

# FIRE FACTS



A comprehensive guide to the installation  
of JELD-WEN Doors

**JELD-WEN**<sup>®</sup>  
WINDOWS & DOORS

# Improving Fire Safety

JELD-WEN manufacture and supply a range of internal & external fire doors.

All JELD-WEN fire doors have been carefully designed to provide the appropriate level of fire resistance in the most cost-effective and high quality package possible.

Extensive fire resistance testing and engineering analysis has proven that they are able to perform as claimed. Their performance can, however, be reduced to a fraction of their potential if they are incorrectly installed.

It is for this reason that JELD-WEN have produced this booklet of FIREFACTS to help the specifier or installer of our doorsets to get the most out of their chosen product, safeguarding the public in their homes, at work or at leisure.

JELD-WEN fire doors are manufactured in accordance with the BWF Certifire Firedoor and Doorset Scheme.

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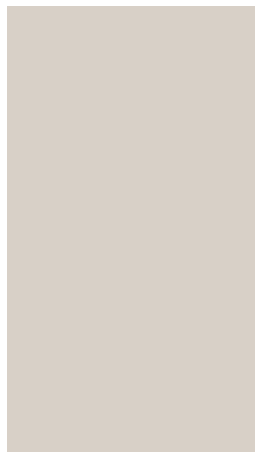
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# Introduction to fire restricting doorsets

**This Firefacts section gives general details on the requirements for fire resisting doorsets, and explains some of the terms that may be encountered when dealing with these products.**

## Fire Doors - Why Do We Need Them?

The concept of keeping the occupants of some domestic and most commercial buildings safe in case of fire relies upon separating whole buildings into smaller 'compartments', thereby keeping the fire in the compartment where it starts, and/or by creating safe, fire protected routes to aid escape. This is done by making the walls, ceiling etc. of that compartment or escape route 'fire resisting'. Of course, as people go about their day-to-day business they will want to pass from one compartment to the other - hence the need for fire doors. It is obvious that, for fire safety to be maintained, these doorsets must have the same fire resistance as the rest of the compartment or escape route. For most buildings the fire resistance requirements for the doorsets will be stated in the appropriate National Building Regulations (for instance, in England and Wales, the Building Regulations Approved Document B, current edition issued in July 2000), Plus the European supplement, although in certain cases other regulations or requirements may apply.

## What is 'Fire Resistance'?

The fire resistance of a doorset is specified in terms of minutes, normally expressed as two separate figures. One figure is the time for which, in a fire resistance test, the doorset would hold back the passage of flames and hot gases ('integrity'), the other being the time for which the door face that is not exposed to the fire would keep its temperature below a specified value ('insulation'). None of the common regulations require the insulation criterion to be satisfied by doorsets. Doors are fire resistance tested by installing complete doorsets (doors and frames, capable of normal operation) into a wall (normally masonry or timber stud partition) forming one side of a furnace chamber. The furnace is lit, and its temperature is carefully controlled to comply with the requirements of the British Standard test

method. The temperature reaches around 850°C in a half-hour test, and 950°C (or about 4 times as hot as a domestic oven) in a one-hour test. The testing laboratory will issue a test report, with details of the door construction tested and the test results. It will also state the standard to which the doors have been tested (currently BS476: Part 22: 1987, but up until 1988 BS476: Part 8: 1972 was used)



These documents are often referred to as 'certificates', when requested by Building Control or Fire Officers. Fire test reports strictly only cover the exact specimens that were tested and it is, of course, impractical to test all shapes, sizes and types or doorset that are to be sold. JELD-WEN UK have, after undertaking an extensive test programme, asked qualified independent fire safety engineers to analyse our test results, and then produce a 'Certificate Of Approval' that fully supports the full range of doors that we offer in our catalogue.

## The Fire Resisting Doorset

All fire doors are tested as 'doorsets' - i.e. the door leaf itself plus frame and all the ironmongery essential for it to work normally - usually hinges, door closer and possibly a latch. It is important to realise that a fire door leaf on its own - no matter how well made - cannot be expected to provide its full fire resistance performance unless it is properly installed. This will usually require it being hung on hinges that will provide enough support, that will not melt or transmit too much heat through the leaf, in a frame which is of the appropriate good quality timber, using the appropriate edge protection to the leaf in the form of intumescent strips. All JELD-WEN fire doors have proven levels of fire resistance performance, but this performance can be reduced to a fraction of its potential if any or all of the above components are inadequate.

## The Smoke Control Doorset

Many doors are also required to restrict the spread of cold smoke. This is designated by the suffix 'D4S'D5 after the fire door rating of 30 or 60 minutes. Such doorsets must not allow an air leakage of more than 3m<sup>3</sup>/hr/metre run of leaf perimeter (excluding the bottom edge) through the door assembly, if tested to BS 476: Part 31.1. or BS EN1634-3. If all other gaps are well sealed (e.g. glazing, letter plates and other openings), then it is generally accepted that the fitting of a tested smoke seal is adequate. Such seals must, however, fill the door edge gap by making contact with the opposing face of the leaf or frame, and must be fitted in total accordance with the manufacturer's instructions. For further information refer to 'Firefact section 6'. In addition to the information in our 'Firefacts' sections, JELD-WEN UK strongly recommend that anyone regularly involved with the selection and/or installation of fire doors should obtain a copy of the British Standard BS 8214: 1990, "Code of practice for Fire door Assemblies with non-metallic leaves" This is available from BSI on 0208 9967000. This Standard gives detailed information on all aspects of the fire resistance performance of timber door leaves, much of which can only be touched upon in these 'Firefacts' sections.

## Glossary of terms

The following are terms that may be encountered in association with fire resisting timber doors:

**BS476: Part 22: 1987 or BSEN1634-1** are the current British Standard for the fire resistance testing of doorsets. These complete doorsets can be tested to these standards.

**INTEGRITY.** The prevention of passage of flames and hot gases from the fire exposed face of a construction to the non fire exposed face. Rating is given in minutes to BS476: Part 22 or BSEN1634-1

**INSULATION.** The ability of a construction to resist the transmission of heat from its fire exposed face to its non fire exposed face. Rating is given in minutes to BS476: Part 22 or BSEN1634-1.

**IRONMONGERY COMPONENTS**, usually made of metal, fitted to allow the operation of doors. For fire doors, it is commonly split into 'essential' and 'non-essential' ironmongery. Essential ironmongery items are vital to the fire resistance performance of a fire door assembly (e.g. hinges, closers on non-latched doors). All other items are non-essential.

A brief description of some common items of ironmongery are shown in Table A overleaf.

**FIRE DOOR ASSEMBLY.** A complete doorset fixed into an opening in a suitably fire resisting wall, that would meet the relevant test criteria (normally integrity) for a specified time, if tested to BS476: Part 22: 1987 BSEN1634-1

**DOORSET.** A complete door assembly, including hinges, frame, door leaf and intumescent strips (if FD30 or FD60).

**FIRE CHECK DOOR.** An outdated term referring to a doorset that, when tested to BS476: Part 8, achieved stability and integrity ratings of 30 minutes and 20 minutes, or 60 minutes and 45 minutes respectively. This term should no longer be used.

