



BUILDING CODE OF AUSTRALIA

In relation to Tredsafe

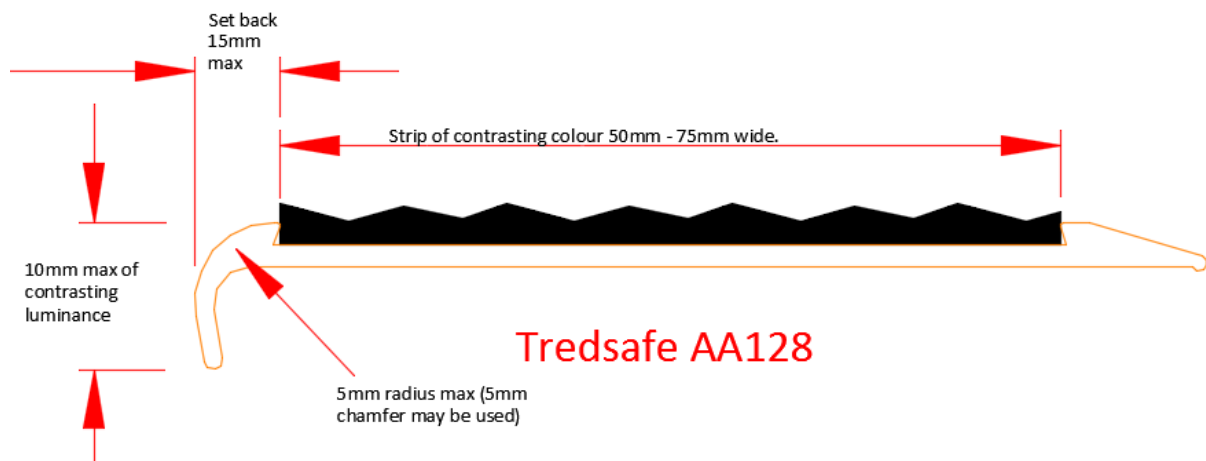
Table of contents	Page
Stairnosing compliances summary	2
Changes in level compliances summary	3
Fire resistance compliances summary	4
Slip-resistance compliances summary	4
Appendices	
A. Stairnosings compliances	5
B. Change in level compliances	7
C. fire resistance compliances	10
D. Slip-resistance compliances	14
E. References	15

BCA Summary

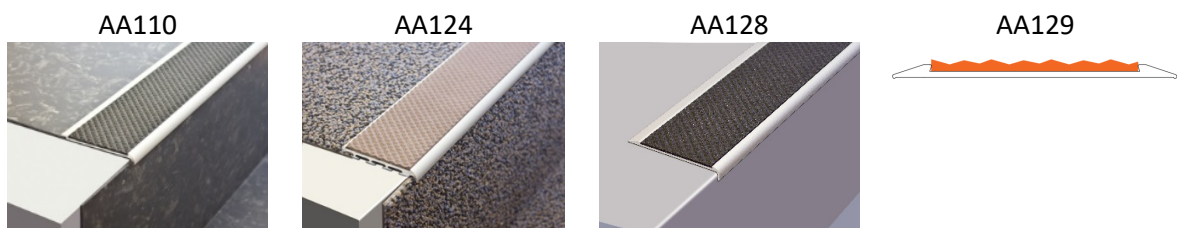
In relation to Tredsafe

Stair nosing compliances:

- Stair nosings shall have a sharp intersection at the rise and the run; or be rounded up to a 5mm radius; or be chamfered up to 5mm x 5mm.
- Each tread shall have a strip of 30% minimum luminance contrast (to the background) at least 50mm deep and no more than 75mm deep across the entire width of the path of travel, set no more than 15mm from the front of the nosing.
- No area of contrasting luminance can extend down the riser more than 10mm.
(Anomaly; Stair nosings with a longer rise than 10mm can be used
If the background colour is not a 30% luminance contrast to anodized aluminium)



