

TIMBER IN BUILDINGS – INTERNAL FIT-OUT

SCOPE

This publication summarises the Building Code of Australia (BCA 96) deemed-to-satisfy provisions with respect to timber for the various building elements within each building classification. It also lists the various timber species available for these applications along with their hazard indices (Ignitability, Heat Evolved, Smoke Developed, Spread of Flame etc).

The materials and applications in this publication are for timber fit-out components such as:-

- timber panelling/lining materials
- timber finishing elements (e.g.skirtings)
- timber framed windows and doors

FIRE HAZARD PROPERTIES

The BCA contains various criteria relating to the performance of materials when exposed to fire. The deemed-to-satisfy provisions require certain materials or assemblies to be non-combustible or have nominated fire hazard properties.

(a) Non-Combustibility

Where the deemed-to-satisfy provisions require a material, construction or part of a building to be non-combustible, when tested in accordance with AS 1530.1 “Combustibility Tests for Materials”, the use of timber or timber products is not permitted as a deemed-to-satisfy solution.

Non-combustibility requirements in the deemed-to-satisfy provisions does not, however prevent or influence the processing of an alternative solution under the performance requirements.

(b) BCA Requirements

Table A lists the BCA requirements for Flammability Index, Spread-of-Flame Index and Smoke Developed Index for the various locations within the different building classifications.

Note: Materials are required to be tested in accordance with AS/NZS 1530.3 “Simultaneous determination of ignitability flame propagation, heat release and smoke release”.

(c) Exempted building parts and materials

The requirements in the BCA for a Spread-of-Flame Index, Smoke-Developed Index or Flammability Index do not apply to –

- timber-framed windows; or
- solid timber handrails or skirtings; or
- timber-faced solid-core or fire doors; or
- joinery units, cupboards, shelving and the like; or
- any other material that does not significantly increase the hazards of fire.

(d) Data on Natural (Solid) Timber

Table B lists test results on samples of a number of natural timber species according to AS 1530.3.

(e) Data on Manufactured Products

Factory produced wood based products such as hardboard, medium density fibreboard (MDF), particleboard and plywood can also be assessed by AS 1530.3. However, since such products may vary widely in formulation from time to time and between manufacturers (raw materials plus additives) the confirmation of specific indices, should be authenticated by the manufacturer of the particular **named** or **branded** products and/or a registered testing authority Certificate of Accreditation.

Some data is available for plywood as a result of tests carried out in 1978-1979. This data is given in Table C. For other factory made sheet materials indicative data is provided in Table D. This information is but a guide and verifiable data when required should be obtained for particular products from the manufacturer.

(f) Fire Retardants

Timber based products which have been pressure impregnated with fire-retardant chemicals may be used provided they satisfy the fire hazard properties required by the BCA and AS/NZS 1530.3.

Paints and fire-retardant coatings cannot be used in order to make the substrate comply with the BCA requirements.

TABLE A - BCA FIRE HAZARD PROPERTY REQUIREMENTS

Building Classification	Building Type	Location	Surfaces	BCA Requirements (deemed-to-satisfy)			Timber Permitted (refer Tables B, C & D)	Comments
				Flammability Index (FI)	Spread of Flame Index (SOF)	Smoke Developed Index (SDI)		
Class 1	Detached Houses Attached Houses (Townhouses, Terrace Houses, Villas etc)	All locations	Ceilings Walls Floors	No BCA requirement (except roof sarking must be not more than 5)	No BCA requirement	No BCA requirement	All timber	
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 2	Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for an alternative solution
			Public Corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement	Must be 0 Not more than 9	Not more than 5 Not more than 8 if SOF more than 5.	Fire retardant timber All timber except Western Red Cedar
Class 2	Apartments (2 or more sole-occupancy units)	All other locations	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for an alternative solution
			Public Corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted
Class 3	Accommodation for aged, disabled and children; boarding houses, backpackers accommodation, residential parts of hotel/motel etc.	All other locations	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement	Not more than 9 Not more than 9	Not more than 8 if SOF more than 5. Not more than 5	All timber except Western Red Cedar All timber except Western Red Cedar	
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
			Public Corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted
Class 4	A single dwelling in a Class 5, 6, 7, 8 or 9 building	All other locations	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
			Public Corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement	Not more than 9 Not more than 9	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted
Class 5	A single dwelling in a Class 5, 6, 7, 8 or 9 building	All other locations	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Not more than 9	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement (except sarking type material must be 0)	Not more than 9 Must be 0	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
			Public Corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5) No BCA requirement	Not more than 9 Not more than 9	Not more than 8 if SOF more than 5. Not more than 2	All timber except Western Red Cedar Timber not permitted