**CERTIFIRE** The BWF Certifire Scheme provides a rigorous and comprehensive third party certification of fire doors and fire door assemblies.

**INTUMESCENT STRIP.** A strip of noncombustable material, often encased in a plastic sleeve, which is installed in the edge of a leaf or in a frame reveal around a fire resisting door leaf. Strips are not normally fitted to the bottom edges of door leaves. When exposed to heat (from a fire) the strip swells up, sealing the gaps around the leaf and helping to hold it into the frame. There are various types of intumescent strip sold, each of which has its own characteristics when it activates. Substitution of one type of strip for another should not be undertaken without expert advice.

**SINGLE ACTION** Doors or Doorsets where the leaf (or leaves) open in one direction only. Often called single swing doorsets. Double action (or double swing) doorsets open in both directions, and are often used in cross-corridor situations.

**FD (30 OR 60).** 'FD' stands for 'Fire Door', and normally ,means a fire resisting doorset that would achieve an integrity rating of the following number (e.g. FD30 -30 minutes integrity).

**FD30S FIRE DOORS.** An 'S' after the number (e.g. FD30S) signifies that the doorset must seal against the passage of 'cold' smoke as well as fire (to BS476: Part 31.1).

**FD20 FIRE DOORS.** BWF research revealed that more confusion was associated with FD20 doors than almost any other matter related to fire doors. Although some fire door designs with NO intumescent seals provide a 20 minute rating under laboratory conditions, it is difficult to meet the very precise door frame / leaf gap tolerance on site. In the interest of simplicity and to avoid risk to life and property, FD20 doors are not available under the BWF-CERTIFIRE scheme.

### SUGGESTED FURTHER READING

'What you need to know to meet the new Building Regulations - Fire Doors' published by the British Woodworking Federation Tel: 0207 6078 5050

British Standard BS 8214: 1990, "Code of practice for Fire door Assemblies with non-metallic leaves" This standard gives detailed guidance on the selection, specification and installation of fire resisting doorsets. Available from: BSI, Chiswick, London, (0208 996 7000).

IFSA Information Section No. 1 "Guide to the use of smoke seals in doorsets". Available from: The Intumescent Fire Seals Association, 20 Park Street, Princes Risborough (01844 275500).

GGF The Physical Environment "Fire Resistant Glazing"- Section 2. Available from the Glass and Glazing Federation 44-48 Borough High Street London SE1 1XB (0207 403 7177).

IFSA Information Section No. 3 "The role of intumescent materials in the design and manufacture of timber based fire resisting doorsets" Available from the address above.

The Association of Builders Hardware Manufacturers Code of Practice "Hardware essential to the optimum performance of fire-resisting timber doorsets". Issued by the: ABHM (01827 52337).

The Guild of Architectural Ironmongers "Code of Practice for architectural ironmongery suitable for use on fire resisting self-closing timber and emergency exit doors" Issued by the: GAI (0207 790 3431)

### THIRD PARTY CERTIFICATION

The Building Regulations Approved Document B July 2000 edition makes reference to 'third party accredited product conformity certification schemes'. The British Woodworking Federation "Certifire' scheme is such a scheme.

### SUMMARY

- 1) In order for a fire door to work properly in a fire, it must be installed carefully, using the appropriate additional components.
- 2) BS 8214: 1990 is the "Code of practice for fire door assemblies with non-metallic leaves", and it is recommended that regular installers or specifiers of fire doors obtain a copy of this document.
- 3) Installing a fire door is not a job for the joinery novice.
- 4) Further information on intumescent strips, glazing, ironmongery and the installation of our fire doors is covered in 'Firefacts' sections 2 to 5 contained in this booklet.

## Common items of ironmongery

1) HINGES (SOMETIMES CALLED 'BUTTS') COMPLYING WITH BSEN 1935/ CE MARKED	Familiar items fitted to the vast majority of doorsets. Those for use on fire doors should be made of metal, with a melting point greater than 800°C. The use of rising butt or spring hinges are not permitted.
2) MORTICE LATCHES COMPLYING WITH BS 7352	Latches having a square or rectangular case, fully enclosed in a mortice cut from the edge of the door leaf. Latches hold a door closed, and may or may not be 'lockable'.
3) TUBULAR MORTICE LATCHES COMPLYING WITH BS 7352	Latches having a tubular body, normally less than 20mm diameter, wholly enclosed in a hole drilled in the door edge. Similar action to mortice latches.
4) KNOBSETS	Latches and knobs having an integral mechanism, the majority of which is contained in a relatively large diameter through-hole bored in the face of the leaf. They often have a locking facility, and a latch mechanism in the door edge similar to, but smaller than, a tubular mortice latch.
5) DEADBOLT	A locking mechanism, normally operated by a removable key. May be similar in appearance and installation to 1) to 3) above.
6) FACE-FIXED OVERHEAD CLOSER CE MARKED	A mechanism, fixed to the face of the door or frame at the top of the doorset, which automatically and in a controlled manner fully closes the door leaf from an open position, usually using the power of a spring under hydraulic control.
7) CONCEALED DOOR CLOSERS	A mechanism, fully concealed in the door leaf, which uses a spring to close the door from its open position. It may include hydraulic control.
8) BOLTS	Devices that are normally manually operated, and which mechanically hold the door leaf to the frame at their point of fitting; are normally surface fixed barrel bolts or projecting arm slide bolts.
9) LETTER PLATES	Commonly referred to as 'letter boxes', these devices use spring or gravity operated flaps to close off openings on door leaves through which newspapers, letters, etc. can pass.
10) SECURITY VIEWERS	A small tubular lens assembly that allows a person on one side of a door to see a distorted view of persons/objects on the other side of the door. Made of metal, approximately 12mm diameter, often supplied with plastic lenses. (Firefacts section no. 4 has more details)
11) STRIKE PLATES	Metal plates into which latch bolts or dead bolts engage when the door is closed.

A wide range of 'Certifire' approved essential ironmongery items are available, listed in the Certifire directory and should be used in conjunction with 'Certifire' fire resisting timber doors. 'Certifire' Telephone: 01925 646777

# Intumescent strips

This Firefacts section gives general details about the specification and installation of intumescent strips - seals made from non-combustible materials that expand under fire conditions to stop the passage of smoke and hot gases.

These strips are normally an essential part of any timber fire door that is to provide 30 minutes fire resistance or more.

Specific information about the strips recommended for use with particular types of JELD-WEN doorsets are given in other Firefacts sections contained in this booklet.