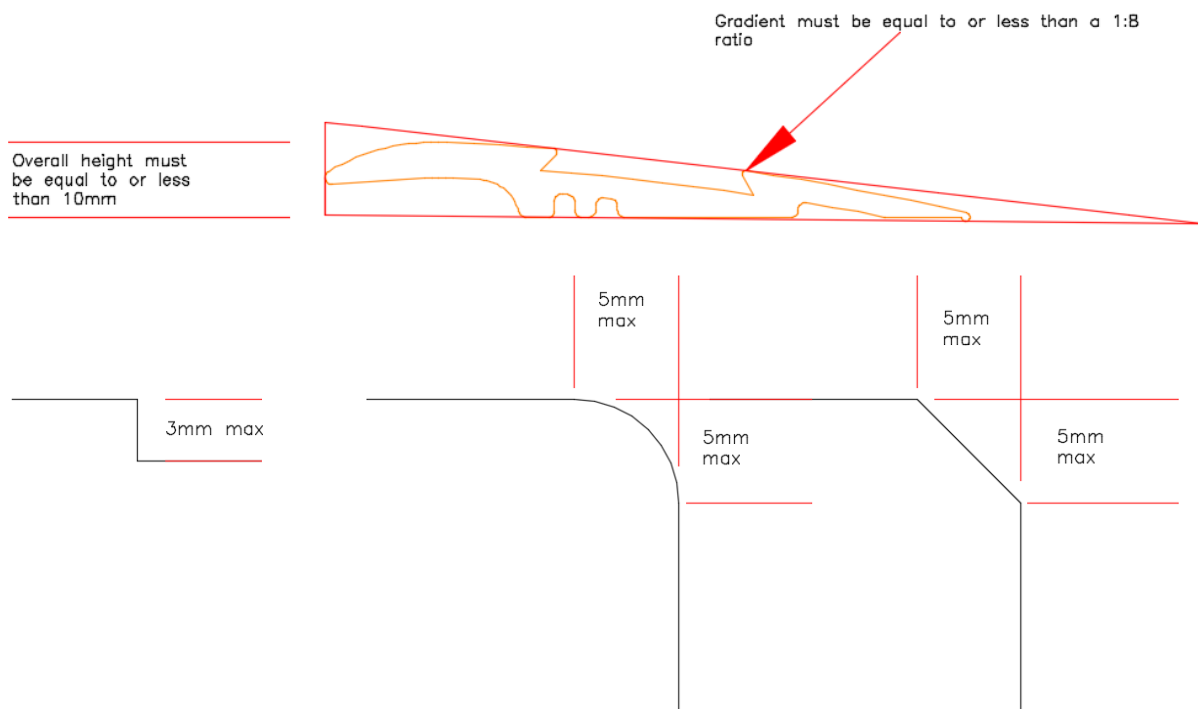
Compliant nosings:



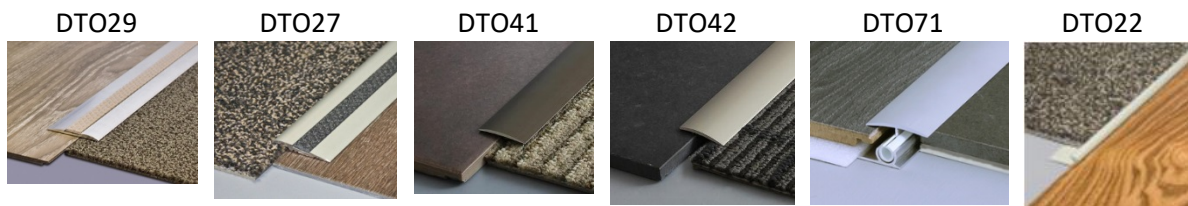
Refer to appendix A for additional information.

Change in level compliances:

- When a change in floor level occurs the maximum vertical transition allowed is 3mm; anything up to 5mm must have a bevelled edge; or have a radius no greater than 5mm.
- Where carpets or any soft flexible materials are used on the ground or flooring surface the pile height shall not exceed 6mm and the base height shall not exceed 4mm; and exposed edges of floor coverings shall be fastened to the floor surface and shall have a trim along the entire length of any exposed edge; and at the leading edges, carpet trims and any soft flexible materials shall have a vertical face no higher than 3mm or a rounded bevelled edge no higher than 5mm or above that, a gradient of 1 in 8 up to a total maximum height of 10mm.



Complying Detail trims:



Refer to appendix B for additional information.

