Australian STANDARD®

AS 3959:2018
Construction of buildings in bushfire-prone areas

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The following are represented on Committee FP-020:

- Australasian Fire and Emergency Service Authorities Council (AFAC)
- Australian Building Codes Board
- Australian Garage Door Association
- Australian Institute of Architects
- Australian Institute of Building Surveyors
- Australian Roofing Tile Association
- Australian Steel Institute
- Australian Window Association
- Bushfire Building Council of Australia
- Consumers Federation of Australia
- Department of Health and Human Services, Vic.
- Fire Protection Association Australia
- Forest and Wood Products Australia
- Housing Industry Association
- Insulated Panel Council Australasia
- Insurance Council of Australia
- Master Builders Australia
- Roofing Tile Association of Australia
- Think Brick Australia
- Timber Preservers Association of Australia
- Window and Door Industry Council

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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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Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at **mail@standards.org.au**, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Message from Adrian O'Connell, CEO of Standards Australia

Standards Australia is proud to be partnering with the Federal Government to provide access to AS 3959:2018, *Construction of buildings in bushfire-prone areas*.

When the scale of the recent disaster became apparent, I wanted to make sure that Standards Australia was directly contributing to the broader Australian response. Providing this standard is a simple and practical way we can assist the recovery and rebuild of bushfire ravaged communities.

This standard provides guidance to professionals in the building and construction industry and is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand bushfires.

By funding access to this standard together with the Commonwealth Government, it is my great hope that as communities rebuild after these most recent bushfires, they do so with access to Australia's construction standard that deals with bushfire prone areas.

AS 3959:2018
(Incorporating Amendment No. 1)

Australian Standard®

Construction of buildings in bushfire-prone areas

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PREFACE

This Standard was prepared by the Standards Australia Committee FP-020, Construction of Buildings in Bushfire-Prone Areas, to supersede AS 3959—2009.

This Standard incorporates Amendment No. 1 (2019). 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.

This edition incorporates the following changes:

(a) The site assessment in Section 2 has been simplified to address interpretational issues related to slope, grasslands and low threat vegetation.

(b) Section 3 clarifies that the shielding concessions relate only to the elements of the wall and do not apply to the subfloor or roofs.

(c) The protection of gaps and openings has been addressed by requiring suitable measures for doors and windows and providing for other gaps to be suitably sealed.

(d) The requirements for floors at BAL-12.5 and BAL-19 relating to bearers, joists and flooring within 400 mm above finished ground level now align with BAL-29.

(e) Windows address the framed material, hardware, glazing, seals and weather strips and screens. Doors address the door panel material, door frame material, hardware, glazing, seals and weather proofing, screens and to be tight fitting. Vehicle access doors recognise that guide tracks do not permit direct access for embers and do not require edge gap protection. Weather strips are to conform with a flammability index of no greater than five (AS 1530.2).

(f) Roofs can now include certain translucent or transparent roof coverings at BAL-12.5 and BAL-19 for verandas, carports or awnings where the roof is separated from the main building.

(g) Editorial changes have been made for consistency with Section 2 and to locate tables with the relevant sections of the site assessment methodology. Appendices F and H have been combined.

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 is of an advisory nature only. They provide explanations and guidance on recommended design considerations or technical procedures, as well as an informative cross-reference to other documents or publications.

This Standard incorporates a 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 the Standard.

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FOREWORD

This Standard is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

Improving the design and construction of buildings to minimize damage from the effects of bushfire is but one of several measures available to property owners and occupiers to address damage during bushfire. Property owners should be aware that this Standard is part of a process that aims to lessen the risk of damage to buildings occurring in the event of the onslaught of bushfire. Other measures of mitigating damage from bushfire fall within the areas of planning, subdivision, siting, building design, landscaping and maintenance.

Research is continuing with regards to the effects of bushfires on buildings, determination of bushfire-prone areas within various States and Territories and particular construction techniques designed to maximize the performance of buildings when subjected to bushfire attack. The outcomes of this research will be reflected in subsequent editions of this Standard.

The measures set out in this Standard to improve construction, and thus better equip a building to withstand the effects from bushfire, may also be used as a guide for those who wish to voluntarily adopt such measures in situations where regulatory compliance is not mandated.

Although this Standard provides for the highest Bushfire Attack Level (BAL), that is, BAL—FZ, there may be circumstances advised by authorities having jurisdiction that building in a particular bushfire location is either not recommended or not permitted based on unrealistic risk exposures.

Of significance to this Standard is the publication of methods of test in the AS 1530.8 series. Building materials, elements of construction and systems subjected to the tests of the AS 1530.8 series will satisfy the construction requirements prescribed in Sections 5 to 9 of this Standard. These methods are AS 1530.8.1, *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* 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 modelling procedure for the assessment of BAL in this Standard uses the nominal inputs shown in Appendix B, Table B1 with an assumed flame temperature of 1090 K. The outputs result in the production of Tables 2.4 to 2.7.

It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.

The survivability of buildings is also dependent on a combination of measures such as landscaping, water supplies, access, building design and maintenance. Care should also be exercised when siting and designing for these measures when constructing a building under this Standard.

