

Fire compliance to BCA

SPECIFICATION **C1.10a** FIRE HAZARD PROPERTIES – FLOORS, WALLS AND CEILINGS

March 2010

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Attachments:

- BCA – PART 3A Classification of building structures
- BCA – Specification C1.10a Fire hazard properties-Floors walls and Ceilings
- Frequently asked questions on testing to AS ISO 9239-1 for the building Code of Australia.

Before We Start.

My objective in preparing this information is to simplify and de-mystify the BCA fire compliance requirements. The information is my interpretation and précis and must please be read in conjunction with the formal BCA documentation. For this purpose I have attached two BCA extracts that relate directly to fire compliance and floor coverings.

I am not an engineer nor am I a qualified consultant. I can only offer this as my interpretation and understanding as a carpet manufacturer.

Throughout this document the assumptions and interpretations are in accordance with the Building Code of Australia (BCA). We have however found that in practice the interpretation and enforcement has varied between States, Councils, Certifiers and even individual companies who can adopt stricter interpretation or corporate covenants'.

Under the provisions of the BCA the ultimate compliance responsibility rests with the person who applied for the building permit/approval and is overseeing the project.

My comments:

Under the BCA this responsibility only applies where a permit / building approval is involved. Here the client will be still looking at the contractor / supplier / service provider to provide such compliance.

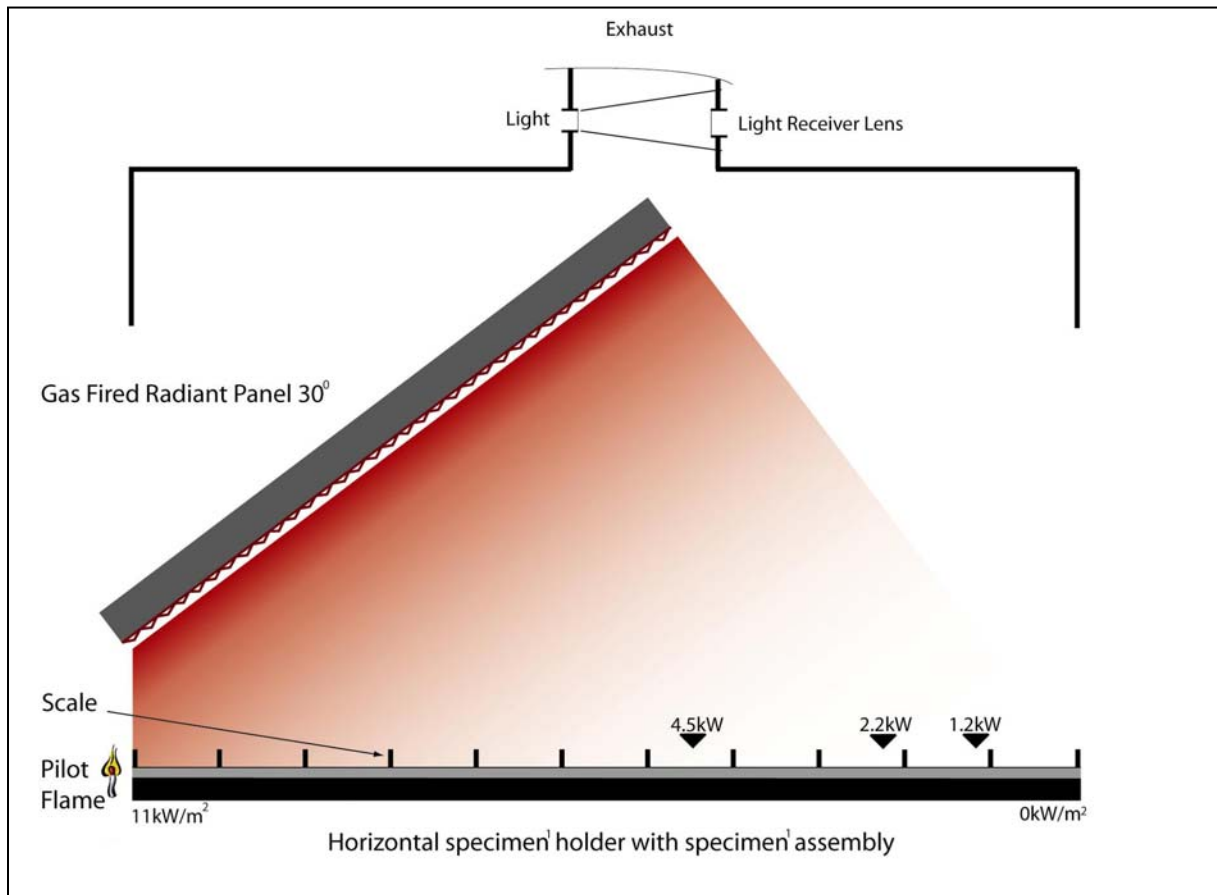
Whether under building approval or otherwise a contractor / service provider / retailer is recognised as the professional and as such is required to provide a compliant building solution / service and be able to provide the relevant compliance as requested.

