to require observations relate to failure criteria and be less subjective.
- (i) A general review of clarity, intent and specification of all testing requirements and in particular through gap criteria, roof pitch, crib location, heat flux gauge location.

The AS 1530.8 series comprises this Standard and AS 1530.8.2, *Methods for fire tests on building materials, components and structures, Part 8.2: Tests on elements of construction for buildings exposed to simulated bushfire attack—Large flaming sources*.

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.

Figures which are referenced in mandatory terms are deemed to be included in the requirements of this Standard.

This Standard incorporates commentary on some clauses. The commentary directly follows the relevant clause, is designated by ‘C’ preceding the clause number and is printed in italics in a panel. The commentary is for information only and does not need to be followed for conformance with this Standard.

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STANDARDS AUSTRALIA**Australian Standard****Methods for fire tests on building materials, components and structures****Part 8.1: Tests on elements of construction for buildings exposed to simulated bushfire attack—Radiant heat and small flaming sources****1 SCOPE**

This Standard provides methods for determining the performance of external construction elements when exposed to radiant heat, burning embers and burning debris.

NOTES:

- 1 The methods do not simulate engulfment by flames from the fire front or large burning items such as other burning buildings or adjacent isolated trees and shrubs (see AS 1530.8.2).
- 2 The peak level of radiant heat exposure is dependent upon the distance of the building from the potential fire front, the fire severity and the extent of shielding. The peak level can be based on an analysis of the specific site from first principles or from the classification of the site in accordance with the simple methods specified in AS 3959.
- 3 The results of the fire tests 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.
- 4 The fire tests in this Standard provide data relating to the performance of the particular element and building system and do not provide a general assessment of the performance of a specific type of material.

2 OBJECTIVE

The objective of this Standard is to provide building designers, manufacturers, test laboratories and regulatory authorities with a set of uniform requirements for heating conditions, test procedures, and criteria for the determination of the resistance to fire of a single building element or multiple building elements. This will be to a radiant heat profile simulating exposure to radiant heat from the fire front of a bushfire with additional exposure simulating ember attack to external surfaces and exposure to direct flame impingement from small secondary fires simulating burning debris.

3 PRINCIPLE**3.1 General**

A representative element of construction, or combination of elements is exposed to conditions simulating exposure to radiant heat, burning debris and burning embers under controlled and repeatable conditions.

Observations are made on the performance of the specimen while it is subjected to simulated exposure. The elapsed times at which various performance criteria are exceeded are recorded. The performance criteria are selected to address typical fire spread scenarios and to facilitate relatively safe movement around a property after the passage of the fire front.

3.2 Test exposure conditions

3.2.1 *Burning embers*

Exposure to burning embers impinging on the vertical and underside of exposed horizontal surfaces is simulated by application of a small gas flame to volatiles released from combustible materials.

3.2.2 *Burning debris*

Exposure to burning debris and the collection of burning embers on the upper surface of horizontal and near-horizontal surfaces is simulated by pre-ignited timber cribs.

Four sizes of timber crib are available. The selection of size of the crib and position for application are based on the potential for debris to collect. The crib size (Class A) is representative of debris that may collect around a building with reasonable levels of housekeeping/block maintenance and is the default size unless otherwise specified by AS 3959. Class B and C cribs simulate collections of debris that are representative of larger collections of debris, which may be more appropriate for facilities and structures that are not regularly maintained or where it is expected that accumulation of debris may occur, for example, a heat shield of sacrificial structure and remote infrastructure services.

The method does not apply to large volumes of combustible materials stored adjacent to the building or exposure to flames from adjacent structures. This test will identify excessive flammable elements of construction and elements susceptible to thermal shock from small flaming sources in addition to evaluating whether small fires may weaken the performance of an element of construction. If the impact of exposure to radiant heat is also being evaluated, the crib will have to be applied and exposure to the radiant heat profile commenced simultaneously.

3.2.3 *Radiant heat*

Element(s) of construction are exposed to a radiant heat profile under controlled conditions simulating the passage of the fire front adjacent to the structure.

