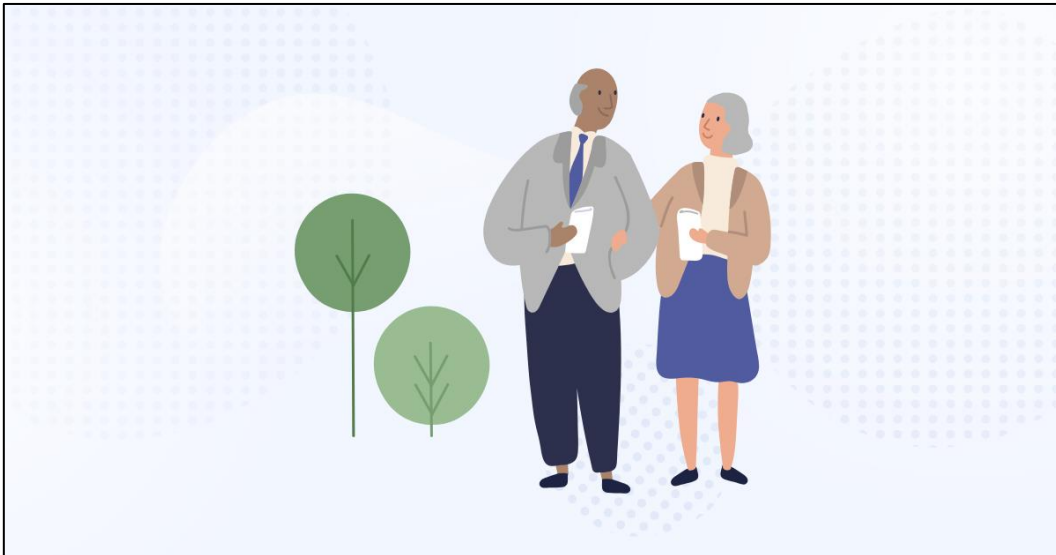


## ***Fire and Smoke Separation in Aged Care***

*By Yahya Elhallak*

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**KEYWORDS:** #Residential Aged Care Facility (RACF), Class 9c, Fire Safety, Fire Compartmentation, Smoke Compartmentation, Passive Fire Construction, Fire Resistance Level (FRL), Fire Stopping, Smoke Sealing



The National Construction Code (NCC) Building Code of Australia (BCA) puts significant emphasis on the fire and smoke separation in a Class 9c Residential Aged Care Facilities (RACF).

### **What is a residential aged care building?**

A residential aged care facility is categorised as a Class 9c building under NCC BCA Volume 1, 2019. A Class 9c building is defined as 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.

This article provides a summary of BCA Deemed-to-Satisfy (DtS) requirements for fire and smoke compartmentation in Class 9c buildings. These provisions can be varied via a Performance-based fire Solution to improve the architectural vision, building functionality, practical buildability and cost-effectiveness of the Class 9c design.

### **BCA Part C1 - Fire resistance**

BCA Part C1 details the fire resistance requirements for buildings. There are three (3) levels of construction defined by the building size, rise in storeys and classifications of use namely:

- Type A (most stringent form of fire-resistant construction)
- Type B (moderate form of fire-resistant construction)
- Type C (least stringent form of fire-resistant construction)

BCA Table C1.1 stipulates that Type A Construction is applicable for a Class 9c RACF with 3 or more storeys.

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Table 1 – Table C1.1 of BCA Clause C1.1.

| Rise in storeys | Class of building | Class of building |
|-----------------|-------------------|-------------------|
|                 | 2, 3, 9           | 5, 6, 7, 8        |
| 4 or more       | A                 | A                 |
| 3               | A                 | B                 |
| 2               | B                 | C                 |
| 1               | C                 | C                 |

## BCA Part C2 - Fire Compartmentation and Separation

BCA Part C2 sets out fire compartmentation requirements for various classifications of use. BCA Table C2.2 stipulates the maximum floor area and maximum floor volume of each fire compartment by construction time and building use.

Table 2 – Table C2.2 of BCA Clause C2.2.

| Classification  | Type A construction   | Type B construction   | Type C construction   |
|---|---|---|---|
| 5, 9b or 9c   | Max <i>floor area</i> —8 000 m <sup>2</sup><br>Max volume—48 000 m <sup>3</sup> | Max <i>floor area</i> —5 500 m <sup>2</sup><br>Max volume—33 000 m <sup>3</sup> | Max <i>floor area</i> —3 000 m <sup>2</sup><br>max volume—18 000 m <sup>3</sup> |
| 6, 7, 8 or 9a (except for <i>patient care areas</i> ) | Max <i>floor area</i> —5 000 m <sup>2</sup><br>Max volume—30 000 m <sup>3</sup> | Max <i>floor area</i> —3 500 m <sup>2</sup><br>Max volume—21 000 m <sup>3</sup> | Max <i>floor area</i> —2 000 m <sup>2</sup><br>Max volume—12 000 m <sup>3</sup> |

Note to Table C2.2: See C2.5 for maximum size of compartments in *patient care areas* in Class 9a *health-care buildings*.

