

Threshold sealing against smoke: enhancing life safety

Where are threshold seals required?

We all know that threshold seals are used to seal the gap between the bottom of the door and the floor. They are commonly used as protection against noise, cold, dust and rain, but here we want to explore their most important role: protection against smoke.

Smoke doors are normally specified to protect escape routes in the event of fire. A smoke filled corridor can make it difficult to see exits and have a disorienting effect on those trying to escape. They can also hamper rescue efforts. Threshold seals are sometimes, but not always, fitted to smoke doors. This is because, historically, smoke leakage tests have focused largely on the head and jambs of the doorset. We have written about this in more detail in our white paper, [Does legislation focus on the deadliest killer?](#)

Guidance

Current requirements for smoke leakage performance of a smoke control door assembly are laid out in Approved Document B to the England & Wales Building Regulations and also in BS 9999: 2017, which in turn also refers to the relevant parts of BS 8214: 2017 (Timber-based fire door assemblies, Code of practice).

There is a difference in requirements at the threshold between the two pieces of guidance. Approved Document B, for example, allows performance to be evaluated at head and jambs only, without any reference to smoke leakage from the threshold gap.

"When installed, the threshold gap should, where practicable, be sealed by a flexible edge or automatic drop seal...Where this is impracticable, the threshold gap **should not exceed 3mm at any point**"



BS 8214:2017, however, recommends the following:

When installed, the threshold gap should, where practicable, be sealed by a flexible edge or automatic drop seal, either with a leakage rate not exceeding 3m³/h per metre at 25 Pa when tested to BS 476-31.1 or BS 1634-3, or just contacting the floor, giving an even contact with the floor but not exhibiting significant increased frictional forces that could interfere with the closing action of the door. Where this is impracticable, the threshold gap should not exceed 3mm at any point.

The reality

Anyone in the trade will know that when turning up at an unfamiliar site, perhaps with uneven floors or floor coverings that weren't in the original spec, achieving a threshold gap of no more than 3mm is rather challenging. A quick google will tell you that there are lots of different 'in practice' recommendations out there, and the reality is that the threshold gap is often as much as 8mm.

However, as the Intumescent Fire Seals Association demonstrated when they commissioned a [series of tests](#) into smoke leakage at the threshold, even a 3mm threshold gap, difficult to achieve in itself, will allow some cold smoke to pass through the door before the intumescent fire seals kick in.



