AS 3959—2009
(Incorporating Amendment Nos 1, 2 and 3)

AS 3959—2009

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.
This Standard was published on 10 March 2009.

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
- Think Brick Australia
- Timber Preservers Association of Australia
- Wood Council Australia

A1

A1 Testing Interests:

- Exova Warringtonfire

Acknowledgement is made to the New South Wales Rural Fire Service for their contriibution in developing this Standard.

This Standard was issued in draft form for comment as DR 03182 and DR 05060.

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.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

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.

Australian Standard®

Construction of buildings in bushfire-prone areas

Originated as AS 3959—1991.
Second edition 1999.
Reissued incorporating Amendment No. 1 (December 2000).
Reissued incorporating Amendment No. 2 (December 2001).
Third edition 2009.
Reissued incorporating Amendment No. 1 (November 2009).
Reissued incorporating Amendment No. 2 (February 2011).
Reissued incorporating Amendment No. 3 (November 2011).

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 9051 8

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.

This Standard incorporates Amendment No. 1 (November 2009), Amendment No. 2 (February 2011) and Amendment No. 3 (November 2011). 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.

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).

A1 (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 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, *Tests on elements of construction for buildings exposed to simulated bushfire attack*. Part 8.1: *Radiant heat and small flaming sources*, which covers BAL—12.5 to BAL—40 and Part 8.2: *Large flaming sources*, which covers BAL—FZ. Concessions for non-exposed facades are included in Section 3. A2

(e) Attached structures, such as garages, have been included.

A1 (f) **‘Text deleted’**

(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.

A3 **‘Text deleted’**

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.

CONTENTS

Page

Page

Page

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*.

A1 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. .

A1 **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.**

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 330 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.

A2

1.2 OBJECTIVE

A3

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

A1

The objective of this Edition is to provide additional and detailed methods of assessing bushfire attack together 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

A3 1445 Hot-dipped zinc-coated or aluminium/zinc-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

AS
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
1684.2 Part 2: Non-cyclonic areas
1684.3 Part 3: Cyclonic areas

1720 Timber structures
1720.2 Part 2: Timber properties

A3 3999 Thermal insulation of dwellings—Bulk insulation—Installation requirements

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

AS/NZS
A3 2588 Gypsum plasterboard
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

BCA Building Code of Australia

Atlas of Australian Resources—Volume 6 Vegetation, Australian Surveying and Land Information Group, Department of Administrative Services, Canberra, 1990.

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.

A2 ### 1.5.2 Bushfire attack

Attack by burning embers, radiant heat or flame generated by a bushfire, which might result in ignition and subsequent damage to or destruction of a building.

1.5.3 Bushfire-prone area

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