Fire Resistance Compliances:

Specification C1.10a of the BCA 2007 states that a floor material of floor covering must have:

- A critical radiant flux (CRF) between 2.2 and 4.5 dependent on their location; and
- A maximum smoke development rate of 750 percent-minutes, if the building is not protected by a sprinkler system.

Refer to appendix C for additional information

Slip Resistance Compliances:

- When tested in accordance with AS 4586, the stair nosing must comply with a particular slip-resistance classification, refer to appendix D table 1. This consists of two tests the wet pendulum test and the oil-wet incling platform test. Our insert meets and exceeds these classifications.

Refer to appendix D for additional information

Appendices

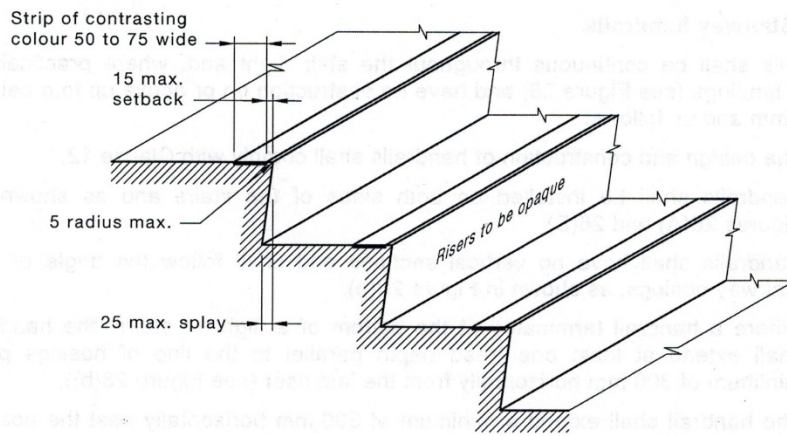
A.

11 STAIRWAYS

11.1 Stair construction

Where required, stairs shall be constructed as follows:

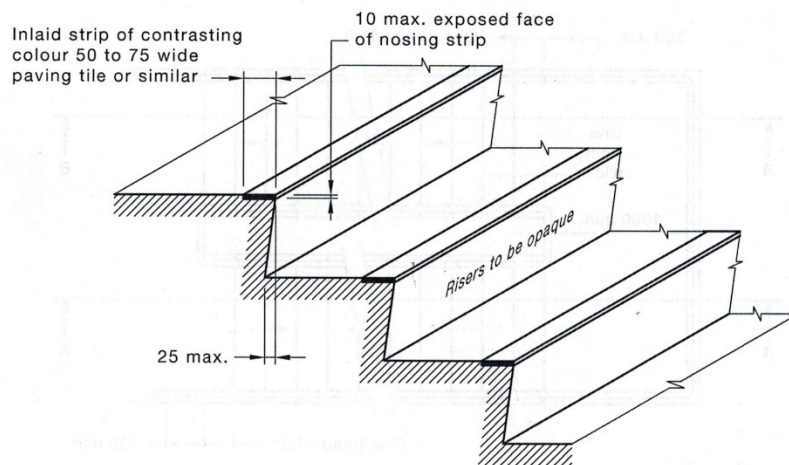
- (a) Where the intersection is at the property boundary, the stair shall be set back by a minimum of 900 mm so that the handrail (complying with Clause 12) and TGSIs do not protrude into the transverse path of travel, as shown in Figure 26(A).
- (b) Where the intersection is at an internal corridor, the stair shall be set back in accordance with Figure 26(B).
NOTE: Examples of stair handrail terminations are given in Figures 26(C) and 26(D).
- (c) Stairs shall have opaque risers.
- (d) Stair nosings shall not project beyond the face of the riser and the riser may be vertical or have a splay backwards up to a maximum 25 mm, as shown in Figures 27(A) and 27(B).
- (e) Stair nosing profiles shall—
 - (i) have a sharp intersection;
 - (ii) be rounded up to 5 mm radius; or
 - (iii) be chamfered up to 5 mm × 5 mm.
- (f) At the nosing, each tread shall have a strip not less than 50 mm and not more than 75 mm deep across the full width of the path of travel. The strip may be set back a maximum of 15 mm from the front of the nosing. The strip shall have a minimum luminance contrast of 30% to the background. Where the luminous contrasting strip is affixed to the surface of the tread, any change in level shall comply with Clause 7.2 and Clause 7.3.
- (g) Where the luminance contrasting strip is not set back from the front of the nosing then any area of luminance contrast shall not extend down the riser more than 10 mm.
- (h) TGSIs shall be installed in accordance with AS 1428.4.1.