During the test, a pilot ignition source is applied to exposed combustibles and volatiles on the exposed face (simulating ember attack and burning cribs) and is applied to simulate burning debris as described in Clause 3.2.1. Conditions are monitored for a period of 60 min from commencement of radiant heat exposure to evaluate the risk of ignition or re-ignition and incipient spread of fire within an element of construction.

NOTES:

- 1 It is recognized that radiant heat profiles will vary from one bushfire to the next as will the extent and nature of attack from burning embers and debris. The radiant heat exposure conditions specified in this Standard have been selected to represent a rapidly approaching bushfire to maximize the potential for thermal shock, a constant peak radiant heat flux maintained for a period of 2 min and a slow reduction in radiant heat to maximize the total applied heat load. The specified profiles are expected to be conservative for most bushfire exposures except some glazed elements, which may be susceptible to thermal shock during the cooling phase.
- 2 The radiant heat test is adapted from the test procedure for wall systems exposed to radiant heat given in AS 1530.4, with modifications to the heating profiles to simulate the transient peak from the fire front, application of flaming sources to simulated burning debris, modified conditioning requirements and modified criteria applicable to bushfires.

4 APPLICATION

This Standard specifies a test procedure applicable to a broad range of elements (and combinations of elements) of construction, including the following:

- (a) External walls.
- (b) Glazed vertical elements with and without shutters or screens.

- (c) Roofs, fascia and gutter details.
- (d) Skylights and roof windows with and without screens.
- (e) Doors with and without shutters and screens.
- (f) Service penetrations in walls, floor roof and eaves construction.
- (g) Decks.
- (h) Sub-floor spaces.

Specific procedures are provided for Items (a) to (h) above. The general test procedure in this Standard may also be applied to exposed structural elements and miscellaneous attachments and building services, such as airconditioning units, plastic pipes penetrating walls, verandas and carports.

NOTES:

- 1 Guidelines for application of the test method to elements other than those for which specific procedures are provided are given in Appendix A.
- 2 By incorporating combinations of elements, such as attachments to combustible walls, it is possible to assess the interaction between combustible walls and windows.
- 3 Verandas are regarded as covered decks and are included under roofs.

5 LIMITATIONS

5.1 General

While this test method provides an assessment of the resistance of elements or combinations of elements to simulated bushfire attack, it should be recognized that there are limitations to the current state of knowledge with respect to the behaviour of buildings exposed to bushfires and that a single test method may not provide a full assessment of fire hazard under all conditions.

Known limitations include wind, radiant heat source and radiant heat profiles (see Clauses 5.2, 5.3 and 5.4).

5.2 Wind

The method does not evaluate the effects of wind.

NOTE: Winds may 'open up buildings' prior to or during exposure to embers or may affect ignition and accelerate flame propagation over combustible materials.

5.3 Radiant heat source and specimen

For testing to be practicable, a maximum radiant heat source size and specimen size of 3000 mm × 3000 mm has been specified, which is consistent with the requirements of AS 1530.4.

It is recognized that the radiation levels will be greatest directly opposite the centre of the radiation source at any given distance and will reduce significantly towards the edges of the specimen. These variations will be further exaggerated when testing elements with details that extend away from the source, such as decks and roof eaves. This limitation has been addressed to some extent by specifying standard test arrangements with the central area of the specimen set back (see Figure 21.4).

5.4 Radiant heat profiles

To maintain the extent of testing required within practical limits, the specified radiant heat profiles include a rapid heating phase, maintain peak radiant heat levels for two minutes and then have a slow decay period with the total radiant heat exposure period lasting 10 minutes.

NOTE: For most applications (excluding some glazed elements such as toughened glass) these proposed profiles would be expected to be conservative when applied to buildings within the scope of AS 3959.

