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## SOLID CORE DOORS – V1

Fire and Security Consulting Services (FSCS) is frequently consulted as to the use of solid core doors. The Building Code of Australia (BCA) Part C3.11 permits such use in Class 2 and 3 buildings.

This paper provides the background of their use, a suggested specification and the issue that neither the BCA nor any Australian Standard details any “tagging requirements.”

### BCA Commentary

The BCA addresses the bounding construction of sole occupancy units (apartments) and the requirements for doors. Where the building is of Type A construction, the sole occupancy doors are required to be fire doors to AS1905.1 with a *fire resistance level* (FRL) of -/60/30 **CE**.

**CE** Please refer to the FSCS paper “*Fire Resistance – A Fire Engineer’s Perspective*” for explanation of the meaning of FRL.

However in buildings of Type B or Type C construction, the BCA permits the use of “self closing, tight fitting solid core doors – not less than 35mm thick”.

John Rakic, Managing Director of J-RAK Consulting in his paper “*The Problem with tight fitting doors said the following:-*”

*§ The BCA deemed to satisfy requirements for a so-called “tight fitting” and “solid core” door do not provide any associated definitions and this in itself is a problem for industry.*

*Firstly, what is a “solid core” door? There is no definition in the BCA and there is no appropriate Australian Standard either. I have heard on many occasions that the timber door standards AS2688, AS2689 and AS1909 have definitions for “solid core doors” but they do not.*

*It is my view that the term “solid core” door has evolved to differentiate against a “hollow core” door which is a door filled with a cellular, honeycomb type cardboard core. Doors typically available in Australia and referred to as “solid core” doors are doors constructed of “solid” core substrates that may include, for example, blockboard, particleboard or solid MDF. Some laminated cores incorporating MDF with a polystyrene infill to keep their weight down are being termed “semi-solid” doors.*

*Without an adequate BCA definition, the use “solid core” may mean different things to different people, and in terms of their relative performance in terms of fire resistance and resistance to smoke leakage in fire conditions (including sprinkler-controlled scenarios), will vary considerably.*

*Secondly, what is the definition of “tight fitting”? Again, there is no definition in the BCA for this term.*

*§ Reproduced with permission.*

### Specification

In consideration of the above, FSCS recommends that to meet the BCA requirements, timber doors complying with AS 2688 – 1984 – *Timber Doors- Section 5 – Flush Doors with Blockboard Core*, be used. While this may satisfy the door specification, we must now specify the door frame and other hardware as follows:-

- Doors to be *reasonably tight-fitting* within the frame whilst meeting aesthetic and functional requirements (approx. 3 mm gap to top and sides and 10 mm to floor). These dimensions equate those for fire doors under AS1905.1.
- Frames to be standard hollow zinc annealed steel - minimum 1.2 mm thick. The frame rebate should be a minimum of 40mm deep x 25mm wide.

- Frames, where installed in masonry walls, fixed with wall ties and then the hollow filled with mortar.
- Frames, where in lightweight construction, tied to the wall studs with the wall sheeting offered into the frame profile.
- Hinges should be 1 ½ pairs of 100mm stainless steel welded to the frame and fixed with suitable screws to the door style (edge).
- The doors, where on open balconies and the like, are likely to be subjected to adverse weather conditions and accordingly, the vulnerable end grain timber sections at the top and bottom edges, should be sealed with a two pack epoxy paint.
- A hydraulic door closer should be fitted with stainless steel screws being used for attachment to the door leaf Ø.
- A suitable latch or lock should be fitted. The lock / latch should be corrosion resistant and suitable for external use Ø.

Ø Refer to the FSCS paper “Apartment Entry Doors” for limitations on hardware.

Whilst solid core doors have no formal FRL (fire rating), research and testing has been conducted on the comparative performance of “fire doors” and solid core doors to fires in terms of their abilities to prevent fire spread.

