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THE GAI GUIDE TO INTUMESCENT

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Introduction

Recent events including the tragedy at Grenfell Tower have brought an increased focus to the subject of fire doors and intumescent seals and intumescent protection for ironmongery on fire doors have recently been some of the most requested topics on the GAI Technical Helpline. This Technical Briefing will provide answers to some of our most frequently asked questions on this topic.

Why do we need intumescent fire seals?

In order to meet the performance requirements of a fire test, every fire door assembly these days must be fitted with an intumescent seal. An intumescent material expands under exposure to intense heat. It is designed to fill the normal gap between the door leaf and its frame, blocking off the supply of oxygen in this area to slow down the rate of erosion and charring of the timber.

Does simply adding intumescent seal to a door make it in to a fire door?

Definitely not! A fire door must be a fully tested door construction with all the appropriate fire test evidence. Retrofitting intumescent on to a door blank will not automatically make it a fire door.

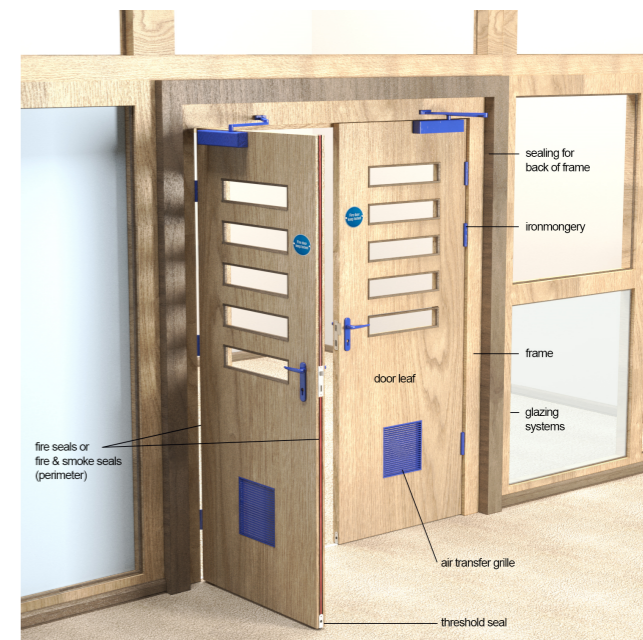


Where should the fire seals be located?

Wherever possible, the seal should be fitted in the door frame, rather than the door leaf. This is because the door leaf may need to be adjusted when it is being installed to achieve the required fit and clearance gaps. Fitting the seal in the frame means the door can be adjusted without needing to remove and re-fit the seal.

Will a standard intumescent fire seal provide smoke protection?

No. if an additional smoke seal is not installed then a large amount of smoke will pass through the perimeter door gaps. The conventional door stop on a fire door is inadequate as a smoke barrier. A threshold seal should also be considered on a fire and smoke door if there is a gap of more than 3mm at the threshold. (This is a recommendation of BS 9999 and BS 8214).



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Can I substitute a different intumescent material to that which has been fire tested?

Put simply, no. Because there are different activation temperatures and different pressures and degrees of expansion, you should only use the same type of material as that which was tested. Using a different seal could have serious consequences on the door's fire performance. For example, if the wrong seal is used down the meeting stiles of a pair of doors it can expand with such force that the door leaves can be pushed open. That said, intumescent seals in third party accredited schemes (such as Certifire) are warranted for fire doors of certain types and dimensions. From this data, you could identify seals from different manufacturers which would be suitable for a specific application. Using this method, the seal you select should support the door's fire performance.

Do all intumescent materials activate at the same temperature?

No. There are three types of intumescent material which are used as door seals; Exfoliating Graphite, Mono-ammonium Phosphate and Hydrated Sodium Silicate. These all activate at different temperatures, therefore only the same material that was used in the actual fire test should be fitted. The intumescent activating too early or too late is likely to compromise the test evidence for the fire door.