Building Classification	Building Type	Location	Surfaces	BCA Requirements (deemed-to-satisfy)			Timber Permitted (refer Tables B, C & D)	Comments
				Flammability Index (FI)	Spread of Flame Index (SOF)	Smoke Developed Index (SDI)		
Class 5	Offices	Shaft containing non-required non-fire-isolated stairways and ramps	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5)	Must be 0	Not more than 5	Fire-retardant timber	
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 2	Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution.
		All other locations including public corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
Class 6	Shops	Shaft containing non-required non-fire-isolated stairways and ramps	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 5	Fire-retardant timber	
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 2	Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
		All other locations including public corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
Class 7	Carparks Warehouses	Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 5	Fire-retardant timber	
		All other locations including public corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
			Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 5	Fire-retardant timber	
Class 8	Laboratories Factories	Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 5	Fire-retardant timber	
		All other locations including public corridors providing egress to required fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
			Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 5	Fire-retardant timber	

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Class 9(a)	Health Care Buildings	Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 2	Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
			Ceilings Walls	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 5		
		All other locations including public corridors providing egress to required fire-isolated exits	Floors	No BCA requirement	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
			Ceilings	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 3	Timber not permitted	
		Patient Care Areas	Walls	No BCA requirement (except sarking type material must be 0)	Not more than 2	Not more than 5	Fire-retardant timber	Skirtings up to 150 mm above floor as for floors
			Floors (including skirtings up to 150 mm above floor)	No BCA requirement	Not more than 3	Not more than 5 if Spread of Flame is 1, 2 or 3 Can be 6 if Spread of Flame is zero	Brush Box Jairrah Spotted Gum Fire-retardant timber	
All other locations	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar			

Building Classification	Building Type	Location	Surfaces	BCA Requirements (deemed-to-satisfy)			Timber Permitted (refer Tables B, C & D)	Comments
				Flammability Index (FI)	Spread of Flame Index (SFI)	Smoke Developed Index (SDI)		
Class 9(b)	Theatres or Public Halls (a) Without sprinklers	Auditorium or audience seating area	Ceilings	No BCA requirement (except sarking type material must be 0)	Not more than 6	Not more than 3	Brush Box Blackbutt Jarrah Messmate Spotted Gum Tallowwood Tulip Oak and Fire retardant timbers	
			Walls	No BCA requirement (except sarking type material must be 0)	Not more than 6	Not more than 5	Brush Box Blackbutt Jarrah Messmate Spotted Gum Tallowwood Tulip Oak and Fire retardant timbers	
			Floors (a) Used for indoor swimming or ice skating (b) Used for indoor, sports or multi-purpose functions	No BCA requirement	Not more than 9	Not more than 8	All except Western Red Cedar	
			(c) All other uses	No BCA requirement	Not more than 8	Not more than 7	Alpine Ash Black Bean Blackbutt Brush Box Cypress Hoop Pine Jarrah Kapur Messmate Mountain Ash Queensland Walnut Radiata pine Ramin Spotted Gum Tallowwood Tasmanian Oak Tulip Oak Yellow Walnut Victorian Ash hardboard MDF particleboard plywood (except faced with Black Bean)	
		Fixed Seating (any part)	No BCA requirement	Must be 0	Not more than 5	Blackbutt Brush Box Jarrah Kapur Messmate Queensland Walnut Radiata pine Ramin Spotted Gum Tallowwood Tulip Oak Yellow Walnut flooring grade particleboard and fire-retardant timbers		

