

# Fire Doors – Technical Guidance

## Introduction

Buildings are compartmented to delay the spread of fire from one area to another. The compartments are usually linked by doors to allow for passage of 'traffic' around the building. Doorsets have two important functions in a fire, when closed they form a barrier to fire spread and when open they provide a means of escape.

A well designed timber fire door will delay the spread of fire and smoke without causing too much hindrance to the movement of people and goods.

Different parts of a building may be separated from each other, into compartments of a fire-resisting construction. Any openings leading from them will have fire doors to maintain an effective fire barrier and should prevent excessive transmission of products of combustion which can interfere with the safe use of escape routes.

Every fire door is therefore required to act as a barrier to the passage of smoke and fire to varying degrees dependent upon its location in a building and the fire hazard associated with the building. Consequently the function of a fire door is to provide adequate resistance to the passage of smoke and other combustion products during the early stages of a fire.

A secondly function is to provide a barrier to a well-developed fire without permitting fire and excessive quantities of smoke to pass. Some doors may be required to fulfil only the first function as they may not be subjected to the full severity of a fire because of their location; others may have the main aim of resisting fire penetration as indicated by the second function. Some may have to meet both requirements.

At present, fire doors are specified as smoke-stop doors when required to fulfil the first function and fire-check and fire-resisting doors to fulfil the second.

## Specifications of timber fire doors

The performance of timber doors is judged by subjecting them to the standard test procedure specified in BS 476: Part 22: 1987 or BS EN 1634-1: 2000.

Tests are made on complete door assemblies, the door and frame with all the necessary hardware. It is then fixed in a wall representing its use in practice.

By testing a door in one type of frame but then using it in another means that no guarantee can be given as to its behaviour under fire conditions. The test procedure is fully described in the Standard and consists of exposing one face of the door to heat condition expected in a fire whilst observing the door for stability and integrity.

The Standard requires the tests to be carried out with the upper part of the door under a small positive pressure, to simulate the conditions likely to occur in a fire. It also provides an objective method of establishing the loss of integrity of a door by the use of a combustible fibrous pad on the unexposed side of the door and see when it ignites.

A door should be tested from each side to establish its performance with either face exposed to fire conditions. Consequently this requires two specimens. It is reasonably assumed that all fire doors and frames manufactured to the same specification as the two specimen doors and frames will achieve the same fire resisting properties.

A technique has been developed for minimising the susceptibility of door edges to early penetration by fire. It consists of applying an intumescent strip to the edges so that a rise in temperature will cause the material to swell and close the gaps. Intumescent paints have been used but the most successful and reliable technique is the intumescent strip, about 4 mm thick by 10 mm wide, cut into a groove in the door or the frame edge. As soon as the temperature in the vicinity of the strips exceeds 200 degrees C, usually about 10-15 minutes after the start of a fire, the strip swells and seals the gaps.

One strip is adequate for a half hour fire door and for the increased protection needed with one-hour doors, two of these strips will be necessary. The intumescent material is soft and cellular in structure and will not prevent deformation of the door. There are fire resisting doors that are able to resist the passage of fire for more than 30/60 minutes but these are more likely to be used for the protection of property than for means of escape from fire.

Fire check and fire resisting doors - Door type	Integrity [1] Minutes	Stability [2] Minutes
Half-hour fire-check	20	30
Half-hour fire-resisting	30	30
One-hour fire-resisting	45	60
One-hour fire-resisting	60	60

*[1] Integrity Failure is deemed to occur when cracks or other openings exist through which flames or hot gases can pass or when flaming occurs on the unexposed face.*

*[2] Stability Failure is deemed to occur when collapse of the specimen takes place.*

## Identifying Fire Doors

Identifying fire doors is very difficult, however responsible door manufacturers label their doors. This will identify the manufacturer, the date of manufacture and the design fire rating of the door type. They may fit a colour coded plug instead, or in addition to, the label. Identification labels are usually fitted on the top or hanging edge of the door and plugs in the long edges. Hospital fire doors display a disc at the top of each face of the door showing the design fire performance. See HTM58.

It should be noted that identification marks are sometimes removed during installation, or adjustment of the assembly and may have been painted over.

All dedicated fire doors providing a half hour or greater performance will be fitted with intumescent seals. These may be encased in a PVC sheath of any colour and may also hold a blade or brush seal for smoke sealing purposes. These seals are fitted in the door leaf edges or the frame to seal the head and long edges of the assembly.

A door may be fitted with a concealed intumescent system where the long edge sealing is housed under lippings. Intumescent seals will be visible at the head of the door. Intumescent seals expand under heating to seal the gaps between the door leaf and the frame and at the meeting stiles of pairs of doors.

Doorsets using 44mm thick doors fitted with 10-15mm wide intumescent seals are likely to be FD30 doorsets.

When used with 54mm thick doors using at least 20mm width of intumescent seal, fitted as one or two strips, the design performance for this doorset is likely to be FD60.

Doorsets with a rating in excess of FD60 are rarely used on escape routes or to protect people but may be found where property protection is important e.g. data storage areas where documents cannot be removed in the event of fire. Some of these doors have the appearance of timber, but may be constructed with a mineral core. Expert assistance may be required to identify such doorsets.

