

Guide for Compliant Construction of Timber Windows and Doors in Bushfire-Prone Areas



WADOC

Window and Door Industry Council Inc

Introduction

This Guide has been developed to show how you can design and build with timber windows and doors, and meet the requirements of the Australian Standard AS 3959–2009 Construction of buildings in bushfire-prone area.

The intent of this guide is to better understand the various strategies that are available to building designers and the building owner to meet the standard. It is anticipated that the designers discuss these strategies with the window and door manufacturers to establish what solution best suits the site constraints and the overall design's solution.

Where applicable the guide also addresses state variations to the National Construction Code (NCC).

Objective of AS 3959–2009 Construction of buildings in bushfire-prone areas

The 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, or flame generated by a bushfire.

The Standard also notes that the performance of buildings constructed to the Standard when subjected to bushfire attack has no guarantee that a building will survive a bushfire event on every occasion. This is due to the unpredictable nature and behaviour of fire and extreme weather conditions.

Understanding the Bushfire Attack Level (BAL)

Assessing the Bushfire Attack Level (BAL) of the building site is the first step towards the building's design. Obtaining the right BAL level for the site is the best strategy to reduce the construction requirements and should also be the first aspect investigated if costs or compliance is problematic.

BAL levels are based on the Fire Danger Index (a factor that considers air temperature, relative humidity, wind speed and drought effects), the type of the surrounding predominate vegetation, the distance of the vegetation from the site, and the slope of the land under the vegetation and it's direction of slope. There are six Bushfire Attack Levels defined in the Standard, and they are;

BAL-LOW: This level has no special construction requirements as there is such a low risk of bushfire attack. Common construction materials and methods, including timber framing windows and doors can be used. The exception is in South Australia where this state has varied the National Construction Code (NCC) to include a few construction requirements around ember attack. These requirements are contained in the NCC, not the Standards. These requirements in BAL-LOW do not affect window and door systems.

BAL-12.5: This is principally concerned with protection from ember attack and radiant heat up to and including 12.5 kW/m² and where the site is less than 100 m from the source of bushfire attack.

BAL-19: This is principally concerned with protection from ember attack and radiant heat but at an increased level to a maximum radiant heat flux of up to 19 kW/m².

BAL-29: This is identified as having an increasing level of ember attack together with an increasing heat flux than BAL 19, but not having heat flux greater than 29 kW/m².

BAL-40: Further increased load of ember and burning debris ignited by wind-borne embers; together with an increasing heat flux, but not greater than 40 kW/m². There is a likelihood of exposure to bushfire flames.

BAL-FZ: Is the top most exposure and has a direct exposure risk to flames from the fire front. Ember attack and a heat flux is greater than 40 kW/m² and no upper heat flux is given.

Site Assessment of the Building

The Standard contains two methods to determine the BAL for a building, either through simplified site assessment method in Section Two or detailed procedure in Appendix B of AS3959.

The methods are applicable to Queensland, Western Australia, ACT, NT and Tasmania. NSW, South Australia and Victoria have additional requirements or a different method.

NSW

This state has its own site assessment method contained in NSW RFS guide Planning for Bush Fire Protection 2006. The site assessment methodology was the forerunner to the method contained in AS3959, and therefore has similar features. The outcome varies to that of the AS3959 Standard as there are different assumptions used. The NSW RFS guide must be used in NSW.

Victoria

This state has designated a bushfire prone area that covers approximately 80% of the state. These areas are defined on maps and found from local government authorities. The designated bushfire prone area does not have a BAL Low, commencing at a minimum BAL level of 12.5. Higher BAL levels are derived by the AS3959 Standard as usual.

South Australia

This state nominates the Bushfire Attack Level through the South Australia Development Plan, again irrespective to the assessed level determined by the AS3959 standard. These areas are;

- General Bushfire Risk requiring BAL – Low construction, and
- Medium Bushfire Risk requiring BAL -12.5 construction.

For areas of High Bushfire Risk they are to be assessed and constructed in accordance with AS3959.

Also some areas that would be considered as excluded vegetation areas within AS3959 i.e. low threat and non-vegetated areas, also have construction requirements. Reference to the NCC and South Australia Development Plan is required.

What can be done to reduce the BAL Assessment?

Utilising a consultant to determine building site BAL level

Often the BAL level can be reduced by carrying out a full assessment of the site instead of relying on Local Government predicted BAL levels or fire authorities' maps. The reduction of one BAL level and subsequent savings in construction costs will in most cases pay for the cost of the consultant.

Evaluate the 'excluded vegetation areas'

The standard has defined conditions that are low threat vegetation or non-vegetated areas. In some cases these areas remove the threat. These exclusions include;

- Vegetation of any type that is more than 100 m from the site, except grassland where it is excluded beyond 50 m.
- Single areas of vegetation less than 1 ha in area, and not within 100 m of other areas of vegetation being classified.
- Multiple areas of vegetation less than 0.25 ha in area, and not within 20 m of the site, or each other.
- Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified.
- Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.

Evaluate 'low threat vegetation'

These areas include;

- grassland managed in a minimal fuel condition. Minimal fuel condition means short-cropped grass to a nominal height of 100 mm,
- maintained lawns,
- golf courses,
- maintained public reserves and parklands,
- vineyards,
- orchards,
- cultivated gardens,
- commercial nurseries,
- nature strips and
- windbreaks.

Calculate BAL Level from first principles

Section 2 of AS3959 is a simplified way to assess the site as it uses conservative assumption for fuel load and the slope under the vegetation i.e. the worse vegetation fuel load for the classification or slope condition. The Appendix B within the standard has a detailed method that can be used to determine the radiant heat that the building will be exposed to where the fuel load for the predominate vegetation and the slope under the vegetation are known.