STANDARDS AUSTRALIA

Australian Standard
Construction of buildings in bushfire-prone areas

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the construction of buildings in bushfire-prone areas in order to improve their resistance to bushfire attack from burning embers, radiant heat, flame contact and combinations of the three attack forms.

Although this Standard is designed to improve the performance of buildings when subjected to bushfire attack in designated bushfire-prone areas there can be no guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

This Standard does not provide any requirements for fencing and screen walls. Fencing and screen walls may reduce exposure of a building to embers, radiant heat and flame contact from the bushfire front and from other potential fire sources such as adjacent buildings. The efficacy of fencing and walls depends on its resistance to ember, radiant heat and flame attack and potential for ignition and subsequent sustained flaming, height and structural design and specific site configurations. Therefore no specific advice has been provided in this Standard but designers may consider utilizing fencing and walls to improve house survivability beyond the base levels provided in this Standard.

NOTES:

1 The construction measures contained in this Standard apply to any building class and are not the only measures that can be considered to address bushfire attack as there are other means available that are outside the scope of this Standard.

2 This Standard does not address the infiltration of smoke nor any associated health and safety risk. The combustion of materials and coatings during a bushfire may present a health and safety risk. Selection of external materials should be considered in relation to potential health and safety risk in a bushfire.

3 The vulnerability of a building is also affected by building design and maintenance. The provision of water, access and landscaping is also important but falls outside the scope of this Standard. The overall survivability of a building is dependent on a combination of these measures in achieving improved safety.

1.2 OBJECTIVE

1.2.1 Objective of this Standard

The objective of this Standard is to prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire, appropriate to the—

(a) potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire; and

(b) intensity of the bushfire attack on the building.

1.2.2 Objective of this edition

The objective of this edition is to provide additional and detailed methods of assessing bushfire attack together with the applicable construction requirements, arranged by BAL.

1.3 APPLICATION

This Standard is limited to those sites where the Bushfire Attack Level (BAL) has been determined as BAL—LOW, BAL—12.5, BAL—19, BAL—29, BAL—40 or BAL—FZ (see Table 3.1).

NOTE: Although there are no specific construction requirements in the BAL designated as LOW, this does not imply these buildings are not at risk.

1.4 NORMATIVE REFERENCES

The following documents are indispensable to the application of this Standard.

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

AS

1288 Glass in buildings—Selection and installation

1445 Hot-dipped zinc-coated, aluminium/zinc-coated or aluminium/zinc/magnesium-coated steel sheet—76 mm pitch corrugated

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
1530.4 Part 4: Fire-resistance test of elements of construction
1530.8.1 Part 8.1: Tests on elements of construction for buildings exposed to simulated bushfire attack—Radiant heat and small flaming sources
1530.8.2 Part 8.2: Tests on elements of construction for buildings exposed to simulated bushfire attack—Large flaming sources

1684 Residential timber-framed construction (series)

1720 Timber structures
1720.2 Part 2: Timber properties

1905 Components for the protection of openings in fire-resistant walls
1905.1 Part 1: Fire-resistant doorsets

2047 Windows and external glazed doors in buildings

2049 Roof tiles

2050 Installation of roof tiles

3999 Bulk thermal insulation—Installation

AS/NZS

2588 Gypsum plasterboard

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

4505 Garage doors and other large access doors

4859 Materials for the thermal insulation of buildings
4859.1 Part 1: General criteria and technical provisions

60335 Household and similar electrical appliances—Safety
60335.2.98 Part 2.98: Particular requirements for humidifiers (IEC 60335-2-98 Ed 2.2, MOD)

ASTM

D2898 Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

NCC National Construction Code

1.5 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.5.1 Bushfire

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

1.5.2 Bushfire attack

Attack by wind, burning embers, radiant heat or flame generated by a bushfire.

1.5.3 Bushfire-prone area

An area that is subject to, or likely to be subject to, bushfire attack.

1.5.4 Bushfire Attack Level (BAL)

A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.

1.5.5 Bushfire-resisting timber

Timber that is in solid, laminated or reconstituted form that meets the test specified in Appendix F.

1.5.6 Bushfire shutter

A shutter that is constructed and fitted to the exterior of a building in accordance with Clause 3.7, to protect a window or a door from exposure to bushfire attack.

1.5.7 Classified vegetation

Vegetation that has been classified in accordance with Clause 2.2.3.

1.5.8 Combustible

Combustible as determined by AS 1530.1.

1.5.9 Decking

That part of the structure of verandas, decks, steps, ramps and landings that forms the trafficable surface of the structure.

1.5.10 Door frame

The frame surrounding and supporting a door where the frame consists of two stiles, a head and sometimes a transom and a sill, and is machined or made from solid stock or with a planted doorstop (see Figure 3.2).

1.5.11 Effective slope

The slope under that classified vegetation which most influences the bushfire attack (see Figure 2.3).

1.5.12 Ember attack

Attack by smouldering or flaming windborne debris that is capable of entering or accumulating around a building, and that may ignite the building or other combustible materials and debris.

1.5.13 Ember guard

A cover inserted in or over an opening or cavity to prevent the entry of burning embers.