You may have documentation that is supplied with the fire door giving you all the necessary information. Unfortunately there is no standard method of identifying fire doors other than insisting on written proof that a fire door meets all the necessary standards, for example a test certificate.

The woodworking association TRADA use a system called Q-Mark it uses coloured plugs inserted in the jamb of the door which indicates the type of fire door.

Q-Mark fire doors are clearly marked as such by small plastic plugs in the door leaf and/or frame, these include member details and scope of certification for verification purposes during specification, installation or at a later stage in their service life. They are only available to full members of the BM TRADA Q-Mark schemes. The plugs follow a simple colour coding system.



This information is summarised on a laminated plastic card, available free of charge from BM TRADA, contact Simon Beer (01494 569821 or sbeer@bmtrada.com).

The British Woodworking Federation (BWF) is another organisation that provides fire door ratings and the following is their system. Fire ratings for fire door assemblies are given in minutes and prefixed by the letters 'FD' i.e. FD 30 equates to a 30 minute fire door or doorset. The most commonly specified integrity levels are:

- FD30 - 30 minutes (Half Hour)
- FD60 - 60 minutes (One Hour)
- FD90 - 90 minutes (Ninety Minutes)
- FD120 - 120 minutes (Hundred and Twenty Minutes)

As part of the steps being taken by the BWF to simplify fire door identification and eliminate confusion in specification, the existing FD20 rating is no longer available.

Every BWF-Certifire Fire Door Assembly carries a permanent and tamper evident label and/or plastic plug.





The former system used by BWF is no longer used but they may be found on older installations.

B.W.F. Scheme for identification of fire resisting door leaves in accordance with BS 476 Part 8: 1972.

Fire Resistant Ratings	Intumescent Necessary	Intumescent Not Necessary Green Core
30/20 (White background)		
30/30 (Yellow background)		
60/60 (Blue background)		
With specified Intumescent in frames or doors 30/30	White Background Blue Core	

Remember – Red Core or Blue Core means Intumescent must be fitted in accordance with manufacturers instructions either in the door or frame. Green Core means you can carry on fixing as Intumescent has been fitted under lipping.  
TRADA having similar coding system with a tree shape as centre core.

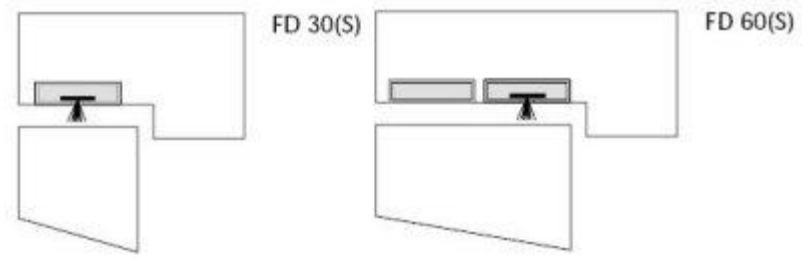
### Intumescent Fire Seals and Cold Smoke Seals

Intumescent fire seals and cold smoke seals should be fitted to the back edge, stile and head of fire resisting door sets.

Not all intumescent materials act in the same way. Low pressure seals expand in all directions but provide little help to the door in resisting distortion under fire. Some high pressure seals exert pressure mainly in one direction and provide some resistance to distortion of the door leaf under fire. A further type of intumescent material, available in different grades, acts in all directions and generates some pressure. Fire seals activate at temperatures that are above human survival levels.

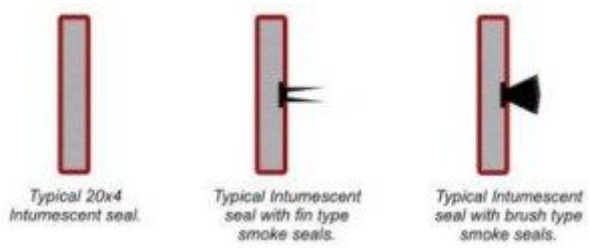
The following is information on the type or size of intumescent strip that should be used.

Type of fire door	Without cold smoke seals	With cold smoke seals
30/30 Single action door 30/30 Double action door	10mm x 4mm (Both sides & top)	10mm x 4mm (Both sides & top)
30/30 Double pairs of doors	10mm x 4mm on one centre stile 10mm x 4mm on other stile, heads and back edges	
60/60 Single action door 60/60 Double action door	20mm x 4mm (Both sides & top)	20mm x 4mm (Both sides & top)
60/60 Double pair of doors	20mm x 4mm on one centre stile 20mm x 4mm on other stile, heads and back edges	



In most circumstances, retention or control of smoke is required, where this is so, fire door sets can be fitted with appropriate smoke seals. These prevent the leakage of air and therefore smoke, through the most vulnerable places i.e. gaps between door and frame, glazed openings and where appropriate, letter plates.

Installations fitted with such seals are designated by the suffix 's' after the Integrity rating i.e. FD 30s. To achieve this, such classifications are given tests on the seals in accordance with BS 476 Part 31.1 or Certified approved smoke seals to TS21.