NOTE: A chamfered nosing 5 × 5 mm may be used.

DIMENSIONS IN MILLIMETRES

FIGURE 27(A) A TYPICAL STAIR NOSING PROFILE WITH NOSING STRIP



DIMENSIONS IN MILLIMETRES

FIGURE 27(B) A TYPICAL STAIR NOSING PROFILE WITH EXPOSED NOSING STRIP

B.

7 FLOOR OR GROUND SURFACES ON CONTINUOUS ACCESSIBLE PATHS OF TRAVEL AND CIRCULATION SPACES

7.1 General

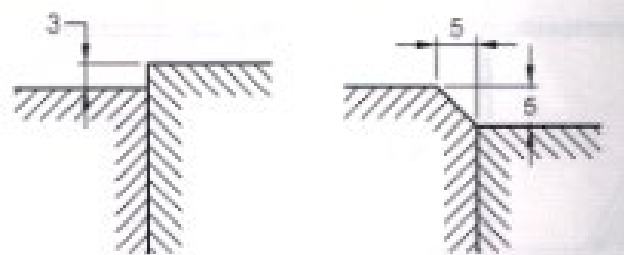
A continuous accessible path of travel and any circulation spaces shall have a slip-resistant surface. The texture of the surface shall be traversable by people who use a wheelchair and those with an ambulant or sensory disability.

7.2 Construction tolerances for abutment of surfaces

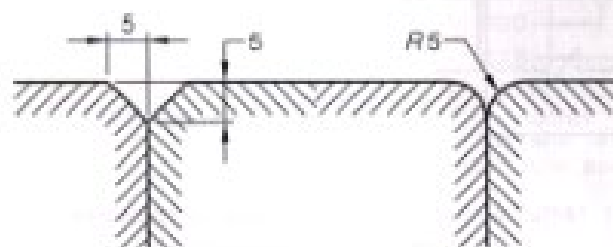
Abutment of surfaces shall have a smooth transition. Design transition shall be 0 mm. Construction tolerances shall be as follows:

- (a) 0 ± 3 mm vertical, as shown in Figure 6(a).
- (b) 0 ± 5 mm, provided the edges have a bevelled or rounded edge to reduce the likelihood of tripping, as shown in Figure 6(b).

Tolerances for raked joint pavers shall be as shown in Figure 7.