The methodology is complex and intended to be used on a spread sheet. WoodSolutions published a web based spread sheet version that can be used to make this calculation easier. Refer to www.woodsolutions.com.au

Reduction in construction requirements due to shielding

The Standard allows the elevation of the building that is not exposed to the source of bushfire attack (not exposed to dominant vegetation) to use the construction requirement to the next lower BAL level and applied only to the shielded (not exposed) elevation from the bushfire.

Where the site has been assessed as BAL—12.5, the shielded elevation of the building cannot be reduced to BAL—LOW and must be constructed to BAL—12.5 requirements.

Example; If the site has been assessed as BAL—29, the building elevation that is shielded from the bushfire threat can be reduced to BAL—19 allowing construction requirements on this shielded side of the building only can use BAL—19 requirements. The exposed building elevation construction requirements remain BAL—29.

Construction Requirements

Once a site has been assessed for its BAL, the Standard contains building methods and materials that are needed for compliance. The following section highlights requirements for timber windows and doors taking into consideration the State variations, and suggesting strategies that could be employed to lessen construction costs.

External mouldings, cover strips, trims and sealants

External mouldings, jointing strips, and trims to be used for decorative purposes or to cover joints between sheeting material can be timber and of any species. There are also no limits on the sealants that can be used.

Higher BAL level construction suitable for lower BAL levels

Construction requirements specified for a particular Bushfire Attack Level (BAL) are acceptable for a lower BAL level. Sometimes construction systems are more practical from higher BAL levels. For example, bushfire resisting timbers, e.g., BAL – 29 requirements, can be used in BAL-12.5 and 19 construction zones.

Bushfire shutters

Bushfire shutters that are radiant heat and ember resistant and cover the entire opening in the building, formed by window and door frames, are an excellent way of removing any need to construct the window or door and frame with specialist timber or glazing. Bushfire shutters can also be good storm shutters and offer some peace of mind to the home owner as they can do something on a day that bushfires are likely or when the house is left unoccupied.

AS3959 has particular requirements for Bushfire shutters that vary per BAL level. The following explains the variations per BAL level.

Generally bushfire shutters are;

- To be permanently fixed to the building and be non-removable,
- When in the closed position, have no gap greater than 3 mm between the shutter and the wall, the sill, jambs or the head,
- Be manually operable from either inside or outside the building,
- Protect the entire window or door assembly, refer Figure 1, and
- Consist of materials for the relevant BAL, refer to Table 1, or in any combination of, except for tested systems where the configuration of the tested system must be followed.
- When the shutter is made with perforations, they must have the perforations uniformly distributed and be no greater than 20% of the shutter area and have a maximum aperture of 2 mm. (NOTE: The shutter used in this guide provides both ember protection as well as acting as a radiant heat barrier and therefore must have a maximum aperture size of 2 mm).

If bushfire shutters are fitted to all external doors then at least one of those shutters shall be operable from the inside to facilitate safe egress from the building. (NOTE: This door would generally open inwards and would not have a flywire door fitted).