All hinges, locks and door closer's should be fitted with intumescent material. Grooves should be made slightly wider than the seals to allow pre-painting and shrinkage of timber. Please refer to fixing and installation instructions.

**Note:** - It is always best to ask door manufacturers what type of seal to use.

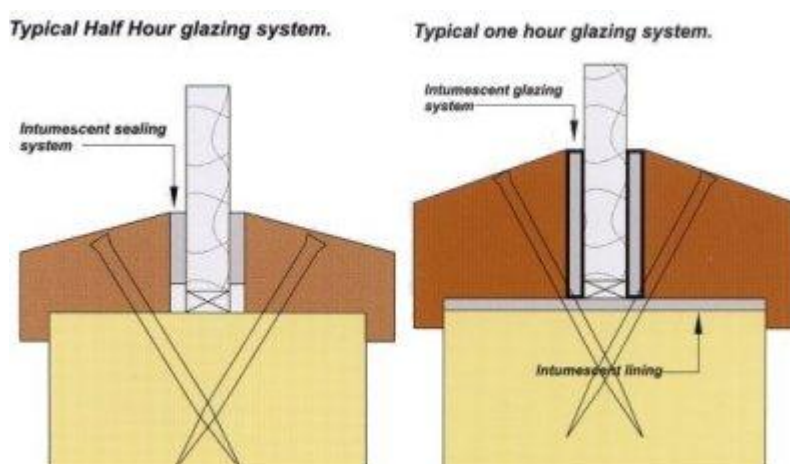
## Fire Resisting Glazing

Glazing may range from a small vision panel in a door to a glazed screen for maximum light transmission. Ordinary glass cracks when exposed to heat and is liable to fall out fairly early in a fire. Wired glass 6 mm thick can withstand exposure to the heating condition in a fire test for at least 60 minutes before it reaches a temperature high enough to soften it. The main reason for this is that nearly 50 per cent of the incident heat is transmitted through the glass by radiation.

The size of the glass and the method of its retention are important factors which influence its integrity. As the temperature approaches the softening point a large sheet will tend to collapse earlier than a smaller one.

On the unexposed face, beading retaining the glass is subjected to radiant and conducted heat through the glass and to convection currents at the top of the pane. This can raise the temperature sufficiently to ignite timber beading after about 20 minutes. To delay the ignition of beading to 30 minutes it is necessary to provide protection by impregnation of a surface coating or a surface covering of non-combustible material.

For longer periods of fire protection, an improved retention system for the glazing is needed. So far only non-combustible glazing sub-frames have been shown to be satisfactory. The glass panel should be small and the method of fixing it should ensure that no direct path could be created for the transference of hot gases.



30/30 using hardwood beading – 10mm X 4mm each side of wired glass  
60/60 using hardwood beading – 20mm X 4mm each side of wired glass plus a lining



## Existing doors

Years ago it was accepted practice to improve the performance of an existing door to a half-hour fire-check or fire-resisting standard, although in some cases it was more economical to replace the door rather than alter it. The doors were usually panel type or a light core flush type about 44mm thick which required a facing on each side with a non combustible board.

It may be necessary to replace existing damaged door leaves or doorsets and in some cases, to install additional fire rated doorsets. It is now the accepted practice to fit new fire resisting doorsets preferably to upgrading them.

There are ASDMA members that specialise in the manufacture of bespoke performance doors and doorsets to suit customer defined requirements. Associate members can supply many of the doorset related materials and components. For further information please refer to the ASDMA website.

There is no advice on improving the performance of existing doors to a one-hour standard however there are occasions when it is acceptable to upgrade doors to a half hour standard and advice is available.

### Suitability of doors for upgrading.

Door type	Suitable?	Comments
Unframed, hollow core, flush	No	Too light and insubstantial
Framed, hollow core, flush		
Framed, solid core, flush	Yes	If core of flaxboard, timber or solid chipboard
Ledged and braced	No	Insufficient thickness at the edges to accommodate an intumescent seal
Framed, ledged and braced	Yes (20 min only)	Extremely dependent on joints and fixings
Framed, solid with solid panels	Yes	Depends on thickness, minimum 44 mm, and panel construction
Framed, solid with glazed panels	Yes	Depends on thickness, minimum 44 mm and type/installation of glazing



## **Methods of upgrading**

There is no 'one size fits all' method of upgrading existing doors and the solution chosen will depend on the door construction, condition, situation and customer requirements.

Techniques that have been successfully used in the past include:

### **Facing the door leaf with a non-combustible board**

This is one of the easiest methods of upgrading, although it does create a visually unattractive result. It is, however, favoured by some heritage authorities as it a reversible process, removing the facing returns the leaf to its original condition. If used, facings should be applied symmetrically to each face. Note that the increased thickness and weight may affect the door frame and ironmongery specification.

### **Sandwiching panels**

For panelled doors, the weakest area is generally the panel itself. In many cases the timber will be less than 10 mm thick at the thinnest point. One method of upgrading is to remove the panels, split them through their thickness and insert a sandwich material, either an appropriate intumescent sheet or a non-combustible board. This is more labour intensive than other approaches but does enable the original finish to be maintained, which can be important for heritage projects.