(a) Change in level



(b) Continuous paving units—flush-jointed with level surfaces

DIMENSIONS IN MILLIMETRES AND ARE MAXIMUM

FIGURE 6 ACCEPTABLE CONSTRUCTION TOLERANCES FOR ABUTMENT OF SURFACES

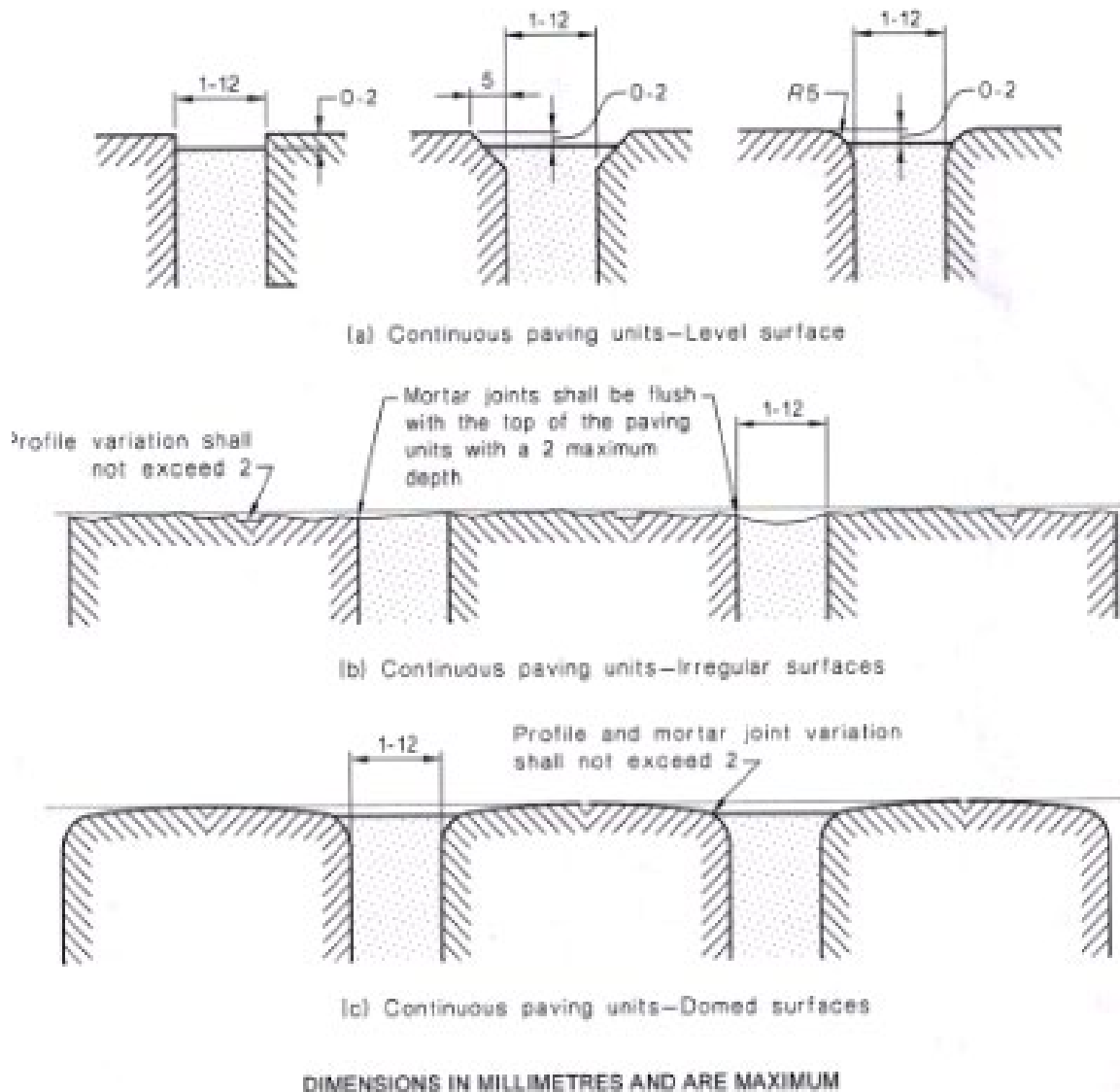


FIGURE 7 RAKED JOINT PAVERS

7.3 Changes in level

When a vertical change of not more than 5 mm occurs between the abutment of two surfaces along a continuous accessible path of travel, such change in surface level shall comply with the tolerances given in Clause 7.2.

7.4 Fixed or recessed floor coverings—Soft floor coverings

7.4.1 Carpets and other soft flexible materials

Where carpets or any soft flexible materials are used on the ground or floor surface—

- the pile height shall not exceed 6 mm and the base height shall not exceed 4 mm;
- exposed edges of floor covering shall be fastened to the floor surface and shall have a trim along the entire length of any exposed edge; and
NOTE: An example is given in Figure 8.
- at the leading edges, carpet trims and any soft flexible materials shall have a vertical face no higher than 3 mm or a rounded bevelled edge no higher than 5 mm or above that height a gradient of 1 in 8 up to a total maximum height of 10 mm.

7.4.2 Recessed matting

Matting recessed within a continuous accessible path of travel—

- (a) where of metal and bristle type construction or similar, its surface shall be no more 3 mm if vertical or 5 mm if rounded or bevelled, above or below the surrounding surface; and
- (b) where of a mat or carpet type material, shall have the fully compressed surface level with or above the surrounding surface with a level difference no greater than 3 mm if vertical or 5 mm if rounded or bevelled.