6 NORMATIVE REFERENCES

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

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

1530.1 Part 1: Combustibility test for materials

1530.4 Part 4: Fire resistance test of elements of construction

1905 Components for the protection of openings in fire-resistant walls

1905.1 Part 1: Fire-resistant doorsets

3959 Construction of buildings in bushfire-prone areas

AS/NZS

1080 Timber—methods of test

1080.1 Method 1: Moistures content

3837 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter

ASTM

D2898 Standard practice for accelerated weathering of fire-retardant-treated wood for fire testing

ABCB

National Construction Code

7 DEFINITIONS

For the purposes of this Standard, the following definitions apply.

7.1 Applicant

A company, corporation, organization, association, partnership, individual, entity or entities who seek a particular test service in accordance with this Standard.

7.2 Bushfire

An unplanned fire burning in vegetation, also referred to as a wildfire.

7.3 Bushfire attack level (BAL)

The ability of an element of construction, component or structure to satisfy the applicable performance requirements stated in this Standard when exposed to a nominated radiant heat flux and size of burning crib or the standard fire resistance heating regime of AS 1530.4.

BALs determined in accordance with this Standard are expressed as follows:

BAL—Xnn

Where X is a letter(s) specifying the class of crib applied and nn is a number relating to the peak radiant heat flux applied to the specimen.

For example: A BAL of AA40 indicates that the specimen satisfied the applicable performance criteria when exposed to a Class AA crib and peak radiant heat flux of 40 kW/m².

7.4 Combustible

Any material that does not meet the definition for non-combustible.

7.5 Element of construction

Either—

- (a) a distinct part of a building constructed by assembling material or materials; or
- (b) a test specimen representing such a part.

7.6 May

Indicates the existence of an option.

7.7 Non-combustible

The classification of a material based on its reaction to defined elevated temperature conditions. In this Standard that means the material—

- (a) is non-combustible in accordance with the *National Construction Code*; or
- (b) has been subjected to the test conditions of AS 1530.1 and has not exceeded flaming or temperature rise limits specified in that Standard.

7.8 Radiation (radiant heat)

The transfer of energy associated with the electromagnetic radiation emitted by a body due to its temperature.

NOTE: Total heat flux meters are used to measure radiant heat in the tests where the radiant heat component is the dominant mode of heat transfer.

7.9 Shall

Indicates a statement is mandatory.

7.10 Should

Indicates a recommendation.

7.11 Test specimen

An element (or part) of construction provided for the purpose of determining either its BAL or its effect on the BAL of another building element.

NOTE: This includes hangers, fixtures, insulating materials and features, such as lighting, ventilation ducts, joints and penetrations.

7.12 Window or door screen assembly

An element of building construction comprising a mesh or perforated sheet attached to a supporting frame used in the protection of windows and doors.

8 LINEAR DIMENSIONS

All linear dimensions given in this Standard are nominal values, unless tolerances are specified.

9 UNCERTAINTY OF MEASUREMENT

There are many factors that may affect the result of a fire test. The factors concerned with the variability of the specimen include its materials, manufacture and installation, which are not related to the uncertainty of measurement.

10 SAFETY PRECAUTIONS

WARNING: FIRE TESTING MAY BE HAZARDOUS AND THERE IS THE POSSIBILITY OF EXPOSURE TO HIGH LEVELS OF RADIANT HEAT, DIRECT FLAME CONTACT AND TOXIC AND/OR HARMFUL SMOKE AND GAS THAT MAY EVOLVE DURING THE TEST. MECHANICAL AND OPERATIONAL HAZARDS MAY ALSO ARISE DURING THE CONSTRUCTION OF THE TEST ELEMENTS OR STRUCTURES, THEIR TESTING AND DISPOSAL OF TEST RESIDUES.

An assessment of all potential hazards and risks to health shall be made and safety precautions identified and provided. Written safety instructions shall be issued. Appropriate training shall be given to relevant personnel. Laboratory personnel shall ensure that written safety instructions are followed at all times.

11 TEST APPARATUS

Unless otherwise specified, the requirements for the test apparatus shall be in accordance with AS 1530.4.