Along with the standard terms and conditions of trade that you submit with your quote / tender it could be a consideration to include a statement that covers your compliance requirements and interpretations. The concise wording would have to be drafted by a legal expert but could read as follows.

The building solution provided is in accordance with the 'deemed to satisfy' provisions of the BCA (Building Code of Australia).

AS ISO 9329-1 REACTION TO FIRE TESTS FOR FLOORINGS

This references the recognised standard for testing the reaction to fire for floorings. The test is designed to simulate the thermal radiation levels likely to impinge on the floor of a corridor whose upper surfaces are heated by flames or hot gasses or both.



The test is carried out by placing the test specimen¹ in a horizontal position directly below a gas fired radiant panel inclined at 30 degrees. Where the test specimen¹ is closest to the radiant panel it will receive 11kW/m² of heat energy graded down to approximately 1kW/m² at the far end. The specimen¹ is lit at the hot end and allowed to burn to extinction. At the point of extinction the heat energy is measured and recorded as CRF (Critical Radiant Flux) or CHF (Critical Heat Flux) in kW/m².

Smoke Developed is measured over the duration of the test. A lens placed opposite a light source in the flue above the test rig measures the smoke obscuring the light beam. This is multiplied by the time of the test and gives a result in percent minutes.

¹ A test specimen shall be representative of the flooring in its end use. AS ISO 9239-1; 2003 defines flooring as the upper layer(s) of a floor comprising any surface finish with or without an attached backing and with any accompanying underlay, interlay and or adhesive.

AS ISO 9239-1 Compliant Test Report

This is an example of a test report as supplied by an accredited testing laboratory. Whilst each laboratory presents their reports in a different format there are five points to identify when confirming compliance.

1. Product identification
2. Test standard. i.e. AS ISO 9239-1
3. Assembly system
4. Mean CRF –kW/m²
5. Mean Smoke developed –%min

SPECIMEN TEST REPORT

Product Identification → **NORTHSTATE SERIES 34C**

Test Standard → **TEST METHOD AS ISO 9239-1 2003 Reaction To Fire Tests For Floorings Part 1 Determination of the Burning Behaviour Using a Radiant Heat Source.**

Assembly System → **ASSEMBLY SYSTEM DOUBLE BOND (DOUBLE STICK)**

MEAN CRF - kW/m² → **MEAN CRITICAL RADIANT FLUX 7.2 kW/m²**

MEAN Smoke Developed → **MEAN SMOKE DEVELOPMENT RATE 222 %/min**

SPECIMEN	Length #1	Length #2	Length #3	Mean
Critical Radiant Flux (kW/m ²)	7.0	8.0	6.7	7.2
Smoke Development Rate (%/min)	231	205	231	222

The goals of the BCA are to enable the achievement and maintenance of acceptable standards of structural sufficiency, safety (including safety from fire), health and amenity for the benefit of the community now and in the future.

In determining fire compliance for floor materials and floor coverings we need to refer to two areas of the building code namely

***BCA Part A3** which outlines the building classes; and

***Specification C1.10a** which sets out the requirements in relation to the fire hazard properties

BCA PART 3A CLASSIFICATION OF BUILDINGS AND STRUCTURES

The classification of a building or part of a building is determined by the purpose for which it is designed constructed or adapted to be used.