Which products on a fire door will need to have additional intumescent protection?

The essential ironmongery often needs to have additional intumescent protection. This means hinges, lockcases and concealed self-closing devices which are all critical to the operation of a fire door, especially under fire exposure. Intumescent pads can protect hinge positions and various thicknesses are available e.g. 0.5 mm, 1 mm and 2 mm, all of which will offer protection to a greater or lesser degree. Likewise, mortise lockcases and strikes, and concealed self-closing devices often need to be protected by intumescent gaskets of the correct material and dimension.

Do I always need intumescent protection for these areas?

This is one of the most frequently asked questions with regards to intumescent protection and the answer is – not always. There are occasions when a door assembly will pass a fire test without using additional intumescent protection. It is therefore vital that the test evidence is checked with the door manufacturer. It is also essential that when supplying intumescent pads or gaskets, that the same material and thickness of intumescent as that tested on a fire door is used.

How do you find out what size and type of intumescent seal should be supplied for a fire door blank?

You must find out from the door blank manufacturer or the test evidence/door data sheet what size and type of intumescent seal was used for the fire test. Supplying anything else will nullify the test evidence, and quite possibly the fire door's performance, unless the substitution has been authorised by a qualified expert, e.g. UKAS approved test house.

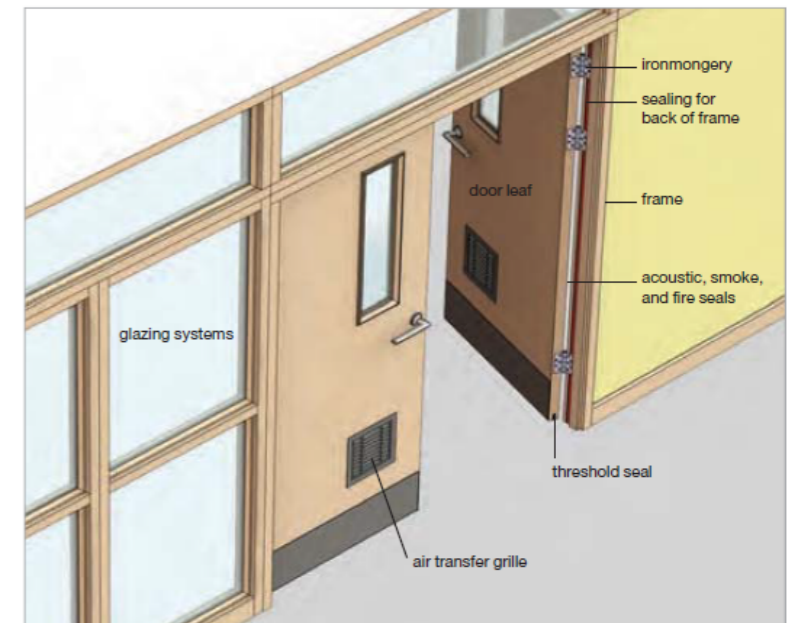


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Approved Document M (Access to and use of buildings) says that doors need to be easy for everyone to use. Which intumescent products should I choose?

Leading brands have been designed with ease of access in mind, and the recommended seals would provide exceptionally low frictional resistance to ensure the seal interferes as little as possible with the smooth operation of the doorset.

For a combined acoustic, smoke and fire sealing solution, choose a one-seal solution, which carries acoustic test evidence and third party accreditation for fire. Remember that brush-style fire & smoke intumescent seals provide very high levels of frictional resistance, so won't be suitable.

It's vital to have a seal at the threshold for effective acoustic and smoke containment, and good automatic threshold drop seals have been designed with high efficiency mechanisms, so doors can be opened with the minimum of effort. Acoustic efficiency can be improved through the use of threshold plates, to remove floor level irregularities, but these may have an impact upon ease of access. There's also a number of threshold ramps available for situations where different floor levels need to be accommodated.