The test apparatus shall include the following:

- (a) A radiant heat source capable of generating a heat flux greater than the required heat flux. The radiant heat source shall be—
 - (i) 3000 mm × 3000 mm (± 100 mm); or
 - (ii) at least 1000 mm × 1000 mm where it is 400 mm wider and 400 mm higher than the element of construction being evaluated.

Where a steel plate is used and it extends beyond the furnace enclosure, the external face shall be insulated by 25 mm thick ceramic fibre blanket and if subject to distortion, the radiation distribution of Clause 13.3 shall be met in the distorted shape.

- (b) An insulated test frame to house a representative section of the element constructed in accordance with the applicable requirements contained in AS 1530.4.
- (c) Means for moving the test frame or furnace, which in combination with appropriate control equipment enables the heat flux to be regulated as specified in Clause 17.1.
- (d) An insulated shield at least 3000 mm × 3000 mm to protect the specimen prior to exposure, which can be removed within 10 s to achieve the required initial heating.
- (e) Water-cooled total heat flux meter(s) to measure the total incident heat flux on the specimen and total heat flux received from the specimen with appropriate mountings.

The following applies to the heat flux meter:

- (i) The target of the instrument shall not be shielded by a window or subject to a gas purge; that is, it shall be subject to convection as well as radiation.
- (ii) The suggested range shall be 0 to 50 kW/m².
- (iii) The accuracy shall be $\pm 5\%$ of maximum in range.
- (iv) The time constant (time to reach 64% of target value) shall be <10 s.
- (v) The view angle may vary, depending on the specimen size.

[SOURCE: AS 1530.4:2014]

- (f) Shielding panels, if necessary, to prevent exposure of personnel to radiant heat.
- (g) Specimen thermocouples and instrumentation, in accordance with the relevant requirements of AS 1530.4 and this Standard, to monitor the conditions on the non-fire side of the specimen.

- (h) Arrangement for restraint of the test specimen.
- (i) Timber cribs to evaluate the effects of burning debris and ember attack to horizontal surfaces, which shall be in accordance with Clause 14.2.1 of this Standard.
- (j) A steel tube connected to an LPG supply or equivalent with a 25 mm long gas flame used as an ignition source to the fire-exposed face at positions where volatiles are being released.
- (k) A gap gauge comprising a 3 ± 0.1 mm diameter steel probe. The gap gauge is used to determine if the size of gaps is greater than 3 mm.
- (l) Equipment for monitoring and evaluating test performance against the nominated criteria and for establishing the elapsed time.

12 CONDITIONING

12.1 Exposed timber product elements

Exposed timber product elements incorporated within test specimens shall be conditioned so as to approximate the moisture content they would achieve shortly before exposure to the fire front. For the purpose of this Standard that means—

- (a) be conditioned to a moisture content of $11 \pm 1.0\%$ on the day of test; and
- (b) their moisture content shall be determined in accordance with AS/NZS 1080.1.

12.2 Other materials

Other materials shall be conditioned in an environment with an average temperature of $25 \pm 2^\circ\text{C}$ and an average relative humidity (RH) of $45 \pm 5\%$ for a period of at least 1 week prior to the fire test.

12.3 Timber product elements with applied coatings or chemical treatments that may improve the fire performance

For exposed timber product elements with applied coatings or chemical treatments that may improve the fire performance, where the specimen meets Items (a), (b) and (c) below, there are no additional conditioning requirements prior to testing in accordance with this Standard:

- (a) The specimen is intended for applications deemed by Appendix F of AS 3959 as not protected from the weather.

and

- (b) It includes external parts of the specimen that are made from materials that have been impregnated with fire-retardant chemicals, or include the application of a fire-retardant or fire protective coating system.

and

- (c) Tests undertaken in accordance with Appendix B produce a performance ratio for $\text{FIGRA}_{0.2\text{MJ}}$ and MAHRE between 0.8 and 1.2.