7.5 Grates

Grates shall comply with the following:

- (a) Circular openings shall be not greater than 13 mm in diameter.
- (b) Slotted openings shall be not greater than 13 mm wide and be oriented so that the long dimension is transverse to the dominant direction of travel.

NOTE: Where slotted openings are less than 8 mm, the length of the slots may continue across the width of paths of travel.

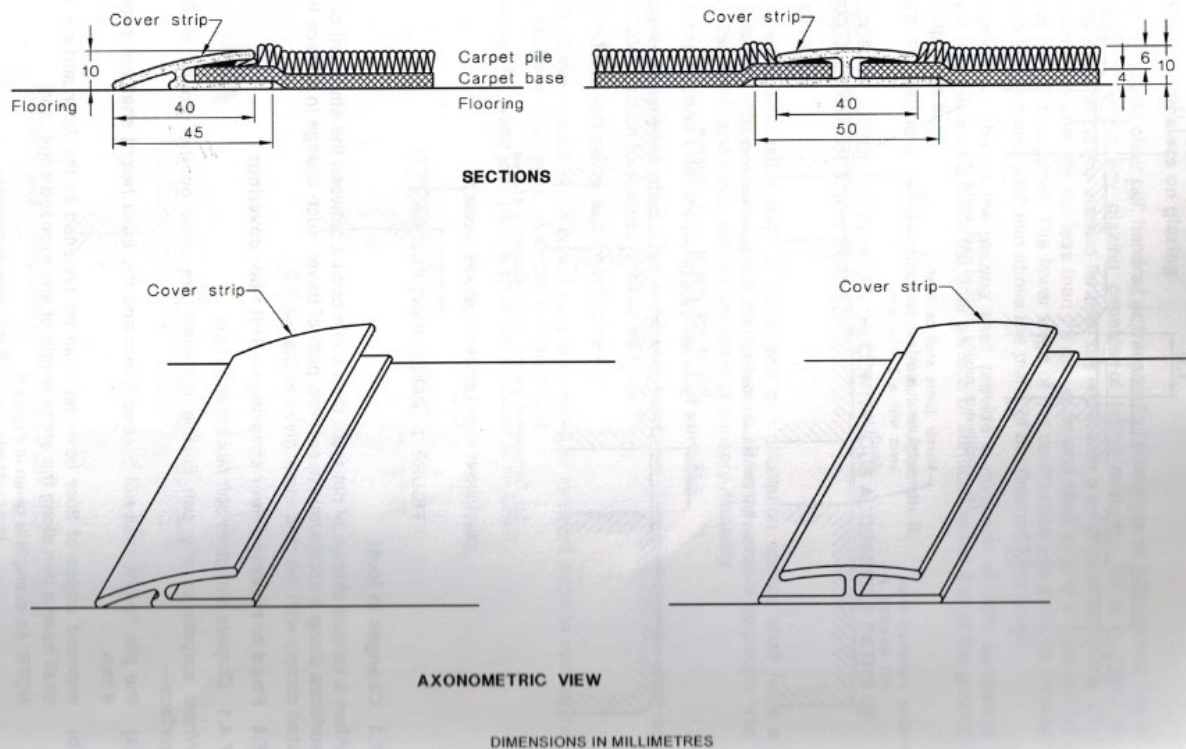


FIGURE 8 EXAMPLE OF ABUTTING FLOOR COVERINGS ON A CONTINUOUS ACCESSIBLE PART OF TRAVEL

C.

Class 2 – 9 Properties of Floor Material and Coverings

Specification C1.10a of the BCA 2007 states that a floor material or floor covering must have :

- A **Critical Radiant Flux (CRF)** not less than that listed in the table below; and
- A maximum **Smoke Development** rate of 750 percent-minutes, if the building is not protected by a sprinkler system complying with Specification E1.5 of the BCA 2007.

