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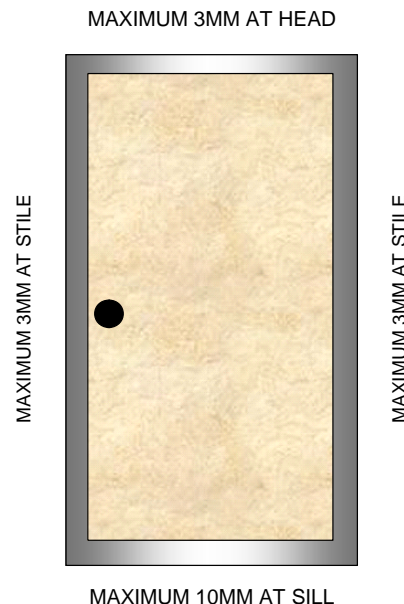
MODELLING SMOKE LEAKAGE THROUGH FIRE DOORS

Fire and Security Consulting Services is frequently asked about the rate of smoke leakage through the gaps around a fire door.

This is especially relevant where apartment entry (fire) doors open out on to stair and lift lobbies in multi-storey buildings.

The provision of smoke seals to fire doors significantly reduces smoke leakage rates into the lobby when the doors are closed. For example, "Warrington Fire Research - Fire Resistant Barriers and Structures" ^[1], Table 8.6, provides a maximum leakage rate of 308m³/h (0.085m³/s), based on a pressure differential of 75Pa. Tests carried out by Rakic at Lorient International ^[2] on doors with smoke seals fitted to door jambs, heads and sills indicate leakage rates of around 16m³/h (0.004m³/s) can be achieved at similar pressures. This indicates that a DtS design with no smoke seals fitted will permit almost 20 times the amount of smoke into an adjacent corridor than a fire door with smoke seals fitted.

As1905.1 ^[3] (The Australian Standard on Fire Doors) limits clearances between fire doors and frames to that depicted in Figure 1 below.



For a 2080 x 820 sized fire door this equates to a vent of 23,062mm². If one were to model such a vent without smoke seals it would be equated to a vertical slot 2.08m high and 11.1mm wide.

Taking the Rakic test data that a door with smoke seals passes 20 times less smoke, the equivalent vertical slot would be 2.08m high and 0.6mm wide.

- [1] Warrington Fire Research, "Fire Resistant Barriers and Structures", Building Control Commission, 2000.
- [2] R Rakic, J "The Performance of Unit Entry Doors When Exposed to Simulated Sprinkler Controlled Fires", Lorient International.
- [3] Standards Australia 1997 AS/NZS1905.1 – *Components for the protection of openings in fire-resistant walls. Part 1: Fire-resistant doorsets*, Standards Australia International, Sydney NSW Australia