13 PRE-TEST SET-UP FOR RADIANT HEAT TEST

13.1 Preheating

Prior to commencement of the test, the furnace and radiant panel shall be preheated to approximately steady state conditions with the specimen shielded from the radiant heat.

13.2 Calibration run

A calibration run shall be undertaken to establish the position and radiometer reading that correspond to the required radiant heat flux at the surface of the specimen and, if necessary,

the values measured by an additional control radiometer with an offset to avoid specimen interactions. The calibration run shall be carried out using an imperforate non-combustible panel of approximately the same size as the test specimen.

NOTE: Calcium silicate boards, ceramic fibre supported on a steel frame or equivalent have been found suitable for this purpose.

The temperature of the radiation source shall be monitored and the furnace temperature adjusted to establish approximately steady state conditions.

13.3 Radiation distribution

Radiation contours shall be established by taking measurements corresponding to the centre and the centre of each quarter section of the radiating source in a plane approximating to the intended position of the specimen such that the central value will be approximately equal to the test radiant heat flux.

The average of the four heat flux measurements at the quarter points shall be $0.75 \pm 25 - 15\%$ of the value measured at the central position.

14 GENERAL TEST PROCEDURE

14.1 General

When surfaces adjacent to the specimen, or forming part of the specimen, are inclined by 18° or less to the horizontal and are more than 110 mm wide, the specimen shall be exposed to burning timber cribs to evaluate the likely effects of burning debris coincident with exposure to radiant heat.

When surfaces adjacent to the specimen are inclined by more than 18° or are less than 110 mm wide, no burning timber cribs are required to be applied.

14.2 Procedures for timber cribs

14.2.1 Crib sizes

There are four options for timber crib sizes as specified in Table 14.2.1. The selection of size of the crib and position for application are based on the potential for debris to collect. The crib size (Class A) is representative of debris that may collect around a building with reasonable levels of housekeeping/block maintenance and is the default size unless otherwise specified by AS 3959.

The test report shall clearly indicate the size of crib used.

TABLE 14.2.1
TIMBER CRIB DIMENSIONS

Characteristic	Class A	Class AA	Class B	Class C
Thickness of stick (mm) ^a	20	9	20	20
Length of stick (mm)	100	100	150	230
No. sticks per row	4	5	6	9
No. of rows	3	6	3	3
Approx. mass (± 0.05 kg)	0.25 ^b	0.152 ^c	0.50 ^b	1.25 ^b
Tolerance on mass	± 0.05 kg	± 0.03 kg	± 0.05 kg	± 0.05 kg

NOTE:

^a Dimension of square cross-section.

^b Nominal density = 500 ± 50 kg/m² (sticks may be added/removed to top layer to achieve mass requirements).

^c Nominal density = 625 ± 50 kg/m² (sticks may be added/removed to top layer to achieve mass requirements).

14.2.2 *Material*

Type A, B and C cribs shall be made from untreated Radiata pine (*Pinus Radiata*) and shall be free of knots or cracks. The sticks may be fixed together with staples.

Type AA cribs shall be made from untreated Tasmanian Oak (*Eucalyptus regnans*, *Eucalyptus obliqua* or *Eucalyptus delegatensis*) and shall be free of knots or cracks. The sticks may be fixed together with staples.

14.2.3 *Conditioning*

The cribs shall be conditioned in an oven with temperatures between 40°C and 50°C for at least 24 h and then removed for a period between 60 min and 120 min prior to testing.

14.2.4 *Crib ignition*

The cribs shall be ignited by subjecting them to the flames from a gas burner such that each surface is fully enveloped in the burner flame except as specified below. An oxy/acetylene type burner with a Type 551 size 8 × 10 heating tip is suitable.