## FIRE DOOR PERFORMANCE

The performance of any fire doorset depends on a complex interaction between its key components, and it depends on many factors, i.e. size of leaf, frame material and dimensions, method of hanging, intumescent seals, ironmongery and, where applicable, glazing. Firefacts section no. 2 deals with leaf size and intumescent's, but all of these factors are important, and are dealt with in other Firefacts sections in the range.

Further details can also be found in British Standard Codes of Practice (e.g. BS 8214: 1990, BS 5588 series), which can be obtained from BSI on 0208 996 7000.

## DOOR SIZE AND INTUMESCENT STRIPS

There are two main roles that the intumescent strips that are installed around the edge of a fire door leaf play in its fire resistance performance:

- 1) to seal the gaps that exist between the door leaf and the door frame, so that fire cannot get through, and
- 2) in order to hold the door straight and in the frame when the door closers and/or latches have stopped functioning. Any timber fire door will become slightly distorted when subjected to a fire, and the bigger the door is, the worse the distortion will be.

The sizes and type of strip that JELD-WEN fire doors have been tested with have been very carefully chosen so that they complement our

door leaves, and the substitution of other types and sizes of strip may seriously affect the fire performance. JELD-WEN UK recommend that our own intumescent strips be used with our fire doors, and that others should be substituted only if tested, assessed and are Certifire approved as being for use with our door leaves.

JELD-WEN UK recommends that, if strips other than those supplied by us are to be used, then they are obtained from a member of the Intumescent Fire Seals Association, who will advise the user on the appropriate strips(s) to use. JELD-WEN door frames are supplied pre-grooved to accommodate strips that are sufficient to protect the common applications of our doors. For double leaf FD30 doorsets, the groove in the frame head must be enlarged to accommodate a 20mm by 4mm intumescent strip. Special care must be taken when protecting the meeting stiles of double doorsets, especially if rebated, as this area of a fire door is very vulnerable to fire attack. We recommend in this case that our recommended details for this application are followed, wherever possible, to avoid a possibly serious loss of performance.

## STRIP TYPES

There are several types of material that can be used in intumescent strips, each having its own way of reacting to the fire.

Some produce a foam that becomes hard and brittle when it sets; others produce large volumes of material that gives good 'gripping' properties; whilst others produce a soft, sticky foam that is good for filling gaps. The right strip must be chosen for the right application, and it should not be assumed that all strips are interchangeable, simply based upon their exterior dimensions.

JELD-WEN intumescent strips have been carefully chosen to make the most of the performance of our door leaves, and we recommend that these be used wherever possible. If the specifier or installer wishes to use components other than those that we recommend, then it is their own responsibility to ensure that those substitutions are CERTIFIRE approved.

The use of alternatives will invalidate the BWF/CERTIFIRE accreditation.

## IDENTIFICATION BWF-CERTIFIRE LABELS

To ensure complete traceability every Fire Door installation carries a permanent and tamper evident label. The number and location of these labels are dependent upon how the door was purchased and any certified work which was carried out.

BWF Label Position Factory assembled Below bottom hinge fire doorset of doorleaf (complete with glazed aperture as appropriate Door leaf purchased Top edge of door separately Fire door frame Below bottom hinge purchased separately position on door frame With glazed aperture Top of door IN installed by BWF- ADDITION to label CERTIFIRE certificated affixed by 'prime manufacturer other fire door' than 'prime fire door' manufacturer manufacturer Fire door assembly FIRAS label is affixed installed by a FIRAS over the relevant Accredited Installer part of the BWF CERTIFIRE label UNDER NO CIRCUMSTANCES must these labels be removed or defaced during installation, decoration or use.

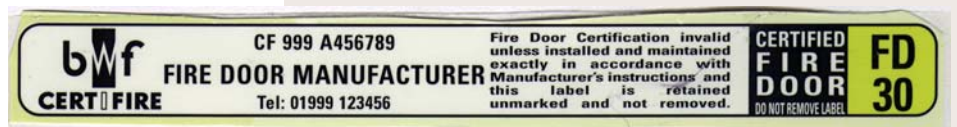
Doing so will invalidate the certification.

## POSITION

Intumescent strips should always be installed according to the manufacturers instructions. If the instructions are not followed closely, then it can be worse than putting no strips in at all.

## Intumescent strips continued

**Intumescent strips** are normally applied to the centre of the frame reveal opposite the door edge, or to the centre of the edge of the leaf itself. In no circumstances should intumescent strips be attached to the face of the stop, and strips should only be fixed away from the plane of mid-thickness in the leaf when explicitly instructed to do so by the manufacturers. Surface fixed strips (not requiring grooves) are available, but can only be used according to the manufacturers instructions - the majority of strips are designed to be grooved into the frame or leaf, and must be installed in this manner. The use of Intumescent strips other than those tested or alternatives assessed and approved by Certifire will invalidate the BWF/CERTIFIRE accreditation.



### Door Gaps

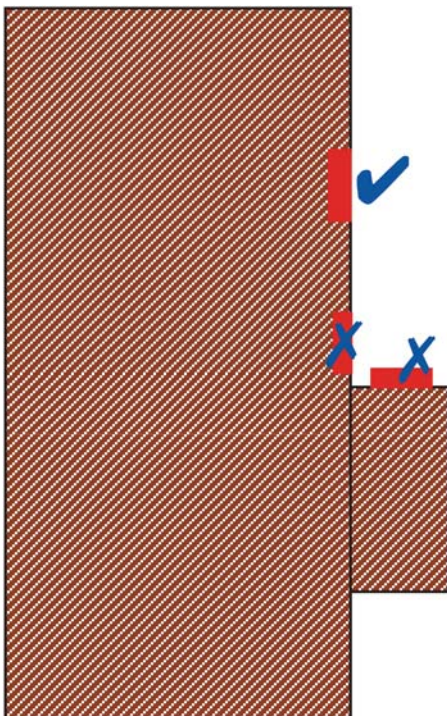
In order to maintain a fire door's performance, it is essential that the gaps between the edge of the leaf and the frame are not too large. Over-size door gaps will increase the amount that an intumescent has to expand to fill them and, if they are excessively large, serious loss of fire resistance performance may result. Ideally, the gaps around the leaves should be as uniform as possible, and installers should aim to comply as closely as possible with the following recommended dimensions:

### Stop Size

All JELD-WEN FD30 and FD60 doorsets have been tested and assessed with 12mm deep stops. Deeper stops than this are neither necessary nor desirable for adequate fire resistance performance. In the meeting stiles of double doorsets JELD-WEN UK does not support the use of 25mm deep rebates, since this detail can lead to a significant reduction in fire resistance. For detailed guidance on the position of intumescent strips, refer to the Data Sheet attached to the door leaf.