### **Intumescent paper**

Intumescent paper and card can be used to selectively protect vulnerable areas such as the fielded area of panelled doors. The application thickness is controlled by the thickness of the paper but can be veneered to restore a timber finish.

### **Intumescent paints and varnishes**

Intumescent paints and varnishes are available for use on timber-based fire resisting doorsets where a maximum performance of 30 minutes integrity is required. These products require extremely specific application techniques and are reliant on the underlying condition of the doorset construction. Great care should be taken to ensure that full-scale test data for the product is both available and appropriate for the application in question. It is likely that other upgrading measures will be required in conjunction with these paints and varnishes.

For more information download the following documents.

[Upgrading's doors BMTRADA.](#)

[Upgrading's doors English Heritage.](#)

[Upgrading's doors Inter nation Fire Consultants Ltd](#)

## **Fire Door Furniture and Ironmongery**

An important aspect of ensuring fire doors meet the required standard is the fitting of certified door furniture, which is overlooked on many occasions. If you go to [Fire Door Fittings and Ironmongery](#) there is a detailed description of all the door furniture suitable for fire doors and the appropriate standards.

## **Maintenance of Fire Doors**

Fire doors are engineered products that provide life and property saving functions in the event of fire. It is important that they are regularly inspected and maintained to permit them to perform at their best on the one and only occasion when they are called upon so to do.

Doorsets fitted with hold open devices or swing free type closers should be closed daily, particularly overnight when there is likely to be low building occupancy. For busy 24/7 buildings (e.g. hospitals) fire doors should be closed at least weekly. All fire doors should close effectively from any angle of opening using only the door closer.

There are a number of reasons why doors may fail to close:

- Check that there are no foreign bodies or other objects obstructing the door.
- Check that any smoke seals are correctly fitted and are undamaged.
- Check the latch, if fitted to ensure correct operation and that it is suitably lubricated.
- Only as a last resort should the closing device be adjusted, but this must be carried out carefully to ensure that the doors can be opened without undue force.

Intumescent seals should be checked regularly, at intervals not greater than 6 months, and damaged or missing seals replaced. To maintain the design performance potential, replacement seals should be of the same brand, size and type as the original. However, any intumescent seal of the same size as the original is better than none.

Mechanical items such as hinges, locks, latches, closer, floor springs etc are likely to wear over time. Maintenance provisions should comply with the hardware suppliers' recommendations where these are known. Otherwise, locks and latches may require occasional light lubrication. Some hinges use self lubricating bearings that will not need additional lubrication.

Where it is necessary to replace worn hardware on a fire door, where possible the essential items listed above should be replaced with products to the same specification as the original. Otherwise hinges, latches, locks, flush bolts, closer(s) and other items of load bearing or securing hardware should be of the same type and size as the original items. Documented proof of the required performance of hardware for use in timber fire rated doorsets should

be obtained. It should be noted that hardware that has been successfully tested in metal doorsets might not be suitable for use with timber doorsets.

Redundant hardware should be carefully removed. Intumescent gaskets may have been used under hinge blades, lock/latch end plates, strike plates, with some closer fittings and in flush bolt recesses. These gaskets should be replaced if possible with gaskets of the same material. If they are undamaged they should be retained and reused with the new fittings. Intumescent gaskets or mastics used for these applications are usually the low pressure type.

## **Decoration**

Unglazed areas of any fire door leaves are generally not required to provide a specific surface spread of flame requirement and may therefore be decorated as desired. There is no evidence to suggest that over painting of heat activated seals have any detrimental effect on the ability of the seals to perform efficiently. There are some benefits in over painting the seals as they are less likely to absorb atmospheric moisture. However, there are limits on how much paint can be applied without there being a risk of the seal being rendered inoperative. It is recommended that over painting be limited to a maximum of five coats of conventional oil bound paint or varnish.

When preparing a frame for redecoration, the use of heat or chemical strippers should be avoided if intumescent seals are incorporated. If seals are damaged by either of these processes they should be replaced. If glazing beads have been painted with intumescent paint, it is essential that they should be repainted with a similar paint.

## **British Standards**

The following is a list of documents relevant to timber fire doors:

BS 476: - 20: 1987 Fire tests on building materials and structures. Methods for determination of the fire resistance of elements of construction (general principles)

BS 476 - 22: 1987 Fire tests on building materials and structures. Methods for determination of the fire resistance of non-loadbearing elements of construction

BS 476: - 23: 1987 Fire tests on building materials and structures. Methods for the determination of the contribution of components to the fire resistance of a structure

BS 476: - 31.1: 1983 Fire tests on building materials and structures. Method of measuring smoke penetration through doorset and shutter assemblies – method of measurement under ambient temperature conditions.

BS 8214:1990 Code of practice for fire door assemblies with non-metallic leaves

BS EN 1634-1: 2000. which is an alternative for BS 476 - 22: 1987

### **Costs**

There was a time when the cost of a fire safety solution was never considered and fire safety schemes were simple based on the current codes. It was up to the employer to consider this aspect and obtain the best cost effective solution. Since the introduction of risk assessment and the numerous solutions available to the fire safety profession it is now incumbent on the person conducting a fire risk assessment to consider costs. This can be achieved by comparing prices on the net and arriving at an average price. You must also consider the cost of installation. In this case a starting point could be the [fire door configurator at SafeLincs.](#)

### **Additional Information**

See a [Quick Guide to the Certification of Timber Fire Doors](#) which you may find useful.