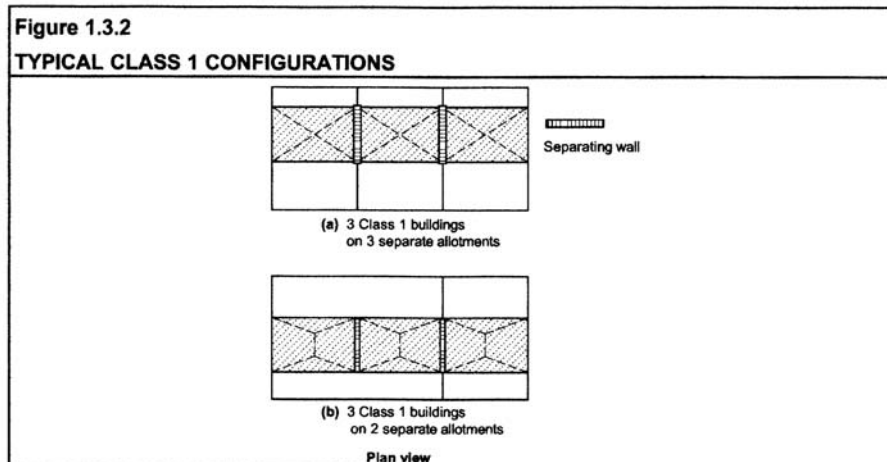
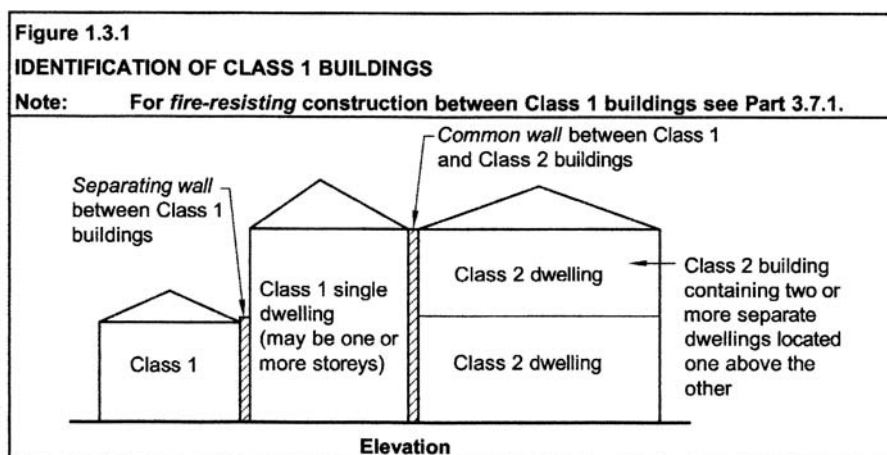
The BCA classifies buildings into 10 classes and various sub-classes. A full extract of the classes is contained in the attached BCA PART A3

Notes and clarification in reference to the building classes

How to distinguish between a Class 1 and a Class 2 building

Class 1 buildings are a single or more storey detached dwelling or a group of single or more storey attached dwellings such as Townhouses, Terrace houses, or Villa units that are separated by a fire-resisting wall.

Class 2 refers to a building containing 2 or more sole occupancy units each being a separate dwelling.



Further to the above explanation, **class 1** is expanded to include a Boarding house, Guest house, Hostel or the like that has a floor area no bigger than 300m² with provision for no more than 12 residents.

Class 4 The only dwelling in a class 5, 6, 7, 8, or 9 building. You will note that this building class is not covered in the C1.10a table1.

C1.6 Class 4 parts of buildings reads as follows.

A Class 4 part of a building requires the same Fire-Resistance Level [FRL] for building elements and the same construction separating the Class 4 part from the remainder of the building as a class 2 in similar circumstances.

Class 10 is not covered in the C1.10a table 1 as it relates to non inhabitable buildings / structures i.e. a private garage, carport, shed, mast, free standing or retaining wall and a swimming pool.

BCA Specification C1.10a FIRE HAZARD PROPERTIES- FLOORS, WALLS AND CEILINGS

In May 2006 the BCA converted the fire performance criteria to CRF and Smoke Developed Rate as tested and measured under AS ISO 9239-1.

The BCA specification C1.10a provides the required CRF values for floor coverings based on the class of building, the location therein (general use or in fire isolated exits) and whether or not the building is sprinkler protected or not. It also provides a smoke developed rate for buildings that are not protected by an E1.5 compliant sprinkler system.

Table 1 CRITICAL RADIANT FLUX (CRF in kW/M²) OF FLOOR MATERIALS AND FLOOR COVERINGS			
Class of building	General		Fire-Isolated Exits
	Building not fitted with a sprinkler system complying with Specification E1.5	Building fitted with a sprinkler system complying with Specification E1.5	
Class 2, 3, 5, 6, 7, 8 or 9b Excluding accommodation for the aged	2.2	1.2	2.2
Class 3 Accommodation for the aged	4.5	2.2	4.5
Class 9a <i>Patient care areas</i>	4.5	2.2	4.5
<i>Areas other than patient care areas</i>	2.2	1.2	4.5
Class 9c <i>Resident use areas</i>	-	2.2	4.5
<i>Areas other than resident use areas</i>	-	1.2	4.5

This table cross-references the building classes with the minimum required CRF values.