Figure 1: Bushfire shutter covering the entire wall opening

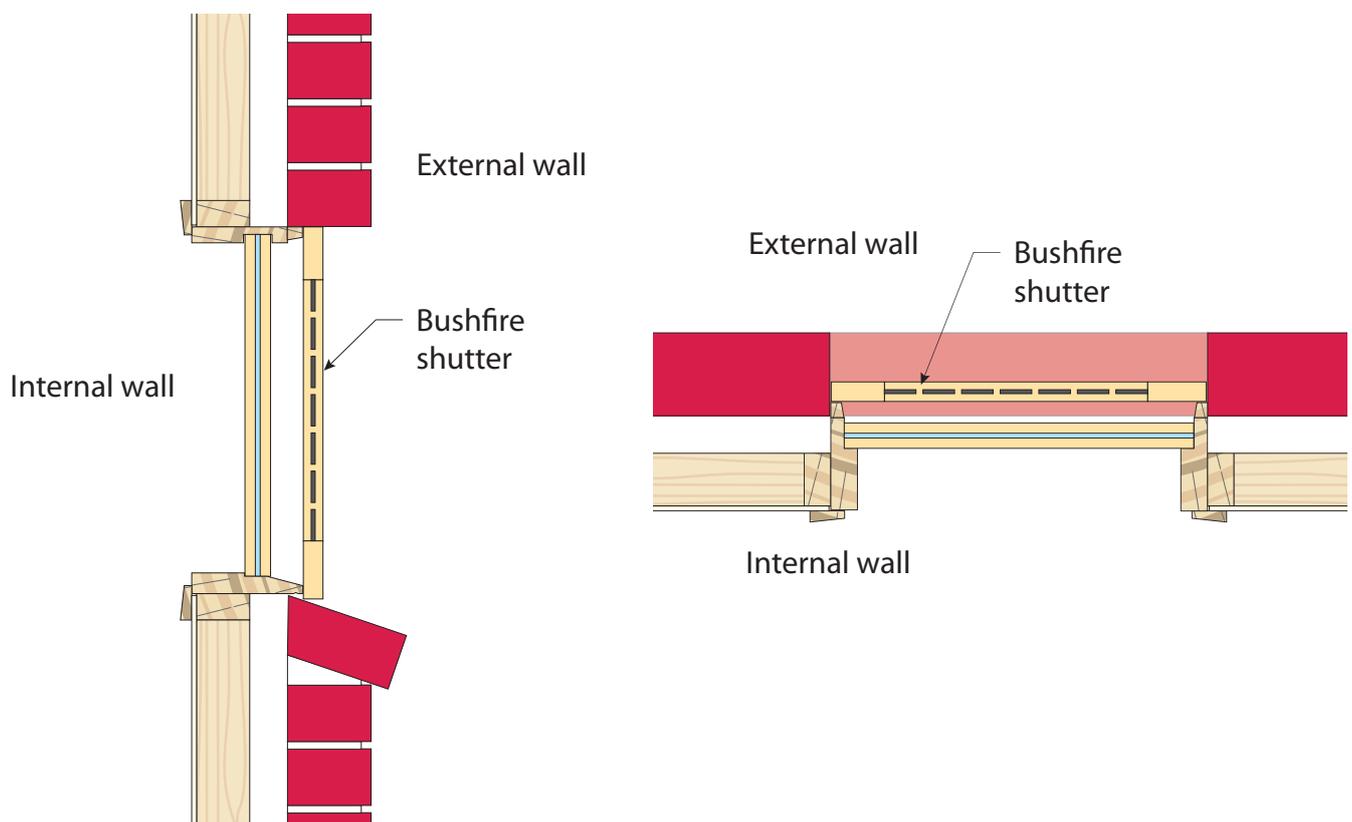


TABLE 1: Bushfire shutter construction

	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
Material that can be used in Bushfire Shutters	Timber species with density of 750 kg/m ³ [2]	Timber species with density of 750 kg/m ³ [2]	-	-	-
	Bushfire resisting timber [3]	Bushfire resisting timber [3]	Bushfire resisting timber [3]	-	-
	Non-combustible material	Non-combustible material	Non-combustible material	Non-combustible material	Non-combustible material except perforations are not allowed over doors
Tested System	System tested to AS1530. 8.1 to 12.5 kW/m ²	System tested to AS1530. 8.1 to 19 kW/m ²	System tested to AS1530. 8.1 to 29 kW/m ²	System tested to AS1530. 8.1 to 40 kW/m ²	System tested to AS1530. 8.2

Note:

1. NSW variation does not recognise the FZ DtS solution in AS3959. An Alternative Solution is required in NSW.
2. Appendix A lists timber species that have a density of 750 kg/m³ or greater.
3. Appendix A lists bushfire resisting timbers.

Window and door screens

Screens for windows and doors must be constructed using mesh or perforated sheet with a maximum aperture of 2 mm from materials listed in Table 2. Gaps between the perimeter of the screen assembly and the building element (e.g. building facade and door/window frame) to which it is fitted must not exceed 3 mm.

The frame supporting the mesh or perforated sheet must be made from material in Table 2. (NOTE: ONLY perforated sheets that have the perforations uniformly distributed and no greater than 20% of the area with a maximum aperture of 2 mm can be bushfire shutters. Perforated sheets that do not have perforations uniformly distributed and/or perforations are greater than 20% of the area, are deemed to be screens).

TABLE 2: Acceptable materials for window and door screens

	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
Mesh or perforated sheet	Corrosion-resistant steel, bronze or aluminium	Corrosion-resistant steel, bronze or aluminium	Corrosion-resistant steel, bronze or aluminium	Corrosion-resistant steel or bronze	Corrosion-resistant steel or bronze
Material that can be used in frame	Timber species with density of 750 kg/m ³ [2]	Timber species with density of 750 kg/m ³ [2]	-	-	-
	Bushfire resisting timber [3]	Bushfire resisting timber [3]	Bushfire resisting timber [3]	-	-
	Metal	Metal [4]	Metal	Metal	Metal
Tested System	System tested to AS1530. 8.1 to 12.5 kW/m ²	System tested to AS1530. 8.1 to 19 kW/m ²	System tested to AS1530. 8.1 to 29 kW/m ²	System tested to AS1530. 8.1 to 40 kW/m ²	System tested to AS1530. 8.2

Note:

1. NSW variation does not recognise the DtS solution in AS3959. An alternative Solution is required.
2. Appendix A lists timber species that have a density of 750 kg/m³ or greater.
3. Appendix A lists bushfire resisting timbers.
4. South Australia does not allow aluminium screens.

Window materials and construction methods

Table 3 describes acceptable materials and construction for windows in the various BAL levels. As the BAL level increases, the number of acceptable options for timber windows reduces.

NSW

NSW has varied the NCC so that the AS3959 construction solutions for Flame Zone are not recognised as a Deemed-to-Satisfy solution to the NCC. An Alternative Solution is required to be developed for all construction in Flame Zone in NSW.

TABLE 3: Acceptable materials and construction methods for windows

Element	Protection Method	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
Tested Window System		A window system that meets AS1530 8.1 to 12.5 kW/m ² and any opening part of the window is to be internally or externally screened.	A window system that meets AS1530 8.1 to 19 kW/m ² and any opening part of the window is to be internally or externally screened.	A window system that meets AS1530 8.1 to 29 kW/m ² and any opening part of the window is to be internally or externally screened.	A window system that meets AS1530 8.1 to 40 kW/m ² and any opening part of the window is to be internally or externally screened.	A window system that meets AS1530 8.2 or has an FRL of - /30/ - and any opening part of the window is to be internally or externally screened.
Windows Frames and Surrounds	Bushfire shutter [2]	If fully protecting the opening in the wall, there is no limitation on the timber species.	If fully protecting the opening in the wall, there is no limitation on the timber species.	If fully protecting the opening in the wall, there is no limitation on the timber species.	If fully protecting the opening in the wall, there is no limitation on the timber species.	If fully protecting the opening in the wall, there is no limitation on the timber species.
	External screen [3]	If fully protecting the opening in the wall there is no limitation on the timber species.	If fully protecting the opening in the wall there is no limitation on the timber species. South Australia does not allow aluminium screens.	Timber species must be bushfire resisting timber [6].	Timber window frames must be a part of a tested system to AS1530 8.1 to 40 kW/m ² and any opening part of the window to be internally or externally screened.	Timber window frames must be a part of a tested system to AS1530 8.2 or has an FRL of - /30/ - and any opening part of the window to be internally or externally screened.
	No bushfire shutter or external screen	For timber less than 400 mm from horizontal surface [4], it must have a density 650 kg/m ³ [5] or greater. For timber 400 mm or greater from horizontal surface ⁴ , there is no limitation on the timber species.	For timber less than 400 mm from horizontal surface ⁴ , it must have a density 650 kg/m ³ [5] or greater. For timber 400 mm or greater from horizontal surface [4], there is no limitation on the timber species. South Australia requires timber windows to be bushfire resisting timber ⁶ .	Timber species must be bushfire resisting timber [6].	Timber window frames must be a part of a tested system to AS1530 8.1 to 40 kW/m ² and any opening part of the window to be internally or externally screened.	Timber window frames must be a part of a tested system to AS1530 8.2 or has an FRL of - /30/ - and any opening part of the window to be internally or externally screened.