Building Research Establishment (BRE) produce research documents called BRE Digests that include one on fire doors. They are available from the Stationery Office and other Government Book shops and outlets. Digests are NOT sold by the BRE directly.

If you require more in depth information check out [Architectural and Specialists Door Manufacturers Association](#) and download the Best Practice Guide to Timber Fire Doors.

[The British Woodworking Federation](#)

[BMTRADA Technology a research establishment](#)

[Intumescent Fire Seals Association](#)

[Glass and Glazing Federation](#)

[Door & Hardware Federation](#)

[DHF - CoP for Hardware for Fire and Escape doors](#)

[Mann McGowan Fabrications Limited](#)

# Fire Door Fittings and Ironmongery

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### (1) Introduction

It is a criminal offence to supply products that do not comply with the UK Construction Products Regulations. For fittings intended for use on fire, smoke and escape doors marking will be the easiest method to demonstrate compliance. The Building Control Officer or other approved inspectors or a Trading Standards Officer will require proof of this compliance. Across the UK construction industry and in Europe, construction products are being tested to the new EN Standards to ensure that fire, safety and performance requirements are met in future building projects. Door hardware will eventually have 21 new EN Standards. For many ironmongery items you will need to ensure that only marked products are used on all fire resisting, smoke control and escape doors.

### (2) Self Closing Devices

All dedicated fire doors, other than those to locked cupboards and service ducts, should be fitted with automatic closing devices. To be effective these must be capable of closing the door from any angle of opening and should be strong enough to overcome the resistance of any latch or sealing system. They should conform to BS EN 1154:1997 Building Hardware. Controlled door closing devices.

Door closing devices fitted to fire-resisting doors are required to perform one of two functions, dependent on whether or not a latch is fitted to the door. These functions are considered "essential" in terms of the ability of the doorset to achieve its intended fire resistance rating.

- **Latched door:** To close the door in a controlled manner into a position where the latch engages. In this case, once the latch is engaged, such closers will have no further essential role to play.
- **Unlatched door:** To close the door in a controlled manner into its frame or, in the case of double swing doors, to its dead centre closed position, and maintain this condition for a period during

fire exposure until the heat activated sealing system takes over the role of maintaining the door in the closed position.

Door closing mechanisms are divided into the following categories:

- face-fixed closer's - overhead mounted
- face-fixed closer's - jamb mounted
- concealed closer's - overhead mounted
- concealed closer's - jamb mounted
- floor springs - floor mounted
- spring hinges
- rising butt hinges.

Self-closing devices can suffer damage and consequently become inoperative if they are surface mounted on the exposed face. If their sole function is to close the door with a latch, when they have done so any damage suffered need not be critical for the integrity of the door. Recessed self-closing devices will suffer less damage, but in the top of the door panel can produce a local weakness. The ideal place is within the sill where it will cause the least interference with the performance of the door.

A self-closing device used with double swing doors should not only close the door but also hold it firmly in the closed position. It needs to be strong enough to keep the door closed against any pressure to which the door leaf may be subjected in a fire. The only type of device which has been shown to be successful is a spring type mounted in the sill.

### **(3) Door Coordinator Devices**

Fire-resisting doorsets (other than those to locked cupboards and service ducts) are usually required to be self-closing, in accordance with building regulations. When pairs of doors are used for fire resisting purposes, the door closing device fitted on each individual leaf should be able to close the door leaf reliably from any angle to which it has been opened and overcome the resistance of a latch or any seals when fitted.

When these pairs of doors have rebated meeting edges it is essential that the individual leaves close in the correct sequence, to maintain the fire integrity of the complete doorset assembly. In these circumstances there is a need for a door coordinator device (also known as a door selector) to ensure that after opening, the first opening leaf of a pair of doors is held back from closing fully, until the second opening leaf has closed back fully into the frame.

Door coordinator devices are divided into the following categories:

- gravity arm coordinators
- swing arm coordinators
- double arm swing coordinators
- coordinators incorporated into door closing devices

*Note: This list does not imply suitability of any particular device for fire door.*

The door coordinator device and its accessories should be CE Marked to BS EN 1158 - Building hardware - Door coordinator devices or preferably should be provided with additional product certification by an approved third party certification body.

#### **(4) Hold Open Devices**

##### **Introduction**

Doorsets are a weak point in any fire barrier because their primary function is to allow traffic to pass from one side of a wall to the other it is important for doors to be kept closed when not in use.

Fire-resisting doors (other than those to locked cupboards and service ducts) are usually required to be self-closing and door closing devices fitted to these doors to achieve this function can pose significant obstacles to the young, elderly, infirm or disabled.

This self-closing function can also be an inconvenience in high traffic areas and cause difficulties where large numbers of users have to pass through the doors. Experience shows that convenience often takes precedence over safety and building users may seek to disable or otherwise undermine devices that inconvenience them in carrying out their work.

Doors are often held open by wedges or fire extinguishers so that the building users, particularly if they are moving loads, can pass easily around the building.

