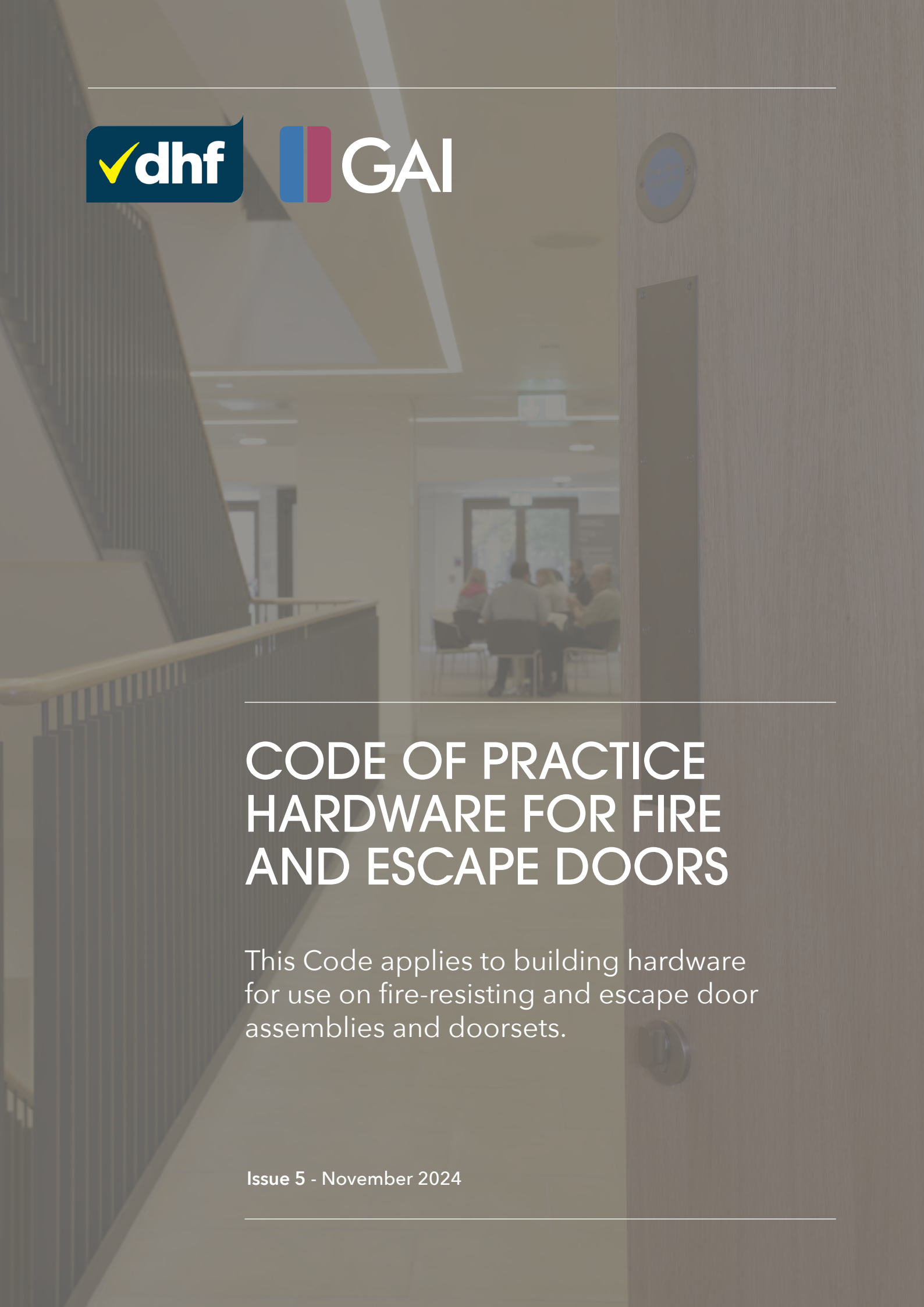

CODE OF PRACTICE HARDWARE FOR FIRE AND ESCAPE DOORS

This Code applies to building hardware for use on fire-resisting and escape door assemblies and doorsets.

Issue 5 - November 2024

CODE OF PRACTICE
HARDWARE FOR FIRE AND ESCAPE DOORS

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FOREWORD

This Code has been compiled by members of the Door and Hardware Federation (DHF) and Guild of Architectural Ironmongers (GAI), to provide advice on best practice in the selection of building hardware for use on fire-resisting and escape door assemblies and doorsets. The Code is aimed at architects, building control officers, fire officers, responsible persons and duty holders, together with manufacturers, specifiers and suppliers of building hardware.

The Code is advisory, and compliance does not imply immunity from any legal requirement, nor does it necessarily satisfy any special conditions which might be required by insurance companies or regulatory authorities.

The Code addresses the requirements of the latest legislation, at the time of publication, in the field including the Construction Products Regulations in both EU and UK, relevant Building Regulations throughout UK and Ireland, 2010 (England & Wales), Building (Scotland) Regulations 2004, Building Regulations (Northern Ireland) 2012 , requirements under the workplace fire safety legislation throughout UK and Ireland such as Regulatory Reform (Fire Safety) Order 2005) , and Equality legislation throughout UK and Ireland. Also considered are third party certification schemes and declarations of conformity with standards. For a list of relevant legislation see **Section 1.4**.

Previous issues withdrawn

This issue, no. 5, replaces the previous edition of the Code, issue 4, published in November 2012 and the previous codes of practice published by both the Association of Building Hardware Manufacturers and the Guild of Architectural Ironmongers, all of which have been withdrawn:

- ABHM Code of Practice, January 1983 Hardware essential to the optimum performance of fire resisting timber doorsets
- GAI Code of Practice, March 1986 Architectural ironmongery suitable for use on fire resisting self-closing timber and emergency exit doors
- ABHM Code of Practice, Issue 2, July 1993 - Hardware essential to the optimum performance of fire resisting timber doorsets
- GAI Code of Practice, Issue 2, September 1993 - Architectural ironmongery suitable for use on fire resisting self-closing timber and emergency exit doors
- ABHM/GAI (BHIF) Code of Practice, November 2000 - Hardware for timber fire and escape doors
- DHF/GAI Code of Practice, June 2006, Hardware for fire and escape doors
- DHF/GAI Code of Practice, July 2009, Hardware for fire and escape doors
- DHF/GAI Code of Practice, July 2012, Hardware for fire and escape doors

FOREWORD

A combined team from the DHF and the GAI has been responsible for this document. Technical enquiries should be directed to the GAI or DHF.

DHF and GAI would like to acknowledge the following organizations which were involved in the development of this Code of Practice:

- Abloy Security
- Access2
- Allgood
- ASSA ABLOY
- Automatic Door Suppliers Association (ADSA)
- CQR Fire & Security
- Dormakaba UK & Ireland
- Elite Hardware
- Em-B Solutions
- Eurobond Doors
- Glutz UK
- John Planck
- Lorient UK
- Salto Systems
- Selectrite Hardware
- Zoo Hardware

SECTION 1
INTRODUCTION

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1 INTRODUCTION

1.1 Scope

This Code applies to building hardware for use on fire-resisting and escape door assemblies and doorsets. The following are taken into account:

- timber fire doors of up to two hours fire resistance
- steel fire doors of up to four hours fire resistance

The building hardware items covered are all either:

- essential to the successful operation of the doors, or
- optional (non-essential) items which could cause a failure of the doors

Excluded from the scope of this document:

- Fire-resisting doors manufactured from materials other than timber or steel
- Revolving doorsets for fire resistance and/or escape

1.2 Terminology

Terminology used in this Code of Practice reflects common usage as far as possible. Where appropriate, terminology has been taken from the current British and European standards for building hardware.

1 INTRODUCTION

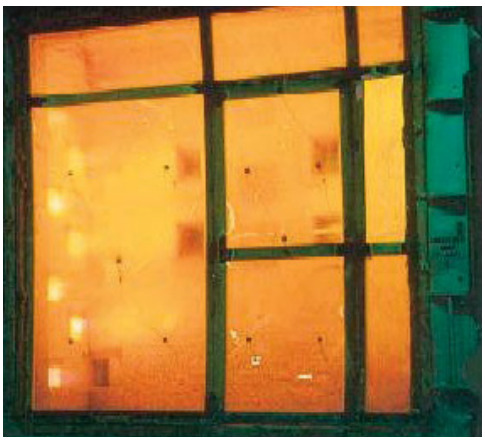
1.3 Commentary

1.3.1 Purpose of Fire-resisting Doors

Fire-resisting doors serve three main purposes in a building:

- To restrict the initial development of a fire - a correctly fitted and functioning fire-resisting door can help to suppress a fire by restricting the amount of oxygen available to it
- To restrict the spread of fire - a closed fire-resisting door is designed to endure direct attack by fire for a specified period of time. This should restrict the spread of fire through the building, gaining time for evacuation of the premises and for active fire protection resources such as sprinklers and fire fighters to perform their functions
- To protect escape routes - the provision of protected escape routes is a requirement of Building Regulations. Any door opening on to an escape route or operating across an escape route is likely to be designated as a fire-resisting door, to ensure that persons using the route have protection from fire while they escape

After evacuation, fire-resisting doors should continue to provide some protection for fire fighters entering the building to extinguish the fire.



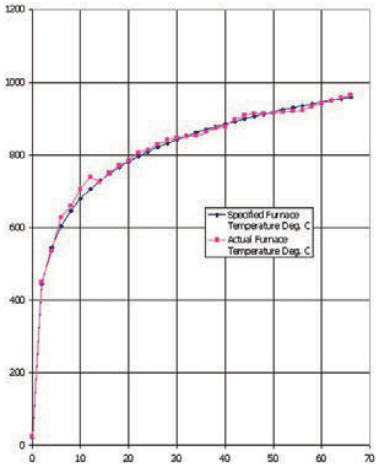
Glazed steel door and screen under fire test

1.3.2 Testing of Fire Doors

The testing and certification of fire-resisting doors is carried out under the requirements stated in:

- EN 1634-1, or
- BS 476-22

At the time of going to press, the UK government is completing the withdrawal of the National Classes BS 476 fire testing standards in England, ending a long period of dual specification, in favour of the EN 1634 European standard in Approved Document B (England) which will commence in September 2029. This implements the recommendation, made in the Hackitt Report, for a clearer, more transparent and effective testing regime. The government has stated there will be a transition period of five years for fire resistance (which will impact fire doors) to facilitate a smooth transition to the European standard. These transitional arrangements will also ensure that products already tested to the BS 476 standard (as well as assessments to this standard) can continue to be used during the transition period and the necessary retesting can be organised.



Time temperature curve EN 1634-1

1 INTRODUCTION

A doorset is built into masonry, partitioning or other walling system and then the whole assembly is offered up onto the front of a test furnace. Gas or oil burners provide the source of heat. The temperature in the furnace is controlled in accordance with the time/temperature curve specified in the Standard.

The pressure in the furnace is also controlled as specified in the standard so that the threshold and lower part of the doorset are exposed to negative pressure (tending to draw cool air into the furnace from outside) while the upper part of the door is subject to positive pressure (tending to force hot gases from the furnace through any apertures in the test specimen). BS 476-22 sets the neutral pressure axis at 1m from finished floor level (ffl), whereas EN 1634-1 sets the neutral pressure axis at 0.5 m above the floor.

In the UK, doors are sometimes tested with the minimum of building hardware fitted, typically:

- three hinges
- a door closer
- a lock or latch

Without smoke seals, smoke passes around fire doors in the early stages of a fire - note the unsealed right hand door

However, usually, the deadbolt is not thrown and the latch bolt may be wired back so that they play no part in holding the door closed. The door manufacturer is then able to test two configurations simultaneously:

- the door can perform its fire-resisting function without a latch or bolt (for unlatched applications relying on a door closer)
- locks of similar dimensions and materials can be fitted without compromising the door's fire resistance

Under both BS 476-22 and EN 1634-1 test regimes, a door withstands fire attack for a period of time, for example 36 minutes or 67 minutes, and for the purposes of regulations is then described as FD30, FD60, etc. (BS 476-22) or E30, E60, etc. (EN 1634-1).

Withstanding fire attack means not allowing flame or hot gases to pass. In other words, the doorset maintains its fire integrity.

Fire resistance classification using test data from EN 1634-1 is covered in EN 13501-2.

"Integrity" does not include passage of smoke, and, unless smoke seals have been fitted in addition to intumescent seals, then during the early stages of a timber door fire test, copious amounts of smoke are pushed through the gaps between the door and frame, and between the meeting stiles on pairs of doors, in the upper area. This is due to the positive pressure in this area of the door. Where doors have intumescent seals fitted, and these have activated and expanded in the gaps around the door(s) and frame, the smoke penetration is reduced to almost zero, until the door assembly reaches the end of its ability to withstand fire attack, and new gaps open, due to warping of the door, or burn-through.

1 INTRODUCTION

EN 1634-1 is significantly different from BS 476:22 in its test regime, so results from one type of test are not directly applicable to the other. Where an item of door hardware has been included in tests to BS 476:22, and it is intended for use on a door tested to EN 1634-1, new relevant test data will be needed.

More recently, hardware can be subjected to a test in accordance with:

- EN 1634-2 Fire resistance characterisation test for elements of building hardware

The results of this small-scale test regime may be used for hardware to be used on doors of similar construction, which were tested to EN 1634-1. Without smoke seals, smoke passes around fire doors in the early stages of a fire - note the unsealed right hand door.

1.3.3 Testing of Smoke Doors

Smoke doors in the UK are currently identified by the suffix 'S', for example FD30S or E30Sa, as in Approved Document B to the Building Regulations in England and in Wales. It is usually a fire-resisting door of designated duration, with a smoke seal added to the frame or door edge (normally sides and top only). The assembly is tested to BS 476-31.1 or EN 1634-3, to determine its leakage rate. This is not part of the fire test, and is conducted at ambient temperature, with no heating of the smoke or doorset.

The report provided after testing will indicate the total length of interruptions in the perimeter smoke seal due to building hardware such as hinges and lock strikes. Therefore the specifier of building hardware for a smoke door must ensure that the fittings selected will not create a greater total length of interruptions in the seal. Example: if the tested doorset's frame-fixed smoke seal was interrupted by:

3 x hinges @ 100 mm height =	300 mm
1 x strike plate @ 220 mm height =	220 mm
Total length of interruptions =	520 mm

The specifier must find out if the seal is to be fitted to the frame or the door and then ensure that building hardware, fitted on the same surface, does not exceed the allowance for interruptions indicated in the test report. Some seals incorporate fins which bypass the hardware or they are fitted into the rebate of the frame, thus removing the problem.

EN 1634-3 covers both cold smoke (similar to BS 476-31.1) and medium temperature (200°C) smoke.

1.3.4 The role of building hardware in fire-resisting doors

Some items of building hardware are essential to ensure that fire- resisting doors stay closed in their frames in a fire emergency. Products fitted as "Essential" items include:

- pivots or hinges - these attach the door onto the frame, and hinges might also help to stop it bowing
- a door closing device - e.g. an overhead door closer or floor spring ensures that the door closes reliably and stays shut
- and/or a latch/lock - in some cases, a latch or lock takes on the role of holding the door shut (in lieu of the door closing device)
- Intumescent seals
- Smoke seals (as and when required)
- panic bolts and other emergency exit devices to normally locked internal fire doors on escape routes

These items must be carefully selected to ensure that they will perform their role satisfactorily. Most other items of building hardware on the door perform a function not directly associated with its fire performance ("non-essential"), but they must in no way impede or reduce the door's ability to withstand fire attack for the specified time. This also requires careful selection. Too often, holes are drilled through timber fire doors, and large metal components are attached, with no thought as to the consequences.

