



D M Smith & A Lloyd
Door and Hardware Federation

Industrial & commercial fire doors

1 Types of product

Fire doors form an integral part of any fire strategy to protect life and property. They are designed to prevent the spread of flame and maintain the integrity of compartment walls for a designated period of time.

In accordance with British and European standards, fire doors are tested to survive for between 30 minutes and 4 hours, depending on the application.

The processes of design, manufacture, installation and maintenance are all equally as important, since a failure at any point can be catastrophic.

Industrial and commercial fire doors come in all shapes and sizes:

a) Rolling

These doors are traditionally made of steel and can be made to operate vertically, horizontally or laterally. They are very robust and can sometimes have a dual purpose, also acting as security doors.

Vertically-operating fire-resistant doors:

These may look similar to traditional rolling shutters but there are significant design differences. Specifiers should ask suppliers to provide test evidence of the fire rating. This is particularly important for large doors, since the furnaces used for testing are only typically 2.5m square. Larger doors therefore require an oversize test

assessment and, since steel doors can be made to around 14m in width, it is imperative that the correct documentation is in place.

Recent innovation has seen the introduction of fire curtains. These have been assessed to over 50m in width and 6m in height. They are fire rated for up to 2 hours and, being made of a fabric, they are considerably lighter and take up significantly less headroom.

Most vertically-operating fire doors are normally kept open by some type of hold-back device, which only releases the door to close upon receipt of a signal or an actual fire in the vicinity.

Horizontally-operating fire-resistant doors:

These have traditionally been used around escalator wells to form a fire break between two floors or to protect hazardous waste pits, which pose a fire risk. They are available in sizes up to 20m by 10m and can be rated for up to 2 hours.

Laterally-operating doors:

These are used around atria, normally in shopping malls or large department stores. They act as compartment walls and are normally rated for up to 2 hours. They are increasingly being used for the dual purpose of fire door and as the front entrance security shutter. These doors are capable of going around corners and can be up to 40m in length.

b) Sliding

These doors are very common in Europe and normally use an inclined track. The doors are usually held open and can be very large, up to 8m in height by 4m wide. In the UK, they are used where the opening is too large for a traditional hinged fire door, or there is a specific requirement in, for example, a whiskey distillery, where there is very valuable stock at risk from fire. They are available with up to a 4-hour rating.

c) Hinged

These can either be made from wood or steel, available in singles or pairs, and are used normally for smaller openings. Steel doors have been designed for openings up to 9m² in area and are tested to hold back fire for up to 4 hours.



2 Design and installation

Fire doors are designed to exacting standards and this should translate to both the manufactured and installed product. Third-party accreditation can offer a degree of comfort to specifiers. The Building Research Establishment (BRE) and Warrington Fire Research (WFRC) offer third-party accreditation in the form of ISO 9001: 2000 and product certification schemes, applicable to steel fire doors and curtains. The schemes are onerous, covering design and installation, and should provide complete traceability through the labelling applied to the product.

Traditionally made of steel, fire doors are designed to withstand very high temperatures. Temperatures can exceed 600°C within 10 minutes – the melting point of aluminium – so the materials used should be appropriate to the requirement.

Steel fire doors are designed to expand in the event of a fire, to seal gaps and prevent the transfer of flame from one side of an opening to another. Careful analysis and calculation is required to ensure that the relevant parts of the door work effectively.

Indicative fire testing has shown that under extreme heat (over 1,000°C), vertical fire shutters distort significantly. To prevent a failure, the support casing must be correctly designed and support straps may be required. Similarly, the side guides must be correctly slotted to allow for appropriate expansion. Fire tests are normally undertaken using mechanically-operated shutters and, therefore, power-operated doors require an extended application assessment by a suitably qualified fire safety engineer.

There has been a significant growth in the use of tubular motors in recent years but these have been shown to flame within the barrel within 30 minutes. Therefore, care should be taken to ensure that any door containing such an operator has been properly tested.