To overcome these problems, electrically powered hold open devices can be used to hold a self-closing fire-resisting door in the open position. These devices are linked either into a building fire/smoke alarm system or controlled from locally positioned smoke detectors. Depending upon the intended use of the door, there are two basic functions available:

**Hold open:** This function holds the door leaf in an open position for as long as the device is energised, thus permitting free passage through the door. When triggered by the fire/smoke alarm system, local detector control, and local pushbutton or by power failure, the device releases the door leaf and allows it to close under the control of a door closing device. With power subsequently restored, the leaf will again be held once it has been returned to the hold open position. These devices are usually used on cross-corridor doors and circulation routes.

**Free-swing:** After priming, by moving the door leaf to the fully open position, this function prevents the door closing mechanism from re-closing the leaf, but enables the leaf itself to be moved freely without the need for the user to overcome any force from the closer. In effect, the door leaf will then behave as though there were no closing



mechanism fitted. When triggered by the fire/smoke alarm system, local detector control, and local pushbutton or by power failure, the device releases the closer mechanism, allowing it to close the door leaf in a controlled manner from whatever position it was in at the time. With power subsequently restored, the leaf will again achieve this free-swing function once it has been returned to the holding position. These devices are usually used on doors opening into individual rooms and are not recommended for cross-corridor doors or circulation routes

It can be seen that the use of these devices will make access around a building much easier, particularly for the young, elderly, disabled or those manipulating trolleys etc, without compromising the fire compartmental function of the fire-resisting doorset to which they are fitted.

Electrically powered hold open devices are divided into the following three categories:

- Separate hold open devices (Self-Contained Release Devices (SCRD))
- Hold open or Free-swing devices incorporated into an overhead closer (with or without an integral smoke detector)
- Hold open or Free-swing devices incorporated into a floor spring mechanism.

**The following information is produced to give advice on the suitability and use of automatic door release mechanisms. It aims to set acceptable standards of safety and at the same time leaving scope for flexibility and the exercise of judgment in relation to individual circumstances.**

## **General Principles**

### **Hold Open Devices**

The holding open of self-closing fire doors should be discouraged in most cases however where they cause serious restriction in the free movement of people within a building, you may need to consider and install, where appropriate, automatic door release mechanisms.

A site-specific risk assessment should be carried out and the following criteria should be appropriately applied: -

- The door release mechanism should conform to BS EN 1155: Electrically powered hold open devices or be accredited as part of the European Construction Product Directive.
- All doors fitted with automatic releases should be actuated by an appropriate automatic fire detection and alarm system. BS 5839 Parts 1 or 6 detail an acceptable standard.
- If devices are fitted to fire doors protecting the means of escape then the automatic detectors should be positioned in accordance

with British Standard 5839 Part 1, for a Type L3 system as minimum, for example suitable detectors on the means of escape routes and in adjacent rooms opening onto those routes. If the means of escape route is fire protected then either smoke or heat detectors are considered suitable in the adjacent rooms, whilst if the route is unprotected, only smoke detectors should be used.

- The practice of using dedicated smoke detectors either side of corridor doors that are to be held open by a door release mechanism should be discontinued. This is because studies have found that smoke entering the corridor from an adjacent room may not have sufficient buoyancy, movement and directional flow to actuate the dedicated detector heads.
- All automatic door releases should be triggered by each or any of the following: - The detection of smoke by automatic detection; or the actuation of an alarm by a manual fire alarm call point; or failure of the fire warning system.

#### **If the power supplies should fail:**

- Each automatic door release should be provided with means of manual operation from a position at the door, closing door by hand/foot is considered unsuitable.
- In sleeping risk premises each door fitted with an automatic door release should be closed at a predetermined time each night and remain closed throughout the sleeping hours. The method of achieving this may be either automatic or manual, depending on the type of release mechanism installed, but compliance with this will be a matter for the management regime of the premises/workplace. Any remote or unsupervised release of self-closing fire doors may injure occupants. The responsible person should only carry out fire alarm tests and/or remotely release self-closing fire doors if arrangements, so far as is reasonably practicable, are in place to safeguard the occupants from injury, for instance if an occupant was struck by a door closing.
- The release mechanisms should be operated at least once each week to ensure that the mechanisms are working effectively, and the doors are not warped and close effectively into their frames
- The release mechanisms should operate within 20 seconds of the fire alarm operating.
- Doors fitted with release mechanisms should be provided with appropriate sign. Automatic Fire Door – Keep Clear.
- The devices must be tested weekly, in association with the testing of the fire alarm system, and maintained in accordance with the manufacturer's instructions. A record should be kept of all testing and maintenance activities. Doors fitted with such devices should be kept closed during periods when the fire alarm system is isolated for maintenance purposes.

### **Self-Contained Release Devices (SCRD)**

SCRD are not normally directly connected to a fire alarm system and it is important that additional points are taken into account and/or considered when these types of devices are to be installed.

These points are set out below:

- Acceptance depends upon the outcome of a site-specific risk assessment. They should not normally be used on doors protecting single stairway buildings or protecting other critical means of escape.
- The fire alarm system should have a secondary power supply to a standard as detailed in BS 5839: Parts 1 or 6.