### SUMMARY

- 1) All JELD-WEN fire resisting doorsets have been tested or assessed to ensure that they perform as advertised, when installed fully in accordance with our recommendations.
- 2) If the specifier or installer wishes to use components other than those that we recommend, then it is their own responsibility to ensure that those substitutions are CERTIFIRE approved. The use of alternatives will invalidate the BWF/CERTIFIRE accreditation.
- 3) In order to perform to their designed levels, fire doors must be installed with the intumescent strips properly visited, and with door leaf clearance gaps that are not excessively large.
- 4) Stops deeper than 12mm are not necessary



**FRAME JAMB AND HEAD: 1 TO 3MM**  
**MEETING STILES (DOUBLE DOORSETS): 2 TO 3 MM**

# Glazing

This Firefacts section gives general details about the specification and installation of glazed openings in our fire doors. These may be required either to comply with Building Regulations (e.g. The Approved Document Part N), for appearance or as a safety feature. Whatever their purpose, it must be remembered that they are just as much apart of the doorset as the leaf itself, and therefore any glazing undertaken on a fire door must be done with care and attention to detail. No single Fire Facts section can hope to cover all possible glass and glazing systems (intumescent's, beads etc.) that are on the UK market, so this section deals with the general principles that need to be borne in mind when specifying or undertaking this work, with specific emphasis on our own glazing systems, which we recommend be used wherever possible. The use of alternative systems may invalidate the BWF/CERTIFIRE accreditation. All JELD-WEN fire door leaves that are offered with the option of glazing have test and/or assessment evidence that fully supports the options given in our current catalogue. Where the specifier or installer of our leaves wishes to use components other than those that we recommend, then it is his responsibility to ensure that the performance of the doorset is not compromised by those components. (refer to Firefact Section 1)

## Glazing Apertures - Positions and Sizes

Glazing apertures cut in fire doors will affect the behaviour of those doors when subjected to a fire. The consequent loss of timber may increase the distortion of the leaf (all timber fire doors become distorted when subjected to fire). The amount of distortion will depend, at least in part, on the size and position of the glazed aperture. It is for this reason that any glazed timber fire door must have test evidence to show that it is able to maintain the appropriate level of fire

resistance, with significant amounts of glazing present. All JELD-WEN fire doors that are offered with the option of glazing have been successfully tested and/or assessed with glazing apertures. As with any fire door, however, the positions and sizes of these apertures must be within limits that are appropriate to the door.

Glazing apertures are only available factory cut; site cutting of apertures invalidates the BWF/CERTIFIRE accreditation, unless carried out by 'Certifire' approved companies in controlled workshop conditions, under its 3rd party certification. All our factory glazing options are fully supported by our test and assessment documentation.

NB: Glazing apertures in doors must be specified at time of order.

## Glasses

JELD-WEN UK supply and recommend Pilkington's 'Pyroshield Safety' cast or clear wired glass for use in their fire doors. If other fire resisting glazing systems are to be used, then it is the specifier's responsibility to ensure that they are Certifire approved. Alternatives may invalidate the BWF/Certifire accreditation. Test and/or assessment evidence should be sought that confirms this suitability (such evidence should be immediately and freely available). Particular caution should be taken with unwired toughened glasses - if glazed wrongly, then their fire resistance can be reduced to a few minutes. Ordinary toughened glasses in themselves must not be assumed to be fire resisting, - fire resisting toughened glasses are specialist products. More information on suitable products can be obtained from the Fire Resisting Glass and Glazed Systems Association (FRGGSA), who can be contacted on 01844275500. or Certifire, who can be contacted on 01925 646777. Glazing Beads The fire

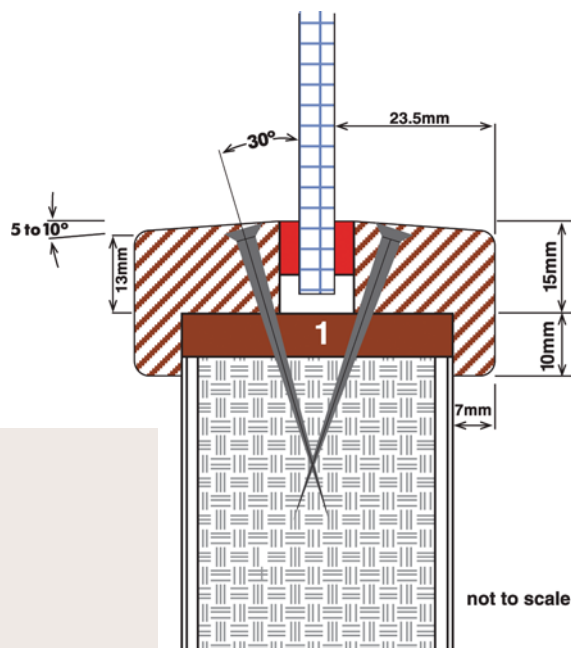
resistance of timber glazing systems relies heavily upon the size, shape and material of the glazing beads, and the method of fixing them to the door. JELD-WEN UK are able to supply a range of beads that perform satisfactorily and these must be used. JELD-WEN UK do not support the substitution of other beads for our doors or doorsets. Fixings: 38mm (minimum) pins commencing 50mm from each end and then at 150mm (maximum) centres, skewed at 30° to the plane of the leaf, so that they cross under the glass. If glazing systems or intumescent materials other than those that we recommend are used, then the responsibility for ensuring the adequacy of those glazing systems must lie with the specifier. The diagram shows technical detail of Glazed Apertures FD 30 and is drawing no. FC700/08/A (Dec 97) issued by JELD-WEN UK Technical Department. Intumescent the variety of intumescent glazing systems claiming to be able to provide '30 (or 60) minutes fire resistance' in the UK market is vast. Whilst we do not dispute that most of these systems are, in the right circumstances, able to provide the correct level of fire resistance, we advise extreme caution in selecting your own fire resisting glazing system. Test or assessment evidence to support the system's use in flaxboard cored timber doors should be sought, and the system's use should only be considered if such evidence is available.

## Improving Glazing continued

JELD-WEN doors have undergone extensive testing using intumescent glazing systems supplied by Sealmaster and Intumescent Seals Ltd. We are therefore able to recommend the following intumescent glazing systems, for use without fire doors and glazing beads, when glazing Pyroshield Safety Glass:

FD30: For square or rectangular apertures:  
Therm-a-strip Intumescent glazing strip manufactured by Intumescent Seals Ltd. For apertures with any curved edge: Fireglaze intumescent compound supplied by Sealmaster Ltd.

FD60: For square or rectangular apertures only:  
Therm-a-glaze 60 intumescent glazing system including intumescent liner manufactured by Intumescent Seals Ltd. Certifire also have a list of intumescent seal suppliers: Certifire Telephone 01925 6467771)



### SUMMARY

1) All JELD-WEN fire resisting doorsets that are offered with glazing options have fire test or assessment evidence to support those applications.

2) JELD-WEN doors can only be ordered with factory machined glazing apertures when required.

3) The cutting of apertures into fire doors on site is not permissible and will invalidate our BWF Certifire accreditation. (see item 5)

4) JELD-WEN UK is able to supply beads, intumescent and glass to suit most applications. If other glazing components are to be used, these must be CERTIFIRE approved. Alternatives will invalidate the BWF/Certifire accreditation.

