

Australian Standard[®]

Construction of buildings in bushfire-prone areas



This Australian Standard® was prepared by Committee FP-020, Construction of Buildings in Bushfire-prone Areas. It was approved on behalf of the Council of Standards Australia on 6 March 2009.

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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 Institute of Architects
- Australian Institute of Building Surveyors
- Australian Steel Institute
- Australian Window Association Inc.
- CSIRO
- Engineers Australia
- Fire Protection Association Australia
- Housing Industry Association
- Master Builders Australia
- Plastics and Chemicals Industries Association Incorporated
- Property Council Australia
- Testing Interests (Australia)
- Think Brick Australia
- Timber Preservers Association of Australia
- Wood Council Australia

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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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Construction of buildings in bushfire-prone areas

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PREFACE

Development

This Standard was prepared by the Standards Australia Committee FP-020, Construction of Buildings in Bushfire-prone Areas, to supersede AS 3959—1999.

Changes to this Edition

This Edition incorporates the following changes:

- (a) The method of determining the Bushfire Attack Level (BAL) for a site (Section 2) has been revised and now comprises six categories, namely BAL—LOW, BAL—12.5, BAL—19, BAL—29, BAL—40 and BAL—FZ. These categories are based on heat flux exposure thresholds (see Table 3.1).
- (b) The methods for determining the Bushfire Attack Level now include both a step-by-step procedure, including tables that list climate, slope of ground and vegetation variations in States and Territories (Section 2) and a detailed calculated procedure contained in Appendix B. The slope of ground has also been clarified in Section 2 and a description and measurement of slope is included in Clause 2.2.4.
- (c) The construction sections have been reorganized in group-specific construction requirements by Bushfire Attack Levels (BALs), rather than by building component. There are now seven Sections, namely Section 3 (General) Section 4 (BAL—LOW, for which this Standard does not provide construction requirements), Section 5 (BAL—12.5), Section 6 (BAL—19), Section 7 (BAL—29), Section 8 (BAL—40), and Section 9 (BAL—FZ).
- (d) The construction requirements in Sections 3 to 9 have been revised to address the levels of exposure for the Bushfire Attack Levels (BALs). This Edition takes into consideration where building elements and materials that have been subjected to established test methods, such as AS 1530.4, *Methods for fire tests on building materials, components and structures*, Part 4: *Fire-resistance test of elements of construction*, covering fire resistance. Standards Australia technical committee FP-018, Fire Safety, has developed test methods exclusively for materials and elements of construction in bushfire-prone areas, namely, AS 1530.8.1, *Tests on elements of construction for buildings exposed to simulated bushfire attack*, Part 8.1: *Radiant heat and small flaming source*, which covers BAL—12.5 to BAL—40 and AS 1530.8.2, *Tests on elements of construction for buildings exposed to simulated bushfire attack*, Part 8.2: *Large flaming sources*, which covers BAL—FZ. Concessions for non-exposed facades are included in Section 3.
- (e) Attached structures, such as garages, have been included.
- (f) The aperture size of mesh at 2 mm is based on ember attack; the gaps and penetrations sizes at 3 mm are based on radiant heat.
- (g) A worked example of bushfire assessment is included in Appendix A and is based on the step-by-step method to assist with the requirements set out in Section 2.

Construction in Flame Zone

Whilst the majority of the Committee support the full Standard, unanimity was not reached on aspects related to BAL—FZ Flame Zone. The Committee will be asked to review this Standard, including Flame Zone construction, in light of relevant outcomes of the Victorian Royal Commission into the February 2009 bushfires.

Issues for future editions and amendments

Several issues were identified by the Committee when considering publication of this edition (which will be reconsidered by the Committee for inclusion in the next edition of this Standard or as amendments to this Standard) as follows:

- (i) *Royal Commission*—Standards Australia, with input from the Committee, will be making a submission to the Royal Commission, which is undertaking a review into the bushfires experienced in Victoria during February 2009. Research from the bushfires will assist the committee in making improvements to subsequent editions of this Standard.
- (ii) *Refuges*—Refuge areas and bunkers as ‘high protection areas’ will be researched and considered as a possible addition to this Standard.
- (iii) *Flame Zone (10 m setback)*—Currently, where the 10 m setback distance cannot be achieved, the performance of the elements of building construction that are less than 10 m from the classified vegetation is required to comply with AS 1530.8.2. The appropriateness of the test criteria for the risk is under consideration.
- (iv) *Grassland*—The inclusion of unmanaged grassland in the vegetation types and classifications.
- (v) *Vegetation fuel loads*—Currently, there is one representative value only for fuel loads for each vegetation category which may be conservative in some areas and consideration for multiple vegetation fuel loads will be given.
- (vi) *Steel roofs*—Tests to demonstrate the performance of steel roofs in a bushfire.
- (vii) *Tiled roofs*—The effects of wind on tiled roofs during a bushfire.
- (viii) *Aperture size of window mesh and perforated sheeting*—Ascertain the appropriate aperture size for window mesh and perforated sheeting used to protect windows and doors from ember attack.
- (ix) *Subfloors*—Requirements for the protection of subfloor spaces against ember attack. This Edition provides information concerning storage of combustible materials in the subfloor space.
- (x) *Doors*—The appropriate type of external door (solid core or glazed) for the varying levels of bushfire attack is to be researched.
- (xi) *Log construction*—The application of log construction as an exterior building element of construction.
- (xii) *Straw bale construction*—The application of straw bale construction as an exterior building element of construction.
- (xiii) *Draught excluders*—Gaps between the base of a door and the floor require a draught excluder that is non-combustible.
- (xiv) *Sarking*—Consideration is to be given to the effectiveness of sarking under different roof coverings.
- (xv) *Glazed elements*—The performance characteristics of glazed elements at elevated temperatures.
- (xvi) *Fire resistance*—Test methods for fire-resisting materials and assemblies, as currently, there is no test method available to assess the performance of fire-resisting materials such as plastics.

Research and development for the assessment of a bushfire attack, together with specific construction requirements, are continuing and the results are being considered by the Committee for inclusion in a future edition of the Standard.

Normative and Informative

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.

Notes and commentaries

The use of Notes in this Standard is of an advisory nature only. They provide explanations and guidance on recommended design consideration 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 compliance 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, landscaping and maintenance.

Research is continuing with regards to the effects of bushfires on buildings, determination of bushfire-prone areas within various States 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 (in 2007) of methods of test whereby 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 Bushfire Attack Level (BAL) in this Standard uses the nominal inputs shown in Table 2.4.1 with an assumed flame temperature of 1090 K. The outputs result in the production of Tables 2.4.2 to 2.4.5. Adoption of flame temperature is a jurisdictional matter.

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 unpredictable nature and behaviour of fire and extreme weather conditions.

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.

NOTES:

- 1 The construction measures contained in this Standard 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. Standards Australia's Handbook HB 36 provides further information on these issues.
- 2 On the basis that the committee is not aware of any clear evidence that smoke from a bushfire entering a building is a risk, this Standard does not address the infiltration of smoke nor any associated health risk.

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 while the fire front passes.

1.2.2 Objective of this Edition

The objective of this Edition is to provide additional and detailed methods of assessing bushfire attack commensurate with the applicable construction requirements at increased increments when compared to the previous edition.

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.

AS	
1288	Glass in buildings—Selection and installation
1530	Methods for fire tests on building materials, components and structures
1530.1	Part 1: Combustibility test for materials



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