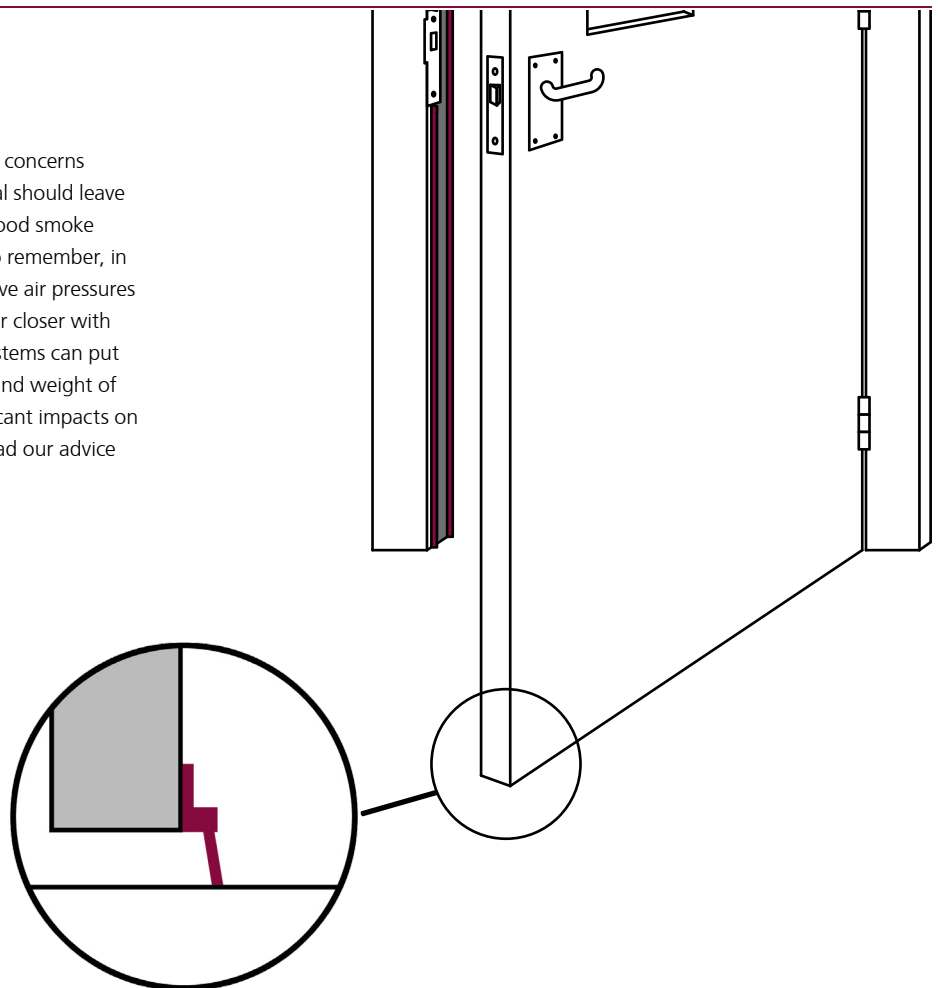
Mitigation

Threshold seals can play a vital role where there are concerns about the threshold gap. A well-fitted threshold seal should leave the threshold unhindered to traffic and provide a good smoke seal when the door is closed. An important point to remember, in areas containing smoke shaft systems where negative air pressures are likely to arise, is that it is important to use a door closer with sufficient power. Pressurisation and smoke shaft systems can put additional demands on door closers. Both the size and weight of the fire door and the closer adjustment have significant impacts on smoke system design and performance. You can read our advice on door closers with smoke shaft systems [here](#).

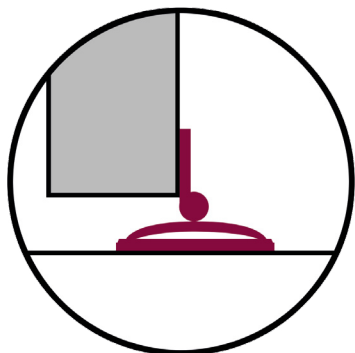
Different types of seals

Fixed seal on level floor

Here the seal remains in contact with the floor when the door opens and closes. This can cause friction if the floor rises on the opening side but is eliminated if a suitable threshold strip is fitted to the floor. The low level of invasiveness makes this seal suitable for historic! doors. It is vulnerable to damage when in use but is able to tolerate changes in gap dimensions at the time of fitting.

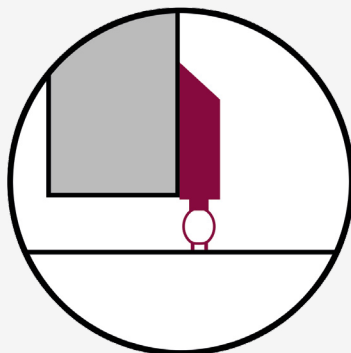


Additional seal types



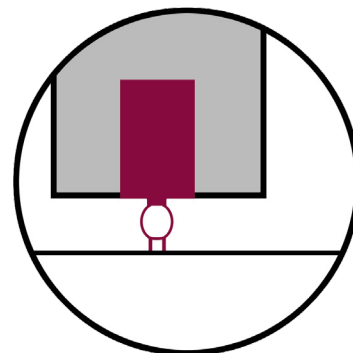
Fixed seal with threshold bar

The threshold strip allows carpet to be fitted up to it whilst the part fitted to the door swings clear of the carpet when the door opens. It is not invasive but can be conspicuous on historic doors. In hospitals, the threshold bar can be a bit like a speed bump so users will often reject this type of seal.



Face fixed self-rising threshold seal

Because this seal rises as the door opens, friction is eliminated over most of the swing, and it is self-levelling on sloping floors. Being surface mounted (face fixed) on the door leaf it can be visually obtrusive, especially in the context of historic doors. Generally robust and larger units are available that can often be used to double-up as a kickplate.



Integral drop down threshold seal

Morticed into the base of the door leaf, its central location makes this type compatible with most leaf-edge-mounted smoke seals. It is not visually obtrusive but more invasive when considering historic doors. It is less able to accommodate a varying gap across the width of the door at time of fitting, but it is self-levelling on sloping floors and less vulnerable to damage.

Conclusion

Summing up, there are a range of threshold seals for different scenarios. They're not always visually appealing or welcome but they are an essential part of preserving life safety. An integrated seal set within the door is the most inconspicuous, but adding these into the door during manufacture naturally adds more production time and cost for the door manufacturer. However, this cost should be able to be passed on, as it would save time and labour costs at the installation stage. If the floor is out of level, it is a costly job to modify the doors. And if done properly, it should involve going back to the door manufacturer to check that the doors can be modified without affecting the guarantee and fire rating/certification, which also results in delay. At the specification stage, it is worthwhile exploring these hidden costs and walking through different options if possible.

¹Existing timber heritage doors in sensitive buildings such as grade III listed.



Discuss your specific requirements with Rutland

Rutland provides specialist support with preparation for smoke, fire and security testing of doorsets and door assemblies. Please make contact if you would like to hear more about our support.

Call 01246 261491 or email sales@rutland.co.uk to start a conversation.

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