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 Patient care areas Areas other than patient care areas	4.5 2.2	2.2 1.2	4.5 4.5
Class 9c Resident use areas Areas other than resident use areas	- -	2.2 1.2	4.5 4.5

Table 1 : Critical Radiant Flux (CRF in kW/M²) of Floor Materials and Floor Coverings

BCA Building Classes

The various classes of buildings are described in the Part A3 of the BCA 2007 document, and are copied here for convenience :

Class	Definition
Class 1a	A single dwelling being – (i) A detached house; or (ii) One of a group of 2 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.
Class 1b	A boarding house, guest house, hostel or the like – (i) with a total area of all floors not exceeding 300 m ² measured over the enclosing walls of the Class 1b; and (ii) in which not more than 12 persons would ordinarily be resident.
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 or 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 public building for the sale of goods by retail or the supply of services direct to the public, including – (a) an eating room, café, restaurant, milk or soft drink bar; or (b) a dining room, bar, shop or kiosk part of a hotel or motel; or (c) market or sale room, show room or service station.
Class 7a	A building which is a car park.
Class 7b	A building which is for storage, or display of goods or produce for sale by wholesale.
Class 8	A laboratory or a building in which a handcraft 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 9a	A building of a public nature that is a health care building, including those parts of a building set aside as a laboratory.
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.
Class 9c	An aged care building.
Class 10a	A non-habitable building being a private garage, carport, shed, or the like.
Class 10b	A structure being a fence, mast, antenna, retaining or free standing wall, swimming pool, or the like.

Technical Explanations

Critical Radiant Flux

The Critical Radiant Flux (CRF) test measures the radiant energy required to just sustain burning. It is used in Australia, and in some parts of the USA and some parts of Europe to regulate floor coverings.

The test involves the product being held horizontally under the influence of a radiant heat source at one end. It is ignited at that end and the radiant heat flux at the point at which combustion ceases is determined. This is the Critical Radiant Flux.

During the test the floor covering is allowed to burn under the influence of the radiant heat source. There is just sufficient air movement in the test chamber to remove the products of combustion into the flue.

Heat Evolved Index

The heat evolved index relates to the amount of heat released by a burning material, and allows, by its linear scale, distinctions to be drawn between materials on the basis of whether or not the amount of heat evolved from them would be sufficient to cause ignition of nearby combustibles. The higher the index, the more likely is the fire involvement of nearby combustible materials.

Ignitability Index

The ignitability index relates to the time taken for the volatiles from the test specimens, irradiated at increasing intensity, to form an ignitable gas mixture and be ignited by a small flame. The index is zero if ignition does not occur under the maximum impressed radiation of the heat and could be as high as twenty (20) if ignition occurred within 30 seconds of the test commencement.

Material Group Numbers

Material Group Number	Description
Group 1	Materials that do not reach flashover following exposure to 300kW for 600 seconds, after not reaching flashover when exposed to 100kW for 600 seconds.
Group 2	Materials that do reach flashover after exposure to 300kW for 600 seconds, after not reaching flashover when exposed to 100kW for 600 seconds.
Group 3	Materials that reach flashover in more than 120 seconds but less than 600 seconds after exposure to 100kW.
Group 4	Materials that reach flashover in less than 120 seconds after exposure to 100kW.

Smoke Developed Index

The smoke developed index relates to the optical density of smoke produced under the conditions of the standard test. Doubling of the optical density of the smoke increases the smoke developed index by unity. The higher the index, the greater the hazard is likely to be from smoke.

Spread of Flame Index

The scale of the spread of flame index is based on studies of actual rates of spread of flame on various wall-lining materials. Where the walls of rooms with 2.75m ceiling height were lined with materials with high spread of flame indices, flames rapidly spread up the wall and, by igniting combustible gases that had accumulated below

the ceiling, rapidly involved the whole room in fire. An index of 10 indicates, from the original corner-burn experiments, that the material could be expected to cause flames to reach the ceiling of such a room within 10s of ignition; an index of zero means that the materials will not cause flames to reach the ceiling.

Steps in establishing a Fire Resistance Level

After a protective layer of char has developed the char rate slows considerably. The charring rate of dry wood has been shown to continue for several hours at a reasonably constant rate given in AS1720.4-2006 by:

$$c = \frac{dh}{dt} = 0.4 + (280/\rho)^2$$

where:

$$c = \frac{dh}{dt} \quad \text{■ notional charring rate (mm/minute);}$$

$$\rho \quad \text{■ timber density (kg/m}^3\text{) at a moisture content of 12\%.}$$

The charring rate of a typical softwood having a density of 500kg/m³ is 0.76mm/minute. During a fire a realistic assessment of structural response can be made by neglecting 10mm of unburnt wood and assuming the remainder retains its full strength and stiffness.