For steel doors, care must be taken to ensure that non-metallic materials, such as plastics, on the unexposed face of the door will not support combustion, due to the relatively high temperatures reached on this type of door. Many ancillary items might not have been included in fire tests, and there might be no evidence to show whether or not they affect fire-resisting door performance. Also, it cannot be assumed that building hardware tested on timber fire-resisting doors will necessarily perform successfully on steel doors, and vice-versa.

Door hardware, that has been included in successful fire tests, has reached one goal, but there is an additional goal - durability. When fire tested, the door, the seals and hardware are brand new, and no significant cycling (opening and closing movements) takes place before the test.

Those items performing a role essential to the successful operation of fire-resisting doors - hinges, closing devices, latches or locks - should be chosen for their ability to cope with the intended use of the door. If hinges collapse, a door closer weakens or a latch wears badly, it is unlikely that the door will maintain its essential self-closing function. This, of course, will defeat the main purpose of the fire door placing the safety of people and property at risk.

Door hardware is available to meet a variety of performance and durability levels. Selection of appropriate products will save on maintenance costs and, when put to the ultimate test, will save lives.

Similarly, door hardware fitted to escape route doors must allow the occupants of a building to make their escape safely to a place outside the building. The exact functional requirements will vary according to the circumstances and must be decided on the basis of a risk assessment. However, the building hardware, particularly the hinges and the emergency/panic exit devices, must always have sufficient strength and durability to remain effective for an economically reasonable working life under the prevailing conditions. Failure of the building hardware to perform properly when required could result in occupants being injured while attempting to escape, or even trapped, with potentially fatal consequences.

1 INTRODUCTION

1.4 Relevant Guidance and Legislation

1.4.1

The Building Regulations (England) 2010 - Approved Document B - (Fire safety) Volume 1: Dwellings (2019 edition incorporating 2020 and 2022 amendments) and Volume 2: Buildings other than dwellings (2019 edition incorporating 2020 and 2022 amendments).

1.4.2

The Building Regulations (Wales) 2010 - Approved Document B - (Fire safety) Volume 1: Dwellinghouses (2006 edition incorporating 2010, 2016 and 2020 amendments) and Volume 2: Buildings other than dwellinghouses (2006 edition incorporating 2010, 2013, 2016, 2017 and 2020 amendments).

1.4.3

Building (Scotland) Regulations 2004 (as amended) – Building standards technical handbook 2022: domestic and Building standards technical handbook 2022: non- domestic

1.4.4

Building Regulations (Northern Ireland) 2000 - DFP Technical Booklet E: 2017 - Fire Safety

1.4.5

Building Standards (Republic of Ireland) - Technical Guidance Document B 2024 - Fire Safety – Volume 1 Buildings other than Dwelling Houses (March 2024) and Technical Guidance Document B - Fire Safety- Volume 2 Dwelling Houses (2017).

These national regulations and their associated technical documents set out the requirements for the design and construction of buildings so as to secure reasonable standards of health and safety for persons in and around the building.

The specific documents listed above contain the detail relating to fire safety, including provisions relating to fire-resisting doors and escape routes. Fire resistance requirements for doors are currently specified by reference to BS 476-22 or to EN 1634-1.

The following schemes are recommended in statutory guidance across UK and Ireland as means of certifying that materials comply with relevant standards:

- independent product certification schemes
- approved installer schemes

Approved Document B in England also states that one way of demonstrating that appropriate materials have been used is to use products bearing the appropriate conformity mark (such as UKCA / CE mark).

There are requirements in all jurisdictions for accessibility which include provisions for many fire-resisting doors to be “accessible” and therefore place limits on the maximum opening forces for manually operated doors.

Such provisions as they affect fire-resisting doors, are considered in detail in **Section 11**.

Statutory guidance documents such as Approved Documents B (Fire safety) and M (Access to and use of buildings) as well as similar UK and Ireland statutory guidance are intended to provide guidance for some of the more common building situations. However, there may well be alternative ways of achieving compliance with the requirements. There is no obligation to adopt any particular solution contained in such guidance if you prefer to meet the relevant requirement in some other way. The guidance relates only to the particular requirements of the Regulations which that document addresses.

1 INTRODUCTION

1.4.6 The Construction Products Regulations 2013 (as amended)

The Construction Products Regulations 2013 (as amended) These regulations implemented Regulation (EU) 305/2011 in UK law. They made it illegal to supply any construction product within the scope of a harmonised standard unless it complied with the conformity marking requirements of said standard.

The relevant essential requirements as far as fire-resisting doors and emergency exit doors are concerned are:

- Safety in case of Fire
- Safety in Use

This provision is in force for all products and prosecutions have been brought in the UK for the offence of supplying products which do not comply. The 2013 Regulations made conformity marking of construction products mandatory in the UK and later amendments introduced UKCA marking post-Brexit. For further details please see **Section 17** on product standards and definitions.

1.4.7 The General Product Safety Regulations 2005

These regulations govern any aspect of the safety of a consumer product not already covered by specific legislation such as 1.4.6. It is an offence to supply an unsafe product unless it can be shown that the supplier had in fact taken all reasonable steps to ensure its safety. The regulations also place obligations on producers and distributors in relation to keeping records of safety-related complaints and notifying the authorities if unsafe products have been supplied. Please see further details on its application for Great Britain and Northern Ireland.

Product Type	Harmonised/ designated standards	Locations
Emergency Exit Hardware	EN 179	• Locked door on escape routes • Fire / smoke doors
Panic Exit Hardware	EN 1125	• Locked door on escape routes • Fire / smoke doors
Single Axis Hinges	EN 1935	• Locked door on escape routes • Fire / smoke doors
Controlled Door Closing Devices	EN 1154	• Fire / smoke doors
Electrically Powered Hold Open Devices	EN 1155	• Fire / smoke doors
Door co-ordinators	EN 1158	• Fire / smoke doors
Locks and Latches	EN 12209	• Fire / smoke doors
Electromechanically operated locks and striking plates	EN 14846	• Fire / smoke doors

1.4.8 UK Fire and Building Safety Regulation

- Regulatory Reform (Fire Safety) Order 2005 (England & Wales)
- Fire (Scotland) Act 2005
- Fire Safety (Scotland) Regulations 2006
- Fire and Rescue Services (Northern Ireland) Order 2006
- Fire Safety Regulations (Northern Ireland) 2010
- Building Safety Act 2022

In brief, these regulations require building owners and operators to conduct risk assessments on the buildings under their supervision to ensure the following:

- hazards which could cause a fire are minimised or removed
- material which could fuel a fire is carefully and appropriately stored to minimise risk
- appropriate fire-fighting equipment is provided
- building occupants are trained in fire emergency procedures
- suitable and sufficient fire escape routes and doors are provided
- the building is maintained to continue or improve its original fire- resisting construction
- the fire safety of the building is maintained through regular checks
- fire escape routes are maintained to provide a continuously high level of operational availability

This list is not exhaustive, but gives an insight into the wide-ranging responsibilities which have been transferred from other agencies, such as the Fire Service, to building owners and operators. Users of this Code of Practice will find its guidance on suitable products, the standards to which they should conform, and the recommendations on their maintenance, of great help in fulfilling responsibilities they might have in connection with this legislation (see also **Section 13**).

Note that Section 156 of the Building Safety Act 2022 has made amendments to the Regulatory Reform (Fire Safety) Order 2005 (FSO), which sees the enforcement of new fire safety guidance to all buildings which are regulated by the FSO.

Similar provisions to the above may be found in the Safety, Health and Welfare at Work Act 2005 for Republic of Ireland.

1.4.9 The Workplace (Health Safety and Welfare) Regulations 1992

These regulations require employers to provide safe workplaces including doors, which are safe in use (regulation 18). There is also a requirement to maintain the workplace and its equipment in a safe condition (regulation 5). The safety of the doors in the workplace is to be determined by risk assessments.

This applies to Great Britain but similar content is referred to in the Workplace (Health Safety and Welfare) Regulations 1993 in Northern Ireland.

1.4.10 The Construction (Design and Management) Regulations (Northern Ireland) 2016

These regulations are aimed at securing minimum health and safety requirements at construction sites. The client, developer, CDM co-ordinator and contractors are all required to undertake their duties in a way which avoids foreseeable risks to persons engaged in construction or cleaning work at any time, including after the building has been handed over to the client. The CDM co-ordinator is required to prepare a health and safety file containing information relating to the project which is likely to be needed during any subsequent construction work to ensure the health and safety of any person. This file is to be handed over to the client who must ensure that it is kept available for the use of any person who might need the information and that it is passed on to subsequent purchasers of the premises. Among the information contained in the file should be details of fire compartmentation and fire exits.

1.4.11 The Equality Act 2010 (England, Wales, Scotland)

This act incorporates the provisions of the former Disability Discrimination Act. The Act requires service providers to take reasonable steps to tackle physical features of premises, like steps or narrow doorways, that prevent, or make it unreasonably difficult for, disabled people to access their services. Similar provisions are contained in the Disability Discrimination Act 1995 which was retained in Northern Ireland and the Equal Status Acts 2000-2018 in Republic of Ireland.

1.5 Documentation

The following documents are considered acceptable as evidence of suitability of building hardware for incorporation into a fire-resisting doorset or door assembly:

- third party certification of the building hardware
- fire-resisting doorsets' third party certification data sheet
- fire test reports, or
- assessment by competent authority.

Durability of building hardware, whether for use on a fire resisting door or an emergency exit door, may be evidenced (in order of preference) by:

- Conformity marking (such as UKCA / CE mark) in accordance with relevant harmonised/designated product standard (where available), and
- Manufacturer's Declaration of Performance, or
- third party EN test report, or
- third party BS test report

Further information is contained in Passive Fire Protection Forum (PFPF) Guide to undertaking technical assessments of fire performance of construction products based on fire test evidence 2021. Additional sources of information are product labelling (fire performance/ durability) and the instructions for fixing, commissioning and use which are available from product manufacturers.

1 INTRODUCTION

1.5.1 Building Hardware Certification

Voluntary third party certification schemes such as CERTIFIRE are available for passive fire protection products. Such door hardware schemes may cover performance under fire test; durability (against relevant EN or BS standards) and quality assured manufacture under the ISO 9000 regime. The certificate issued for each product will give details on the scope of the product's certificated use on various fire-resisting door types.

It should be noted that conformity marking (such as UKCA / CE mark) of certain construction products require mandatory conformity assessment by a notified/ approved product certification body. This service may be available from the same body as the voluntary third party certification referred to above.

1.5.2 Fire-resisting Door Certification

There are several fire-resisting door certification schemes. These include BWF Fire Door Alliance, BRE Certification and BM TRADA, each of which includes schemes for both timber and steel doors. Such doors are supplied with information covering their installation.

Door hardware is also addressed in these documents, and descriptions are given of the type, material, dimensions and fixings of building hardware which may be used on the door without invalidating the certification. If the selected fittings fall outside the scope of the data sheets, they will invalidate the door's certification, and possibly its fire resistance.

It should be noted that conformity marking (such as UKCA / CE mark) of certain construction products such as external doorsets require mandatory conformity assessment by a notified/approved product certification body. This service may be available from the same body as the voluntary third-party certification referred to above.

1.5.3 Fire Test Reports

These should:

- be relevant to the particular installation being considered (including supporting construction)
- name the product clearly and unambiguously
- relate to doors and frames which are generically the same as the ones proposed in the project
- be current

Fire test reports are complex technical documents and should only be used by those who are competent to interpret what is reported in the document.

It can be easy to overlook a vital aspect of the test which limits the field of application of the result. For example, a closer tested on a door which was latched closed is not proven as suitable for the same door in unlatched condition.

1.5.4 Field of Application Summary

This document is a digest of information extracted from the fire door test reports and accepted fire engineering principles to provide a full scope of approval for manufacture. It is intended for use by the sponsor and fire performance certification providers. Manufacturers in turn, provide fire door certification data in accordance with this document

1.5.5 Assessments

These are usually written in much more user-friendly language than fire test reports. They are written by test laboratories and are based on test evidence as well as the assessor's experience.

1.5.6 International Test Evidence

An international technical specification, including those prepared by ISO, or a national technical specification of a country other than the UK, may be used to demonstrate that a product not covered by a harmonised/designated European Standard meets the performance requirements of relevant regulations.

It should be noted that fire tests in other countries are typically conducted in the context of local building regulations, national practices and locally available materials which may not provide data applicable to UK situations.

1.5.7 Performance Standards

By using EN Standards for building hardware, its performance for fire-resisting doors and emergency escape doors can be quantified in any or all the following areas:

- Category of use
- Durability
- Door size/mass
- Fire resistance
- Safety
- Corrosion resistance
- Security

European building hardware standards typically use a classification system in which the first seven digits are common. Each digit relates to a feature of the product measured against the requirements of the relevant standard.

An example of their use taken from EN 1935 – Single axis hinges; (other building hardware standards are generally similar):

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6	Digit 7
Category of use	Durability	Door size/ mass	Fire resistance	Safety in use	Corrosion resistance	Security

1 – Category of use

Grade 1 – Light duty
Grade 2 – Medium duty
Grade 3 – Heavy duty
Grade 4 – Severe duty

2 – Durability

(Out of possible grades 1-8, only 3,4 & 7 are used in this standard)
Grade 3 – 10,000 test cycles
Grade 4 – 25,000 test cycles
Grade 7 – 200,000 test cycles

3 – Door size/mass

Grade 1 – 20 kg
Grade 2 – 40 kg
Grade 3 – 60 kg
Grade 4 – 80 kg
Grade 5 – 100 kg
Grade 6 – 120 kg
Grade 7 - 160 kg

4 - Fire resistance

Grade 0 - not approved for use on fire / smoke door assemblies

Grade A - suitable for smoke door assemblies - subject to test evidence

Grade B - suitable for fire and smoke door assemblies - based on a test in accordance with EN 1634-1

5 - Safety in use

Grade 1 - safe (only acceptable grade)

6 - Corrosion resistance

Based on the grades given in EN 1670
Grade 0 - none
Grade 1 - mild
Grade 2 - moderate
Grade 3 - high
Grade 4 - very high
Grade 5 - extremely high

7 - Security

Grade 0 - not suitable for burglar-resistant doors

Grade 1 - suitable for burglar-resistant doors, subject to test evidence. Certain products may carry additional classification digits for parameters specific to those devices.

British Standards for products outside the scope of the ENs might not cover all of these categories. Reference must be made to each standard with which a product claims compliance. In the product section of this Code of Practice, relevant standards for each product are listed.

SECTION 2
HINGES

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2 HINGES

2.1 Introduction

When hinges are used in a fire-resisting door, the door leaf should be hung on single or multi axis hinges in accordance with local and national building regulations.