CONTINUED ON NEXT PAGE

TABLE 3: CONTINUED FROM PREVIOUS PAGE

Element	Protection Method	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]	
Glazing [7] & [9]	Bushfire shutter [2]	If fully protected annealed glass may be used.	If fully protected annealed glass may be used.	If fully protected annealed glass may be used.	If fully protected annealed glass may be used.	If fully protected annealed glass may be used.	
	External screen [3]	If fully protected annealed glass may be used.	If fully protected annealed glass may be used.	No reduction in glazing specification is given where external screens are used.	No reduction in glazing specification is given where external screens are used.	No reduction in glazing specification is given where external screens are used.	
	No bushfire shutter	For glazing less than 400 mm from horizontal surface [4], at least 4 mm Grade A safety glass [8] must be used.	For glazing less than 400 mm from horizontal surface [4], at least 5 mm toughened glass [8] must be used.	For glazing less than 400 mm from horizontal surface [4], at least 5 mm toughened glass [8] must be used.	For glazing less than 400 mm from horizontal surface [4], at least 5 mm toughened glass [8] must be used and have that portion covered by an external screen.	Glazing in timber window frames must be a part of a tested system to AS1530 8.1 to 40 kW/m ² and any opening part of the window to be internally or externally screened.	Glazing must be a part of tested system to AS1530 8.2 or has an FRL of - /30/ - and any opening part of the window to be internally or externally screened.
		For glazing 400 mm or greater from horizontal surface [4], annealed glass may be used.	For glazing 400 mm or greater from horizontal surface [4], annealed glass may be used where external screens cover all parts of the window. Where screens are not used, glazing is to be 5 mm toughened glass [8]	For glazing 400 mm or greater from horizontal surface [4], annealed glass may be used where external screens cover all parts of the window. Where screens are not used, glazing is to be 5 mm toughened glass [8]	For glazing 400 mm or greater from horizontal surface [4], at least 5 mm toughened glass ⁸ be must used.		
Openable parts of the window	No bushfire shutter or external screen	Must be screened internally or externally over openable parts of window.	Must be screened internally or externally over openable parts of window. Where internal screens are used, glazing for the opening parts of the window must be at least 5 mm toughened glass. South Australia does not allow aluminium screens.	Must be screened internally or externally over openable part of window. South Australia does not allow aluminium screens.	Must be screened internally or externally over openable part of window.	Must be screened internally or externally over openable part of window.	
External fitted hardware	No bushfire shutter	Must be metal.	Must be metal.	Must be metal.	Must be metal.	Hardware used in the tested system.	
Seals	No bushfire shutter	No requirements.	No requirements.	No requirements.	Manufactured from silicone or materials with a flammability index no greater than 5.	Seals used in the tested system.	

Notes:

1. NSW variation does not recognise the FZ DtS solution in AS3959. An alternative Solution is required.
2. Bushfire shutter details for each BAL level found in Table 1.
3. Screen details for each BAL level found in Table 2.

4. A horizontal surface is defined at ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame, refer to Figure 2.
5. Appendix A lists timber species used for window and door frames that have a density of 650 kg/m³ or greater.
6. Appendix A lists bushfire resisting timbers.
7. Glazing may have other requirements such as impact resistance, wind pressure, thermal resistance, etc. that may determine the glazing used. This guide nominates minimum requirements for bushfire condition only. Refer to AS1288 for additional requirements.
8. For double glazed units the required glazing for bushfire must be on the external face of the window.
9. South Australia has additional requirements for lead light windows where they are required to be protected by non-combustible shutters or toughened glass.

Door materials and construction methods

Table 4 describes acceptable materials and construction for doors in the various BAL levels. As the BAL levels increase the number of acceptable options for timber doors reduces.

NSW

NSW has varied the NCC so that the AS3959 construction solutions for Flame Zone are not recognised as a Deemed-to-Satisfy solution to the NCC. An alternative Solution is required.

TABLE 4: Acceptable materials and construction for doors

Element	Protection Method	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
Tested Door System – all door types		A door system that meets AS1530 8.1 to 12.5 kW/m ² .	A door system that meets AS1530 8.1 to 19 kW/m ² .	A door system that meets AS1530 8.1 to 29 kW/m ² .	A door system that meets AS1530 8.1 to 40 kW/m ² .	A door system that meets AS1530 8.2 or has an FRL of - /30/ -.
Protected Side Hung External Door and Door Surrounds	Bushfire shutter [2]	If fully protecting the opening, there is no limitation on the timber species.	If fully protecting the opening, there is no limitation on the timber species.	If fully protecting the opening, there is no limitation on the timber species.	If fully protecting the opening, there is no limitation on the timber species.	If fully protecting the opening, there is no limitation on the timber species.
	External screen [3]	If fully protecting the opening, there is no limitation on the timber species.	If fully protecting the opening, there is no limitation on the timber species. South Australia does not allow aluminium screens.	If fully protecting the opening, there is no limitation on the timber species.	No timber solutions are given where only external screens are used.	No timber solutions are given where only external screens are used.
Glazing [8] & [9] to protected Side Hung External Doors	Bushfire shutter [2]	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	Glazing required to comply to AS1288. South Australia requires shutter to be non-combustible	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.
	External screen [3]	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	No glazing solution for timber doors are given where only external screens are used.	No glazing solution for timber doors are given where only external screens are used.