The effective depth of charring (d_c) for each exposed surface after a period of time (t) is given by:

$$d_c = ct + 7.5$$

where:

$$d_c \quad \text{■ calculated effective depth of charring (mm);}$$

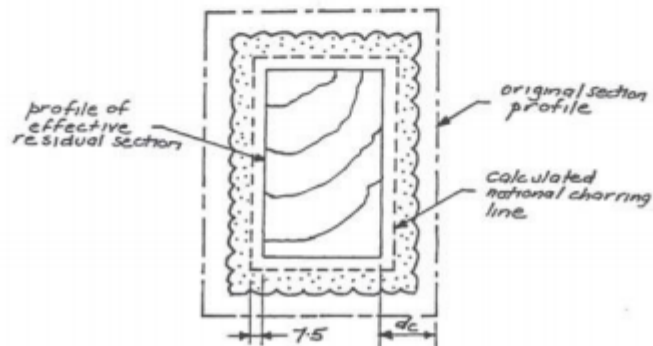
$$c \quad \text{■ notional charring rate;}$$

$$t \quad \text{■ period of time (minutes)}$$

NOTE: t can be taken as either the:

- time taken for the FRL to be achieved;
- fire resistance period determined by a series of successive iterations.

The effective residual section is determined by subtracting d_c from all fire-exposed surfaces of the timber member as shown below :



D.

The DtS Provisions in Volumes One and Two of the BCA now require:

Stairway treads to have a:

- surface with a slip-resistance classification not less than that listed in Table 1 (refer below), when tested in accordance with AS 4586; or
- nosing strip with a slip-resistance classification not less than that listed in Table 1, when tested in accordance with AS 4586.

Table 1 Slip-Resistance Classifications

Application	Surface conditions	
	Dry	Wet
Ramp steeper than 1:14	P4 or R11	P5 or R12
Ramp steeper than 1:20 but not steeper than 1:14	P3 or R10	P4 or R11
Tread or landing surface	P3 or R10	P4 or R11
Nosing or landing edge strip	P3	P4

Note: AS 4586 applies to all new pedestrian surfaces. The BCA requirements only apply to stairways in Volumes One and Two and also ramps and landings in Volume One. Therefore, where a general surface requirement is in conflict with a stairway, ramp or landing requirement, the latter takes precedence.

Slip-resistance classifications

There are six slip-resistance classifications within the BCA DtS Provisions and these classifications differentiate between:

- the application;
- the type of test to be used; and
- the surface condition (e.g. wet or dry).

AS 4586 contains four test types, however, only two of these are applicable to the BCA DtS Provisions. The two tests are a wet pendulum test and an oil-wet inclining platform test.

The wet pendulum test provides a classification range of P0 to P5 and can be tested in-situ or in a laboratory. The oil-wet inclining platform test provides a classification range of R9 to R13 and is a laboratory based test.

In respect to determining the appropriate surface condition (as expected at the time of construction), a wet surface includes a surface that:

- is exposed to weather, such as an external stairway; or
- on occasions, becomes wet such as in an entry lobby.

Likewise, a dry surface is one that is not normally wet or likely to be made wet, other than by an accidental spill or general cleaning.

E.

- Australian standard, AS 1428.1-2009 Design for access and mobility, part 1: General requirements for access-new building work.
- http://www.ewp.asn.au/library/downloads/ewpaa_fire_resistance.pdf
- <http://www.google.co.nz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCMQFjAA&url=http%3A%2F%2Fwww.abcb.gov.au%2F~%2Fmedia%2FFiles%2FDownload%2520Documents%2FPublications%2FNational%2520Advisory%2520Note%2520-%2520Slip%2520Resistance.ashx%3Fla%3Den&ei=gGUwVbGQEOXVmgWW94DACg&usg=AFQjCNG-Gp8MhiHfaLIBcjeENWCTjXqC9g&bvm=bv.91071109,d.dGY>