5) BWF Certifire approved manufacturers include companies that can provide a local aperture cutting and glazing service, under its 3rd Party accreditation. Any, and all, other cutting of apertures or other modification to BWF- Certifire doors will invalidate the BWF-CERTIFIRE accreditation.

# Ironmongery for fire doors

This **Firefacts** section gives guidance on the selection and fitting of items of ironmongery (latches, closers, hinges, etc.) to our door leaves, and is aimed at ensuring that the resulting doorset will perform its fire resisting function in a fire. As such it does not deal directly with the 'in-use' suitability of ironmongery, i.e. its ability to perform reliably in extended normal use. It is worth remembering, however, that a fire door will have to hold back a fire, at most, once in its lifetime, whereas it will have to perform as an ordinary door through perhaps tens or even hundreds of thousands of opening and closing cycles. We therefore recommend that you select your ironmongery with due consideration given to quality and longevity. There are various British Standards to which this performance can be claimed, some of which are listed below: Certifire also have an approved Ironmongery list which is available

BS EN1935 'Specification for strength and durability performance of metal hinges'.

BS 5872: 1990, 'Specification for locks and latches'

BS 4951: 1973, 'Specification for builders' hardware; lock and latch furniture (doors)'

The main points to consider when choosing and fitting various items of ironmongery to fire doors are discussed below

## Hinges

The incorrect choice or fitting of hinges can potentially cause many problems in a fire door. Hinges that are of a material that melts or softens in a fire can let the door 'D4drop'D5; hinges that are made of thick metal can transmit heat past the intumescent seals, causing the non-exposed face of the leaf to ignite. Hinges with very deep hinge flaps can cause the same problem. If hinges have very narrow flaps, then the timber into which they are fixed may become charred through, allowing the leaf to move. The following guidelines are given for the selection and fitting of hinges:

### Recommended Hinge

**Types:** Fixed pin, washered butt, Steel loose pin, ball bearing butt or journal supported hinges.

**Number of Hinges:** 3 (1 1/2 pairs) per leaf.

**Positions:** Centrally in leaf height, and 150mm to 250mm from the head and foot of the leaf.

**Fixings:** Steel screws, as recommended by the hinge manufacturers, but in no case smaller than No.8 (3.8mm diameter) by 32mm long. (25mm long to MDF frames)

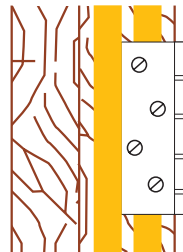
**Hinge Leaf Sizes:** 3.5mm thick (max) by 36mm (max) to 32mm (min). (These dimensions denote the amount by which the hinges are let into the leaves).

**Hinge Materials:** Brass (to BS2874), Phosphor Bronze, Steel, Stainless Steel.

**(Aluminium, Nylon or 'Mazac' are not permitted). Rising butts, non-cranked butts and spring hinges (single or double action) must not be used on our fire doors.**

On FD60 doorsets, the hinges must be installed so that a complete intumescent strip runs continuously past the hinge blade:

as shown here:



## Latches

All JELD-WEN fire door constructions have been tested both with and without latches; latches are not, therefore, necessary to ensure their fire resistance performance, so long as a suitable, tested or assessed selfclosing device is fitted. Where latches are fitted, they should be centred at mid-height ( $\pm 200$ mm), and should comply with the following specifications.

**Latch types: FD30 and FD60 leaves:**

Mortice latches, tubular mortice latches†A0

**FD30 leaves only:** Cylinder rim nightlatches, knobsets†A0

## Maximum dimensions:

**Forend plate:**

160mm high by 25mm wide

**Latch body:**

19mm wide by 120mm high\*

**Striking plate:**

160mm high by 25mm wide

\*The maximum depth of the latch body will depend on the type of doorset. Generally, bodies up to 100mm deep will be acceptable, although our solid timber doors (e.g. 2XGGF) should not have mortice's deeper than 70 mm cut in their edges. †A0A description of these items is contained in 'Firefacts' section no. 1, "Introduction and glossary of terms".

Over-morticing is to be avoided; mortices should be as tight as possible to the latch. If slight over-morticing does occur, then this must be made good with intumescent mastic. Cutting into the mid rail/stile joint of solid timber doors should be avoided, as weakening of this joint will inevitably occur.

Holes for spindles, cylinders or knobset bodies should be kept as small as is compatible with the operation of the ironmongery. The above does not exclude latches that have dimensions and/or specifications in excess of those described above, but which have been successfully fire resistance tested.

Any items which do have applicable fire resistance test or assessment evidence can be used. **NB:** Rebate conversion sets in latched, double leaf doors with rebated meeting stiles should only be used where test or assessment evidence to support the performance of these components is available.

## Ironmongery for fire doors continued

### Closers

JELD-WEN UK strongly recommend that all fire doors have a suitable self-closing device fitted, since no door will resist a fire if it is not fully closed. Some doors which are used only rarely (e.g. those to service ducts), and which are normally locked shut, may not need self-closing devices, so long as the building occupier's fire safety management plan ensures that these doorsets are kept locked when unattended. There are too many different configurations and models of door closer on the UK market for this section to cover them all.

The most common type of closer encountered will be the face-fixed overhead closer, and these should have evidence of successful fire test performance on timber doors, if their use is to be acceptable. Examples of such closers are the Briton 2000 Series, and the Dorma TS73. It is essential that the closers are of the correct power rating for the width and weight of the doorset, that they are fitted according to the manufacturer's instructions and that they are capable of fully closing the door leaf, onto its latch, if fitted, from any position. Concealed door closers are popular for basic fire door installations, but their use should be restricted to types which have Certifire approval and test evidence for the performance of these items should be available. They should be installed fully in accordance with the manufacturer's instructions, the mortice's being as tight as possible to the closer mechanism, and must include intumescent material where required. They must be adjusted and maintained so that they are able to reliably close the door leaf over its latch, if fitted.

### Bolts

Bolts may be necessary on double doorsets, especially those with rebated meeting stiles. They must be face-fixed; JELD-WEN UK do not support the practice of edge-fixing flush bolts in their leaves. Projecting slide bolts and barrel bolts are to be preferred to lever-action flush bolts, since they require little (if any) removal of timber from the face of the leaf. Bolted leaves should still have a self-closing device attached.

### Other Items: Letter plates:

Intumescent letter plates providing both 30 minutes and 60 minutes fire protection in compatible leaves are available from several manufacturers. The manufacturer's instructions on the installation of these items must be followed exactly. Details of the manufacturers that have suitable items can be obtained from the [Intumescent Fire Seals Association](#) on 01844 275500.

**NB:** If it is required to install a letter plate in one of our paneled doors, then this must be specified at time of order, since it may be necessary to slightly modify the door construction to accommodate it.

