



## Technical information

# Fire doors for the health sector

### 01 Introduction

Health sector buildings have particular fire safety challenges, predominately in safeguarding patients with a wide range of dependencies (e.g. mental disability, physical impairment, mechanical/electrical life support) in the event of fire. In addition to this, the size and complexity of a modern day hospital or care centre will often mean that complete evacuation of the building is neither practical nor appropriate.

It is for this reason that the most common approach adopted in health care buildings is progressive horizontal evacuation, which is referenced in the UK Department of Health guidance, Health Technical Memorandum (HTM) 05-02: Guidance to support functional provisions in healthcare premises. The HTM guidance sets out measures to meet the functional requirements of Part B (Fire Safety) to the Building Regulations in England and Wales for healthcare buildings.

The basic principle of progressive horizontal evacuation is to move occupants from the fire-affected area through a fire resisting barrier to an adjoining area, which is designed to protect the occupants from the immediate dangers of fire and smoke. The occupants then remain in the fire safe area (refuge) until the fire is extinguished or, if necessary, further evacuation is required to another refuge or down the nearest stairway.

Obviously key to this strategy, in conjunction with other fire safety measures, is the use of fire resistant compartment lines to form the barrier between the fire and the refuge points and fire doors to allow the passage of persons and objects through them. If the fire resistant compartment lines cannot be relied on, the evacuation strategy for the hospital will be severely compromised and in the event of fire, the lives of the patients, staff and visitors will be placed in serious jeopardy.

## 02 Functions of hospital fire doors

A fire doorset specified for use in a hospital may have to offer more than simply fire resistance, although nothing must detract from its primary function: to resist the passage of fire and control its spread, especially in a high-occupancy building.

However, there are many other performance and design requirements for hospital fire doors. Cross-corridor doorsets will need to withstand constant opening and closing, as well as resisting potential damage caused by regular impact from hospital trolleys and wheelchairs. Doorsets into cleanrooms must be totally hygienic to avoid harbouring harmful pathogens, while doors on high-security wards must safeguard patients and staff.

To help meet the key functional requirements described above, HTM 58 – Internal Doorsets, offers guidance on the technical design and output specifications of internal doorsets for use in health buildings.

Table 1 provides a snapshot of the functions that may be required for hospital doorsets during their lifetime, although this list is not exhaustive.

Some or all of these functions may be designed in, but the doorset must still be able to provide the required level of fire resistance.

Area in hospital	Function of door	Design features
<b>Restricted access – e.g. patient record rooms, medical store rooms, etc.</b>	Prevent unauthorised entry, resist break-in	Swipe card systems or magnetic locking devices, enhanced security doors, multi-point locking devices
<b>Corridors, high-traffic areas</b>	Durability, impact resistance from trolleys	Heavy duty hinges/floor springs, crash plates, edge protectors
<b>X-ray suites</b>	Prevent transmission of X-rays	Code 3 lead lining (British Standard lead thickness)
<b>Cleanrooms</b>	Prevent harbouring of harmful bacteria, such as MRSA	Wipe clean surface – e.g. polymeric faces, PVCu lippings to all faces and edges
<b>High-security wards</b>	Safeguard against patients harming themselves or others	Anti-ligature devices, vision panels obscured from one side, quick-release door stops, electric points/switch gear
<b>General – Disability Discrimination Act</b>	Ease of movement/access for the disabled	Glazing 500mm – 1500mm from the threshold to allow visibility for wheelchair users, impact-rated glass, minimum 750mm – 800mm clear opening width, requisite closing/opening force, accessible thresholds

Table 1: Functions of hospital fire doors

## 03 Test evidence

The performance of the fire door must be considered as a doorset – that is, the door leaf/leaves, frame and all other associated component parts, including hardware. Supporting test evidence for each of the component parts or performance functions cannot be considered in isolation.

To facilitate the interpretation of test evidence and to provide a definitive scope of application for a particular door design, UKAS accredited laboratories with the necessary expertise will often produce written documents termed 'global assessments'. Global assessments are

written using expert judgement and are effectively design appraisals based on test evidence that state the construction requirements and permitted leaf size and configuration parameters for a particular door design.

Testing bodies will work with manufacturers to help demonstrate that a doorset design can meet the required performance. This may mean interpreting and assessing test evidence to provide a scope of cover for hospital doors tailored to a particular specification, or developing an appropriate test programme for doors or components that are not covered by the scope of the original fire test.

Increasingly, third-party certification of a doorset and its installation is being called for.

It is important to stress that fire-resistance performance must be demonstrated in all cases to the required period (for example, 30, 60 or 120 minutes) under BS 476-22: 1987: *Fire tests on building materials and structures. Methods for determination of the fire resistance of non-loadbearing elements of construction*, or BS EN 1634-1: *Fire resistance tests for door and shutter assemblies. Fire doors and shutters*.