The test cribs shall be subjected to the required size of flame of the gas burner for the following periods of time:

- (a) Class A test cribs shall be exposed to the flame for 3 min, during which time they shall be rotated so as to expose each surface, except the bottom face, to the flame in the following manner and sequence:
 - (i) Each 0.10 m × 0.10 m face for 30 s.
 - (ii) Each 0.06 m × 0.10 m face for 30 s.
- (b) Class AA test cribs shall be exposed to the flame for 2 min, during which time they shall be rotated so as to expose each surface, except the bottom face, to the flame in the following manner and sequence:
 - (i) The upper 0.10 m × 0.10 m face for 20 s.
 - (ii) Each 0.54 m × 0.10 m face for 20 s.
 - (iii) The upper 0.10 m × 0.10 m face for 20 s.
- (c) Class B test cribs shall be exposed to the flame for 4 min, during which time they shall be rotated so as to expose each surface, except the bottom face, to the flame in the following manner and sequence:
 - (i) Each 0.15 m × 0.15 m face for 30 s.
 - (ii) Each 0.06 m × 0.15 m face for 30 s.
- (d) Class C test cribs shall be exposed to the flame for 5 min, during which time they shall be rotated so as to expose each surface, except the bottom face, to the flame in the following manner and sequence:
 - (i) Each 0.23 m × 0.23 m face for 30 s.
 - (ii) Each 0.06 m × 0.23 m face for 30 s.

14.2.5 *Time of crib application*

After exposure to the burner has been completed, the crib shall be positioned on the assembly within 15 s and the radiant heat exposure test commenced within a further 15 s. If the assembly has a vertical element of construction, the crib shall be positioned such that one of the sides of the burning crib is in contact with the face of the vertical element.

14.2.6 Location of crib application

The required crib locations are specified in Clauses 15 to 22 as appropriate to the type and configuration of the specimen.

14.3 Radiant heat test procedures

14.3.1 Exposure conditions

A radiometer, to measure the incident radiation at approximately the centre of the specimen, shall be mounted in the test specimen provided the mounting is unlikely to affect significantly the performance of the test specimen and the radiometer readings are unlikely to be affected by flaming from the specimen.

Where the radiometer cannot be mounted within the specimen, a pre-calibration run shall be undertaken to establish the relationship between distance and incident radiant heat flux at the centre of the element/feature under investigation, and an additional control radiometer shall be mounted at approximately the specimen's mid-height with an offset such that the radiometer will not be affected by flames or impact on the performance of the specimen. The calibration run shall establish the measured heat flux by the additional offset control radiometer that corresponds to the required incident heat flux at the centre of the specimen in accordance with Clause 13.

The furnace temperature and radiant panel shall be controlled so that the average heat flux, measured or calculated at the centre of the panel at no more than 5 s intervals, is maintained within the prescribed radiant heat flux limits specified above.

For a given time interval in Table 14.3.1, above average heat flux for the given period shall be no less than the value in Table 14.3.1 and not exceed the given values by more than 20% or 1 kW/m², whichever is the greater. A graph of the minimum imposed heat flux is shown in Figure 14.3.1.

TABLE 14.3.1

BUSHFIRE RADIANT HEAT TEST PROFILES—TIME FROM START OF TEST

Bushfire attack level (BAL)	Incident radiation kW/m ²	Time from start of test(s)								
		20–140	140–180	180–240	240–300	300–360	360–420	420–480	480–540	540–600
Severe [1]	40	Min 40	24	16	12	8.5	7	5	4	3
Very high	29	Min 29	21	14	11	8	6.5	5	3.5	3
High	19	Min 19	15	11	8	7	5	4	3	3
Medium	12.5	Min 12.5	10	8	6	5	4	3	3	3

NOTE: Refer to AS 1530.8.2 for the BAL FZ.