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				Flammability Index (FI)	Spread of Flame Index (SOF)	Smoke Developed Index (SDI)		
Class 9 (b) cont'd	Theatres or Public Halls (b) With sprinklers	Auditorium or audience seating area	Ceilings Walls Floors	No BCA requirement (except sarking type material must be not more than 5)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
			Any part of fixed seating	No BCA requirement	Must be 0	Not more than 5	Fire-retardant timber	
		Fire-isolated exits	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Must be 0	Not more than 2	Timber not permitted	Timber unlikely to satisfy either the performance or deemed-to-satisfy requirements for alternative solution
			Public corridors providing egress to required fire-isolated exits.	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0) No BCA requirement	Must be 0 Not more than 9	Not more than 5 Not more than 8 if SOF more than 5	Fire-retardant timber All timber except Western Red Cedar
Class 10	Non-habitable building (carport, shed etc)	All other locations	Ceilings Walls Floors	No BCA requirement (except sarking type material must be 0)	Not more than 9	Not more than 8 if SOF more than 5	All timber except Western Red Cedar	
		All	All	No BCA requirement	No BCA requirement	No BCA requirement	All timber	

TABLE B – Fire Hazard Properties of Selected Timbers						
Common Name	Botanical Name	Ignitability Index	Spread of Flame Index	Heat Evolved Index	Smoke Developed Index	Report Reference
Alpine Ash	<i>Eucalyptus delegatensis</i>	14	8	7	3	E.4161
Australian Red Cedar	<i>Toona australis</i>	14	9	8	3	E.4230
Blackbean	<i>Castanospermum australe</i>	13	8	7	3	E.4232
Blackbutt	<i>Eucalyptus pilularis</i>	13	6	5	3	E.4233
Blackwood	<i>Acacia melanoxylon</i>	13	9	8	3	E.4226
Brush Box	<i>Lophosteman confertus</i>	14	3	4	2	*
California Redwood	<i>Sequoia sempervirens</i>	14	9	9	4	E.4253
Canada Pine	<i>Tsuga heterophylla</i>	14	9	9	3	E.4223
Cypress Pine	<i>Callitris columellaris</i>	13	8	7	3	E.4228
Douglas Fir (Oregon)	<i>Pseudotsuga menziesii</i>	14	9	9	3	E.4221
Hem-fir	<i>Tsuga heterophylla</i>	14	9	9	3	E.4223
Hoop Pine	<i>Araucaria cunninghamii</i>	14	7	6	2	*
Jarrah	<i>Eucalyptus marginata</i>	13	3	4	2	*
Kapur	<i>Dryobalanops</i> spp.	13	7	6	3	E.4255
Klinki Pine	<i>Araucaria hunsteinii</i>	15	9	8	3	E.4231
Lauan	<i>Shorea</i> spp. <i>parashorea</i> spp.	14	9	10	4	E.4227
Meranti	<i>Shorea</i> spp.	14	9	10	4	E. 4227
Messmate	<i>Eucalyptus obliqua</i>	13	5	5	3	*
Mountain Ash	<i>Eucalyptus regnans</i>	14	8	7	3	E.4161
Oregon	<i>Pseudotsuga menziesii</i>	14	9	9	3	E.4221
Pacific Maple	<i>Shorea</i> spp.	14	9	10	4	E.4227
Philippine Mahogany	<i>Shorea</i> spp. <i>parashorea</i> spp.	14	9	10	4	E.4227
Queensland Walnut	<i>Endiandra palmerstonii</i>	13	7	7	3	E.4224
Radiata Pine	<i>Pinus radiata</i>	15	7	6	3	E.4220
Ramin	<i>Gonystylus</i> spp.	14	7	7	3	E.4256
Red Cedar (Australian)	<i>Toona australis</i>	14	9	8	3	E.4230

TABLE B – Fire Hazard Properties of Selected Timbers (cont'd)

Common Name	Botanical Name	Ignitability Index	Spread of Flame Index	Heat Evolved Index	Smoke Developed	Report Reference
Red Cedar (Western)	<i>Thuja plicata</i>	14	10	9	4	E.4219
Redwood	<i>Sequoia sempervirens</i>	14	9	9	4	E.4253
Seraya	<i>Shorea</i> spp.	14	9	10	4	E.4227
Spotted Gum	<i>Corymbia citriodora</i>	13	3	4	3	E.4254
Tallowwood	<i>Eucalyptus microcorys</i>	12	5	5	4	E.4229
Tasmanian Oak	<i>E. regnans</i> <i>E. obliqua</i> <i>E. delegatensis</i>	14	8	7	3	E4161
Teak	<i>Tectona grandis</i>	13	9	10	5	E.4225
Tulip Oak	<i>Argyrodendron trifoliolatum</i>	13	6	5	2	E.4234
Victorian Ash	<i>E. regnans</i> <i>E. delegatensis</i>	14	8	7	3	E.4161
Western Hemlock	<i>Tsuga heterophylla</i>	14	9	9	3	E.4223
Western Red Cedar	<i>Thuja plicata</i>	14	10	9	4	E.4219
Yellow Walnut	<i>Beilschmiedia bancroftii</i>	14	7	6	1	*