Quick Reference Guide to BUILDING CLASSES / BCA COMPLIANCE

This table is designed as a quick reference guide and must be read in conjunction with the attached BCA documents

		Buildings NOT FITTED with a compliant sprinkler system	Buildings FITTED with a compliant sprinkler system	Fire Isolated Exits
Single dwelling or group of dwellings separated by a fire resisting wall Small Boarding house, Guest house, Hostel area ≤12 residents	CLASS 1	N/A	N/A	N/A

Building with 2 or more attached sole occupancy units	CLASS 2	≥2.2 kW/m ²	≥1.2 kW/m ²	≥2.2 kW/m ²
Residential building for long term or transient living for unrelated persons	CLASS 3			
<ul style="list-style-type: none"> Boarding, guest, lodging house, backpackers and hostel accommodation Residential part of hotel / motel Residential part of a school Accommodation for the disabled / children Residential part of a health care building, staff quarters Residential part of a detention centre 				
The only dwelling in an alternate use building	CLASS 4			
An office building	CLASS 5			
Retail shop or building for sale of goods or services including café, restaurant bar kiosk Dining room, bar, shop, kiosk in a hotel or motel Market or sale room, showroom, service station	CLASS 6			
Carpark / wholesale display / storage	CLASS 7			
Laboratory, business building for production, handicraft, assembling, repairing, finishing, cleaning	CLASS 8			
Assembly building, includes trade workshop, laboratory in a school	CLASS 9 9b			

<ul style="list-style-type: none"> Accommodation for the aged 	CLASS 3	≥4.5 kW/m ²	≥2.2 kW/m ²	≥4.5 kW/m ²
Health-Care including laboratory	CLASS 9 9a	Patient care areas ≥4.5 kW/m ² All other areas ≥2.2 kW/m ²	Patient care areas ≥2.2 kW/m ² All other areas ≥1.2 kW/m ²	
Aged care building	CLASS 9 9c	N/A	Residential use area ≥2.2 kW/m ² All other areas ≥1.2 kW/m ²	

Smoke Developed
≤750% min

No Smoke
Requirement

- Lift Cars:** - All building classifications require a CRF ≥2.2 kW/m²
- There is no smoke requirement.

Glossary

Aged Care Building: Means a Class 9c building for residential accommodation of aged persons who, due to varying degrees of incapacity associated with the ageing process, are provided with *personal care services* and 24 hour staff assistance to evacuate the building during an emergency.

Building Solution: Means a solution which complies with the *performance requirements* and is;

- a) An *alternative solution* or
- b) A solution, which complies with the *deemed to satisfy provisions*.
- c) A combination of both

Critical Radiant Flux: CRF is defined, as the minimum radiant energy a fire needs to sustain flame propagation on the material. The lower the number the greater is the tendency of the material to spread flame.

Deemed to Satisfy Provisions: A building solution, which complies with the deemed to satisfy provision, is deemed to comply with the *performance requirements*.

Fire Isolated Exits: There are 3 areas of a building covered by this clause;

- 1) Fire isolated passageway – corridor, hallway of fire resisting construction and provides egress to or from a - fire isolated stairway
 - fire isolated ramp
 - fire exit to open space
- 2) Fire isolated ramp – ramp within a fire resisting enclosure and provides egress from a story / building.
- 3) Fire isolated stairway – stairway within a fire resisting shaft and includes the floor and roof or top enclosing structure.

Health Care Building: Means a building whose occupants or patients undergoing medical treatment generally need physical assistance to evacuate the building during an emergency and includes –

- a) A public or private hospital; or
- b) A nursing home or similar facility for sick or disabled persons needing full-time nursing care; or
- c) A clinic, day surgery or procedure unit where the effects of the predominant treatment administered involve patients becoming non-ambulatory and requiring supervised medical care on the premises for some time after the treatment.

Patient Care Area: Means a part of a *health-care building* normally used for the treatment, care, accommodation, recreation, dining and holding of patients including a *ward area* and *treatment area*.

Sprinkler Compliance: BCA specification E1.5 sets out the requirements for the design and installation of fire sprinkler systems.

There are four different solutions depending on the building class state and territory variations should also be consulted.

GENERAL PROVISIONS

PART A3

CLASSIFICATION OF BUILDINGS AND STRUCTURES

A3.1 Principles of classification

The classification of a building or part of a building is determined by the purpose for which it is designed, constructed or adapted to be used.