All fire doors should be fitted with an automatic self-closing device. A number of closure devices are available. The fusible link is the most common. This is a local device, which operates at 68°C, at which point no-one should be in the vicinity.

Remote closure is also common, with doors closing upon receipt of a fire signal. This causes problems if there are people in the area who could either be trapped or hurt by doors closing in an uncontrolled manner. To avoid this, vertically-operating doors should not close in excess of 150mm/second and

horizontally-operating doors at 300mm/second.

The use of audio-visual warning systems to indicate that the doors are closing, combined with a door delay device, can sometimes be specified – particularly in public areas where people need to pass through to escape a fire.

Regulation 18 of the Workplace (Health, Safety and Welfare) Regulations 1992 requires all 'upwardly moving doors' to be provided with an effective means of preventing them falling back. This can cause a conflict with the requirement that the doors close in the event of a fire, but practical solutions are available. It is vital that proper risk assessments are undertaken to determine both the type of

door and its method of closure for the intended application.

The importance of the installation cannot be overstated. Even the best designed and manufactured doors may fail to work if incorrectly installed. Specifiers need reassurance that:

- the design criteria have been carried through to installation
- the door is fixed to the structure in the correct manner
- there are no clearance gaps that could result in an integrity failure

Third-party accreditation provides reassurance to specifiers that the installed product will behave in a similar fashion to the fire-tested specimen.

3 Inspection and maintenance

Manufacturers and building owners/managers must be aware of their maintenance obligations under both health and safety legislation and Approved Document B 2000 to the Building Regulations in England and Wales.

Manufacturers should provide clear operating and maintenance manuals and prescribe the maintenance periods for each of their doors. Similarly, they should provide logbooks for recording operational tests and completed maintenance.

Building owners/managers should comply with the manufacturers' requirements and use individuals or companies with the appropriate experience. They will not be able to rely on manufacturers' warranties if they have not undertaken the appropriate operational testing and maintenance.

The importance of regular testing cannot be over emphasised. Any fire door which fails to close could invalidate the fire strategy for a building.



4 Relevant standards and other documents

Part B of the Building Regulations in England and Wales and its supporting guidance document, Approved Document B, determine the minimum performance for fire doors.

Fire doors should be tested to BS 476: Part 22: *Fire tests on building materials and structures. Methods for determination of the fire resistance of non-loadbearing elements of construction*: 1987, or the new European test standard, BS EN 1634: Part 1: *Fire resistance tests for door and shutter assemblies*: 2001. Testing against these standards will ensure compliance with the Building Regulations in England and Wales.

All power-operated doors must be CE-marked in accordance with the European Machinery Directive 1995. This requires a

declaration of conformity to act as evidence of compliance.

All doors, whether manual or electric, will have to be CE marked under the Construction Products Directive. For non-fire doors this will become mandatory from 1 May 2005 and fire doors will follow probably within one year. This will force manufacturers to publish the performance of their product against the pre-determined standards, as agreed within the European Union. The standard for fire doors is currently under review

Given the nature of the products, specifiers must undertake suitable risk assessments to ensure that they are purchasing the appropriate product for the relevant application.

5 Other issues

The Door and Shutter Manufacturers' Association (DSMA) has recently merged with the Architectural and Building Hardware Manufacturers to form the Door and Hardware Federation (DHF).

The DHF recommends that all manufacturers of fire doors are assessed to ISO 9001: 2000, using third-party accreditation and offer products that meet the requirements of a third-party product certification scheme. The DHF has been instrumental in developing these schemes, which provide specifiers and building owners/managers with independent evidence of suitability when purchasing very important products.

The Code of Practice for fire resisting rolling shutters is available for download from the DSMA/DHF website, www.dsma.org.uk; or for further information tel: +44 (0)1827 52337

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T: +44 (0) 1422 376181
F: +44 (0) 1422 310070
E: info@c3securiglass.com
W: www.c3securiglass.com

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