The fire alarm audibility level at the position of any acoustically actuated device must be sufficient to ensure that the mechanisms will release the door upon the actuation of the fire alarm system. The management of the premises/workplace should ensure that there are procedures in place, either manual or automatic, to de-activate any or all of the devices in the following circumstances:

- 1) When there is a fault in the fire warning system
- 2) When the fire alarm system is isolated for any reason e.g. Maintenance.
- 3) Any other circumstances when the sound of the fire alarm will not trigger the device
- 4) Self-contained devices should have their batteries replaced at least every 12 months or when the low voltage-warning device sounds.

BS 7273-4:2007 Code of practice for the operation of fire protection measures. Actuation of release mechanisms for doors and BS EN 1155 - Electrically powered hold-open devices for swing doors are relevant standards.

### **(5) Single Axis Hinges**

Hinges and latches have an important role in ensuring the integrity of the door. The hinges must remain adequately screwed, in spite of the charring of wood in the vicinity.

It is common to use three hinges although tests have shown that with some doors two hinges may be adequate for the half-hour period. Steel and brass hinges are effective for a half-hour door, but only steel hinges will be satisfactory for a one-hour door. For the latter, it may be necessary to use hinges with extended flaps (broad butts) so that fixing is maintained even when severe charring has taken place.

BS EN 1935: 2002: Building Hardware Single Axis Hinges is the current European standard for single axis hinges and being able to understand the CE markings, provided when purchasing hinges, is of some importance.

## Guide to interpreting Markings for Single Axis Hinges.

The Building Regulations set out the circumstances in which rising butts may be used but not recommended, compensation must be provided for the cut-out from the top edge of the door by increasing the depth of the stop.

### **(6) Locks and Latches**

In order to provide an effective barrier to a fully developed fire, a door has to remain closed within the frame. In the case of single action doorsets, this role might be undertaken by a latch.

Where the latch does not perform this role, there is a need for a lock to be fitted. This might be on a duct door which is normally kept locked with only occasional access to service equipment, or doors to cupboards which for security reasons are locked for periods of time.

Where security is in conflict with easy egress, consultation with the regulatory authority or fire officer should be made in order to reach a satisfactory solution.

Sometimes a turn operated lock might suffice whilst in other cases specialist devices are available that can reduce this conflict to a minimum, such as panic escape devices to BS EN 1125: 1997 or emergency exit devices to BS EN 179: 1998.

In fitting locks or latches to fire-resisting doorsets, the potential fire performance of a doorset can be reduced due to:

- removal of a section of the door leaf, door frame or seal
- leaving voids within the structure of a timber door
- adding materials which could cause heat transfer problems in a timber door
- through fixings creating thermal bridges in a timber door
- using materials of low melting point (less than 800°C, or 900°C for steel doors over 90 minutes resistance) in components which, if they should melt, could cause a failure of functionality of the device
- locks containing materials which might flame.
- Locks and latches are divided into the following categories:
  - roller catches
  - rim latches
  - mortise latches
  - mortise locks, rim locks and deadlocks
  - bored-in knob sets

Where mortise locks are provided, the cut-out in the door should be the minimum necessary to prevent any voids which fire can penetrate. After the edges, the mortise lock and latch areas represent the next zone of weakness.

Filling the voids in the cut-out with intumescent paste will markedly lessen the weakness in this area.

As the latch is the only holding device on the closing edge, hence it is important that it should be strong and that the nib of the latch should engage into the latch plate at least 12 mm to ensure that the closing edge will not spring open when the door deforms. Extended flap latch plates are advisable for one-hour doors.

Plastics and aluminium handles and knobs will be destroyed on the fire side but this may not have a serious effect on the integrity of the door if steel spindles are provided.

The lock or latch should be CE marked to BS EN 12209 or preferably should be provided with additional product certification by an approved third party certification body

### **(7) Letter plates**

Wherever possible the fixing of a letter plate to a fire-resisting door should be avoided. Prime consideration should be given to installing the letter plate elsewhere. Both free standing and wall mounted postal boxes are available as an alternative.

Letter plates introduce a weak-ness in a door and those made of aluminium are likely to melt and even with steel flaps deformation can lead to integrity failure. A double flap of steel, one on each side of the door, is likely to be necessary to maintain integrity.

There are letter plates on the market which have performed satisfactorily in fire tests in timber and steel doors. It is recommended that a product of proven performance and durability be selected, which has been included in satisfactory fire tests to B8476:22 : 1987, or BS EN 1634-1, in a door of a similar or weaker type of construction to that in which it will be fitted.

Letter plates should ideally be positioned in the lower part of the door and should conform to BS EN 13724: Letter plates.

### **(8) Panic & Emergency Exit Devices**

Experience relating to escape from buildings and general safety has shown the importance of fitting doors on escape routes with suitable exit devices to enable the occupants of the building to escape quickly and easily in the case of fire or some other emergency.