Hinges fitted to fire-resisting doors should be able to achieve the intended fire rating and allow a door closing device (with the exception of floor springs or transom closers), when fitted to a fire-resisting door assembly, to close the door leaf reliably and completely from any angle to which it has been opened, including overcoming the resistance of any type of latch or any seals when fitted.

Where hinged doors are on escape routes the specification of suitable hinges is of the utmost importance. This will help the occupants of that building to escape quickly and easily in the case of an emergency.

Generally, all doors on escape routes should open in the direction of travel (see panic and emergency exit section for more detailed information).

At the same time, where panic and emergency exit doors are part of the final exit from a building, there may be additional requirements for security of those doors against intrusion and burglary. In this case, any hinge should be of such a design so that it cannot be removed or parted whilst the door is closed, whilst also ensuring that the building and its contents are secure against unauthorised entry.

Where panic and emergency exit route doors are part of the fire compartmentation of a building, there will be additional requirements to ensure that the hinges fitted do not compromise the fire-resisting performance of the doors.

2 HINGES

2.2 Critical Recommendations

Except where otherwise noted, these recommendations apply both to hinges for fire-resisting door assemblies and to those fitted to doors on panic / emergency exit routes.

2.2.1

Hinges placed on the market must have the appropriate conformity marking (such as UKCA / CE mark, see **section 17** for further details) to EN 1935 – Single axis hinges, are preferably provided with additional product certification by a third-party certification body.

2.2.2

When used on fire-resisting doors the product must have demonstrated its ability to be suitable for the intended purpose, by inclusion in satisfactory fire test to EN 1634-1 or EN 1634-2 on a type of door assembly and configuration in which it is proposed to be fitted.

A Conformity Assessment Body (CAB) should provide this evidence.

2.2.3

The strength and features must be correct for the size of door and mass to which it is to be fitted, bearing in mind:

- The application of the door (main entrance, office, toilet lobby, duct door etc.)
- Size (height and width) and mass (weight) of the door number and fitting position of hinges
- Whether subject to factors such as heavy traffic use, abusive treatment
- Whether or not a door closer is being used and whether special functions such as backcheck or cushion stops are being included
- The position of a door stop if being used (position on floor or wall in relation to the width of the door)
- Whether the door is on an accessible route and therefore needs to satisfy local or national building regulations (see **Section 13** for details)
- Whether the hinges will be liable to corrosion. For instance, externally on seldom used escape doors or in swimming pool and similar damp environments

2 HINGES

2.2.4

A regular program of maintenance must be undertaken to ensure that the correct operational performance of the hinges is maintained for the life of the building (see **Section 16**).

2.2.5

Rising butt hinges are NOT recommended for use on fire-resisting doors (see **2.3.6**).

2.2.6

Spring hinges are NOT recommended for use on fire-resisting doors (see **2.3.8**).

2.2.7

For timber doors and frames, fixing screws should be not less than size No.8 (3.8 mm) and not less than 30 mm in length (see also **2.3.9**). For steel doors the dimensions may vary according to the method of fixing in accordance with their individual test report.

2.2.8

Hinges for use on final exit escape doors should have a corrosion resistance of not less than Grade 3 of EN 1670.

2.2.9

Conformity Marked (such as UKCA / CE mark) hinges should be marked according to clause ZA.3 of EN 1935.

Hinges on potential fire or escape route doors which have become badly worn

2 HINGES

2.3 Commentary

2.3.1 Melting Point

BS 9999 Fire safety in the design, management and use of buildings – Code of practice states "Unless shown to be satisfactory when tested in accordance with BS 476-22, EN 1634-1 or EN 1634-2, no part of a hinge on which any fire door is hung, which provides the means of support at the hanging edge, should be made either of combustible material or of non-combustible material having a melting point of less than 800 °C."

2.3.2 Sizes

Hinges are available in a range of sizes, which relate to the mass and size of the door. These are set out in Table 1 of EN 1935, which is shown below.

Clearly, an important factor is the size of the hinge with respect to the door mass. Due to the production processes, variations of hinge dimensions and fixing methods cannot generally be accommodated on a steel door. Steel door manufacturers generally provide their own hinges, which otherwise comply with these requirements, as part of the fire-resisting steel doorset and these are covered by evidence of performance.

2.3.3 Torque

The torque between the two hinge leaves is important. Limits of this torque are set down in EN 1935; a low torque requirement of the hinge is necessary to allow the door closing device to overcome the resistance of the latch bolt and/or seal pressure. The requirements range between 2 Nm and 4 Nm dependent on the grade of hinge from 7 to 14. Hinges fitted on fire-resisting doors that are on accessible routes should have the lowest possible torque. (For more details see **Section 13**).

Digit 1			Digit 2		Digit 3		Digit 4	Digit 5	Digit 6	Digit 7	Digit 8
Category of use			Endurance Test Cycle		Test Door Mass		Fire	Safety Resistance	Corrosion	Security Resistance	Hinge Grade
Duty	Grade	Use on	Grade	No of test cycles	Grade	Mass Kg	Grades	Grade	Grade	Grade	Grade
Light	1	Window	3	10,000	0	10	0 or 1	1	0,1,2,3,4	0 or 1	1
Light	1	Window	3	10,000	1	20	0 or 1	1	0,1,2,3,4	0 or 1	2
Light	1	Door/ Window	4	25,000	1	20	0 or 1	1	0,1,2,3,4	0 or 1	3
Medium	2	Door	7	200,000	1	20	0 or 1	1	0,1,2,3,4	0 or 1	4
Light	1	Window	3	10,000	2	40	0 or 1	1	0,1,2,3,4	0 or 1	5
Light	1	Door/ Window	4	25,000	2	40	0 or 1	1	0,1,2,3,4	0 or 1	6
Medium	2	Door	7	200,000	2	40	0 or 1	1	0,1,2,3,4	0 or 1	7
Light	1	Window	3	10,000	3	60	0 or 1	1	0,1,2,3,4	0 or 1	8
Light	1	Door/ Window	4	25,000	3	60	0 or 1	1	0,1,2,3,4	0 or 1	9
Medium	2	Door	7	200,000	3	60	0 or 1	1	0,1,2,3,4	0 or 1	10
Heavy	3	Door	7	200,000	4	80	0 or 1	1	0,1,2,3,4	0 or 1	11
Severe	4	Door	7	200,000	5	100	0 or 1	1	0,1,2,3,4	0 or 1	12
Severe	4	Door	7	200,000	6	120	0 or 1	1	0,1,2,3,4	0 or 1	13
Severe	4	Door	7	200,000	7	160	0 or 1	1	0,1,2,3,4	0 or 1	14

Table 1: EN 1935 Classification Summary

2 HINGES

2.3.4 Number and Position of Hinges

In all cases reference should be made to the evidence of the fire door manufacturer's compliance. The necessary information should be on the fire door's data sheet or field of application report.

It is usual for at least 3 hinges to be fitted on fire and escape route doors. With fire-resisting doors becoming heavier, there is a practice to fit two hinges at the top of the door with the third hinge at the bottom of the door. It is unsafe to alter the "as tested" position of a hinge on a fire door, without assessment from a suitably qualified authority.

For doors heavier than 160 kg or exceeding 2000 mm in height and 1000 mm in width, a recommendation from the hinge and/ or door manufacturer should be obtained.

Annex D of EN 1935 gives additional advice regarding the use of hinges on doors of excessive width (A wide door is one where the width is more than half the height).

2.3.5 Influence of Door Closing devices

Door closers put extra stress on hinges, which has significance for fire-resisting and escape doors. This has been addressed in EN 1935, annex E, as follows:

> *"For a standard door closing device it is recommended that the door mass should be notionally increased by 20%. The effect of a backcheck door closing device is greater and it is recommended that the door mass should be notionally increased by 75%."*

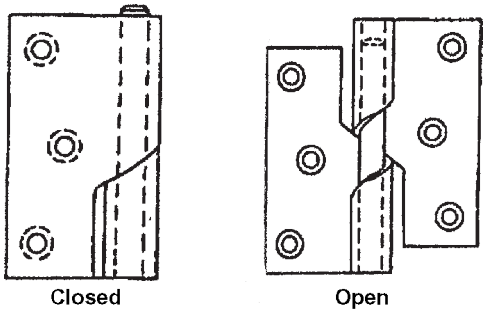
2 HINGES

2.3.6 Rising Butt Hinges

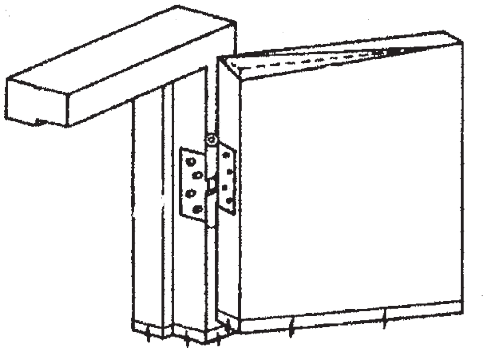
BS 9999 does not accept rising butt hinges as a door closing device for fire doors. In this Code of Practice, the use of rising butt hinges is discouraged from the fire resistance viewpoint for the following reasons:

a) To enable the timber fire door to function properly, it is necessary to ease the top edge of the door sufficiently to allow for the rise of the butt. When the door is returned to its closed position, this means that a gap in excess of 9 mm will exist at the head of the door. This will be in addition to the 3 mm gap, which is the recommended maximum for fire doors, making a total of 12 mm where the thickness of the door stop is only 12 mm. The head of the door is the most vulnerable point of the door if a fire breaks out. It is at this point that the pressure of smoke and hot gases, searching for cracks and fissures through which to escape, is highest.

b) The closing force exerted by rising butt hinges is extremely low and will not overcome air pressure differences or resistance from latches, seals or carpets that might be fitted, and therefore they cannot be considered as reliable door closing devices (see **3.3.9**).



Rising Butt Hinge



Rising Butt Hinge - special preparation at top of door

2.3.7 Lift-off, Loose Pin and Journal Supported Hinges

Only hinges which require a special tool to separate the hinge leaves when the door is in the closed position may be used (this prevents the fire-resisting door from being removed by unauthorised persons).

Lift-off hinge

2 HINGES

Double action spring hinge

2.3.8 Spring Hinges – Single and double action

Such hinges come in many forms. The common factor with hinges of this type is the large amount of metal incorporated in their construction. This may lead to early integrity failure in a timber door. In addition, the spring tension which acts as an integral self-closing device has an inherently low resistance to pressure in the closed, or near closed, position, making it difficult for such hinges to hold the door in the closed position without the assistance of a latch (see **3.3.8**).

2.3.9 Fixing Screws

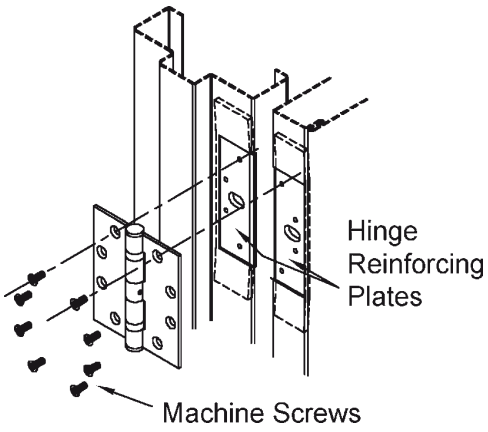
Although it is possible to use very short screws when fixing hinges to timber doors it is obvious that this must stress the construction - even in the "cold" state. When fire develops, a short screw will lose its holding ability more quickly than a long one, due to charring of timber around the hole. This is why screws used for fixing the hinges should be no less than 30 mm long. The fire test evidence or assessments should also be examined.

Increasingly, fire doors are being manufactured with Graduated Density Core materials. These require a longer fixing screw of at least 50mm. If there is any doubt, advice should be sought from the door manufacturer regarding the material of the door core.

The diameter of the screw will also play a significant role in supporting the door particularly in fire. It is also strongly recommended that no screw in a timber door should have a diameter of less than 3.8 mm (No.8).

It is recommended that the torque applied to the fixing screws should be not greater than 6 Nm per screw to prevent stripping the timber and that full thread type of screws be used. Care should be taken to ensure that the fixings do not penetrate the brickwork unless the brickwork is prepared to receive the screw otherwise the screw thread might be stripped.

For steel doors, hinges should be fixed with machine screws which are screwed into steel reinforcing plates provided in the door and the frame.



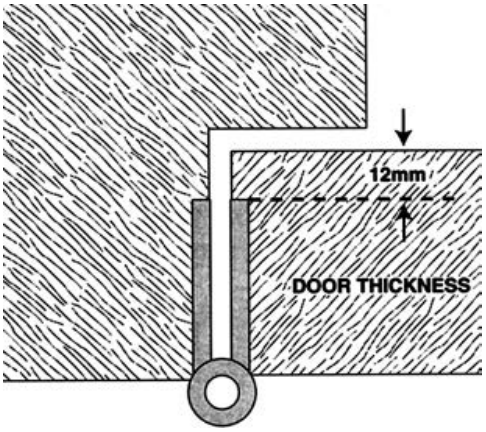
Hinge reinforcing plates for steel doors and frames

2 HINGES

2.3.10 Thermal Bridging

Except where there is satisfactory fire test evidence to prove performance, it is recommended that for timber door leaves of 44 mm thickness no part of the hinge should extend across the door thickness to a position closer than 12 mm from the non-pivoting face.

For timber door leaves of 54 mm thickness no part of the hinge should extend across the thickness to a position closer than 18 mm from the non-pivoting face (see also **2.3.13**).



Limiting thermal bridging

2.3.11 Door Stops and Hold Open Devices

These can put extra stress on the hinge and the hinge fixings, especially when the door is pulled to over-ride the hold open, or pushed against a door stop fitted near the middle of the door, or even closer to the hinges.

It is recommended that the hold open device should be positioned in the same horizontal plane as the door closing device and as near to the edge of the locking stile as possible if it is not incorporated in a door closer. Door stops should also be positioned as near to the locking stile edge as possible, whilst taking care not to create a tripping hazard.

2.3.12 Door Preparation

To ensure the accuracy and position of the hinge rebates in the door leaf and door frame it is recommended that they be machined in position at the door manufacturing stage.

2.3.13 Intumescent Protection

If intumescent material was used when the hinge was fire tested, it is essential that the same material be used in order for the test evidence to be valid and maintain the integrity of the door set. Advice should be obtained from the door, hinge or intumescent supplier as to the type, position and fixing method to be used (see also **Section 11: Fire and Smoke Seals**).

2.3.14 Conductor Hinges

For further information see **4.3.5.2, Electrically Powered Hold-open Devices**.

For further information see also the Best Practice Guide:

- **Single Axis Hinges to BS EN 1935;**

published by the DHF and included on the DHF website.

Further information on hardware for fire and escape doors is available from the GAI website.

www.dhfonline.org.uk **www.gai.org.uk**

SECTION 3
DOOR CLOSING DEVICES

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3 DOOR CLOSING DEVICES

3.1 Introduction

Fire-resisting doors (other than those to locked cupboards, service ducts, and internal doors in flats and dwelling houses) are usually required to be self-closing, in accordance with building regulations.

Door closing devices fitted on fire-resisting doors must be able to:

- close the door leaf reliably from any angle to which it has been opened
- overcome the resistance of a latch or any seals if installed

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 doors to achieve their 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.