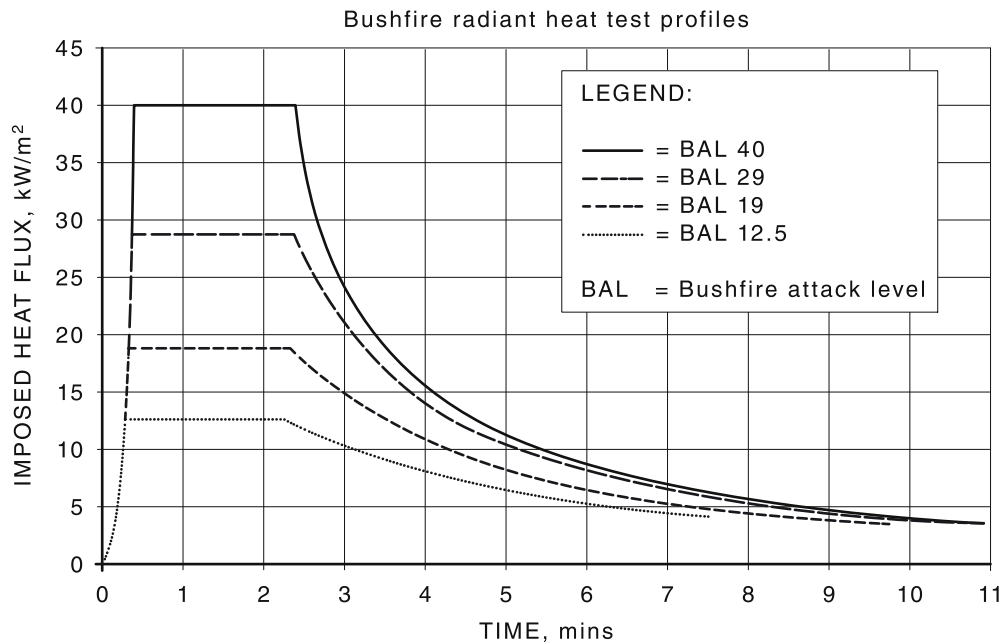


FIGURE 14.3.1 TYPICAL EXPOSURE CONDITIONS FOR RADIANT HEAT TEST

14.3.2 Specimen temperature data

Specimen temperatures shall be recorded at a maximum of 5 s intervals. The temperatures of the test specimen shall be measured at the positions indicated in Clauses 14.3.3 to 14.3.6. For elements not specifically addressed in Clauses 14.3.3 to 14.3.6, the positions indicated in AS 1530.4 for determining the insulation performance of separating elements of the same type and the most similar elements in the following clauses shall be used.

14.3.3 Heat flux data

The incident and radiant heat flux data shall be recorded at a maximum of 5 s intervals.

14.3.4 Observations

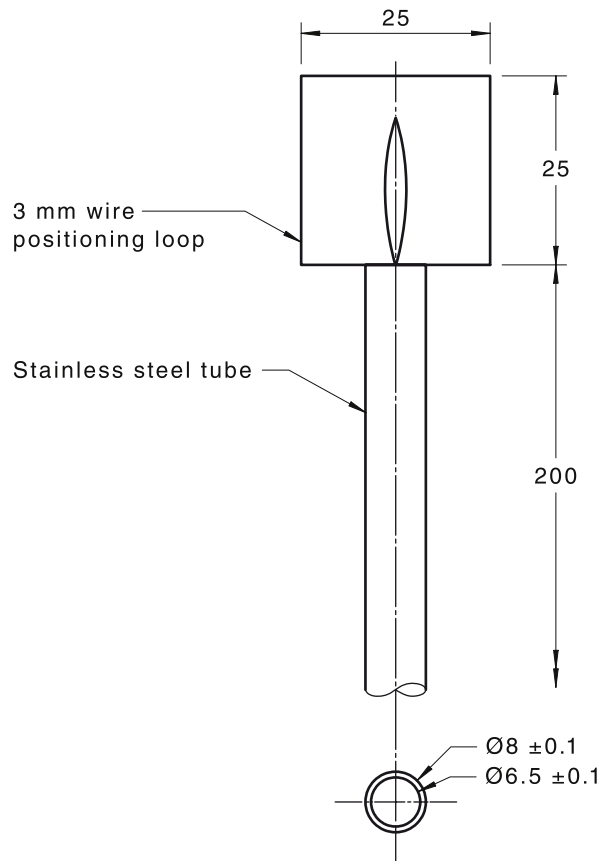
Throughout the course of the test, observations shall be made of the behaviour of the specimen with particular emphasis on the performance criteria listed in Clause 14.4. All specimen behaviour shall be recorded, and the time of their occurrence shall be noted. Measurements shall be recorded at sufficient frequency to produce a plot that will permit reliable interpolation.