CONTINUED ON NEXT PAGE

TABLE 4: CONTINUED FROM PREVIOUS PAGE

Element	Protection Method	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
Unprotected Side Hung External Doors	No bushfire shutter or external screen (except BAL 40)	A solid timber [4] door of any species with a minimum thickness of 35 mm for the first 400 mm above the threshold. There is no limit on door thickness above 400 mm above the threshold, or Any door including hollow core doors that has a metal kick-plate on the first 400 mm above the threshold, or	A solid timber [4] door of any species with a minimum thickness of 35 mm for the first 400 mm above the threshold. There is no limit on door thickness above 400 mm above the threshold, or Any door including hollow core door that has a metal kick-plate on the first 400 mm above the threshold, or	A solid timber [4] door of any species with a minimum thickness of 35 mm for the first 400 mm above the threshold. There is no limit on door thickness above 400 mm above the threshold, or A timber framed glazed door must have the complete door frame made from bushfire resisting timber [6], and	A solid timber [4] door of any species with a minimum thickness of 35 mm for the first 400 mm above the threshold. There is no limit on door thickness above 400 mm above the threshold. The door must be protected by an external screen door with maximum aperture of 2 mm and made from steel or bronze.	Door system, including surrounds and glazing must have at FRL of - /30/ -.
		A timber framed glazed door must have the complete door frame with a timber species of density 650 kg/m ³ [5] or greater.	A timber framed glazed door must have the complete door frame with a timber species of density 650 kg/m ³ [5] or greater.	South Australia only allows doors to be solid core with a minimum of 35 mm thickness.		
Unprotected Side Hung External Door surrounds	Doors surround requirement only – no bushfire shutter or external screen -	For timber less than 400 mm from horizontal surface [5], it must have a density 650 kg/m ³ [6] or greater. For timber 400 mm or greater from horizontal surface [5], there is no limitation on the timber species.	For timber less than 400 mm from horizontal surface [5], it must have a density 650 kg/m ³ [6] or greater. For timber 400 mm or greater from horizontal surface ⁵ , there is no limitation on the timber species.	Door surrounds must be made from bushfire resisting timber [7].	Door frames to be metal.	Door system, including surrounds and glazing must have at FRL of - /30/ -.
Glazing [8] & [9] to Unprotected Side Hung External Doors	No bushfire shutter or external screen	Less than 400 mm from horizontal surface [5] must be at least 4 mm Grade A safety glass or to the requirements of AS1288, whichever is the greatest.	Must be 5 mm toughened glass.	All glazing must be 6 mm toughened glass and any glazing less than 400 mm from a horizontal surface [5] to be screened. Screening can be fitted directly onto door covering the glazing in the door, refer Figure 2.	All glazing must be 6 mm toughened glass and any glazing less than 400 mm from a horizontal surface [5] to be screened. Screening can be fitted directly onto door covering the glazing in the door, refer Figure 2.	Door system, including surrounds and glazing must have at FRL of - /30/ -.

CONTINUED ON NEXT PAGE

TABLE 4: CONTINUED FROM PREVIOUS PAGE

Element	Protection Method	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
External Hardware to Unprotected Side Hung External Doors	No bushfire shutter or external screen	No requirements	No requirements	Must be metal	Must be metal	Hardware permitted by fire rated door system
Draught Excluders	No bushfire shutter or external screen	Installed at base of door	Installed at base of door	Installed at base of door	Installed at base of door and be manufactured from silicone or have a flammability index no greater than 5.	Installed at base of door and not compromise the door's fire rating.
Protected Sliding External Door and Door Surrounds	Bushfire shutter [2]	If fully protecting the opening, there is no limitation on timber species.	If fully protecting the opening, there is no limitation on timber species.	If fully protecting the opening, there is no limitation on timber species.	If fully protecting the opening, there is no limitation on timber species.	If fully protecting the opening, there is no limitation on timber species.
	External screen [3]	If fully protecting the opening, there is no limitation on timber species.	If fully protecting the opening, there is no limitation on timber species.	If fully protecting the opening, there is no limitation on timber species.	No solutions are given for external screens.	No solutions are given for external screens.
Glazing 8&9 to protected Sliding External Doors	Bushfire shutter [2]	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.
	External screen [3]	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	Glazing required to comply to AS1288.	No solutions are given for external screens.	No solutions are given for external screens.
Unprotected sliding External Door and Door Surrounds	No bushfire shutter or external screen	Door frame and surrounds must have timber species with density 650 kg/m ³ [6] or greater.	Door frame and surrounds must have timber species with density 650 kg/m ³ [6] or greater.	Door frame and surrounds must be made from bushfire resisting timber. [7]	Door and door surrounds must be metal.	Door system, including surrounds and glazing must have at FRL of - /30/ - .
Glazing 8&9 to unprotected Sliding External Doors	No bushfire shutter or external screen	All glazing must be at least Grade A safety glass or to the requirements of AS1288, whichever is the greatest.	All glazing must be 5 mm toughened.	All glazing must be 6 mm toughened glass.	All glazing must be 6 mm toughened glass and screen externally. Screens can be direct fixed to door.	Door system, including surrounds and glazing must have at FRL of - /30/ - .
External Hardware to Unprotected Sliding External Doors	No bushfire shutter or external screen	No requirements	No requirements	Must be metal	Must be metal	Hardware permitted by fire rated door system.