For the purpose of this Code of Practice door closing mechanisms are divided into the following categories:

- Face-fixed closers - overhead mounted
- Face-fixed closers - jamb mounted
- Concealed closers – door leaf mounted
- Concealed closers – transom mounted
- Concealed closers - jamb mounted
- Floor springs - floor mounted
- Spring hinges
- Rising butt hinges

Note: This list does not imply suitability of any device for fire door use - see **3.2** and **3.3** for further information.

3 DOOR CLOSING DEVICES

3.2 Critical Recommendations

3.2.1

If placed on the market after 1 July 2013, the controlled door closing device and its accessories:

- must be conformity marked (such as UKCA / CE mark) to EN 1154 - Building hardware - Controlled door closing devices, including annex A
- and preferably, should be provided with additional product fire certification by an approved third party certification body

(For further information on certification schemes see **1.5 Documentation**).

3.2.2

The product and any accessories must have demonstrated their suitability for the intended purpose, by inclusion in satisfactory fire tests to EN 1634-1 or EN 1634-2, on a type of door and the configuration in which it will be used. This evidence should be provided by an approved third party certification or testing body. (**See 1.5 Documentation**).

3.2.3

The strength and features of the control must be correct for the size of door to which it is fitted, bearing in mind:

- Door size and mass
- the application to the door (see **3.3.3**)
- whether subject to other factors such as differential air pressure, draughts, heavy traffic use, abusive treatment
- whether door is to be latched or unlatched
- whether smoke or other seals are fitted to the door
- whether the door is on accessible route and therefore needs to satisfy Building Regulations (such as Part M in England) and should also satisfy BS 8300-2 (see **Section 13** for details)

For further information see **3.3.1.**

3.2.4

Face fixed overhead controls should NOT be used on unlatched doors where the arm assemblies or components are made of material with a melting point of less than 800°C unless proven by specific tests (see **3.3.4**).

3.2.5

Concealed overhead controls should NOT be used unless they are provided with any specially designed and proven intumescent protection (see **3.3.7**) which must be as detailed in the fire test report or field of application data sheet.

3.2.6

For floor springs, strap accessories are preferred (see **3.3.10**).

3.2.7

Spring hinges, which are purely spring operated and do not control the closing speed, are unable to comply with EN 1154 and therefore should NOT be used on fire doors designated as self-closing (see **3.3.8**).

3 DOOR CLOSING DEVICES

3.2.8

Rising butt hinges which are gravity urged and do not control the closing speed, are unable to comply with EN 1154 and therefore should NOT be used on fire doors designated as self-closing (see **2.3.6** and **3.3.9**).

3.2.9

Manually operated mechanical hold-open devices (i.e. mechanisms which must be released manually) SHOULD NOT BE USED ON FIRE DOORS (see **3.3.2**).

3.2.10

The automation of fire-resisting doors must not detract from their essential primary function as a fire door. The device should meet all critical criteria applicable to self-closing devices (please refer to **3.3.11 Powered Swing Door Operators** for further detail).

3.2.11

A regular programme of maintenance and inspection must be undertaken to ensure that the correct operational performance is maintained for the life of the building (see **Section 16**).

3.2.12

UK Government in Approved Document B in England (with similar wording throughout remainder of UK statutory guidance) states the following in respect of Self-closing devices: "A self closing device is a device that closes a door, when open at any angle, against a door frame."

To achieve this safely, it is our recommendation that a controlled door closing device which has been tested and is conformity marked to EN 1154 be used.

3 DOOR CLOSING DEVICES

3.3 Commentary

3.3.1 General

The Building Regulations 1991 Approved Document B 2019 edition incorporating 2020 and 2022 amendments – requires that all fire-resisting doors (with the exception of locked cupboard/duct doors and internal domestic doors) be fitted with an appropriate self-closing device. Equivalent documents within the UK and Republic of Ireland give similar advice.

Within the framework of EU Construction Products Regulation 305/2011 and UK Construction Products Regulations 2013 (as amended) these devices have been identified as playing an essential role in the safety of buildings in the case of fire. Compliance with EN 1154 (and EN 1634-1 or EN 1634-2) is deemed to satisfy the requirements of the European and UK CPR in this regard, and it is therefore a legal requirement that proof of compliance be obtained for any controlled door closing device before it is specified or used, e.g. Manufacturer's Declaration of Performance.

Closing controls are available in a range of powers (commonly referred to as sizes) that relate to the available power to close the door. The minimum performance requirements are laid down in EN 1154 - Building hardware - Controlled door closing devices - and include levels of mechanical efficiency, suitable door width and tested mass.

The table extract from EN 1154 (below) shows the range of door closer power sizes and related parameters.

An important factor is the closing moment: a fire-resisting door must be closed to be effective. Situations may arise which dictate that a stronger closer should be specified (e.g. air pressure, hinge friction or fitted smoke seal considerations). Whilst this deals with the requirements for a fire-resisting door, it will inevitably cause problems for the user in terms of the greater effort required to open.

A door must be easy for occupants of the building to open, particularly for those with mobility issues and reduced upper and lower body strength. (See also **Section 13**). When used in conjunction with a latched door assembly, there is no need for the closer to exert any greater force than that required to overcome the latch, friction and any seals. If however, the force is only marginally in excess of that required to overcome the latch resistance, friction and any seals, then reasonably high levels of maintenance will be required to ensure that the latch/seal resistance does not exceed the closing force. When considering the spring pressure, the anticipated degree of maintenance should also be taken into account.

1	2	3	4	5	6	7	8	9
Door closer power size	Recommended door leaf width	Test door mass	Closing moment				Opening moment between 0° and 60° Nm max	Door closer efficiency between 0° and 4° % min
			between 0° and 4°		between 88° and 92°	any other angle of		
	mm max	kg	Nm min	Nm max	Nm min	Nm min		
1	<750	20	9	<13	3	2	26	50
2	850	40	13	<18	4	3	36	50
3	950	60	18	<26	6	4	47	55
4	1100	80	26	<37	9	6	62	60
5	1250	100	37	<54	12	8	83	65
6	1400	120	54	<87	18	11	134	65
7	1600	160	87	<140	29	18	215	65

Note 1: The door width are given for standard installations. In the case of unusually high or heavy doors, windy or draughty conditions, or special installations, a larger power size of door closer may be used.

Note 2: The last door masses are shown only related to door closer power sizes for the purpose of the last procedure. They are not intended to indicate maximum values for actual use.

Extract from BS EN 1154

3 DOOR CLOSING DEVICES

Door closing devices which incorporate spring pressure adjustment and are power adjustable (as required in BS 8300-2) provide a very useful way of adjusting the closing force on installation to suit the particular site conditions encountered. The adjustment should be used with care, bearing in mind the needs of adequate closing force and the effects on the user. Smoke seals can sometimes prevent the door closer from fully closing the door, considerable force being required to deflect or compress the seal, particularly if they are not correctly installed and maintained. Very careful consideration should be given to these issues when specifying closing controls to ensure that extra spring strength is not applied just to overcome poor seal selection or installation.

EN 1154 states that door closers of less than power size 3 are not considered suitable for fire doors due to their low closing moments, especially beyond 90°. It also requires that power adjustable closers should be capable of adjustment to at least power size 3, and that for such closers the installation instructions shall include precise instructions to the installer to ensure that the door closer is adjusted on site to size 3 or more. (Care should be taken to differentiate between variable power adjustable closers and template adjustable, where the closer power remains dependent on the template fixing position). Please note that door-closing devices whose power is adjustable by template are not usually suitable for this application as per BS 8300-2.

EN 1154 permits delayed action closers to be used on fire- resisting door assemblies but it is important that any delay set is no more than that required for its use (e.g. for the easy passage of those with mobility issues and reduced upper and lower body strength), with a recommendation of not more than 25 seconds or under a specific risk assessment.

Where delayed action is to be used it must be tested in accordance with the requirements of EN 1154.

It should also be noted that the use of delayed action closers on circulation routes should be avoided in accordance with Approved Document M (England). On this occasion it is preferable to use an electrically held open closing device.

3.3.2 Hold Open and Free-Swing Devices

Manually operated mechanical hold-open devices (i.e. mechanisms which must be released manually) SHOULD NOT BE USED ON FIRE- RESISTING DOORS, as they would inhibit the closing action of the door.

In situations where the fire-resisting door is required to be held open on busy traffic routes, or free swinging for the benefit of those with mobility issues and reduced upper and lower body strength, specialist hold-open devices should be used which, being linked into the fire/smoke alarm/ detection system, will release and close the door on receipt of a signal in the event of emergency or power failure. They can also be manually released when required. To ensure that these devices have the correct mechanical and electrical performance, they should comply fully with EN 1155 - Electrically powered hold-open devices for swing doors. **Section 4** of this Code of Practice contains detailed recommendations for these devices.

3 DOOR CLOSING DEVICES

3.3.3 Closer Installation

Some door closers when used on push side can encounter significant power loss. In addition to this, certain features may be affected and may cease to function. Such features can include latch, backcheck and delayed action. EN 1154 requires that the manufacturer must state clearly the door closer power size for the fitting position of each installation that is offered. A closer should always be installed in accordance with the manufacturer's instruction. If it is intended to install a closer in other than its standard installation, the manufacturer's Declaration of Performance and instructions must be consulted to ensure that size 3 is still achievable and is suitable for the door width.

3.3.4 Door Closing Devices on Steel Doors

While the notes in paragraphs **3.3.5** to **3.3.12** below apply generally to all types of fire-resisting doors, it should be noted that door closing devices fitted to uninsulated steel doors can be susceptible to ignition of leaking fluid on the unexposed face of the door, causing integrity failure of the doorset. Therefore, any closing device intended for use on such doors must be accompanied by evidence of performance for the required period when fitted to the unexposed face of steel doors.

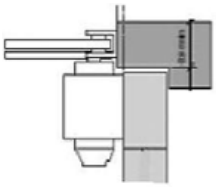
3.3.5 Face Fixed Overhead Closers

These are the most common form of door control and can be applied to the door in one of four ways:

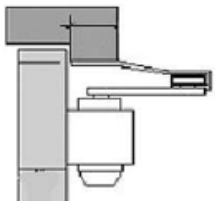
- on the pull face
- on the push face
- mounted on the transom on the push side of the door
- mounted on the transom on the pull side of the door

The connection between the door leaf and frame is created by a pair of folding arms or a single arm guided in a channel.

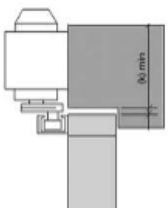
A wide variety of models has been proven by inclusion in fire door tests. The use



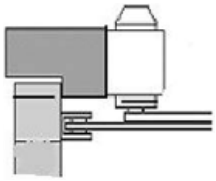
Pull face



Push face



Transom pull side



Transom push side

of low melting point material in the arm linkage has been shown to be of risk in some applications. It is particularly important to check that the fire test evidence covers such an arm assembly in the fixing application that is intended.

It is advisable to assume that either face of a door could be exposed to fire and that suitable hardware be specified to achieve ultimate performance and safety. These characteristics can only really be established by subjecting the closing device to a test as part of a complete fire door. The flammability of the damping

3 DOOR CLOSING DEVICES

fluid is normally of little consequence on insulated fire doors; if the closer is on the unexposed face of an insulated fire door assembly then the temperature is unlikely to get high enough to cause fluid leakage, although this might become important where a significant area of the door leaf is glazed and escaping fluid might be ignited by contact with the glazing. If the closer is on the exposed face, then the additional fuel that the damping fluid contributes will be negligible.

3.3.6 Face-fixed Jamb Closers

These uncontrolled closers do not meet the requirements in Approved Document B 2019 edition incorporating 2020 and 2022 amendments – for self-closing devices (see 3.1 Introduction for details). These closers are normally of low power and low mass and rely on dynamic force to close the door and do not control the closing speed. They are unable to comply with EN 1154 and should NOT be used on fire doors designated as self-closing.

3.3.7 Concealed Closers

Concealed closers are installed into the door leaf and/or its frame. On timber doors, they are mortised into the fabric of the assembly causing a significant amount of the fire-resisting door material to be removed and intumescent protection of some kind will usually be required to protect the door from early integrity failure. This intumescent protection should be supplied by the manufacturer with every concealed closer intended for use on a timber fire-resisting door. It is particularly important with these closing devices to check that the fire test evidence is relevant to the intended door application and material. Some concealed closers have been successfully tested in steel doors without the need for intumescent protection.

Face-fixed jamb closer

3.3.7.1 Concealed 'In Door'

These devices are mounted into the top of the door and are virtually concealed from view with the possible exception of the arm linkage. In view of the large amount of timber removed from the door to accommodate these types they must be installed using specially designed intumescent protection jackets to delay integrity failure during fire conditions. It is therefore particularly important to check that the fire test evidence is relevant to the intended door application and material.

Concealed overhead closer

To ensure sufficient durability and closing strength, it is also important that such closers comply fully with EN 1154. Due to the position of the closer body, care should be taken in determining use on joinery doors, being positioned around the joint between the top rail and jamb the required mortice will weaken this joint and the door.

3 DOOR CLOSING DEVICES

3.3.7.2 Transom Closers

These devices involve the removal of a considerable amount of material from both the head frame and top rail of the door and also from the bottom rail of the door leaf, where the associated bottom pivot has to be fitted.

Where transom closers have been satisfactorily tested, they will require specific intumescent protection and precise preparation of the door leaf and frame prior to fitting of the device. Only systems which can provide documented evidence of satisfactory testing for the specific

doorset intended should be considered for fire door use.

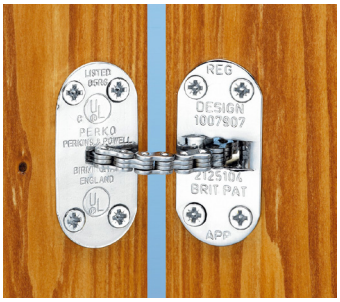
3.3.7.3 Concealed Jamb Closers - controlled closing

These closers are normally morticed in to the hanging stile of the door leaf and are anchored to the frame edge by means of a linkage. It is important to check that the selected concealed jamb mounted closer complies fully with EN 1154 for both power size and controlled closing, whether intended for use on latched or unlatched doors (See **3.1**).

Because these closers are mortised into the leaf, it is also important to check that doors are suitable to accommodate the closers and that the installation of the closers will not be a possible cause of burn- through and integrity failure.

3.3.7.4 Concealed jamb closer with uncontrolled closing

These uncontrolled closers do not meet the published guidance to Building Regulations throughout the UK and Ireland for self-closing devices (see **3.1 Introduction** for details). As described for concealed jamb closers with controlled closing, concealed jamb closers which have uncontrolled closing have their lowest closing power at, or near, the closed position. Test evidence has shown that the majority of these uncontrolled devices are unable to achieve power size 3 to EN 1154 therefore they should not be considered for self-closing fire doors.



3 DOOR CLOSING DEVICES

3.3.8 Spring Hinges

These uncontrolled closers do not meet the published guidance to Building Regulations throughout the UK and Ireland for self-closing devices (see **3.1 Introduction** for details). Spring hinges, whether single or double action, embody a spring for the storage of energy but do not have a system for controlling and regulating the closing function. They provide their lowest closing power at, or near, the door closed position and, therefore, on latched doors, are unlikely to overcome latch resistance. On unlatched doors they are unlikely to hold the door leaf closed against the pressures known to exist in fire situations until any heat activated sealing system has operated.