However, as the following information explains, test evidence is needed for the additional functions of the doors, based on their location in the hospital and the areas they are protecting.

There is also a need for test documentation to satisfy building control officers and others.

### 3.1 Restricted access/high-security doorsets

Supporting fire resistance data for security devices fitted to the door, such as swipe card systems or magnetic locks, should be checked to ensure their compatibility with fire doors. It is also advisable to check if a security device has been incorporated into a door of similar design. It may be that the item is already covered in the global assessment for the door. Any design features incorporated into the door to achieve a particular security rating (for example, impact resistance or burglary resistance) must also be tested/assessed to ascertain their effect on the fire-resistance performance of the door.

### 3.2 Cross-corridor doorsets

Cross corridor doorsets are often subject to more frequent usage and physical abuse than doors in any other areas of a health building and it is therefore vital that these doors are durable so that they will be able to perform their everyday function as well as having a greater probability of being able to maintain their fire resistance.

BM TRADA has developed a testing programme and certification scheme to classify doorsets for service-life and allow doors to be manufactured and specified to meet the needs of their end use application with minimal maintenance.

The testing programme is titled CDTM01 and utilises the most demanding elements from the following British and European Test Standards:

- DD 171: *Guide to specifying performance requirements for hinged or pivoted doors*
- BS EN 1191: 2000: *Windows and doors. Resistance to repeated opening and closing - test method*
- BS EN 1192: 2000: *Doors – classification of strength requirements*

- BS EN 12046-2: 2000: *Operating forces – test method – doors*

It is important to stress that the CDTM01 test method is not a means for demonstrating fitness for purpose for a fire door but rather a method to demonstrate that a verified fire door has a level of durability appropriate for a cross corridor doorset. In other words a fire door classified under the CDTM01 test programme will be suited for its end use as a cross corridor doorset but cannot be guaranteed to provide the intended level of fire resistance after 'X' years of operation. However, a fire door that has been classified under CDTM01 and subjected to heavy traffic as a cross corridor doorset will certainly be expected to stand a much greater chance of providing the required level of fire resistance, compared with a fire door that has not been classified under CDTM01.

The test programme incorporates a large number of performance characteristics that would be expected of a cross corridor doorset or a doorset that is likely to be subject to a high level of use and abuse.

Based on the performance under testing, doors can be classified against BS EN 12400: *Windows and doors – mechanical durability – requirements and classification*. The classification is expressed as a category of duty: severe, heavy, medium or light.

A doorset design that has been classified as 'severe' or 'heavy' under the CDTM01 programme could therefore be considered suitable for use as a cross corridor doorset in a hospital.

However, specific fire test or assessment documentation for the doorset will still be needed that supports the incorporation of design features that enhance durability such as large crash plates and edge protectors (which may be PVCu, ABS or metal) and plates that wrap around the edge of doors.

### 3.3 X-ray rooms

Depending on the layout and fire containment requirements, X-ray doorsets may be additionally required to provide fire resistance. In many circumstances, shielding from X-rays will be provided by a Code 3 lead lining (a British Standard lead thickness) located within the door. This lead detailing must be incorporated into a full-scale fire-resistance test in the positions required for its end-use application.

The National Radiological Protection Board (now subsumed under the Health Protection Agency) establishes and advises on shielding requirements, and specifiers should discuss project requirements with the local Radiological Protection Adviser.

**3.4 Doorsets to cleanrooms**

The fire test must be carried out incorporating the required facing and lipping material. Typically, this evidence would then be written into a global assessment for the door design. It must support the sizes and configurations for which it is intended. Changing the facing and lipping material may also affect performance features of the door, such as durability.

**3.5 High-security wards**

Safety and security features should either be assessed for their suitability with fire doors, or supported by test data if assessment is not possible. Typically, this information will be presented in the form of an assessment of performance (global assessment for the door design or specific for the project).

Examples of features that would be expected on a door within a high-security ward:

- Anti ligature hardware
- Removable doorstops – anti barricade
- Door protection systems – prevent trapping of fingers
- Multi-point locking systems
- Electric points and switch gear
- Privacy glazing that can be obscured from one side.

**3.6 Disability Discrimination Act (DDA)**

Many of the requirements of the DDA can be met by ensuring that the fire-resistance test/ assessment data for the door design supports the requisite area of glazing and the required minimum clear opening width of 750mm - 800mm (a wider door is required to allow easier manoeuvring where it is necessary for a wheel chair user to turn into a door opening, as opposed to approaching it head-on).