CONTINUED ON NEXT PAGE

TABLE 4: CONTINUED FROM PREVIOUS PAGE

Element	Protection Method	BAL 12.5	BAL 19	BAL 29	BAL 40	FZ [1]
Vehicle Access doors (garage doors) [10]		For timber less than 400 mm from horizontal surface ⁵ , it must have a density 650 kg/m ³ [6] or greater. For timber 400 mm or greater from horizontal surface [5], there is no limitation on the timber species.	For timber less than 400 mm from horizontal surface [5], it must have a density 650 kg/m ³ [6] or greater. For timber 400 mm or greater from horizontal surface [5], there is no limitation on the timber species.	Timber species must be bushfire resisting timber [7].	Must be metal.	Must be metal.
Vehicle Access doors (garage doors) Seals		Panel lift, tilt or side hung doors shall be fitted with weather strips, draught excluders, draught seals to guide tracks so there is no gap greater than 3 mm. Roller doors to have guide tracks with a maximum gap of 3 mm and fitted with nylon brushes.	Panel lift, tilt or side hung doors shall be fitted with weather strips, draught excluders, draught seals to guide tracks so there is no gap greater than 3 mm. Roller doors to have guide tracks with a maximum gap of 3 mm and fitted with nylon brushes.	Panel lift, tilt or side hung doors shall be fitted with weather strips, draught excluders, draught seals to guide tracks so there is no gap greater than 3 mm. Roller doors to have guide tracks with a maximum gap of 3 mm and fitted with nylon brushes.	Panel lift, tilt or side hung doors shall be fitted with weather strips, draught excluders, draught seals to guide tracks so there is no gap greater than 3 mm. Roller doors to have guide tracks with a maximum gap of 3 mm and fitted with nylon brushes. All seals to be manufactured from silicone or materials with a Flammability Index no greater than 5.	Panel lift, tilt or side hung doors shall be fitted with weather strips, draught excluders, draught seals to guide tracks so there is no gap greater than 3 mm. Roller doors to have guide tracks with a maximum of 3 mm and fitted with nylon brushes. All seals to be manufactured from silicone or materials with a Flammability Index no greater than 5.

Notes:

1. NSW variation does not recognise the FZ DtS solution in AS3959. An alternative Solution is required in NSW.
2. Bushfire shutter details for each BAL level found in Table 1.
3. Screen details for each BAL level found in Table 2.
4. Solid timber includes laminated or reconstituted timbers
5. A horizontal surface is defined at ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame, refer to Figure 3.
6. Appendix A lists timber species used for window and door frames that have a density of 650 kg/m³ or greater.
7. Appendix A lists bushfire resisting timbers.
8. Glazing may have other requirements such as impact resistance, wind pressure, thermal resistance, etc. that may determine the glazing used. This guide nominates minimum requirements for bushfire condition only. Refer to other Standard such as AS1288.
9. For double glazed units the required glazing for bushfire must be on the face of the window.
10. Vehicle access doors shall not include ventilation slots.

Appendix A - Timber Species

The following table contains a number of timber species that meet various BAL levels. Timber species' availability varies around the country so it recommended that before specification of a particular timber species that the window or door manufacturer is contacted to confirm availability.

Also from time to time other timbers may become available that are not listed below. Refer to AS3959 for a more comprehensive list of timber species or methodology to ascertain suitability of timber species for relevant BAL.

Timber Species Acceptability

Standard trade name	Botanical name	Density 650 kg/m ³ or better	Density 750 kg/m ³ or better	Bushfire Resisting Timber	Available as door or window timber species
Ash alpine	Eucalyptus delegatensis	Yes	Yes	No	Available
Ash, mountain	Eucalyptus regnans	Yes	No	No	Available
Ash, silvertop	Eucalyptus sieberi	Yes	No	Yes	Available
Beech, myrtle	Nothofagus cunninghamii	Yes	No	No	Limited Available
Belian	Eusideroxylon zwageri	Yes	Yes	No	Limited Available
Blackbutt	Eucalyptus pilularis	Yes	Yes	Yes	Limited Available
Blackbutt, New England	Eucalyptus andrewsii, Eucalyptus campanulata	Yes	Yes	No	Limited Available
Blackwood	Acacia melanoxylon	Yes	No	No	Limited Available
Box, grey	Eucalyptus microcarpa	Yes	Yes	No	Limited Available
Box, grey, coast	Eucalyptus bosistoana	Yes	Yes	No	Limited Available
Box, white-topped	Eucalyptus quadrangulata	Yes	Yes	No	Limited Available
Box, yellow	Eucalyptus melliodora	Yes	Yes	No	Limited Available
Gum, grey, mountain	Eucalyptus cypellocarpa	Yes	Yes	No	Limited Available
Gum, rose	Eucalyptus grandis	Yes	Yes	No	Limited Available
Gum, spotted	Corymbia maculate, Corymbia henryi, Corymbia citriodora	Yes	Yes	Yes	Limited Available
Ironbark, grey	Eucalyptus paniculata	Yes	Yes	No	Limited Available
Jarrah	Eucalyptus marginata	Yes	Yes	No	Limited Available
Kapur	Dryobalanops spp.	Yes	Yes	No	Limited Available
Karri	Eucalyptus diversicolor	Yes	Yes	No	Limited Available
Kempas	Koompassia malaccensis	Yes	Yes	No	Limited Available
Kwila (Merbau)	Intsia bijuga	Yes	Yes	Yes	Available
Mahogany red	Eucalyptus resinifera	Yes	Yes	No	Limited Available
Mahogany, southern	Eucalyptus botryoides	Yes	Yes	No	Limited Available
Mahogany, white	Eucalyptus acmenoides	Yes	Yes	No	Limited Available
Meranti Dark red	Shorea spp.	Yes	Yes	No	Available
Messmate	Eucalyptus obliqua	Yes	Yes	No	Available
Messmate, Gympie	Eucalyptus cloeziana	Yes	Yes	No	Limited Available
Oak , American	Quercus spp.	Yes	Yes	No	Available
Pine, celery-top	Phyllocladus asplenifolius	Yes	No	No	Limited Available
Rosewood, New Guinea	Pterocarpus indicus	Yes	No	No	Available
Satinay	Syncarpia hillii	Yes	Yes	No	Limited Available
Stringybark, Blackdown	Eucalyptus sphaerocarpa	Yes	Yes	No	Limited Available
Stringybark, blue- leaved	Eucalyptus agglomerata	Yes	Yes	No	Limited Available
Stringybark, silvertop	Eucalyptus laevopinea	Yes	Yes	No	Limited Available
Stringybark, white	Eucalyptus eugenioides	Yes	Yes	No	Limited Available
Stringybark, yellow	Eucalyptus muelleriana	Yes	Yes	No	Limited Available
Tallowwood	Eucalyptus microcorys	Yes	Yes	No	Limited Available
Taun	Pometia pinnata	Yes	No	No	Limited Available
Vitex, New Guinea	Vitex cofassus	Yes	No	No	Limited Available