They do not contain a damped, or controlled closing mechanism and they are unlikely to achieve the minimum power size 3 for use on fire-resisting doors or to comply with the performance requirements of EN 1154. They are therefore NOT recommended for self-closing fire doors.

3.3.9 Rising Butt Hinges

These hinges do not meet the the published guidance to Building Regulations throughout the UK and Ireland for self-closing devices (see **3.1** for details). Rising butt hinges contain a ramped profile between the two hinge blades which causes the door leaf to rise as it is being

opened. The mass of the door leaf will then tend to close the door when it is released. To enable the door to function properly, it is necessary to ease the top edge of the door sufficiently to allow for the rise of the butt. When the door is returned to its closed position, this means that a gap will exist at the vulnerable head of the door, which could compromise the fire integrity of the door assembly.

In order to achieve any form of self-closing, the butt hinges must be accurately aligned. Fire doors have a minimum requirement of 3 hinges per leaf whereas rising butt hinges are traditionally fitted as 2 hinges per leaf. Correct alignment of rising butt hinges is extremely difficult to achieve with 3 hinges.

The closing action resulting from the use of such a device is extremely low and will not overcome air pressure differences or resistance from latches, seals or carpets that might be fitted, and therefore they cannot be considered as reliable door closing devices. Whilst such devices are still permitted within dwellings and flats covered by Approved Document B for certain domestic applications only, they are NOT recommended for any self-closing fire door application by this Code of Practice (see also **2.3.6**).

3 DOOR CLOSING DEVICES

3.3.10 Floor Spring Accessories

As the floor spring and its associated pivots are responsible for holding the door in position, high melting point metals for the structural components will usually be required. Although the box containing the closer mechanism is one of the largest items of hardware, it is set into the threshold of the doorway and so, with the exception of the cover plate, is protected by the floor screed. The performance of the closer is aided during fire attack by the slight negative pressure at floor level, which is drawing cold air from the unexposed side of the construction, across the cover plate, so helping to keep this cool on many occasions.

3.3.10.1 Double Action Strap

A steel lever incorporating a socket of tapered form which fits onto the projecting drive spindle of the floor spring. The tapered form is designed to control the clearance between the threshold and underside of the door leaf and forms a firm drive link between door and closing control.

This fitting is installed centrally within the thickness of the bottom rail and is concealed. This fitting has proved itself successful as an item of fire door hardware for, like the closing control, its position within the door leaf is the least onerous in terms of exposure. Some designs require the addition of intumescent protection against the effects of heat reflection from the cover plate and this should be stated in the fire test evidence.

3.3.10.2 Double Action Shoe

Whilst this performs the same function as the strap, it is constructed with side and heel walls which wrap around the heel profile of the door and is commonly made in brass. One side wall is, therefore, exposed to flame, and conduction of heat via the walls to the unexposed face is likely to cause failure of integrity in timber doors under fire conditions. Some manufacturers are able to solve these problems by careful design and/or the addition of intumescent protection, and thus achieve satisfactory fire test evidence.

3.3.10.3 Double Action Top Centre

This fitting is complementary to both strap and shoe, forming the upper pivotal member of the door leaf. It comprises two assemblies:

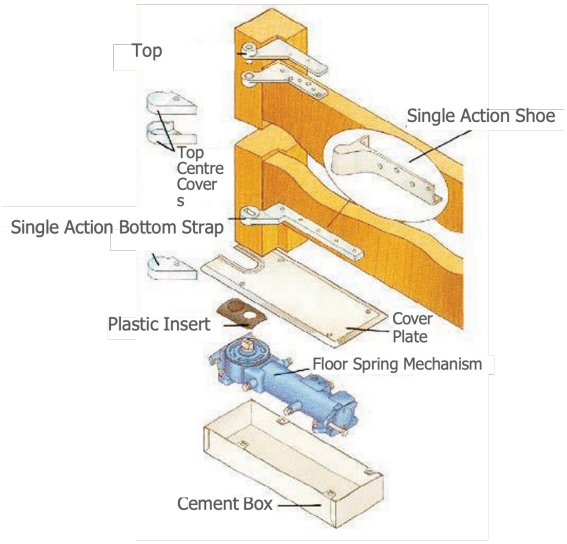
- the upper part housing the pivot pin, which is retractable to assist installation, mortised into the underside of the head frame
- the lower part containing a bearing or bush for the pivot pin, morticed centrally into the thickness of the door top rail

In view of the extreme conditions to which these fittings are subjected during fire, generally they will be manufactured from materials with a melting point in excess of 800°C and should also be proven by fire test. They should be fitted carefully and accurately. The fire test evidence should record the details of any additional intumescent protection where used.

3 DOOR CLOSING DEVICES

3.3.10.4 Single Action Offset Strap

Of the same principle as for double action but the housing incorporating the tapered drive socket is offset and therefore projects from the face of the door, thus dictating opening in one direction only.



This projecting mass, if exposed to fire, is more likely to absorb and conduct heat to the fixings, leading to integrity failure of a timber door, but not normally of steel doors. Where fire test evidence dictates protection, it is provided by incorporating intumescent gaskets.

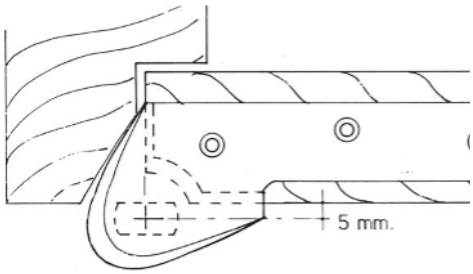
3.3.10.5 Single Action Offset Shoe

Of the same principle as the strap but with vertical side and heel walls let into the door face. The combination of walls and the projecting housing mass is an area of concern and the fitting might require insulation with intumescent gaskets. See fire test evidence for details.

3.3.10.6 Single Action Offset Top Centre

Complementary to single action strap and shoe, these fittings usually incorporate a removable pivot pin. As with the double action top centre, this component is sited in the most onerous position on the door and the projecting mass of metal housing the pivot pin and its bush accentuates the absorption of heat, requiring careful attention to insulation. The fire test evidence should record the details of the additional intumescent protection which was used.

Note: with these last three items, where they have a limited offset, it is necessary to notch away the door and frame locally, to provide clearance for the housing. This practice could lead to integrity failure in timber doors, and it is therefore important to check that the fire test evidence is relevant to the intended door application.



3 DOOR CLOSING DEVICES

3.3.11 Powered Swing Door Operators

3.3.11.1
Powered swing door operators generally look like a larger version of a manual self-closing door closer. However, there are safety considerations that are detailed in BS EN 16005 and BS 7036-0 (see also 3.2.2).

3.3.11.2
The powered swing door operator should be capable of being interfaced with the building fire alarm system and for fire-resistant doors, this would cease powered operation (passive mode) and the door would therefore self-close in the event of mains electrical power failure, fault/s and/or signal from the fire alarm.

It may also be a requirement for non-fire resistant doors to power open on fire alarm for escape or smoke control and ventilation (active mode). In some examples an additional stored electrical energy source may need to be fitted.

In manual passive operation the self-closing characteristics are similar to controlled self-closing devices as defined in EN 1154. A primary difference with Powered Pedestrian Devices is that they are generally designed to control the powered opening force, so manually operable forces will not always reach the lower values of BS 8300-2. EN 16005 specifies the maximum permissible forces in these conditions.

3.3.11.3
Powered pedestrian swing door operators normally power to open and then self-close with spring return force (mechanical stored energy). Consideration can be given to external forces such as wind and other air pressure in the same way as for non-powered self-closing door closers. Powered Pedestrian Devices are primarily designed to remove the human effort required to open the door and are not aerodynamic machines. Larger door mass and door surface area have the most significant adverse effect on the opening and closing forces of the door.

3.3.11.4
Any powered pedestrian doorset is classified as machinery as defined in the Machinery Directive 2006/42/EC which is transposed to UK law as The Supply of Machinery (Safety) Regulations 2008. These regulations stipulate the requirements and that the complete Powered Pedestrian Door Assembly is covered by a Declaration of Conformity and the assembled doorset must also bear the conformity marking as specified in the appropriate regulations. The entity issuing the declaration is also required to keep a technical construction file for inspection by the authorities.

For further information see also the Best Practice Guides:

- **EN 1154 Controlled door closing devices**
- **EN 1155 Electrically powered hold-open devices**

published by the DHF and included on the DHF website. Further information on powered pedestrian doors is available on ADSA website.

www.dhfonline.org.uk **www.gai.org.uk**
www.adsa.org.uk

SECTION 4
ELECTRICALLY POWERED HOLD OPEN DEVICES

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4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.1 Introduction

Mechanically operated door closing devices fitted on fire-resisting doors 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 (see **Section 13**).

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, local push button 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 opening the door leaf to a position where the free swing engages, 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, local push button 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 engagement position. These devices are usually used on doors opening into individual rooms and are not recommended for cross-corridor doors or circulation routes.

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 compartmentation function of the fire-resisting doors to which they are fitted.

For the purpose of this Code of Practice, electrically powered hold open devices are divided into the following three categories:

- Separate hold open devices
- 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 or transom closer mechanism

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.2 Critical Recommendations

4.2.1

Manually operated mechanical hold open devices (i.e. mechanisms which must be released manually) SHOULD NOT BE USED ON FIRE DOORS UNDER ANY CIRCUMSTANCES.

4.2.2

Low voltage (24/12 V DC) electrically-powered hold open devices and their accessories should be:

- Conformity Marked (such as UKCA / CE mark) to BS EN 1155 - Building Hardware - Electrically powered hold open devices for swing doors
- Provided with, preferably, additional product certification by an approved third party certification body

(For further information on certification schemes see **1.5 Documentation**).

Note 1: BS 5839-3 Specification for automatic release mechanisms for certain fire protection equipment, covers products which run off mains voltage (240 V AC). Some point magnets are supplied to work off mains voltage.

Note 2: Electrically powered hold open devices should be installed in line with the recommendations of BS 7273-4 Code of practice for the operation of fire protection measures. Actuation of release mechanisms for doors.

4.2.3

The product and any accessories should have demonstrated their suitability for the intended purpose, by inclusion in satisfactory fire tests to BS EN 1634-1 or BS EN 1634-2, on a type of door assembly and configuration with which it is proposed to be used. This evidence should be provided by an approved third party certification or testing body (see **1.5**).

4.2.4

When used on fire-resisting doors, electrically powered hold open devices must always be connected either to a building fire/smoke alarm system or a local smoke detector control (see **4.3.1**).

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.2.5

For separate hold open devices, the holding power and manual release force must be correct for the size of door and power size to which they are to be fitted, bearing in mind:

- The power of the door closer that is fitted to the door,
- The position of the hold open device relative to the door width and its distance from hinges or pivots,
- Whether subject to other factors such as air pressure, draughts,heavy traffic use, abusive treatment, use by elderly, infirm or disabled. (For further information see **4.3.1** and **4.3.2**).

4.2.6

Separate hold open devices should be installed such that they are in the same horizontal plane as the closing device to minimise any twisting or distortion of the door leaf (see also **4.3.2**).

4.2.7

Holes and apertures for the cables that provide electrical power to door or frame-mounted devices must be protected to maintain the fire integrity of the doors. This might require specially designed and proven intumescent protection (see **4.3.5**).

4.2.8

A regular programme of maintenance must be undertaken to ensure that the correct operational performance is maintained for the life of the building (see **Section 13**).

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.3 Commentary

4.3.1 General

According to published guidance to Building Regulations throughout the UK and Ireland, self-closing fire-resisting doors are allowed to be held open by electrically powered hold open devices actuated by an automatic fire detection and alarm system, in those situations where a normal self-closing device would be considered a hindrance to the normal approved use of the building.

Within the framework of the The European and UK versions of the Construction Products Regulation (CPR) these devices have been identified as playing an essential role in the safety of buildings in the case of fire. Compliance with BS EN 1155 and fire test evidence to BS EN 1634-1 or BS EN 1634-2 will be deemed to satisfy the requirements of the Regulation in this regard, and it is therefore strongly recommended that proof of compliance be obtained for any electrically powered hold open device before it is specified or used.

Electrically powered hold open devices are available in a range of strengths (commonly referred to as sizes) which relate to the available closing power of the door closer fitted, whether the closer is separately mounted or integral with the hold open device.

The minimum performance requirements are laid down in BS EN 1155 and include levels of electrical performance, holding power, suitable door width and mass.

The following extract from BS EN 1155 shows the range of hold open power sizes and related maximum recommended door leaf widths, together with some of the relevant test parameters:

Hold open power size	Max. door leaf width	Test door mass (kg)	Overload test drop weight	Max. test door friction (Nm)
3	950	60	15	0.3
4	1100	80	18	0.4
5	1250	100	21	0.5
6	1400	120	27	0.6
7	1600	160	36	0.8

Table 1 BS EN 1155

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

These devices are designed to release a door held open by them in the event of each or any one of the following:

- detection of smoke by either separate or integral smoke detectors
- manual operation (pulling the door off hold open)
- operation of a manually operated switch fitted in a suitable position
- failure of the electrical supply to the device
- operation of the building fire alarm system, where installed

It is important that the holding force of any separate hold open device is higher than the closing force exerted by the door closing mechanism. If the holding force is not strong enough, the closer will tend to pull the door leaf from the held position and hence close the door. Whilst this does not in itself compromise the fire performance of the door, it will be an annoyance to the building users, who might respond by wedging the door open to overcome this "nuisance closing".

If the holding force is too strong, the users might have difficulty in mechanically pulling the door leaf from the hold open position.

BS EN 1155 sets limits on the forces that are required to manually pull the door leaf from hold open, although it does also permit manual release by means of a local accessible push button to disconnect the electrical power to the device.

It is vital that these hold open devices are able to release reliably in the case of fire. BS EN 1155 contains durability requirements and other performance tests to ensure that release will always occur, even when subject to variations of voltage supply.

4.3.2 Separate Hold Open Devices

These devices are mounted independently of the door-closing device and usually consist of an electro-magnet mounted on the floor or an adjacent wall, and an armature and mounting plate fixed in a corresponding position on the door leaf. The armature is generally quite small and is unlikely to adversely affect the fire integrity of the door. If the armature is fitted flush with the door face, or through- bolts are used to fix it, there is an increased chance of the fire integrity being affected in a timber door, so in these circumstances it is important to check the detail of the fire test evidence.

The effective holding force available will depend upon the mounting position of the armature relative to its distance from the hinges and the power size of the door closer fitted. It is therefore important that the installation instructions are closely followed to avoid "nuisance closing".

Separate hold open electro-magnet

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

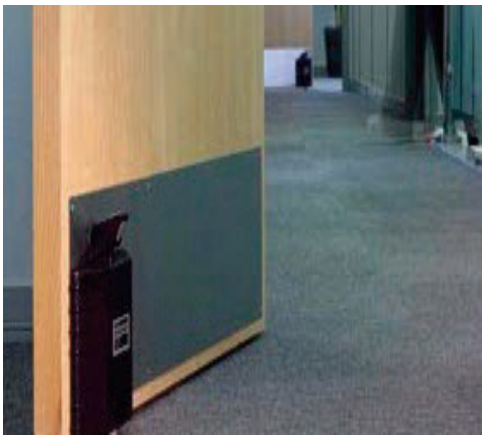
Magnets used with timber fire-resisting doors should be mounted in the same horizontal plane as the door-closing device, i.e.:

- level with the top of the door when used with an overhead door closer,
- at floor level when used with a floor spring.