Notes:

1. Data on solid timber samples was obtained from published documents or from originals of the Certificates-of-Tests which were issued by the then Commonwealth Experimental Building Station (EBS). The relevant tests were carried out in 1978-1979 according to AS 1530.3 (1976).
2. Identifying number listed is for tests done by CEBS in 1978-79. Species with an asterisk are results reported in CSIRO Division of Building Research Technical Paper No. 6 (1974) by Beesley J., Keogh J. J., Moulén A. W.
3. Timber products may be available as special branded and accredited flame-retardant treated products which have been impregnated in pressure vessels with special chemicals which inhibit the spread of flame, often reducing the spread of flame index to zero (0).

TABLE C – Fire Hazard Properties of Plywood with Selected Face Veneers						
Common Name of Face Veneer	Botanical Name	Ignitability Index	Spread of Flame Index	Heat Evolved Index	Smoke Developed	Report Reference
Australian Red Cedar	<i>Toona australis</i>	13	8	8	3	E.4248
Australian Red Cedar (grooved)	<i>Toona australis</i>	13	8	7	2	E.4250
Blackbean	<i>Castanospermum australe</i>	13	9	10	3	E.4238
Coachwood	<i>Ceratopetalum apetalum</i>	15	8	8	2	E.4235
Hickory Ash	<i>Flindersia itflaiana</i>	13	8	8	3	E.4249
Hickory Ash (grooved)	<i>Flindersia itflaiana</i>	14	8	9	3	E.4251
Klinki Pine	<i>Araucaria hunsteinii</i>	15	8	10	4	E.4245
Lauan	<i>Parashorea</i> spp.	14	8	10	3	E.4244
Meranti	<i>Shorea</i> spp.	14	8	10	2	E.4240
Pacific Maple	<i>Shorea</i> spp.	14	8	10	2	E.4240
Queensland Maple	<i>Flindersia brayleyana</i>	13	8	8	2	E.4239
Queensland Walnut	<i>Endiandra palmerstonii</i>	14	8	10	3	E.4241
Radiata Pine	<i>Pinus radiata</i>	14	8	9	2	E.4237
Sapele	<i>Entandrophragma cylindricum</i>	13	8	8	2	E.4243
Silver Ash	<i>Flindersia bourjotiana</i>	13	8	9	3	E.4242
Tasmanian Oak	<i>E. obliqua</i> <i>E. delegatensis</i> <i>E. regnans</i>	14	8	8	2	E.4236
Teak	<i>Tectona grandis</i>	14	8	10	3	E.4247
Victorian Ash	<i>E. regnans</i> <i>E. delegatensis</i>	14	8	8	2	E.4236

Notes:

1. This data on plywood was obtained from originals of the Certificates-of-Test which were issued by the then Commonwealth Experimental Building Station (EBS). The relevant tests were carried out in 1978-1979 according to AS 1530.3 91 (1976).
2. Timber products may be available as special branded and accredited flame-retardant treated products which have been impregnated in pressure vessels with special chemicals which inhibit the spread of flame, often reducing the spread of flame index to zero (0).

TABLE D – Indicative Fire Hazard Indices of Manufactured Products				
	Ignitability Index	Spread of Flame Index	Heat Evolved Index	Smoke Developed Index
hardboard (standard)	14	7	7	3
medium density fibre-board	14	8	7	3
particleboard (standard)	14	7	6	3
flooring grade particleboard	14-15	7	6	2-3

Notes:

1. For specific branded products, verifiable data must be obtained from the particular manufacturer and/or a Registered Testing Authority.
2. Timber products may be available as special branded and accredited flame-retardant treated products which have been impregnated in pressure vessels with special chemicals which inhibit the spread of flame, often reducing the spread of flame index to zero (0).