A Class 9c building under Type A Construction has a floor area limitation of 8,000 m<sup>2</sup> floor area and floor volume limitation of 48,000 m<sup>3</sup> which reduces in size for Type B and Type C Construction. As such the applicable Fire Resistance Levels (FRL) for Class 9c use is as follows:

- Type A: 120/120/120 FRL
- Type B: 120/120/120 FRL
- Type C: 90/90/90 FRL

## Smoke Compartmentation

BCA Clause C2.5 also sets out maximum smoke compartment size of 500 m<sup>2</sup> as shown by the figure below. However, larger smoke compartments can be designed via a Performance Solution.

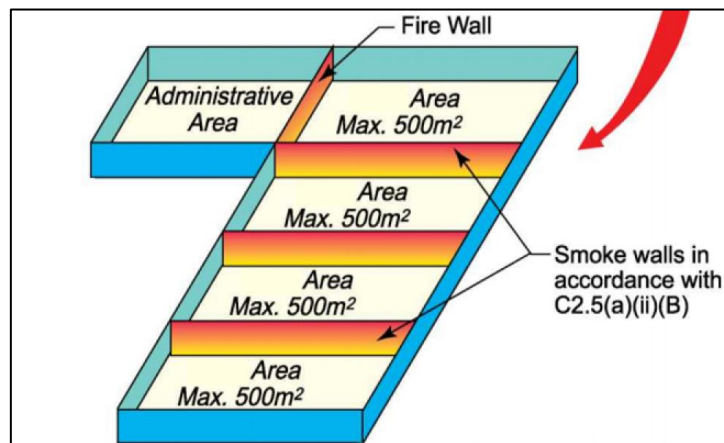


Figure 1 – Schematic illustrating maximum smoke compartment areas.

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Typical fire and smoke separations requirements for Class 9c buildings include:

- (i) A building must be divided into areas not more than 500 m<sup>2</sup> by smoke-proof walls complying with BCA Specification C2.5.
- (ii) A fire compartment must be separated from the remainder of the building by fire walls and, not withstanding C2.7 and Specification C1.1, floors with an FRL of not less than 60/60/60.
- (iii) Ancillary use areas containing equipment or materials that are a high potential fire hazard, must be separated from the sole-occupancy units by smoke-proof walls complying with BCA Specification C2.5.
- (iv) Openings in fire walls must be protected as follows:
  - a. Doorways – self-closing -/60/30 FRL fire doors.
  - b. Windows – automatic or permanently fixed closed -/60/- fire windows or -/60/- fire window shutters.
  - c. Other openings – construction having FRL of not less than -/60/-.

### BCA Specification C2.5 –Smoke-proof Walls

BCA Specification C2.5 sets out the requirements of constructing a smoke-proof wall for Class 9c buildings as shown by the extract below:

**3. Class 9c buildings**

Smoke-proof walls *required* by C2.5 in Class 9c buildings must comply with the following:

- (a) The wall may be lined on one side only.
- (b) Linings on the wall must be *non-combustible* and extend to the underside of—
  - (i) the floor above; or
  - (ii) a *non-combustible* roof covering; or
  - (iii) a flush plasterboard ceiling lined with 13 mm standard grade plasterboard or a *fire-protective covering*, with all penetrations sealed against the free passage of smoke.
- (c) If plasterboard is used in the lining on a wall, it must be a minimum of 13 mm standard grade plasterboard.
- (d) Not incorporate any glazed areas unless the glass is safety glass as defined in AS 1288.
- (e) Only have doorways which are fitted with smoke doors complying with *Specification C3.4*.
- (f) Have all openings around penetrations and the junctions of the smoke-proof wall and the remainder of the building stopped with *non-combustible* material to prevent the free passage of smoke.
- (g) Incorporate smoke dampers where air-handling ducts penetrate the wall unless the duct forms part of a smoke hazard management system *required* to continue air movement through the duct during a fire.

Figure 2 – Extract of BCA Specification C2.5 Clause 3.

### BCA C3.15

Walls required to have a fire resistance are not always unpenetrated, and a lot of the times it is necessary that services such as (cables, sprinkler pipes and AC ducting) passes through a fire wall. In this instance the integrity of the fire resistance is compromised and is required to be sealed in a manner that maintains the relevant fire resistance levels of the subject wall.

BCA Clause C3.15 addresses the penetration of services through fire walls and sets out the fundamental rules on how to treat said penetrations to maintain fire resistance. This clause calls out Australian Standards (AS 1530.4 and AS 4072.1) which provide specific details on how different types of service penetrations are to be treated, whether it be the application of fire rated mastic on electrical cabling or the installation of a fire collar on a PVC pipe.

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### Further Links


FNRSW (2020), 'Fire safety in waste facilities', FRN14/3255 D17/81582 Version 2.02, available on:


[https://www.fire.nsw.gov.au/gallery/files/pdf/guidelines/guidelines\\_fire\\_safety\\_in\\_waste\\_facilities.pdf](https://www.fire.nsw.gov.au/gallery/files/pdf/guidelines/guidelines_fire_safety_in_waste_facilities.pdf).


Fire Talk Article – by John Rakic, Technical Director – Trafalgar Fire Containment Solutions - <https://awci.org.au/wp-content/uploads/2019/05/Fire-Talk-Smoke-Containment-Requirements.pdf>

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