This is to minimise the forces transmitted through the door caused by the opposing hold of the magnet and closing force of the door closer. These forces can cause twist in a timber door if the forces are applied at diagonally opposite corners, ultimately leading to permanent distortion of the door leaf.

Magnet mounted in the same horizontal plane as the door-closing device

Some separate hold open devices are battery operated rather than hard wired. They work from an acoustic signal, or a radio transmission. These can be attached to the top or the bottom of the door. The acoustic type relies on the high level of sound from the fire alarm to initiate releasing the door. For noisy areas, a similar product that works off a radio signal is available. There are limits with both types as to the effective distances between the transmitter and receiving units.



Battery-operated acoustic signal hold open unit

These types of unit are considered suitable only for low risk situations. Guidance on acceptable locations for their use is given in BS 7273-4 Code of practice for the operation of fire protection measures: Part 4: Actuation of release mechanisms for doors. It is recommended that only those products carrying the appropriate conformity mark (such as UKCA / CE mark) to BS EN 1155 be fitted to fire doors.

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.3.3 Hold Open or Free-swing Devices Incorporated in an Overhead Closer Mechanism

For this type of device, BS EN 1155 requires that the overhead closer mechanism itself conforms fully with BS EN 1154. (See **Section 3** for further information on door closer requirements).

Some types of device use an electrically operated valve to control the oil flow in the closer mechanism (electro-hydraulic).

Other types operate directly on the closer arms (electro-mechanical). BS EN 1155 permits a maximum "creep back" of only 2° over a period of 48 hours. Irrespective of the type of device used, it is important that the manufacturers' recommendations for routine checks and maintenance are followed, and it is often a requirement to ensure that all door holding devices are released at the end of each working day.

Some types are used for pairs of doors where the two door closing devices are linked by arms to a common track, which runs across the transom for the full width of both door leaves. In these circumstances this additional mass of metal can act as a heat sink and cause local charring of the frame or leaf in this vulnerable area, unless additional protection such as an intumescent gasket is fitted. It is important with all such devices to ensure that any protection recommended or supplied by the manufacturer is fitted during installation. The fire test evidence should be examined to make sure that it is relevant to the intended application.

Electro-hydraulic hold open door closer

Single track running full width of transom

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.3.4 Devices Incorporated into an Overhead Closing Mechanism with Integral Smoke Detector

Where devices incorporate their own smoke detection elements, it is particularly important to follow the installation instructions to ensure the operation of the detector is not impaired by incorrect mounting.

With these devices, smoke passing through the open doorway is sensed by the detector, which in turn sends a signal to release the hold open device and thus allow the closing mechanism to close the door. It is therefore essential to have a regular maintenance programme to ensure that the detectors are kept clean and all parts are in good operational order.

Closer with integral smoke detector

4.3.5 Power Transfer to the Door Leaf

Where the electrical parts of a hold open device are mounted on the door leaf, it is necessary to bring the electrical supply on to the door leaf. This can be done in several ways, each with its own implications for the fire integrity of the door and frame.

4.3.5.1 Exposed Flexible Cable

This type of connection is by far the most common, and has a negligible effect on the integrity of the door or frame as the components are generally small and surface mounted. The flexible cable is fully exposed, and no evidence has been found (at time of going to press) that this type of connection ever caused a fire integrity failure.

Exposed flexible cable

4.3.5.2 Concealed Conductor Hinge

This method requires a special hinge (sometimes non-load-bearing) containing small flexible conductors which can be connected at one end to the device on the door leaf, and at the other end to a connector block leading to the control unit or fire alarm system. It requires holes to be drilled in both the door leaf and frame, which might require the addition of intumescent protection to maintain fire integrity. It is important to check that the fire test evidence covers installation with conductor hinges.

Conductor hinges

4 ELECTRICALLY POWERED HOLD OPEN DEVICES

4.3.5.3 Concealed Flexible Cable

This method involves mortising steel housing containing an armoured flexible cable into the hanging stile of the door; the other end of the cable being fixed to the hanging edge of the door. Holes are drilled to carry wires to the hold open device and to connect to the fire alarm system.

These might need intumescent protection to maintain fire integrity.

Mortising the steel housing removes a significant amount of timber from the door frame. It is essential to check that the fire test evidence covers this type of installation, and that any recommended intumescent protection is fitted.

Concealed cable loop

4.3.4 Devices Incorporated into a Floor Spring Mechanism

Electrical hold open and free swing incorporated in a floor spring are contained within the floor spring cement box and generally will have no effect on the fire integrity of the door. The power supply is under the floor. (See **3.3.9** for further information on floor springs).

4.3.5 Devices Incorporated into a Transom Closer Mechanism

Electrical hold open and free swing incorporated in a transom closer will possibly differ from a standard transom closer in that they may be larger, ensure any such model has the necessary fire test evidence. The power supply will be into the transom from above.

For further information see also the Best Practice Guides:

- **Controlled Door Closing Devices to BS EN 1154**
- **Electrically powered hold-open devices to BS EN 1155**

published by the DHF and included on the DHF website.

Further information on hardware for fire and escape doors is available from the GAI website.

www.dhfonline.org.uk **www.gai.org.uk**

SECTION 5
DOOR CO-ORDINATOR DEVICES

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5 DOOR CO-ORDINATOR DEVICES

5.1 Introduction

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
- overcome the resistance of a latch or any seals when fitted

When these pairs of doors have rebated meeting edges or security astragals 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 co-ordinator 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.

The types of doors which door coordinators are specified on include:

- rebated doors
- flush doors with astragals
- flush doors with automatic flush bolts

For the purpose of this Code of Practice door co-ordinator devices are divided into the following categories:

- Gravity arm co-ordinators
- Swing arm co-ordinators
- Double arm swing co-ordinators
- Co-ordinators incorporated into door closing devices

Note: This list does not imply suitability of any particular device for fire door use - see **5.2** and **5.3** for further information.

5 DOOR CO-ORDINATOR DEVICES

5.2 Critical Recommendations

5.2.1

The door co-ordinator device and its accessories should be:

- Conformity Marked (such as UKCA / CE mark) to EN 1158 - Building hardware - Door co-ordinator devices, including its Annex A
- Preferably, provided with additional product certification by an approved third party certification body

(For further information on certification schemes see **1.5 Documentation**).

5.2.2

The product and any accessories should have demonstrated their ability to be suitable for the intended purpose, by inclusion in satisfactory fire tests to EN 1634-1 or EN 1634-2, on a type of doorset and configuration in which it is proposed to be used. This evidence should be provided by an approved third party certification or testing body (see **1.5 Documentation**).

5.2.3

The strength and features of the co-ordinator must be correct for the size of door to which it is to be fitted, bearing in mind:

- the application to the door
- whether subject to other factors such as air pressure, draughts, heavy traffic use
- subjected to abusive treatment or used by the elderly, infirm or disabled
- whether smoke or other seals are fitted to the doors (for further information see **5.3.1**)

5.2.4

Concealed overhead co-ordinators should NOT be used on timber doors unless they are provided with specially designed and proven intumescent protection (see **5.3.1**).

5.2.5

Door or frame preparation in timber doorsets for mortised components must be protected to maintain the fire integrity of the doorset.

This might require specially designed and proven intumescent protection (see **5.3.5**).

5.2.6

Co-ordinators incorporated with electrical hold-open devices should comply additionally with the recommendations of **4.2** of this Code of Practice.

5.2.7

A regular programme of maintenance must be undertaken to ensure that correct operational performance is maintained for the life of the building (see **Section 13**).

5 DOOR CO-ORDINATOR DEVICES

5.3 Commentary

5.3.1 General

The Building Regulations 1991 Approved Document B 2019 edition incorporating 2020 and 2022 amendments as well as similar UK and Ireland statutory guidance (see 3.1 Introduction for details) require that all fire doors (with the exception of locked cupboard/duct doors and internal domestic doors) be fitted with an appropriate self-closing device. This applies equally to pairs of doors (double doors) with rebated meeting edges and therefore requires the use of a door co-ordinating device for these doors.

Within the framework of EU Construction Products Regulation 305/2011 and UK Construction Products Regulations 2013 (as amended), door co-ordinator devices have been identified as playing an essential role in the safety of buildings in the case of fire. Compliance with EN 1158 is deemed to satisfy the requirements of the Directive in this regard, and it is therefore strongly recommended that proof of compliance be obtained for any door co- ordinator device before it is specified or used.

Door co-ordinator devices are available in a range of sizes which relate to the available closing power of the door closers fitted and/or the rebate depth, whether the co-ordinator is separately mounted or integral with the closing device. The minimum performance requirements are laid down in EN 1158, and include manipulation, durability and abuse resistance tests.

The following extract from EN 1158 shows the range of co-ordinator sizes and related maximum recommended door leaf widths, together with some of the relevant test parameters:

From the below table it can be seen that co-ordinator sizes are related to the door leaf width and the mass of the door to be controlled, in exactly the same manner as door closing devices (see Section **3.3.1**, **Table from EN 1154**). This is important not only to ensure that the co-ordinator size is matched with the power size of the door closers that are to be fitted, but also to make sure that the co-ordinator is able to withstand the normal forces and mechanical stresses experienced in daily use.

Smoke seals can sometimes prevent the door closer from fully closing the door, considerable force being required to deflect or compress the seal, particularly if they are not correctly installed and maintained.

Door coordinator size	Max. door leaf width (mm)	Test door mass (kg)	Overload test drop weight (mm)	Max. test door friction (Nm)
3	950	60	1900	0.3
4	1100	80	2200	0.4
5	1250	100	2500	0.5
6	1400	120	2800	0.6
7	1600	160	3200	0.8

Table 1 BS EN 1158

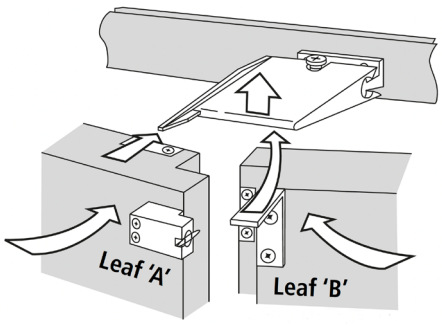
5 DOOR CO-ORDINATOR DEVICES

Very careful consideration should be given to these issues when specifying door co-ordinators that incorporate closing controls to ensure that extra spring strength is not applied just to overcome poor seal installation or performance.

As a general rule, wherever components have to be mortised into the door leaves or frame of a timber doorset, there is an increased chance of an adverse effect on the fire resistance of the doors, and there might be a need for additional intumescent protection. The fire test evidence should always be examined.

5.3.2 Gravity Arm Co-ordinators

These devices consist of simple gravity components such as flaps or roller arms, which are attached to the transom on the opening side of the door. They control the door leaves by blocking the last few degrees of return of the active leaf (the first opening and last closing leaf) until the inactive leaf (the last opening and first closing leaf) has closed into the frame. Generally they are surface mounted and, being of small mass in themselves, are unlikely to reduce the fire-resisting properties of the doors. However, for correct operation they also require a "carry bar" or rebate catch to enable the active leaf to be opened to its holding position, in instances when the inactive leaf is opened first.



Gravity arm co-ordinator

It is therefore essential to check that appropriate fire test evidence exists for these components and that it is suitable for the rebate dimensions of the doors for which it is intended.

5.3.3 Swing Arm Co-ordinators

These devices consist of a simple spring-controlled arm which is attached to the transom on the opening side of the doors, and controls the door leaves in a similar manner to the gravity type of co- ordinator. They require some form of plate/carry bar fixed to each door leaf, but generally all components are surface mounted and relatively small, and therefore unlikely to adversely affect the fire-resisting properties of the doorset assembly. In operation the spring loaded arm swings out to hold the active leaf open until the inactive leaf has closed, and as a result this type of design can be vulnerable to misuse or vandalism. It is especially important that such devices are subjected to regular checks to ensure they continue to work correctly.

Swing arm co-ordinators

5.3.4 Double Arm Swing Co-ordinators

To minimise the vulnerability to abuse of single swing arm co- ordinators, versions are available which contain very short operating arms and which hold the active leaf from a position nearer to the hanging edge of the door leaf. The co-ordinating mechanism is contained in a long tube which is mounted under the transom.

5 DOOR CO-ORDINATOR DEVICES

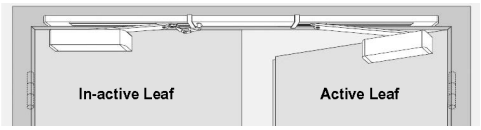
5.3.5 Co-ordinators Incorporated into Door Closing Devices

These devices offer the most effective way of providing both the closing function and the co-ordinating function in one device.

They consist of two door closing devices (one for each door leaf) and a common track assembly or concealed cable which connects the two closers and provides the co-ordinating action.

For overhead, surface fixed co-ordinators, the track assembly can be fixed to the underside or the face of the transom. Some versions also provide smoke detectors built into the co-ordinator assembly and with these devices it is essential to have a regular maintenance programme to ensure that the detectors are kept clean and all parts remain in good operational order.

Other versions use closers concealed in the door leaves, with the track assembly concealed in the transom. As so much material is removed when installing these devices, it is absolutely imperative to ensure that all intumescent protection recommended or supplied by the manufacturer is fitted during installation. The fire certification should be examined closely to ensure that it covers the particular application envisaged.



Overhead closer with integral co-ordinator

Several manufacturers provide floor springs with a co-ordinator function, achieved by means of a cable running under the finished floor level that connects the two floor spring mechanisms together. From a fire door control point of view, these are very satisfactory devices as all elements are concealed and away from the worst effects of a fire or misuse. Such an arrangement is most unlikely to have any adverse effect on the fire integrity of the doors.

With all of these devices it is most important to check that the fire test evidence is appropriate to the particular application for which it is intended to be used, and that any intumescent protection recommended is actually fitted during installation. A thorough inspection of the installation is also recommended.


Floor springs with integral co-ordinator

Further relevant information on door closers and electrically powered hold-open devices can be found in **Sections 3** and 4 of this guide. For further information see also the Best Practice Guides:

- **Controlled door closing devices to EN 1154**
- **Electrically powered hold open devices to EN 1155**
- **Door coordinator devices to EN 1158**

published by the DHF and included on the DHF website.

Further information on hardware for fire and escape doors is available from the GAI website.

www.dhfonline.org.uk **www.gai.org.uk**

SECTION 6
LOCKS & LATCHES

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6 LOCKS & LATCHES

6.1 Introduction

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 doors, this role might be undertaken by a latch, or a combination of lock and latch when product is within scope of EN 179 (where the latch does not perform this role see **3.1**).

In certain cases, there is a need for a lock to be fitted to a fire-resisting door. This might be on a duct door which is normally kept locked with only occasional access to service equipment, or other fire-resisting doors which for security reasons are locked for periods of time.