**Push Plates, Kick Plates, etc:** These may be surface-fixed to any of our doorsets.

**Pull Handles:** These may be fixed to our doorsets, provided that they are not more than 500mm long. Pull handles that are fixed through the leaf should use clearance holes drilled as small as possible.

### Security Viewers

These may be fixed into our FD30 doorsets only. Both our flush and paneled doors have been tested with 'Chubb' and 'Abus' plastic lens viewers. The maximum through-hole clearance for these items is to be 1mm overall.

### SUMMARY

- 1) JELD-WEN UK strongly recommend that all fire doors in normal use should have a self-closing device. The face-fixed overhead closer is preferred.
- 2) Door closing devices for use on fire doors should have fire resistance test or assessment evidence to support their performance on timber fire doors.
- 3) The installation of latches on our doors should comply with the recommendations in this "D4Firefacts"D5 section. Where the latch dimensions exceed those specified above, then the manufacturer's advice on additional intumescent protection required should be sought.
- 4) Where ironmongery has to be morticed into fire doors, then as little timber as possible should be removed. Intumescent mastic may be applied to rectify any slight over-morticing.

## How to install a JELD-WEN fire door

This Firefacts section gives guidance on the installation of our fire door leaves, including frame selection, ironmongery and intumescent strip fitting, and fire stopping around the back of the frame. Only brief information on the selection of ironmongery and intumescent strips will be given, since these are dealt with in detail in other 'Firefacts' sections in the series. JELD-WEN UK strongly recommend that anyone involved with the selection or installation of fire doors on a regular basis should obtain a copy of BS8214: 1990, "Code of practice for Fire door Assemblies with non-metallic leaves". (available from BSI on 0208 996 7000). That document gives much useful information on all aspects of the fire resistance performance of timber door leaves, which can only be touched upon in this 'Firefacts' section. This section will, therefore, deal with the installation of the more common fire door configurations: Single and Double Leaf timber doors in timber frames in masonry or timber stud partitions.

### Installation

The correct installation of fire doors and doorsets is fundamental to the overall performance they will achieve in the event of a fire and should only be carried out by competent and experienced professionals. To ensure correct installation is carried out, the BWF has formed an association with FIRAS to develop an Accredited Fire Door Installer Scheme. This now ensures that fire door installations are carried out safely and correctly, ensuring thorough compliance with the new Building Regulations - Approved Document B.

These new Building Regulations will quickly bring the UK into line with practically every other Western developed country. Third party certification will ensure that all the elements of a fire door assembly are compatible, eliminating the need for any trimming of the door to fit the frame.

UNDER NO CIRCUMSTANCES must the fire door leaf be cut to fit under a staircase, angled ceiling or into an existing frame. If such a fire door is required, contact the BWF-CERTIFIRE Manufacturers who provide bespoke fire doors.

### JELD-WEN Door Frames

JELD-WEN UK is able to provide door frames for both FD30 and FD60 doorsets (softwood or hardwood for FD30, hardwood only for FD60 doors). All frames and linings are pre-grooved for our standard intumescent strip detail (1 No. 15mm by 4mm strip for FD30 doors and 2 No. 15mm by 4mm for FD60 doors). FD30 double leaves require the groove to be enlarged for a 20mm by 4mm intumescent strip in the frame head. FDO MDF Minimum density 70kg/m<sup>3</sup> minimum dimensions 70mm x30mm plus 12mm stop.

### Other Door Frames

If manufacturing your own frames, then the following specifications should be used, wherever possible:

**FD30:** Softwood or hardwood, minimum density 510 kg/m<sup>3</sup>. Timber must be free of splits, shakes, checks, cup or twist. Sound knots are permitted. Moisture content should be 12 ± 2%. Minimum dimensions 70mm by 30mm.

**FD60:** Hardwood, minimum density 630 kg/m<sup>3</sup>. Timber must be free of knots, splits, shakes, checks, cup and twist. Timber should also have a slope of grain better than 1:15. Moisture content should be 12 ± 2%. Minimum timber dimensions 85mm by 41mm.

Stops need be no larger than 12mm and may be wrought from solid, pinned and glued or pinned only. The thickness of timber in the frame must not be reduced to less than the above (not including the grooves for the intumescent strips).

The door frame must be constructed to give a clearance of 3 ± 1mm all round the head and long edges of the door leaves (including the meeting edges of double doors), and 8mm or less at the foot. The head may be fixed to the jambs using a screwed or nailed mortice and tenon or half-lapped joint. The frame should be fixed to the surrounding aperture using steel fixings at 500mm maximum centres, on both jambs. Fixing of the frame head is not necessary.

### Installing Double Doors

Double leaf doorsets are less tolerant of poor fitting than single doors, and so special care must be taken with doorsets of this configuration. Door edge gaps should be adjusted to be as near to 3mm as possible (this can be done by adjusting packing behind the frame and/or by planing the leaves). The leaves should be flush at the meeting stiles when closed.

Rebated meeting stiles are not necessary for fire resistance performance - they may in fact be less likely to perform satisfactorily. JELD-WEN doors have, however, been tested with 12mm rebated meeting stiles, both lipped and unlipped, and may therefore be supplied with meeting stiles rebated to this depth. 25mm meeting stile rebates have been shown by test to perform worse than 12mm rebates, and JELD-WEN UK do not, therefore, support the installation of our door leaves with 25mm rebated meeting stiles.

Rebate conversion sets must only be fitted if direct test evidence for their satisfactory fire resistance performance in timber doors is available.

## How to install a JELD-WEN fire door continued

### Installing the ironmongery

Our Firefacts Section no. 4 gives details on the installation of ironmongery into our doorsets and should be consulted before attempting this operation. Generally, the ironmongery must be chosen and installed carefully to ensure that the door's performance is not compromised.

**Hinges** should be positioned at mid-height and 150mm to 250mm from the head and foot of the leaf. They should be fixed to the frame and door using steel fixings no smaller than No. 8 by 32mm.

**Latches and Striking Plates** should be fitted into mortices that are as tight a fit to the ironmongery as possible - over morticing is to be avoided. The latch should be at mid-height  $\pm$  200 mm from the foot of the leaf.

**Bolts** must always be face-fixed, and do not require morticing of the leaves.

**Face-Fixed Overhead Closers** should be fitted according to the manufacturer's instruction, after the door leaf has been installed and adjusted. The closer must be capable of fully closing the leaf, over its latch, if fitted, from any position.

### Intumescent Strips and Smoke Seals

Intumescent strips should, ideally, be fitted before the door leaf is installed in the frame (especially double leaf FD30 doors, where the groove in the frame head must be enlarged to accommodate a 20mm by 4mm intumescent strip). The strips should be fitted all round the heads and jambs of the frames, unbroken except at the ironmongery positions (hinges and latches). Alternatively they may be fitted in the leaves. For FD60 leaves, the hinges must be installed so that the 15mm by 4mm strip nearest the stop runs unbroken past the hinge blade.