Figure 2: Illustration of a screen fitted over glazing and directly to the door frame

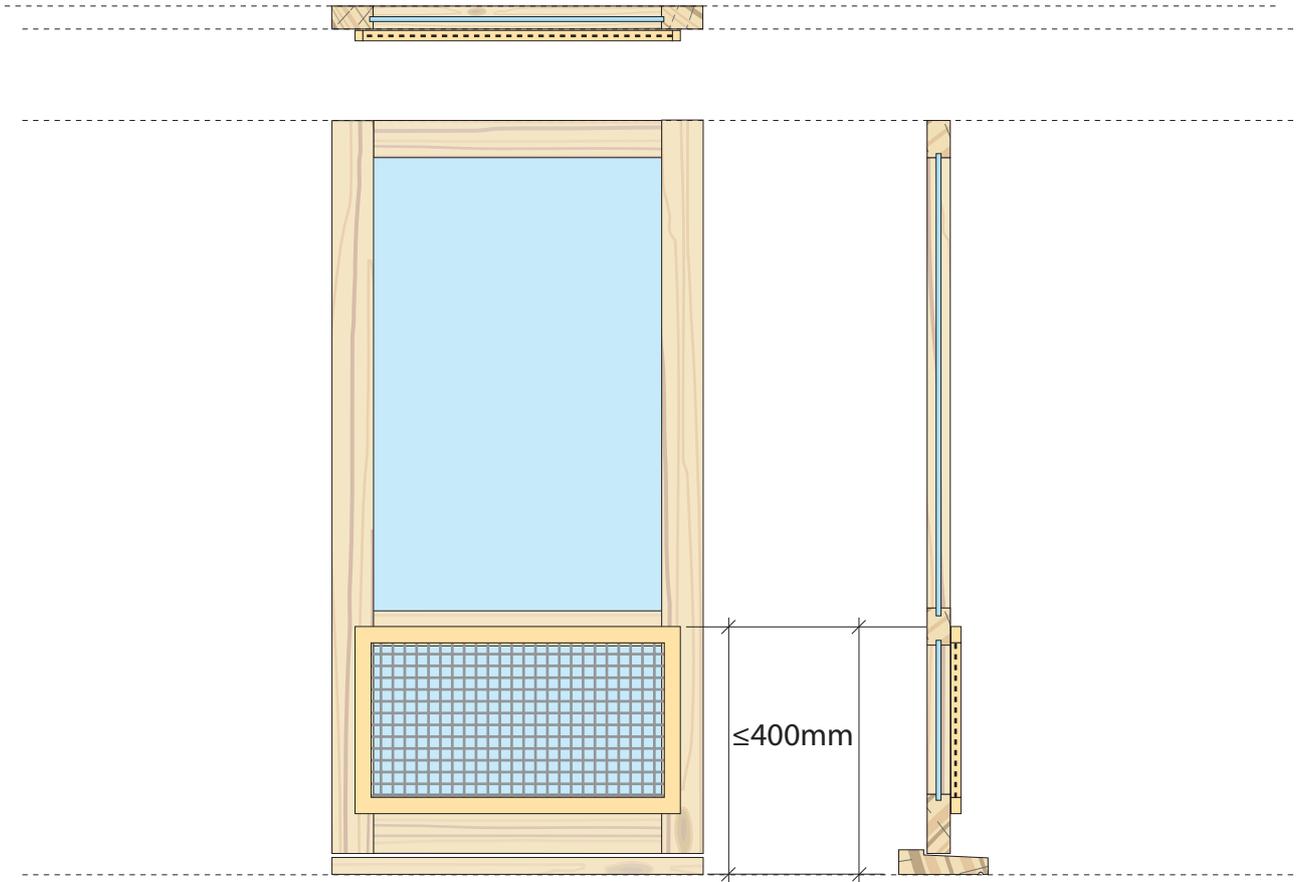
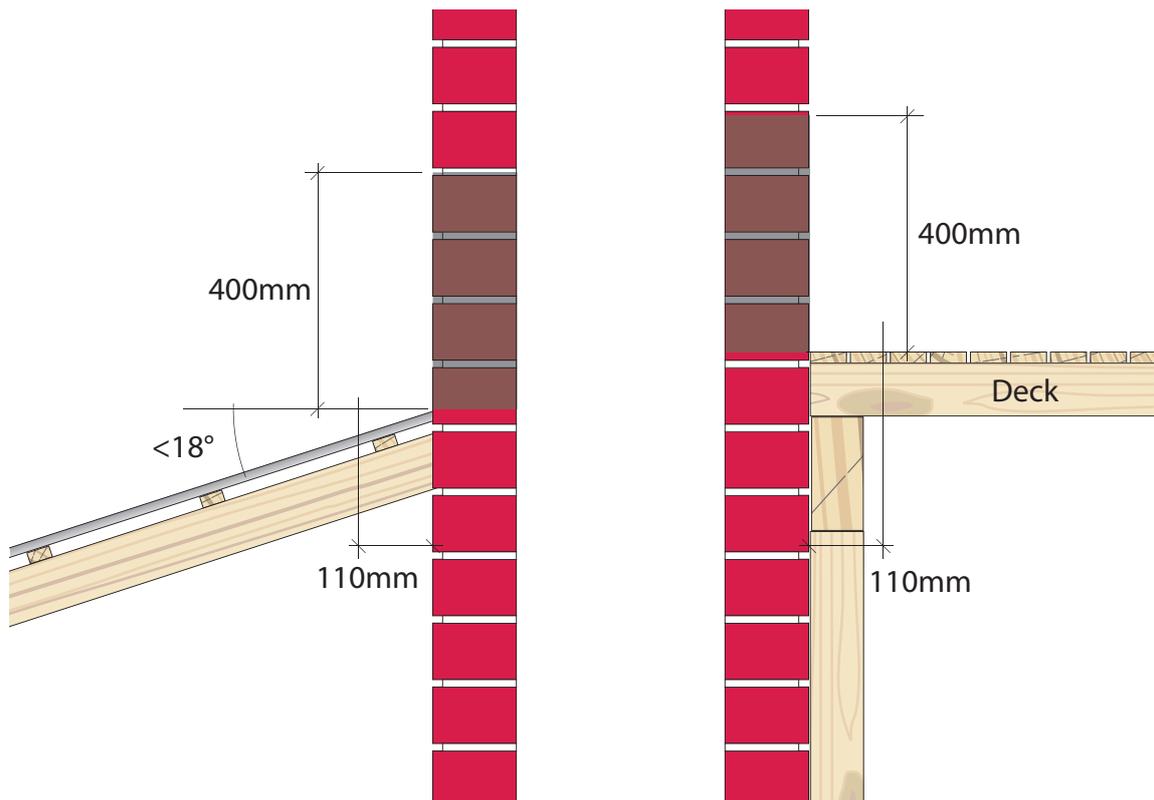


