

Disasters like the Grenfell Tower fire that killed dozens of people in London in 2017 are tragic reminders of how important it is to design buildings so that they not only stop fire from propagating but also protect against smoke spreading, for example through lift shafts.

Although smokeproof lift doors are often specified in tender documents, there are a number of reasons why it is simply not possible to make smoke-resistant doors for lifts.

It is not possible to construct smokeproof lift doors

This has first of all to do with the door's construction: a lift door consists of components that are designed to move towards each other, while at the same time satisfying the requirements of performance, speed, noise reduction and low-energy consumption.

Then there are regulatory stipulations that prohibit the production of a smokeproof door. Naturally, everyone expects smokeproof lift doors to be fireproof. The required fire resistance class is attained by ensuring compliance with EN 81-58 or ISO 3008. However, such standards provide for a leak rate of $\leq 3.0 \text{ m}^3$ per minute per metre of door length, which eliminates the possibility of designing a smokeproof door.

Theoretically, it should be possible to seal a fire-tested door retrospectively using appropriate materials. However,

this too is not permissible, as the additional sealing materials would increase the fire load on the door, which in turn would render the fire certification according to EN 81-58 null and void. In addition, there is the question of how to certify a modification of this nature and how to ensure and demonstrate its ongoing functionality.

The solution – sealing off the lift floor by floor

There is only one way of achieving a smoke seal for a landing door, and this is to combine the door with a smokeproof product that does not affect the criteria for its fire certification. The innovative component manufacturer, Meiller Aufzugtüren from Munich, has come up with such a solution. A lift door that has undergone fire testing in accordance with EN 81-58 is combined with a special smoke curtain made by a reputable manufacturer. This combination has been tested by an accredited fire testing institute that has confirmed that installing the smoke curtain to a fire-tested landing door does not impair its fire resistance in any way. In practice, there are some conditions that must be satisfied when specifying an order for landing doors to be used in this way, including EvoN (niche installation), a frame width of 100 mm, and others. Meiller can then prepare the door frame as required for the smoke curtain installation. The curtain itself is installed to the frame of the landing

door at the construction site. The retractor box is mounted on the upper frame element along the entire width of the door, and guide rails, enclosed on three sides, are placed over the side sections of the frame. The box and rails can be supplied in stainless steel, K 240 brushed or with linen pattern, or RAL powder coated. To prevent smoke spreading from one storey to the next in the event of a fire, the smoke curtain unrolls in front of the landing door and shields the shaft from the landing. This gives the lift an effective smoke barrier that functions on each individual storey. By employing a universal controller for the smoke curtain (for instance a static or dynamic fire control system, a fire alarm centre, or other system), the smoke curtain can be made to activate in all manner of scenarios. The function is implemented accordingly by the lift or the controller manufacturer. A retrofit version has undergone extensive analysis. It is technically feasible, but the upper frame element must have a height of at least 210 mm, while the side frame sections require a minimum clearance of 100 mm, to enable them to accommodate the runner rails.

This combination of fire-tested landing doors with a smoke curtain represents the first such solution to enter the market, and it has been accorded utility model protection.

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