Where security is in conflict with easy egress, a full risk assessment should be made in order to comply with best practice. Doors which are normally unlocked when the building or area is occupied may be fitted with locks for out-of-hours security. In certain circumstances, a thumbturn on the inside of the door will give means of escape to anyone inadvertently locked in a room. Where the door will be normally locked during occupation, e.g. a dispensary or a wages office, then hardware such as panic escape devices to EN 1125 or emergency exit devices to EN 179 should be used (see **Section 12**).

It should be noted that only locks and latches with the requisite fire test evidence should be installed on a fire door. Furthermore, in fitting locks or latches to fire-resisting doors, the potential fire performance of a door might be reduced due to:

- the 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 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
- incorrect installation of hardware and doors

(Further information on the potential fire performance of a door see **6.3.1**).

For the purpose of this Code of Practice locks and latches are divided into the following categories:

- Roller catches
- Rim latches
- Mortice latches
- Mortice locks, rim locks and deadlocks
- Multi-point locks
- Bored-in knobsets

Note: This list does not imply suitability of any device for fire door use (see **6.3.2** to **6.3.6** for further information).

6 LOCKS & LATCHES

6.2 Critical Recommendations

6.2.1

If placed on the market, the lock or latch:

- must be conformity marked (such as UKCA / CE mark) to EN 12209:2003 or EN 179 (see **Section 17** for further detail on conformity marking)
- and preferably, should be provided with additional product certification by an accredited third party certification body

(For further information on certification schemes see **1.5 Documentation**).

6.2.2

The lock or latch must have demonstrated its suitability for the intended purpose by inclusion in satisfactory fire tests to EN 1634-1 or EN 1634-2, on a type of door and configuration in which it is proposed to be used. This evidence should be provided by an accredited third party certification or testing body (see **1.5 Documentation**).

6.2.3

According to published guidance to Building Regulations throughout the UK and Ireland, locked doors on escape routes should be operable by one single action i.e. not requiring manipulation of more than one mechanism (see **Section 12** for further information).

6.2.4

A regular programme of maintenance must be undertaken to ensure that the correct operational performance is maintained for the life of the building (see **Section 13**).

6 LOCKS & LATCHES

6.3 Commentary

6.3.1 General

Locks and latches come in a range of sizes, methods of fixing (rim/mortice) and are manufactured using a range of materials, all of which can affect the fire performance of the door set.

6.3.1.1

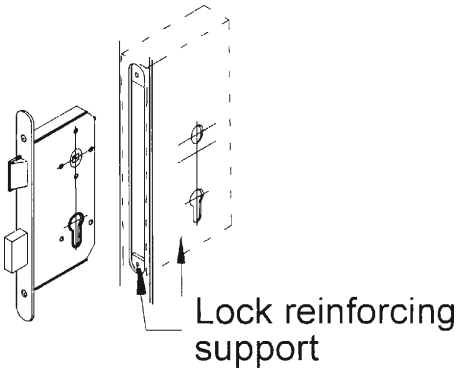
The addition of a lock or latch to a fire-resisting door might reduce the fire performance of the door due to removal of material which reduces the fire protection and insulation properties of the doorset.

The reduction in the amount of material in the stile or rail can also impair the stability of the door, leaving it less able to resist distortion caused by the heat of a fully developed fire.

In the case of a fire-resisting metal door, the addition of a lock or latch does not require removal of material such as timber, but the natural heat transfer properties of a metal door can contribute to the potential melting of the critical components of the lock or latch, therefore leading to a possible failure of the fire door being held in the latched position.

6.3.1.2 Voids in the Structure of the Door

All mortising in fire-resisting timber doors should be performed as accurately as possible to avoid creating unnecessary voids. Clearance holes for keys, cylinders and spindles should be no larger than the sizes specified on the manufacturer's fitting instructions. If the latch or lock calls for the fitting of some form of intumescent protection and/or use of covered escutcheons, these must be used to ensure that the fire resistance of the door is no less than when tested. (BS 8214 Section 11 Building hardware, confirms these requirements).



Steel doors are normally of hollow construction and voids for mortice locks do not generally create a risk of integrity failure. However, hollow steel doors should be constructed with a lock reinforcing support to ensure that the lock case:

- is rigidly and securely fixed
- is provided with an adequate thickness of metal for hardware fixing screws

6.3.1.3 Intumescent protection for locking devices

Timber is a naturally insulating material. In the presence of high temperatures and flaming it will burn, but, at a predictable rate.

Wherever timber is removed and replaced by a metal, the charring characteristics of the door will be affected at this point. If the majority of the timber is removed, leaving only very small sections, integrity failure is likely to be accelerated.

To compensate for loss of material and/or the creation of voids, intumescent material may be required depending on the fire test evidence. For further detail please refer to **section 9**.

On steel fire-resisting doors, the door preparation method should not be changed from that tested. Where the scope of performance of a door is dependent on the engagement of a latch bolt or a dead bolt, the throw of the bolt should not be less than that covered by the evidence of performance.

6.3.1.4 Through fixings

Any fixing which passes through a fire-resisting timber door construction is a potential heat transfer hazard. The larger the fixing, the greater the hazard.

Where high melting point metals are used, and where these remain in position for the duration of the fire exposure, it is particularly important to keep through fixings as small as possible. By the use of clearance holes, items such as spindles and cylinders should not come directly into contact with the door's combustible facings. As stated earlier, these clearances must not be so large as to become an integrity risk in themselves.

In addition, intumescent material may be required in accordance with the fire test evidence.

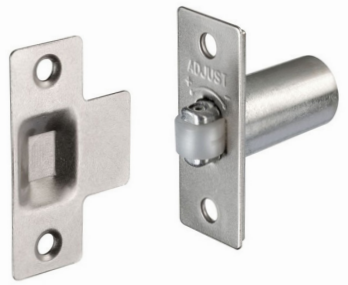
Fixings, clearance holes and use of intumescent materials must be as per the manufacturer's fitting instructions to ensure that the fire resistance of the door is no less than when tested.

6 LOCKS & LATCHES

6.3.2 Roller Bolt Catches

This form of latch cannot be relied upon to provide a retaining action and indeed can actually prevent a door from fully closing into the frame. Their use on fire-resisting doors without a self-closing device fitted is therefore NOT recommended.

It should be noted that some latches, where withdrawal of the latch is via a handle/turn, use a roller rather than a bevelled bolt. Such devices can provide a positive retention of the door leaf but it is important to ensure that the rollers of such devices are made of a material of high enough melting point to meet the fire test requirements.



Roller bolt catch

6.3.3 Rim Latches

A rim latch on a fire door assembly is vulnerable when exposed to the full effect of fire. This is in contrast to mortised products, which, in a timber door, gain protection from the component parts of the door into which they are fitted.

Where the latch case and keeps are fixed to the protected side of a timber door, zinc cases and keeps fitted with brass or steel bolts have been shown to perform satisfactorily. Cast iron lock cases and keeps fitted with a steel bolt have also been shown to maintain their retaining action when fitted on either side of a fire-resisting door.

The cylinder type latch poses an additional problem in timber doors as the mass of metal forms a thermal bridge and some form of intumescent protection might be required.

In all cases documented evidence of satisfactory testing for the specific door intended should be obtained before being considered for use on fire-resisting doors.

Cylinder rim nightlatch

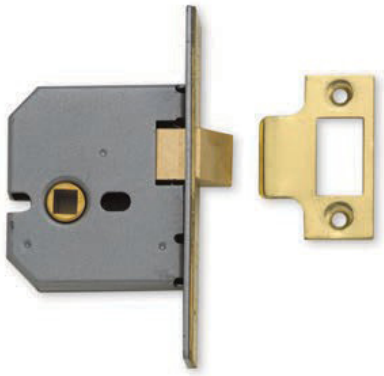
6 LOCKS & LATCHES

6.3.4 Mortice Latches

Mortice latches are normally mortised into the door edge and depending upon the backset, are in either a vertical or horizontal latch case. A variant of these is the tubular type designed to be installed into a hole drilled in the edge of the door leaf.

The other major considerations with reference to the choice of mortice latches are:

- the thickness of the latch case in timber doors
- the material from which the latch bolt is constructed
- the length of the forend in timber doors
- the length and the depth of the strike plate
- the projection of the latch bolt



Mortice latch

All of these factors could affect the fire integrity of the door. Intumescent material may be required in respect of mortice latches, depending on the fire test evidence. For further detail please refer to **section 9**.

Where latches are incorporated in doorsets consisting of two leaves with rebated meeting stiles, the latch is often used in conjunction with a rebate kit. Typical rebate kits may create a thermal bridge in timber doors due to the mass of metal used as well as the amount of timber removed. If specifying said items always ensure there is sufficient fire test evidence.

Doors with rebated meeting stiles and rebate kits also require the use of a door co-ordinator (if a door closer is fitted) so that the leaves close in the correct order.

The door co-ordinator itself can affect the fire performance of the doors (see **Section 5**).

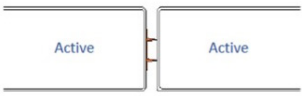
In doors incorporating intumescent seals, those with plain edge meeting stiles are likely to provide a better level of fire resistance than doors with rebated stiles. Plain edge meeting stiles are more tolerant of differential door distortions in timber doors and more likely to be able to accommodate a purpose-made smoke seal than the rebated edge.

For these reasons it is recommended that pairs of timber fire doors have plain edge stiles with a conventional latch and striking plate rather than rebated meeting stiles with rebate kits.

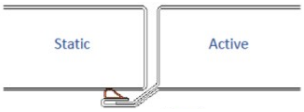
However, providing there is satisfactory fire test evidence, timber rebated doors with their appropriate fittings can be used for pairs of fire-resisting doors.

6 LOCKS & LATCHES

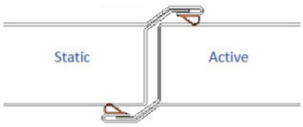
Plain meeting stile



Single Astragal to active leaf only



Standard Double Astragal



In respect of meeting stiles for metal doors the available options are:

- rebated
- single astragal
- double astragal
- plain meeting stile

Astragals tend to be used in metal doors as an extra means of security in order to protect the latching element of the lockcase .

For a fire integrity test the benefit of the astragal is that it will protect the meeting stile from opening under test conditions when the door expands.

Note that metal doorsets behave differently from timber during the fire test due to their increased deflection as a result of the expansion of the steel. For steel double escape doors there is the potential for the latching to the slave leaf being in conflict with an internal astragal

It should always be noted that, regardless of the material of the door, to ensure the fire performance is maintained, it is recommended that documentary evidence of satisfactory testing for the specific door intended be checked before specifying the building hardware.

6.3.5 Mortice Locks and Deadlocks

The fitting of a lock to a fire-resisting door will create the same problems of reducing the fire integrity of a timber door as has been mentioned for latches both rim (**6.3.3**) and mortice (**6.3.4**).

As locks are generally larger than latches, the amount of material removed in fixing and the extra amount of metal introduced where applicable can make the reduction in fire integrity that much greater. In all cases documentary evidence of the suitability of the fittings for the specific door intended should be checked to ensure that the fire integrity of the door is maintained.

Where fire-resisting doors are normally kept locked (for example duct doors) and rely on the lock bolt to hold the door leaf in the closed position, it should be noted there is the human element of uncertainty of the door always being correctly locked. Appropriate signage such as "fire door keep locked" and management instructions will need to be considered (see **Sections 10** & **12**).

Some fire-resisting doors also serve as fire and emergency escape doors and the functionality of the locking device will need to be considered to ensure that there is no conflict with easy egress. This might entail some form of risk assessment and/or consultation with the local fire prevention officer. Further information on specialist panic/emergency exit devices is contained in **Section 12**.

Mortice deadlock

6 LOCKS & LATCHES

6.3.6 Bored-in Knobsets

Most bored-in knobsets require a large section of the door to be removed in order to accommodate the mechanism and through fixings. This is likely to reduce the fire resistance of the door. Where test evidence supports the ability of a knobset to satisfy the integrity requirements of a fire door, they can be used on fire doors of similar construction.

Cylinder knobset

6.3.7 Push button (digital) locks –

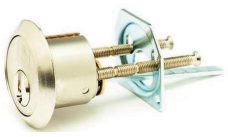
Many push button (digital) locks require a large hole to be made in the door in order to accommodate the mechanism and through fixings. This is likely to reduce the fire integrity of the door, especially if the lock incorporates electronic components and batteries. Where test evidence supports the ability of a push button lock to satisfy the integrity requirements of a fire door, they can be used on fire doors of similar construction. Any intumescent protection used during the test must be replicated on site.

Push button lock

6.3.8 Cylinders

In some of the devices referred to in **6.3.2** - **6.3.6**, the locking mechanism is operated by a cylinder which can be removed from the device.

In such cases the performance of the cylinder can be specified by reference to EN 1303 Building hardware - Cylinders for locks - Requirements and Test Methods.



Round cylinder

Euro-profile cylinder

For further information see also the Best Practice Guide:

- **Cylinders for Locks to EN 1303**
- **Master Key system data protection to CEN/TS 17814**

published by the DHF and included on the DHF website.

Further information on hardware for fire and escape doors is available from the GAI website.

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SECTION 7
ACCESS CONTROL & ELECTRONIC LOCKS

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7 ACCESS CONTROL & ELECTRONIC LOCKS

7.1 Introduction

Electronic Access Control solutions have become increasingly routine components of the infrastructure of most commercial buildings. They can be found on the main entrances to many of our buildings, from the doors in a school nursery to the secure entrances at remote infrastructure sites and almost everywhere in between.

Access Control systems were originally designed and implemented to control who has access in and around a building and when they have that access. The range, complexity and capability of modern Electronic Access Control solutions has increased significantly in recent years. The introduction of mechatronic products – combining the intelligence and convenience of electronics with the security and safety of mechanical – has moved access control solutions on further still.

Electronic Access Control solutions are now often integrated with other security, human resource management and building management systems. Combining Electronic Access Control solutions with other building services provides increased efficiencies and enhanced user experience. As a result, electronic access control solutions are now routine within most work, home and lifestyle environments.

By their very nature, electronic access control systems are primarily designed to manage and control access to authorised persons. To achieve this logically and efficiently, systems are fitted at the points of building often used as main entrances, zonal entrances and circulation routes. Electronic locking is used to secure these entrances to limit movement to authorised persons only. It is at these points within a building that a conflict may inadvertently arise between providing secure access and ensuring safe egress.

Generally, with all instances of access control system design, selection, application and installation, priority must first be given to the ability of occupants to escape safely, which must not be impeded in any way. The safe egress from a building in any panic, emergency or fire evacuation situation, must always take priority over building security, except for a few unique situations which are outside the scope of this document.

Building regulation requirements, specific to electronic locking on escape routes, can vary from country to country. Many electronic locking products are designed and manufactured to incorporate performance tested escape functions and this Code of Practice supports their use as part of an approved system to EN 179, EN 1125 and EN 13637.

In applications where panic or emergency situations are likely to occur, the preferred method of egress – whether emergency, panic, or normal day to day use - should be provided by a performance tested escape locking solution such as one of the following examples:

- An electronic locking solution operated by a lever handle or push pad (an EN 179 type application)
- An electronic locking solution operated by a panic bar (an EN 1125 type application)
- An electronic escape system made up of suitable components (an EN 13637 type application)

7 ACCESS CONTROL & ELECTRONIC LOCKS

It is essential that all system component parts are suitably tested and certified collectively as part of a single solution for use in EN 179, EN 1125 or EN 13637 type applications.