Factors to consider include:

- Different groups of users will have differing requirements to enable them to make an effective escape and this has to be reflected in the type of device chosen. For example, in buildings frequented by the general public it is important that doors can be released easily by people who might have no training in emergency procedures or the use of the exit device, and might therefore panic in the rush to escape.
- Other buildings might be occupied predominantly by authorised personnel, who have been trained specifically in the procedures for escape, and who are therefore unlikely to panic in the case of an emergency.
- Where escape route doors are part of the final exit from a building, there will be some additional requirements for security of the door against intrusion and burglary. In this case there can be a conflict between the requirements of building users to be able to escape easily and the requirements of building owners to secure their building and its contents against crime
- Where escape route doors are part of the fire compartmentation of the building there will be additional requirements to ensure that the escape hardware fitted does not compromise the fire-resisting performance of the doorset. Therefore, exit door hardware is divided into the following categories:
  - Panic exit devices (for use where panic situations may be envisaged)
  - Emergency exit devices (for use by trained personnel where panic situations are not envisaged)
  - Exit devices for use on fire-resisting doorsets
  - Accessories for exit devices.

**Note:** *This list does not imply suitability of any device for fire or escape door use*

The device and its accessories must be chosen taking account of the type of user:

- devices intended for use by the general public should be CE Marked to BS EN 1125 - Panic exit devices operated by a horizontal bar, and preferable provided with additional product certification by an approved third party certification body.
- devices for use by trained personnel should be CE Marked to BS EN 179 - Emergency exit devices operated by a lever handle or push-pad, and preferably provided with additional product certification by an approved third party certification body.

If there is any doubt about the conditions relating to building occupancy, it is recommended that devices covered by BS EN 1125 (panic exit devices operated by a horizontal bar) be specified.

### (9) Costs

There was a time when the cost of fire safety solutions was never considered and the fire safety schemes were simply based on the current codes. It was up to the employer to consider this aspect and obtain the best cost effective solution. Since the introduction of risk assessment and the numerous solutions available to the fire safety profession it is now incumbent on the person conducting a fire risk assessment to consider costs. This can be achieved by comparing prices on the net and arriving at an average price and you must also consider the cost of installation. In this case a starting point and an idea of various types could be the [Fire Door Retainers page at SafeLincs](#)

### (10) Definitions

- **Accessible route** - Any route that is used to approach, or move around or within a building, and is accessible to disabled people.
- **Closing moment** - Torque (Nm) generated by a door closing device which acts upon the door leaf during the closing operation.
- **Cylinder** - Key operated device containing differs, usually separate from, but engaging with, its associated lock or latch.
- **Deadbolt** - Bolt that is operated in both directions by a key, handle and/or thumb turn.
- **Deadlock** - Lock that contains only a deadbolt.
- **Dogging mechanism** - Mechanism fitted to an emergency/panic device for holding the bolt head(s) in the withdrawn position until manually or electronically reset.
- **Doorset** - Assembly of door leaf, frame, hinges and all other hardware, and including any fire or smoke seals.
- **Escape route** - Route forming the means of escape from any part in a building to a final exit.
- **Final exit** - An exit from a building where people can continue to disperse in safety and where they are no longer in danger from fire and/or smoke.
- **Fire integrity** - Measure of the ability of a specified doorset to resist and thus contain the effects of fire for a recognised period of time. (Usually expressed in minutes - e.g. FD60 or E60 implies a doorset capable of withstanding exposure to fire test for at least 60 minutes).
- **Latch bolt** - Moving part of a latch that engages the locking plate.
- **Light reflectance value** - The amount of light the surface reflects. The LRV scale runs from 0, which is a perfectly absorbing surface that could be assumed to be totally black, up to 100, which is a perfectly reflective surface that could be considered to be the perfect white. Because of practical influences in any application, black is always greater than 0 and white never equals 100.



- **Mortise latch** - Latch for fixing in a mortise, usually in the closing edge of a door leaf or window.
- **Mortise lock** - Lock for fixing in a mortise, usually in the closing edge of a door leaf or window.
- **Rim lock** - Lock for fixing on the face of a door leaf.
- **Tubular latch** - Mortise latch, which has a case shaped to fit into a cylindrical mortise.

### **(11) Additional Information**

The Door and Hardware Federation - Code of Practice for Hardware for Fire and Escape doors is an excellent publication and provides in depth information on many types of fire and escape door fittings and ironmongery. Home page Door & Hardware Federation

The following European product Standards have been published as British Standards:

- BS EN 179 - Emergency exit devices operated by a lever handle or push pad\*
- BS EN 1125 - Panic exit devices operated by a horizontal bar\*
- BS EN 1154 - Controlled door closing devices\*
- BS EN 1155 - Electrically powered hold-open devices for swing doors\*
- BS EN 1158 - Door coordinator devices\*
- BS EN 1303 - Cylinders for locks
- BS EN 1527 - Hardware for sliding doors and folding doors
- BS EN 1670 - Corrosion resistance
- BS EN 1906 - Lever handles and knob furniture
- BS EN 1935 - Single axis hinges\*
- BS EN 12051 - Door and window bolts
- BS EN 12209 - Locks and latches - Mechanically operated locks, latches and locking plates\*
- BS EN 12320 - Padlocks and padlock fittings
- BS EN 13724 - Apertures of private letter boxes and letter plates

\* These standards are "harmonised". This means that products successfully tested to them can be CE Marked.