14.3.5 Recording data

Specimen data shall be recorded from commencement of the test for a period of at least 60 min.

14.3.6 Pilot ignition

The pilot ignition source shall be applied for a period of at least 10 s to any areas releasing significant quantities of volatiles that may be likely to ignite. The ignition flame shall be applied at a distance of 6 mm from the surface of the specimen. This can be achieved by fitting spacers to the steel tube, as shown in Figure 14.3.6.



DIMENSIONS IN MILLIMETRES

FIGURE 14.3.6 PILOT IGNITION—STEEL TUBE ASSEMBLY

14.4 Performance criteria

The failure criteria for the test are the following:

- Where a gap from the fire exposed face to the non-fire exposed face of the element through which a 3 mm diameter probe can penetrate during the 60 min test period.
NOTE: Penetration is defined as a straight, unimpeded path through which a straight 3mm probe can pass through the specimen, freely and unobstructed, from the fire side to the non-fire side such that the tip of the probe is visible from the non-fire side.
- Sustained flaming for more than 10 s on the non-fire side during the 60 min test period.
- Flaming on the fire-exposed side at the end of the 60 min test period.
- Where the specimen includes uninsulated areas, the radiant heat flux 365 mm from the non-fire side of the specimen exceeds 15 kW/m^2 during the 60 min test.

- (e) Mean and maximum temperature rises greater than 140 K and 180 K, respectively, on the non-fire side during the 60 min test, except for glazed/uninsulated areas for which the radiant heat flux limits are applicable.
- (f) Radiant heat flux 250 mm from the fire-exposed face of the specimen, exceeds 3 kW/m² between 20 min and 60 min after the commencement of the test.
- (g) Mean and maximum temperatures of the internal faces of construction including cavities, exceeding 250°C and 300°C respectively between 20 min and 60 min after the commencement of test.

Where elements of construction may interact with other elements of construction, the test specimen shall incorporate representative associated construction. The above performance criteria apply to the associated construction as well as the specific element under consideration and failure of the associated construction constitutes failure of the total system.

14.5 Expression of results

The results shall be expressed in a tabular format in the report. If no failure occurs this shall be stated in the time to failure column. If failure occurs under a single performance criterion at several positions, the time of each occurrence shall be noted in the table. If a criterion is not applicable it shall also be stated in the time to failure column.

NOTE: Table 14.5 provides an example of the required tabular format. Example results for a wall system that satisfied all the required criteria are also included in the Table.

The BAL for elements that satisfy the appropriate performance criteria at a nominated radiant heat flux shall be expressed in the following form:

BAL: A40

Where the first letter indicates the crib class and the second number the peak radiant flux for which all relevant performance criteria were satisfied and shall be 12.5, 19, 29 or 40.

TABLE 14.5
EXAMPLE OF RESULTS FOR A WALL SYSTEM
SATISFYING ALL RELEVANT CRITERIA

Performance criteria	Time to failure (min)	Position of failure
A gap from the fire exposed face to the non-fire exposed face greater than 3 mm	No failure	—
Sustained flaming for 10 s on the non-fire side	No failure	—
Flaming on the fire-exposed side at the end of the 60 min test period	No failure	—
Radiant heat flux 365 mm from the non-fire side exceeding 15 kW/m ²	Not applicable	—
Mean and maximum temperature rises greater than 140 K and 180 K	No failure	—
Radiant heat flux 250 mm from the specimen, greater than 3 kW/m ² between 20 min and 60 min	No failure	—
Mean and maximum temperature of internal faces exceeding 250°C and 300°C respectively between 20 min and 60 min after commencement of test	No failure	—
Crib class	A	Peak heat flux
		40 kW/m ²