Where intumescent's, apart from those supplied by us are used with our doorsets, they must be CERTIFIRE approved.

Alternatives will invalidate the BWF/CERTIFIRE accreditation.

Many doors are also required to restrict the spread of cold smoke. This is designated by the suffix 'S' after the fire door rating of 30 or 60 minutes.

Such doorsets must not allow an air leakage of more than 3m<sup>3</sup>/hr/metre run of leaf perimeter (excluding the bottom edge) through the door assembly, if tested to **BS 476: Part 31.1.** or **BSEN 1634-3** If all other gaps are well sealed (e.g. glazing, letter plates and other openings), then it is generally accepted that the fitting of a tested smoke seal is adequate. Such seals must, however, fill the door edge gap by making contact with the opposing face of the leaf or frame, and must be fitted totally in accordance with the manufacturer's instructions. Only one smoke sealing strip should be installed in or opposite any door edge, as paired or opposing seals may stop the door closing properly. On the hinged edges of the doorsets on FD60 doors, where the smoke seals are integral with the intumescent strips, then the combined intumescent and smoke sealing strip must be installed nearest the stop.

### Fire Stopping Around the Frame

**BS8214: 1990** gives specific guidance on fire stopping around timber frames for both FD30 and FD60 doorsets, when installed in varying types of supporting construction. Generally speaking, however, gaps up to 10mm wide behind FD30 door frames can be protected by:

- 1) 15mm (min) thickness timber architraves, tightly fitted around both sides of the frame;
- 2) Packed mineral fibre (not glass fibre);
- 3) Complete fill of plaster or mortar;
- 4) Proprietary intumescent mastics.

For gaps larger than this, Table 2 of BS8214: 1990 should be referred to.

The same sizes of gap behind FD60 frames may be fire stopped using mineral fibre packing, plaster or mortar or proprietary intumescent mastics. For gaps larger than 10mm Table 3 of BS8214: 1990 should be referred to.

### Finishing Off the Doorset

Doorsets can be painted, varnished or stained as required without compromising fire resistance. Care must be taken, however, not to over-apply varnish or paint to glazing beads; one brush-applied top coat only should be applied. Paint or varnish should not be applied to ironmongery or over intumescent strips.

### SUMMARY

1) In order for a fire door to work properly in a fire, it must be installed carefully, so that the gaps around the leaf are not too large, and it is capable of self-closing reliably

2) Any gaps between the frame and the surrounding construction must be 'fire stopped' using appropriate fire resisting materials.

3) Self-manufactured door frames must use timber carefully selected for its quality, density and moisture content.

4) Installing a fire door is not a job for the joinery novice.

5) Further information on intumescent strips, glazing and ironmongery for our fire doors is available in 'Firefacts' sections 2 to 4, in this booklet.

# Smoke control Fire Doors

This Firefacts section gives a general description of the factors affecting a fire resisting doorset's ability to provide a smoke control function, and gives guidance upon the effective specification and installation of JELD-WEN fire door leaves in smoke control doorsets.

## Why Do We Need Smoke Control Doors?

It is a well publicised fact that most interested casualties and deaths are caused not by heat but by the toxic and suffocating effects of the smoke produced by the fire.

Anything that burns will produce gases or fumes that are toxic to some degree - poisonous substances that may or may not be visible. In addition to the toxic effects, most of the furniture and furnishings with which we fill our homes and offices will produce visible smoke when they burn, and if this smoke is allowed to enter protected escape routes it can disorientate those people trying to escape the fire, with possibly fatal consequences.

In a well-maintained building most gaps in a fire separating barrier (e.g. a wall) will be sealed, both for fire resisting purposes and to control noise, draughts etc. One area where sealing is not so readily attainable is around door leaves, which must be able to be opened and closed for the passage of persons and materials. In order to mitigate this potential weakness, National Building Regulations and Codes of Practice recommend that some doorsets shall restrict the passage of smoke (presently only smoke at 'cool', i.e. ambient temperature). Invariably fire resisting as well, these doors are normally signified by the letter 'S' after the 'FD' fire resistance rating (e.g. FD30'S - see Firefacts section no. 1)

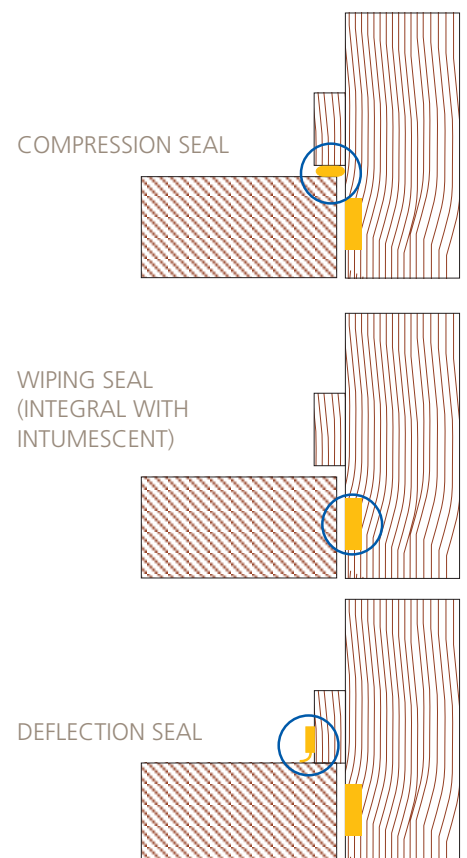
## What is a Smoke Control Door?

A smoke control doorset is a doorset whose perimeter and any other through-gaps have been sealed using an appropriate sealing system. Smoke control doors will invariably be required to be fire resisting, as well. The standard against which smoke control doorset performance is adjudged is *BS476: Part 31.1.* or *BSEN64-* This requires that a complete doorset (including ironmongery, glazing and smoke seals, as appropriate) is subjected to a pressure and leakage test. There are no pass/fail criteria in the test, but the regulations generally recommend that the doorset will have leaked no more than 3m<sup>3</sup> of air (at ambient temperature) per hour, per metre of leaf periphery (not including the threshold, which is completely sealed for test purposes), at a differential pressure of 25 Pascals (25 Pa). Although this is a tiny fraction of atmospheric pressure (which is about 100,000 Pa), it has been found that, to achieve this performance, flexible edge seals are invariably required. The inclusion of 25mm stops (traditionally thought to be of benefit to smoke control) alone make a marginal difference to smoke leakage, and, in view of their irrelevance to fire resistance performance (see Firefacts Section no. 2 - Intumescent Strips), the specification of door stops larger than 12mm is not necessary. If all other gaps (e.g. letter plates, glazing, etc.) are well sealed, then it is generally accepted that the fitting of a tested ambient temperature smoke seal in the leaf/frame gap is adequate. The seal must have been tested on leaves of the same basic construction and configuration (e.g. single swing, double swing), and must be fitted exactly in accordance with the seal manufacturer's test evidence and installation instructions.