A3.2 Classifications

Buildings are classified as follows:

Class 1: one or more buildings which in association constitute—

- (a) **Class 1a** — a single dwelling being—
 - (i) a detached house; or
 - (ii) one of a group of two or more attached dwellings, each being a building, separated by a *fire-resisting wall*, including a row house, terrace house, town house or villa unit; or
- (b) **Class 1b** — a boarding house, guest house, hostel or the like-
 - (i) with a total area of all floors not exceeding 300 m² measured over the enclosing walls of the Class 1b; and
 - (ii) in which not more than 12 persons would ordinarily be resident,

which is not located above or below another dwelling or another Class of building other than a *private garage*.

Class 2: a building containing 2 or more *sole-occupancy units* each being a separate dwelling.

Class 3: a residential building, other than a building of Class 1 or 2, which is a common place of long term or transient living for a number of unrelated persons, including—

- (a) a boarding-house, guest house, hostel, lodging-house or backpackers accommodation; or
- (b) a residential part of a hotel or motel; or
- (c) a residential part of a *school*; or
- (d) accommodation for the aged, children or people with disabilities; or
- (e) a residential part of a *health-care building* which accommodates members of staff; or
- (f) a residential part of a *detention centre*.

Class 4: a dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.

Class 5: an office building used for professional or commercial purposes, excluding buildings of Class 6, 7, 8 or 9.

Class 6: a shop or other building for the sale of goods by retail or the supply of services direct to the public, including—

- (a) an eating room, cafe, restaurant, milk or soft-drink bar; or

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- (b) a dining room, bar, shop or kiosk part of a hotel or motel; or
- (c) a hairdresser's or barber's shop, public laundry, or undertaker's establishment; or
- (d) market or sale room, showroom, or *service station*.

Class 7: a building which is—

- (a) **Class 7a** — a *carpark*; or
- (b) **Class 7b** — for storage, or display of goods or produce for sale by wholesale.

Class 8: a laboratory, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce is carried on for trade, sale, or gain.

Class 9: a building of a public nature—

- (a) **Class 9a** — a *health-care building*, including those parts of the building set aside as a laboratory; or
- (b) **Class 9b** — an *assembly building*, including a trade workshop, laboratory or the like in a primary or secondary *school*, but excluding any other parts of the building that are of another Class; or
- (c) **Class 9c** — an *aged care building*.

Class 10: a non-habitable building or structure—

- (a) **Class 10a** — a non-habitable building being a *private garage*, carport, shed, or the like; or
- (b) **Class 10b** — a structure being a fence, mast, antenna, retaining or free-standing wall, *swimming pool*, or the like.

A3.3 Multiple classification

Each part of a building must be classified separately, and—

- (a)
 - (i) where parts have different purposes — if not more than 10% of the *floor area* of a *storey*, being the minor use, is used for a purpose which is a different classification, the classification applying to the major use may apply to the whole storey; and
 - (ii) the provisions of (i) do not apply when the minor use is a laboratory or Class 2, 3 or 4 part; and
- (b) Classes 1a, 1b, 7a, 7b, 9a, 9b, 9c, 10a and 10b are separate classifications; and
- (c) a reference to—
 - (i) Class 1 — is to Class 1a and 1b; and
 - (ii) Class 7 — is to Class 7a and 7b; and
 - (iii) Class 9 — is to Class 9a, 9b and 9c; and
 - (iv) Class 10 — is to Class 10a and 10b; and
- (d) A plant room, machinery room, lift motor room, boiler room or the like must have the same classification as the part of the building in which it is situated.

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A3.4 Parts with more than one classification

- (a) Notwithstanding **A3.3**, a building or part of a building may have more than one classification applying to the whole building or to the whole of that part of the building.
- (b) If a building or part of a building has more than one classification applying to the whole building or part in accordance with (a), that building or part must comply with all the relevant provisions of the BCA for each classification.

FIRE RESISTANCE

SPECIFICATION **C1.10a** FIRE HAZARD PROPERTIES – FLOORS, WALLS AND CEILINGS

Deemed-to-Satisfy Provisions

Specification
C1.10a inserted
by Amdt No. 13

1. Scope

This Specification sets out requirements in relation to the *fire hazard properties* of-

- (a) floor materials and floor coverings; and
- (b) wall and ceiling linings.

2. Floor materials and floor coverings

A floor material or floor covering must have-

- (a) a *critical radiant flux* not less than that listed in Table 1; and
- (b) in a building not protected by a sprinkler system complying with Specification E1.5, a maximum *smoke development rate* of 750 percent-minutes.

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