Figure 3: Illustration of a horizontal surface



Glossary of terms

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.

Bushfire-resisting timber - Timber that is in solid, laminated or reconstituted form that meets the criteria specified in Appendix F of AS3958. Suitable timbers are listed in Appendix A.

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

Fire resistance level (FRL) - The nominal grading period, in minutes, that is determined by subjecting a specimen to the standard time temperature curve regime as set out in AS 1530.4, to specify—

- (a) structural adequacy,
- (b) integrity, and
- (c) insulation,

Flammability index - The index number as determined by AS 1530.2.

Horizontal surface - is defined at ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame, refer to Figure 3.

NCC - National Construction Code formerly known as the Building Code of Australia

Side Hung Doors - including French doors, panel fold and bi-fold doors

References

AS1288 Glass in buildings—Selection and installation.

AS1530.8.1 Part 8.1: Tests on elements of construction for buildings exposed to simulated bushfire attack—Radiant heat and small flaming sources.

AS1530.8.2 Part 8.2: Tests on elements of construction for buildings exposed to simulated bushfire attack—Large flaming sources.

AS3959: Construction of buildings in bushfire-prone areas.

National Construction Code Series Volume 2 Building Code of Australia 2012.

#4 Building with timber in bushfire-prone areas, FWPA 2012.

Disclaimer

The Window and Door Industry Council makes no warranties or assurances with respect to this publication, including merchantability, fitness for purpose or otherwise. WADIC and all persons associated with it exclude all liability (including liability for negligence) in relation to any opinion, advice or information contained in this publication or for any consequences arising from the use of such opinion, advice or information. This work is copyright and protected under the terms of the Copyright Act 1968 (Cwth). All material may be reproduced in whole or in part, provided that it is not sold or used for commercial benefit, and its source (Window and Door Industry Council Inc.) is acknowledged, and this disclaimer is included. Reproduction or copying for other purposes, which is strictly reserved only for the owner or licensee of copyright under the Copyright Act, is prohibited without the prior written consent of WADIC.

About WADIC

The Window and Door Industry Council Inc. (WADIC) is a service organisation for timber window and door manufacturers supplying products to the building and construction industry.

WADIC's role is to assist members in compliance with relevant Australian Standards and codes, to promote the environmental and energy performance benefits of member's products, and provide members with options for window energy rating systems.

A major focus for WADIC is to provide information on member's products to the marketplace through its website, and to promote timber windows as a superior product in meeting energy and environmental goals in building performance.

Members of WADIC specialise in well designed and functional window and door systems and see themselves as craftsmen, not as assemblers of window components. They also pride themselves on providing the best possible products and service to their customers.

WADIC actively participates in the development of Australian Standards and other regulatory reform processes to enable builders, architects, building designers and consumers to be assured that WADIC members are up-to-date with all compliance issues. A major service to members is provision of a "Compliance Manual", developed by WADIC to meet the requirements of the regulatory environment with appropriate specifications and test results that support member's products.

WADIC is an organisation committed to supporting energy conservation and environmentally sustainable products, through ongoing development and assistance to their members in the timber window and door manufacturing industry.

Window and Door Industry Council Inc.

609 Gardeners Rd Mascot NSW 2020

Ph: 02 9700 8798 Fax: 02 9700 8807

eMail: admin@wadic.com.au

www.wadic.org.au

Front cover house – Architects: Iredale Pederson Hook (WA). Photography: Shannon McGrath

Published by WADIC December 2012

WAD9939.BMS1212