

Smoke Containment in Front of Lifts

While smoke curtains and Smoke Guard smoke containment screens may seem like similar products, they are vastly different systems and ONLY ONE IS PURPOSE DESIGNED FOR LIFTS.

Smoke curtains – when deployed – are fixed on all four sides and can only be moved with power. Even on full power failure, Smoke Guard smoke containment screens can be operated without any special skills or knowledge. Simply pushing past the screen allows egress, after which, the screen reseals the smoke compartment by reconnecting to the magnetic auxiliary rails.

To see the operation of the Smoke Guard screen, please visit the links below:

Manual Egress - <https://www.youtube.com/watch?v=M13Hl4XzCOU>

Curtain Mounted Retraction Button - <https://www.youtube.com/watch?v=pb8UaU-OhvI>

While not designed for this application, there still may be some cases where smoke curtains can be used in front of a lift which is why we have their differences outlined below.

	Smoke Curtain	Smoke Guard
1. Allows lift occupant egress after full power failure	X	✓
2. Disability Discrimination Act (DDA) Compliance	X	✓
3. Minimised Maintenance	X	✓
4. Type of side guide system for the curtain	Channel	Magnetic Rail
5. Tested to AS1530.7 for smoke leakage	X	✓
6. Fixing style; Head or Face fixed headbox	✓	✓

Things to consider

- How do lift occupants egress when system is deployed?
 - Smoke curtain:
 - **With power;** wall mounted push button must be installed inside the lift recess for curtain retraction.
 - **Without power; occupants are trapped.**
 - Smoke Guard:
 - **With power;** curtain mounted push button will retract the screen, or the occupant can push past it.
 - **Without power; occupants can push past the curtain.**
- Smoke Containment:
 - Smoke curtains are smoke baffles designed to work in conjunction with smoke management systems. They are permitted to be used without side guides and have deflections up to 15 degrees from the vertical. These leakage paths are typically used as make up air paths for the mechanical services and the direction of movement of the make-up air is typically in the opposite direction to the smoke movement. Therefore, installing these smoke curtain systems over lifts doors does not prevent smoke movement at all. This is *not* smoke containment.
 - Smoke containment is typically provided by a system which is effectively sealed on all sides. A system tested in accordance with AS1530.7 must incorporate all components as it is intended to be installed in practice. While some smoke curtain manufacturers provide smoke leakage results of the fabric (termed smoke permeability when tested in accordance with EN12101.1 Annex C), this is not representative of the leakage possible through side guides, head box and bottom bar constructions. Thus, it is not a true representation of what is occurring in practice.

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- Which level do the elevators go to in the event of a fire alarm?
 - Lift occupants must be considered here i.e. if lifts move to ground floor on fire alarm, occupants must be able to egress here without the risk of entrapment.
- Do the aesthetics of the lift lobby matter?
 - Smoke Guard: magnetic grade stainless steel auxiliary rails look like the architrave face of the lift frame. The head box fully conceals the bottom of the system with no visual slots or gaps, leaving a flush finish. No access panels required for maintenance as access is provided through the door in the bottom of the box.
 - Smoke Curtain: a channel type side guide that sits 50mm+ from the wall leaves a slot in the wall. Bottom bar is typically exposed and finish is not flush with ceiling. Access panels are required for maintenance and access to external controls. The mandatory battery backup and push button for retraction inside the lift recess may not be appropriate.

Smoke Leakage Requirements

Maximum allowable leakage:

- The National Construction Code (NCC) is silent on the suitable maximum allowable smoke leakage of building elements. Specification C3.4 states that a tight fitting solid core door 35mm thick can resist 200°C for 30 minutes with smoke seals and is deemed-to-satisfy.
- Published data is available from some door seal manufacturers showing that this generic construction leaks significant amounts of smoke. That is; in excess of 15m³ per minute per m² of opening^[1]. Similarly, lift doors have been shown to leak in excess of 12m³ per minute per m² of opening^[2].
- AS6905 Smoke Doors is a product standard aimed at hinged doors, but similar principles can be applied to other products protecting openings such as Smoke Guard. This standard recognises incompatible door and seal combinations may result in higher leakage rates. Simply selecting the right combination can provide a significant improvement. Clause 2.4 shows that for a single leaf door (nominally 2040 x 820mm x35mm thick) with the correct door/seal combination the maximum allowable leakage shall not exceed 0.35 m² per minute per m² of opening.

Applying maximum allowable leakage:

- Leakage through a barrier needs to be considered for the complete system as it is to be installed. AS1530.7 provides a test method for smoke barriers such as doors, shutters and walls as they would be used in practice. This test method provides measured leakage at various temperatures and pressures that can be used to demonstrate a system is equivalent or exceeds the minimum requirements in the NCC.
- Smoke Leakage performance of a building element is affected by both temperature and pressure. Typically, temperatures and pressures in a sprinkler controlled fire are around 25Pa and 200°C and is considered medium temperature smoke. If fire performance is also required, Fyrehalt can also be used in this application to provide a 2-hour fire rating (-/120/-) as well as smoke containment.
- Lift doors opening into a fire isolated stair for example would require a lower smoke leakage rate than that of other applications. This is due to the volume that the smoke is leaking into being relatively small, and as such, may directly affect the ability of occupants to egress the building safely. A maximum allowable smoke leakage rate of less than 0.3m³/min/m², when measured at 200°C and 25Pa in accordance with AS1530.7, may be suitable in this application. This can be achieved by products such as Smoke Guard, Smokehalt and Fyrehalt.
- Lift doors in a basement car park preventing smoke from entering upper levels through a relatively larger volume may not adversely affect egress of occupants. In this instance, a maximum allowable leakage of less than 1m³/min/m² when measured at 200°C and 25Pa in accordance with AS1530.7, may be suitable. This can also be achieved by products such as Smoke Guard, Smokehalt and Fyrehalt when tested in accordance with AS1530.7.

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- These smoke leakage rates better the minimum NCC requirements for smoke doors by a factor in excess of 40 times.
- In comparison, other developed nations have regulated the maximum allowable leakage rate of building elements intended to be used for smoke containment at $0.91\text{m}^3/\text{min}/\text{m}^2$ by NFPA 105.

References:

[1] Report of the Performance of a Solid Core Timber Door in a Fire Test using a Standard Heating Regime, J.P. England and S.A. Young, Warrington Fire Research, 1999

[2] Analysis of Smoke Movement in a Building via Elevator Shafts, Hughes Associates Inc, Beitel *et al*, 2000