## Types of Ambient Smoke Seals

There are two main types of this kind of seal on the market; the deflection/ compression seal and the 'wiping' seal. The characteristics of the two may be briefly described as follows:

- i) Deflection/compression seals are generally applied to the door stop, and comprise flexible blades or compressible 'beads' that contact the face of the door leaf when closed;
- ii) 'Wiping' seals are normally fitted to the door edge or in the frame opposite the door edge, and comprise flexible blades or brushes that contact the frame/door edge when it is closed.



## Smoke control Fire Doors continued

Both types of seal have advantages and disadvantages, and there may be circumstances where only one type of seal is suitable. For example, at the meeting stiles of double doors it is generally only practicable to fit wiping seals. Both the above types of seal are available as "D4 stand alone" "D5 smoke sealing solutions. The wiping type seal is, however, also widely available combined with the casing of an intumescent strip, with the obvious advantages of reduced purchase and installation costs. When choosing seals of this type, the purchaser must be mindful of all the factors that govern the selection and installation of intumescent strips themselves - our *Firefacts* section no. 2 gives more information on this.

### Choosing Smoke Seals

Smoke seals must be chosen so that they are appropriate to the doors in use; so that their architectural appearance is acceptable; and so that their installation does not interfere with the door's "D5s proper operation.

Care must be taken to ensure that any seals being considered have BS476: Part 31.1 or BSEN64-

test evidence that is appropriate to the door configuration being installed (e.g. single leaf, single action, double leaf, double action, etc.). This evidence should be freely and immediately available.

The opening and closing resistance of the seals must also be considered if proper performance of the doors is to be assessed. Blade-type seals can generate significant resistance when they contact the frame or leaf edge, especially when new, and so they must be installed precisely in accordance with the manufacturer's "D5s instructions, if interference with the door's "D5s self-closing action and/or premature wear of the seals is to be avoided. Similarly, compression type seals are capable of stopping a door self-closing if installed in gaps that are too narrow. In either case careful hanging of the door will be needed. If the fitting of the smoke seal requires the removal of timber from the frame reveal, then

the seal manufacturer's "D5s advice on any remedial measures (e.g. additional intumescent protection) should be sought.

### Installing Smoke Seals

The installation of smoke seal should not be an afterthought. Perhaps even more so than intumescent seals, smoke seals have precise requirements for proper installation, if the seal's "D5s performance is to be maximised and the operation of the door is not to be compromised. Rarely will seals work effectively if they are fitted after the door is in place in its frame. Particular care is needed with compression or deflection seals installed in the corner between the frame reveal and the stop. If significant resistance to closing is to be avoided, then a sufficient clearance between the door face and the stop to accommodate the compressed seal must be provided; this is often several millimetres. If this is not provided then difficulty in closing and/or latching may be encountered, which will often ruin the seal's "D5s smoke sealing performance, and may even reduce the doorset's "D5s fire resistance. Where "D4 wiping" "D5 seals are installed the most important dimension is that between the leaf edge and the frame (or between meeting stiles, on double doorsets). Again, the door must be hung so that the seal manufacturer's "D5s recommended gap dimensions are complied with (but these must not conflict with the gap dimensions that are recommended for intumescent strip performance; see *Firefacts* section no. 2). If using combined intumescent and smoke seals, then on FD30 doors the strip will require to be interrupted at the hinge positions, since it is installed centrally in the frame reveal. On FD60 doors two intumescent strips are required around the leaf, only one of which should be a combined intumescent/smoke seal (to avoid too much resistance to closing). On the frame jambs or leaf hanging edges this should be the strip nearest the stop, so that it can run uninterrupted past the hinges.

Seal Maintenance: In locations where doors are in frequent use smoke seals will

wear. The building occupier's "D5s fire safety management plan must ensure appropriate periodic inspection and where necessary, replacement.

### Ironmongery

It is likely that good quality ironmongery (hinges, latches, closers, etc.) will be required in order for the smoke control door to close properly. Worn or poor quality ironmongery will probably present too much resistance to closing to allow the door to operate properly. Where smoke seals are poorly installed or maintained, and this interferes with the door closing and/or latching, then it may be tempting to increase the power of the closer (where available) or to adjust its closing speed in order to get the leaf to slam shut.

This practice is strongly discouraged because:

- a) increasing the closer power may make it difficult or even impossible for children, the disabled or the elderly to open the door. In some cases this may conflict with regulations;
- b) doors that slam or are difficult to open can be a nuisance to building users. They are then more likely to prop or wedge the door open, rendering the fire and smoke control door useless;
- c) an over-powerful door closer can distort a door leaf, especially if it is held open until released by a fire alarm, or if it is (even occasionally) propped or wedged open (see point b above).

## Smoke control Fire Doors continued

### Other Considerations

Other items of ironmongery fitted to and penetrating a door can compromise smoke sealing; particularly ventilation grilles and letter plates. There are smoke resisting letter plates of proven performance currently available, so we recommend that the purchaser/installer satisfy themselves that any letter plate that they use in a smoke control door will resist leakage to the appropriate degree. This may include determining that the letter plate has some test evidence available, and using this information to determine that it, together with the door edge seals, glazing etc. will resist leakage to the recommended degree (e.g. leakage less than 3m<sup>3</sup>/hr/m of leaf periphery). Ventilation grilles with fire and/or smoke sealing properties are also available; we recommend that you contact the *Intumescent Fire Seals Association* for more details on these items (Telephone 01844 275500).

Lastly, it goes without saying that if a lot of time, effort and expense is put into making a doorset smoke resisting, it is only sensible to make sure that the surrounding joint between the building structure and the door frame is also sealed against the passage of smoke; this can be affected by the application of proprietary mastic materials, tightly fitted packing or architraves.

1) Doors that have a smoke control function can be recognised by the designation "D4S"D5 after their fire rating (e.g. FD30S)

2) Smoke resistant doorsets will require the fitment of flexible door edge seals.

3) These seals must have appropriate test evidence, to BS476: Part 31.1, BSEN1634-3 to support their use with the configuration of door being installed.

4) The strips should be installed during the manufacture and installation of the doorset.

5) After installation of the seals the door leaf should be capable of self-closing, over its latch if fitted, from any position.

6) The ironmongery and the fit of the leaf should be adjusted so that it can easily be opened or closed by any person likely to use the door (e.g. the elderly or infirm).

If in doubt about your particular application, please contact either of the Departments listed below

**BWF** Telephone 0207 608 5050

**CERTIFIRE** Telephone 01925 646777

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**Note:** Whilst every effort has been made to ensure the accuracy of the advice given JELD-WEN cannot accept liability for loss or damage arising from the use of the information supplied in this publication.

JELD-WEN reserve the right to change or amend specifications, without prior notice, in line with our policy of continual improvement to all our products



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