The necessary opening/closing force of the door, as outlined in the Act, can be fulfilled by fitting a fire-rated closer suitable for the door design, to provide the appropriate opening and closing force.

All DDA design considerations such as identification of the door, accessible thresholds, door positioning, hold open devices, hardware and further information on the features listed above, are given in Approved Document M, access to and use of buildings, Building Regulations 2000. Essentially a balance must be struck by ensuring compliance with the requirements of the DDA without detracting from the fire resistance performance of the door.

**3.7 Maintenance and repair**

Maintenance of fire resisting doorsets (and in fact all fire protection measures) should be incorporated within a planned programme of inspection as part of the overall fire safety strategy and management for the hospital. A well implemented maintenance programme not only helps to ensure longevity of the doorset but also pre-empts malfunction and defects before they occur.

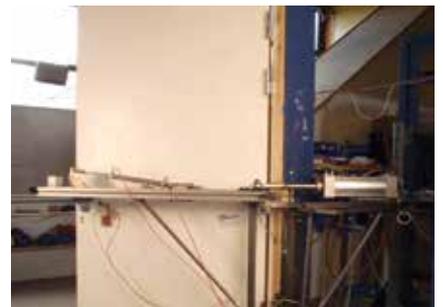
Should a fire resisting door require repair it is important that the remedial works reinstate both the operational function of the door as well as its fire performance. For this reason it is necessary that the person undertaking the works has a good knowledge of fire resisting doorsets and ideally has access to the manufacturers supporting information for the doorset in question.



Incompatible security hardware can have a detrimental effect on a fire door.



A double door subject to heavy traffic may drop on its hinges, preventing the leaves from fully closing.



An example of a doorset being subject to cyclic testing.



Doors used within health care buildings must demonstrate fire resistance performance to either BS 476: 22 1987 or BS EN 1634-1:2000.



Example of hardware used for restricted access.

All too often, well intended repair works carried out by personnel without a sufficient level of knowledge result in a detrimental impact on the fire resistance performance of the door; whether replacing glazed elements without the correct fire rated glazing seals or fitting incompatible hardware.

The ideal situation is to prevent damage from occurring in the first place. Damage is predominately caused by staff within the building transporting patients and goods and an important contribution to the condition of the door can be made if staff are encouraged to use the installation in a caring manner. This is especially important for personnel that use equipment and machinery that have a high risk of damaging the door such as pump trucks, trolleys, beds etc.

Careful planning can also help preserve the condition and integrity of fire doors, for example (not exhaustive):

- Providing recessed pockets in busy corridors within which the fire door is on a hold-open device wired to the fire detection system
- Fitting wheeled equipment with soft buffers to limit impact damage
- Delayed action closers to allow the passage of goods and persons with reduced mobility.

## 04 Summary

Any doorset within a hospital environment must serve its purpose, whether that be protecting patients in terms of cleanliness, reducing the risk of infection, or enhancing security.

However, the door must also provide protection in terms of fire resistance and, critically, compartmentation, particularly as hospitals often rely on phased evacuation of patients, where time is of the essence. Fire doors that provide the required level of compartmentation and meet the additional requirements of a modern hospital are therefore integral to safety in the public health sector.

## 05 How can BM TRADA help?

BM TRADA operates a UKAS accredited test laboratory offering fire resistance testing and assessment. In terms of health sector fire doors BM TRADA can:

- Produce documents based on test evidence that provide a scope of cover for hospital doors tailored to a particular specification
- Help develop an appropriate test programme for hospital doors or items that are not covered for a particular door design
- Arrange for third party certification (BM TRADA Q-Mark) of fire door manufacture or arrange for an additional scope of cover for those manufacturers who are currently BM TRADA Q-Mark members
- Present our On the Road seminar: Fire Doors for the Health Sector. Visit [www.bmtrada.com](http://www.bmtrada.com) for more details.
- Provide third party certification (BM TRADA Q-Mark) of fire door installation and maintenance.



An example of anti-ligature hardware.



Magnetic door stop. Fire doors on magnetic hold open devices linked to the fire alarm system provide good access and will help to meet the requirements of the DDA.



An example of a door protection system to prevent trapping of fingers.



Fire doors are key to progressive horizontal evacuation, a strategy often adopted in health care.

**06 References**

- Health Technical Memorandum 05-02: Guidance in support of functional provisions for healthcare premises – Department Of Health
- Health Technical Memorandum 58: Internal Doorsets – NHS Estates
- Approved Document B (Fire safety) – Building Regulations 2000
- Approved Document M (Access to and use of buildings) – Building Regulations 2000
- TI-11: CDTM01: Classification for Service Life – BM TRADA.



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testing@bmtrada.com



bmtrada.com



+44 (0) 1494 569800