Warrington Fire Research conducted tests on the performance of a solid core timber door in a fire test using a Standard Heating Regime. The door that was tested was constructed in accordance with AS 2688 and tested against the specified AS 1530.4 standard heating regime used to simulate doors directly exposed to a large flaming or fully developed fire.

The test apparatus used consisted of a corridor (6m long x 1.8m wide x 2.4m high) with the door fitted in one end of the corridor directly facing the furnace. The test method used was FSE 21, developed by Warrington Fire Research.

The test construction comprised a single leaf 35 mm door assembly, with a steel door frame built into a masonry wall. Warrington Fire Research showed that for a solid core door exposed to the AS 1530.4 standard heating regime substantially met the performance requirements of a fire door for a period of 15 minutes.

Accordingly, FSCS is of the opinion that for occupant evacuation, this period of time provides for a reasonable degree of life safety. Note however that like a fire door, solid core doors do not offer any significant degree of smoke separation. The FSCS paper “*Modelling Smoke leakage Through Fire Doors*” provides further explanation.

Where doors are required to be smoke proof, there are a number of smoke seals available and typically FSCS recommends the use of the Lorient 1212-1515 Batwing Seal as shown in Figure 1 below. FSCS considers that a bottom seal does not offer any significant improvement of smoke sealing. Furthermore, bottom seals are prone to damage.

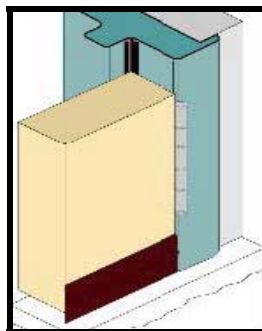


Figure 1 – Lorient 1212-1515 Batwing Seal

One issue that confuses many building owners and suppliers is that although the BCA calls for smoke doors to be installed in various occupancies such as Class 9a hospitals and Class 9c aged care facilities, there is no Australian Standard for such doors or seals. Neither has any formal marking (tagging) system been established.

## Other Uses

Other instances where solid core doors may be used is where a Fire Engineer considers that (in an Alternative Solution) a degree of protection be afforded to building occupants and / or attending fire fighters in certain building configurations. An example of these instances may be:- In occupant egress paths where frequent use would render a fire door susceptible to Frequent damage and subsequent failure. The Fire Engineer would consider the 15 minute performance of the door as being sufficient “to the degree necessary” for the protection of the building and occupants.

Where internal fire hydrants, not located in a fire isolated stair, need a degree of separation and protection from the general floor area whilst fire fighters prepare for entry; such doors can be provided with additional features such as:-

- Glazed viewing panels, usually using wired glass within a timber frame to afford the user with a view to the compartment or floor area being entered so the due care can be made upon entry.
- Smoke seals as described earlier.
- Electro-magnetic door hold open devices arranged so that when a fire detection or sprinkler system activates and the door is released and closes **6 #**.

**6** Note that the Fire Indicator Panel (FIP) must have sufficient / additional battery capacity to power the device for the required time. FSCS does not consider that the use of fire rated cable is warranted because the device is fail safe and will release the door on power failure.

**#** Note that the name “magnamatic” is often used for this device. That name is a registered trade mark of Fire Control Pty Ltd – now Tyco and cannot be use generically.

## Maintenance

Where solid core doors are used as part of a Deemed to satisfy (DtS) design under the BCA or as part of an Alternative Solution, they must be maintained in accordance with an appropriate Australian Standard. It should be noted that within the Australian Standard on maintenance, there is no specific section on solid core doors.

Accordingly FSCS advises that to comply with the maintenance requirements under the Building Fire safety Regulation 2008 and the Queensland Code QDC MP6.1, the doors should be treated as fire doors under AS1851 - 2012 for the purposes of maintenance, this includes the maintenance of smoke seals.

Whilst the QBSA has competency levels for maintenance technicians, there is no such competency level listed for solid core doors, accordingly FSCS considers that a licensed carpenter would be appropriate.

I trust that this paper provides appropriate and sensible advice regarding the use of solid core doors.

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