Whitepaper | November 2021

Fire doors are only effective when they are closed

Roughly 3 million new fire doors are installed per year. They are a fundamental part of a building's safety system. They prevent fire from spreading, and they protect vital escape routes such as stairs and corridors. But fire doors are only effective fire doors when they are closed. If anything impedes the closing of a fire door in the event of fire, the results can be devastating. It's only when a fire breaks out that the consequences of poorly fitted fire doors are known, so it is doubly important to get the installation of a door and all its constituent parts right, and to ensure that it is maintained that way.

Installing a fire door is a skilled job because the fitter must understand how each element affects the function of the door. Any component fixed to or interacting with a fire door plays a vital role in the way that a fire door performs its safety role. As a rule of thumb, for a door closer to reliably close a door, the door should swing closed and latch smoothly enough that you could close it with the push of a little finger. However, on site and under time pressure, that isn't always easy to achieve. In this whitepaper, we explore some measures and essential checks that should be made to ensure a fire door performs as intended.

Locks and latches

It goes without saying that locks and latches are an integral part of the doorset when fire testing. A fire door must remain closed within the frame and a latch or lock will ensure this happens. Locking systems must be set up correctly and the strike plate must be set at the right angle. The latch must fit tightly to the door, and the nib of the latch should extend at least 12mm into the latch plate to prevent the door from reopening.

The latch plays a large part in how easily the door will close to fully latched position. A radiused leading-edge latch, used in conjunction with keep plates that have a pre-formed curve provide the smoothest latching action. The round edge of the latch meeting the round of the keep-plate ensures a smooth closing function without the impediment of angles preventing closure. Our Euro Sash and Latch locks both have this easy-latch feature. These curves are especially useful when using a multi-point lock where more dynamics are involved.

Some highly respected door manufacturers do a lot of testing and learn more than others. A lot is learnt the day after fire tests looking at the charred remains of doorsets. For example door hardware with through-frame-to-structure fixings can remain intact in the frame after a fire test, whereas hardware only frame fixed may fall out the frame. This level of detail is not always picked up in certification.

Seals

Intumescent fire seals play a vital role in fire doors, by expanding and closing the gap around the edge of the door in the event of a fire, therefore restricting the passage of fire and hot smoke.

In a survey conducted by the Fire Door Inspection Scheme (FDIS)[1], **61% of fire doors inspected had fire and/or smoke seals missing, fitted incorrectly or not filling perimeter gaps correctly**. Seals must be fitted in accordance with the manufacturers' guidance. They should form a continuous seal around the edge of the door/frame. On heat activation they must be sufficient to close the gap between door and frame, but not prevent closing in normal use.

When seals are fitted during the manufacturing process, enough space should be allowed for them in the recess to the door stop. However, retro-fitted seals can often result in fire doors failing inspection because the seals simply impede closing due to a lack of space for the seal. It is necessary to properly alter the doorset (normally by adjusting the size and position of the doorstop) to allow space for a seal to ensure that it does not impede closing. While adjusting the door's position on its hinges can make space for a seal, this may then cause the door to fail inspection by causing it to sit proud of the frame by more than 3mm. The fitter must double check every component when making any adjustments.

Hinges

In the FDIS's report, one in five fire doors inspected had unsuitable hinges. Hinges on fire doors must comply to annex B of the BS EN 1935 guidelines. On an FD60 fire door, the hinges must be made of steel, not steel and brass. **At least three CE marked hinges must be fitted to fire doors**. If the fire door has a back check door closer (exterior doors often have these to prevent backlash from wind), heavy duty hinges are recommended, and will need to be positioned accordingly to support the extra pressure exerted at the top of the door. Some hinges have a screw port to allow through-frame into structure fixing which helps take a lot of strain protecting the frame and hinges. Rutland recommends placing two hinges towards the top of the door. Many top door manufacturers use four hinges in set dimension and spacing taken from the door top – for example 102, 377, 967 and 1682 centres. Again, this is governed by what the doorset has been fire (and if appropriate PAS 24) tested with.

Door frames and storage of doors

There are other less obvious factors that may affect the correct fitting of fire doors. Door manufacturers will always advise that fire doors, indeed any doors, should be stored flat on site, not propped up against a wall, which can lead to warping of the door. This leads to the fitter having to make alterations, which may affect the performance of the fire door.

Any adaptations to the door must be accompanied by written permission from the manufacturer, first of all for safety's sake, but also because the guarantee and certification may become void otherwise. Before making any adaptations it is worthwhile checking that the doorframe is fitted squarely – this isn't always visible to the eye. If old fittings are not entirely removed and the doorframe is twisted, that will affect everything else.

[1] A scheme delivered by the BWF-CERTIFIRE Scheme and the Guild of Architectural Ironmongers. 677 doors were inspected at 31 sites and 2506 faults were identified.

Conclusion

The frightening reality is that badly installed fire doors might only provide 5-10 minutes of protection from smoke and fire, which is a major risk to life safety. Components used should be properly certified and suitable for the task required. They should be fitted as per the manufacturers' instructions and any alterations should be run by the manufacturer. At Rutland, we provide detailed specifications with all our products, but we also have an experienced technical team, always available to give support and advice, and we offer on-site training for teams or individuals with the optional opportunity to become an accredited door closer installer.

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.