Approved Document M also details the recommended opening and closing forces clearly, which makes the selection of the door closer and its adjustment absolutely critical. Therefore the careful selection of the perimeter seal is vital in order to reduce the potential friction that the door closer encounters in the final moments of latching the door shut – as friction must be eliminated or at least minimised, at all costs.



What are the factors which should be considered when choosing a specific type or size of intumescent strip for a fire and smoke door?

- The fire resistance required (e.g. half or one hour)
- The type of door (e.g. single or double-leaf)
- The meeting stile detail if pairs of doors are involved. Plain meeting stile seals are fitted differently from those for rebated meeting stiles.

I also require acoustic as well as fire and smoke protection on a door assembly. Is this possible?

- Performance claims for intumescent material should be carefully checked.
- Valid documentary evidence must underpin any recommendation
- Is the material offered as described on the test document – it might look similar but is it the same?
- Are the tests/assessments in date? (Test and assessments have time limits on their validity. These are recorded on the documents).



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What should I specifically look out for regarding intumescent materials?

- Performance claims for intumescent material should be carefully checked.
- Valid documentary evidence must underpin any recommendation
- Is the material offered as described on the test document – it might look similar but is it the same?
- Are the tests/assessments in date? (Test and assessments have time limits on their validity. These are recorded on the documents).

Can you paint over fire and smoke seals?

Over-painting of intumescent seals would not compromise performance in a fire situation. However, the flexible elements of smoke seals should not be painted over as this will certainly compromise smoke containment performance. If the smoke seal part of the seal has already been painted over, it should be replaced immediately.

I need to put a letterplate into my fire rated door – but the door needs to provide acoustic performance too. Can this be done?

A number of brands have carried out comprehensive acoustic testing with their fire rated letterplates. Once again – make sure you look closely at the test evidence.



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What are the relevant standards and regulations which relate to fire and smoke containment?

- Approved Document B (England and Wales)
- Technical Booklet E (Northern Ireland)
- Technical Handbook Section 2 (Scotland)
- Technical Guidance Document B (Republic of Ireland)
- Regulatory Reform (Fire Safety) Order 2005 (England and Wales)
- BS 476-31.1: 1983: Methods for measuring smoke penetration through doorset and shutter assemblies
- BS 476-22: 1987: Methods for determination of the fire resistance of non-loadbearing elements of construction
- BS EN 1634-1: 2014+A1:2018: Fire resistance and smoke control tests for door, shutter and, openable window assemblies and elements of building hardware. Fire resistance tests for doors, shutters and openable window
- BS EN 1634-3: 2004: Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware. Smoke control test for door and shutter assemblies
- BS 8214: 2016: Code of practice for timber-based fire door assemblies
- BS 9999: 2017: Code of practice for fire safety in the design, management and use of buildings



Glossary of terms:

Acoustic Seal: A seal with an integral flexible gasket, normally fitted on all four sides of a door, designed to reduce airborne sound transmission.

ADE : Approved Document E - Approved Document E to the Building Regulations [England] - Resistance to the passage of sound.

ADM: Approved Document M - Approved Document M to the Building Regulations [England] - Access to and use of buildings.

Decibel - dB - Unit of sound pressure measurement, generally relating to a reduction in value from one location to another.

Intumescent – A material which does not immediately melt on exposure to elevated temperature but first expands to a cellular structure many times its original volume, sometimes accompanied by pressure development.

Intumescent fire and smoke seal: A combined seal designed to enhance the performance of a fire and smoke door assembly, generally by virtue of an intumescent core in the seal profile along with a flexible smoke sealing element (fin or brush).



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Further Advice

The GAI continually keep its membership up to date through Technical Briefings and Guides to Standards, all of which can be downloaded from the members section of the GAI website. The GAI Guides to EN 1154 and EN 1155 would be of particular note on this topic, as would the Technical Briefing 15 on Door Closing devices and access requirements.

Where can I get further information?

If you have any further questions then please contact:
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