It is important to consider that doors fitted with electronic access control are likely to be used as escape doors and escape exits. Due to their location within the building these doors may also be fire doors – as a result these doors will have additional fire certification requirements which will also apply to the electronic locking products that may be fitted to them.

Where electronic locks are used on escape doors, any electronic locking device which is surface fitted to doors and frames must not encroach into the minimum clear headroom requirement as defined by local building regulations.

For applications where it is important to maintain the perimeter security of a building, it may be appropriate to use fail secure electronic locks as part of a solution to EN 179 or EN 1125 where applicable. Local Building Control advice should be sought in all cases where this application may be considered with particular consideration given to escape doors which may need to be accessed by emergency services.

The following sections provide information on a wide range of electronic access control products, their requirements and suitability for use on fire and escape doors.

7 ACCESS CONTROL & ELECTRONIC LOCKS

7.2 Critical Recommendations

7.2.1 - Electromagnetic locks

7.2.1.1 - Fire doors

Where fitted to fire rated doors, it is essential that an electromagnetic lock has been included in a fire test to EN 1634-1 or assessed by a competent body. The electromagnetic locks must be successfully tested to EN 1634-1 for the duration required either 30, 60, 90, 120 or 240 hours.

NB. if intumescent was fitted as part of the EN 1634-1 test, the same specification of intumescent must be used as per the test or assessment report.

7.2.1.2 - Escape doors

Electro-magnetic locks may be utilised as part of an electrically controlled escape system. Where fitted to an escape door it is essential that the electromagnetic lock is installed in accordance with EN 13637. To release power to the electromagnetic lock an initiating and/or operating element as defined by the system manufacturer will be required.

EN 13637 is not a harmonised standard it is however, considered best practice and as such it is recommended to install electromagnetic locks in accordance with the requirements of the standard.

7.2.1.3 - Fire rated escape doors

Where electromagnetic locks are fitted to fire rated escape doors, the following conditions apply:

1. The electromagnetic lock is supplied and installed in accordance with EN 13637 as part of an Emergency Escape Door solution
2. The electromagnetic lock must be tested and certified to EN 1634-1
3. The electromagnetic lock must not reduce the fire integrity performance of the door

7.2.2 - Electromechanical striking plates (Electric strikes/releases)

7.2.2.1 - Fire doors

For an electric strike to be used on fire doors, the electric strike and latch/lock must be fire rated and tested to EN 1634-1 or fire assessed by an approved body (UKCA) or notified body (CE).

NB. Electric strikes that are UKCA or CE marked are tested in the fail locked application for EN 1634-1.

In applications where electric strikes are fitted to a double door, the installation of the wiring providing signalling and/or power to the electric strike should in no way reduce the integrity and fire performance of the door.

When using an electric strike with a fire door it is important that if intumescent was fitted when tested that the specification is followed as per test or assessment report. When using intumescent it is usually fitted all around the body inside the frame.

When fitted to a fire door the electric strike has to be set as fail secure (fail locked).

The electric strike and lock must be installed in accordance with the relevant test data applicable to the application.

7.2.2.2 - Escape doors

If an electric strike is used on an escape door, then the inside hardware must be tested with the electric strike to ensure that the panic or emergency exit hardware can release the door to the relative standards EN 179, EN 1125 or EN 13637

For escape doors an electric strike can be fail locked or fail unlocked as long as the inside panic or emergency exit hardware will always allow for a safe egress in one action. If the electric strike has to be unlocked electrically, then the electric strike must be fail unlocked.

7 ACCESS CONTROL & ELECTRONIC LOCKS

If an electric strike is to be used with a mortice latch and a set of lever handles or a push pad, then the package must be tested to EN 179 Emergency Escape so that the latch can be mechanically withdrawn from the electric release when a load is applied against the door and does not hinder the operation of releasing the door with one action.

If an electric strike is to be used with a mortice latch and panic hardware on the inside then the package must be tested to EN 1125 Panic Escape so that the latch can be mechanically withdrawn from the electric release when a load is applied against the door and does not hinder the operation of releasing the door with one action.

If a system which includes an electric strike is to be specified where the system requires the strike to be electrically released to allow escape then the package can be tested to EN 13637 which is the standard for electrically controlled exit systems for use on escape routes. This is not mandatory as the standard is not harmonised but is recommended as a best practice solution.

7.2.2.3 - Fire rated escape doors

If an electric strike is used on an escape door, then the inside hardware must be tested with the electric strike to ensure that the panic or emergency exit hardware can release the door to the relative standards EN 179, EN 1125 or EN 13637.

For escape doors an electric strike can be fail locked or fail unlocked as long as the inside panic or emergency exit hardware will always allow for a safe egress in one action.

7.2.3 - Electric mortice locks

7.2.3.1 - Fire doors

For an electric mortice lock to be used on fire doors, it must be fire rated and included in a fire test to EN 1634-1 or assessed by a competent body.

In applications where electric mortice locks are fitted to a door or double door, the installation of the wiring providing signalling and/or power to the electric mortice lock should in no way reduce the integrity and fire performance of the door.

When using an electric mortice lock with a fire door it is important that if intumescent was fitted when tested that the specification is followed as per test or assessment report. When using intumescent it is usually fitted all around the lock and keep.

The electric mortice lock must be installed in accordance with the relevant test data applicable to the application.

Where a door is fire rated and has additional requirements to maintain fire and/or smoke control performance and integrity, there must be appropriate fire/ smoke test evidence in accordance with

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tests carried out against BS 476-22 or EN 1634-1 / EN 1634-2 / EN 1634-3 to support the use of the given hardware in the particular fire door assembly or fire doorset application and door configuration.

7.2.3.2 - Escape doors

The operation of an electric lock in a door that is on an escape route, is a critical life safety application.

To always facilitate escape through a door, locks will have a single action mechanical operation to release the locking mechanism. If an electric mortice lock is used on an escape door, the inside hardware must be tested with the electric mortice lock to ensure that the panic or emergency exit hardware can release the door to the relative standards EN 179 & EN 1125.

The operation of these locks to defined performance criteria ensures reliable unlocking of the door. Only locks that meet the performance requirements as defined by EN 179 and EN 1125 are suitable for use on escape doors.

Where the escape function is via a lever handle, push/pull pad or panic/touch bar the operating furniture must be the 'As Tested' operating hardware, as defined by the manufacturer and tested with the locking device. This is to ensure the reliability and durability of the operation can be proven. The substitution of any of these components for a non-tested alternative will invalidate the certification and result in non-compliance with the mandatory requirements and a performance that cannot be quantified.

Installation of the lockset must be in accordance with the manufacturer's instructions.

The selection of lock must be appropriate to the risk of either panic or emergency as defined in EN 179 / EN 1125.

7.2.3.3 - Fire rated escape doors

In some circumstances it may be necessary for a door to be an escape door and also to be fire rated, due to its location in a building or the type of building. Therefore, when used in these applications it is important that the electric mortice lock meets the requirements for both an escape door and a fire door.

In these applications, electric mortice locks should be included in a fire test to EN 1634-1 and to the performance standard EN 14846. Additionally, the electric mortice lock should also have been tested to EN 179 or EN 1125 (as defined in the sections above) and can be part of a system tested to EN 13637 Building Hardware - Electrically controlled exit systems for use on escape routes.

NB. EN 13637 is not a harmonised standard but is recommended as a best practice solution.

Comment

The requirements as defined above for both escape and for fire must be achieved. Any electric mortice lock defined suitable to provide escape must also have adequate fire test evidence to support the application into a given fire rated doorset. When installing electric mortice locks to fire rated or escape doors, it is critical for life safety that the fire safety performance of the doorset is not compromised by the installation of the hardware and that the ability of occupants to easily and quickly escape through the door is not hindered in any way.

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7.2.4 - Electric multi-point mortice locks

7.2.4.1 - Fire doors

For an electric multi-point mortice lock to be used on fire doors, it must be fire rated and included in a fire test to EN 1634-1 or assessed by a competent body.

In applications where electric multi-point mortice locks are fitted, the installation of the wiring providing signalling and/or power to the electric multi-point mortice lock should in no way reduce the integrity and fire performance of the door/doorset.

When using an electric multi-point mortice lock with a fire door, it is important that if intumescent was fitted when tested, the specification is followed as per the test or assessment report. When using intumescent it is usually fitted wrap around the lock and under the keep.

The electric multi-point mortice lock must be installed in accordance with the relevant test data applicable to the application.

Where a door is fire rated and has additional requirements to maintain fire and/or smoke control performance and integrity, there must be appropriate fire/smoke test evidence in accordance with tests carried out against BS 476-22 or EN 1634-1 / EN 1634-2 / EN 1634-3 to support the use of the given hardware in the particular fire door assembly or fire doorset application and door configuration.

7.2.4.2 - Escape doors

The operation of an electric multi-point mortice lock in a door that is on an escape route is a critical life safety application.

To always facilitate escape through a door, locks will have a single-action mechanical operation to release the locking mechanism for escape egress.

The operation of these locks to defined performance criteria ensures reliable unlocking of the door. Only locks that meet these performance requirements as defined by EN 179 (emergency) and EN 1125 (panic) are suitable for use on escape doors.

Where the escape function is via a lever handle, push/pull pad or panic/touch bar the operating furniture must be the 'As Tested' operating hardware, as defined by the manufacturer and tested with the locking device. This is to ensure the reliability and durability of the operation can be proven. The substitution of any of these components for a non-tested alternative will invalidate the certification and result in non-compliance with the mandatory requirements and a performance that cannot be quantified.

Installation of the lockset must be in accordance with the manufacturer's instructions.

The selection of lock must be appropriate to the risk of either panic or emergency as defined in EN 179 (Emergency) or EN 1125 (Panic).

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7.2.4.3 - Fire rated escape doors

In some circumstances it may be necessary for a door to be an escape door and also to be fire rated, due to its location in a building or the type of building. Therefore, when used in these applications it is important that the electric mortice lock meets the requirements for both an escape door and a fire door.

In these applications, electric mortice locks should be included in a fire test to EN 1634-1 and to the performance standard EN 14846. Additionally, the electric mortice lock should also have been tested to EN 179 or EN 1125 (as defined in the sections above) and can be part of a system tested to EN 13637 Building Hardware - Electrically controlled exit systems for use on escape routes.

NB. EN 13637 is not a harmonised standard but is recommended as a best practice solution.

Comment.
The requirements as defined above for both escape and for fire must be achieved. Any electric mortice lock defined suitable to provide escape must also have adequate fire test evidence to support the application into a given fire rated doorset. When installing electric mortice locks to fire rated or escape doors, it is critical for life safety that the fire safety performance of the doorset is not compromised by the installation of the hardware and that the ability of occupants to easily and quickly escape through the door is not hindered in any way.

7.2.5 - Electronic cylinders

7.2.5.1 - Fire doors

For an electronic cylinder lock to be used on fire doors, it must be fire rated and included in a fire test to EN 1634-1 or assessed by a competent body.

In applications where electronic cylinder locks are fitted to a door or double door, the installation should in no way reduce the integrity and fire performance of the door.

The electronic cylinder lock must be installed in accordance with the relevant test data applicable to the application.

Where a door is fire rated and has additional requirements to maintain fire and/or smoke control performance and integrity, there must be appropriate fire/smoke test evidence in accordance with tests carried out against BS 476-22 or EN 1634-1 / EN 1634-2 / EN 1634-3 to support the use of the given hardware in the particular fire door assembly or fire doorset application and door configuration.

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7.2.5.2 - Escape doors

The operation of an electronic cylinder lock in a door that is an escape door, must not compromise the single action means of escape under EN 179 & EN 1125.

Installation of the lockset must therefore be in accordance with the manufacturer's instructions.

The selection of lock must be appropriate to the risk of either panic or emergency as defined in EN 179 / EN 1125.

Some panic locks require a certain position of the cam for their correct operation. Such electronic cylinder variants are often called "anti-panic".

7.2.5.3 - Fire rated escape doors

In some circumstances it may be necessary for a door to be an escape door and also to be fire rated, due to its location in a building or the type of building. Therefore, when used in these applications it is important that the electronic cylinder lock meets the requirements for both an escape door and a fire door.

In these applications, electronic cylinder locks should be tested to EN 1634-1 for fire and to the performance standard EN 15684, and must not compromise the occupants' ability to escape.

Comment.
The requirements as defined above for both escape and for fire must be achieved. Any electronic cylinder lock must have adequate fire test evidence to support the application into a given fire rated doorset. When installing electronic cylinder locks onto fire rated or escape doors, it is critical for life safety that the fire safety performance of the doorset is not compromised by the installation of the hardware and that the ability of occupants to easily and quickly escape through the door is not hindered in any way.

7.2.6 - Electric locking for specialist applications

7.2.6.1 - Fire doors

For a special electric lock to be used on fire doors, the lock must be fire rated and tested to EN 1634-1 or fire assessed by an approved body (UKCA) or notified body (CE).

In applications where special electric locks are fitted, the installation of the wiring providing signalling and/or power to the lock should in no way reduce the integrity and fire performance of the door/doorset.

When using a special electric lock on a fire door, it is important that if intumescent was fitted when tested, that the specification is followed as per the test or assessment report. When using intumescent it is usually fitted wrap around the lock and under the keep.

The special electric lock must be installed in accordance with the relevant test data applicable to the application.

Where a door is fire rated and has additional requirements to maintain fire and/or smoke control performance and integrity, there must be appropriate fire/smoke test evidence in accordance with tests carried out against BS 476-22 or EN 1634-1 / EN 1634-2 / EN 1634-3 to support the use of the given hardware in the particular fire door assembly or fire doorset application and door configuration.

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7.2.6.2 - Escape doors

The operation of a special electric lock in a door that is passed through to escape to safety in an emergency situation is a critical life safety application.

To always facilitate escape through a door, locks will have a single-action mechanical operation to release the locking mechanism for escape egress or will be electrically unlocked by an exit system triggered by a manual release or fire alarm interface.

The operation of locks which are electrically unlocked should meet a defined performance criteria which ensures reliable unlocking of the door. Only locks that meet these performance requirements as defined by EN 13637 Electrically Controlled Exit Systems are suitable for use on escape doors.

Some powered pedestrian doors are connected to the evacuation alarm so they will release the lock and drive the door open on alarm.

Where there is an escape function via mechanical egress the operating furniture must be 'As Tested' and defined by the manufacturer and tested with the locking device. This is to ensure the reliability and durability of the operation can be proven. The substitution of any of these components for a non-tested alternative will invalidate the certification and result in non-compliance with the mandatory requirements and a performance that cannot be quantified. Installation of the lockset must therefore be in accordance with the manufacturer's instructions.

7.2.6.3 - Fire rated escape doors

In some circumstances, it may be necessary for a door to be an escape door and also to be fire rated, due to its location in a building or the type of building. Therefore, when used in these applications it is important that the special electric lock meets the requirements for both an escape door and a fire door.

In these applications, special electric locks should be tested to EN 1634-1 for fire and to the performance standard EN 14846. Additionally, these locks should also have been tested to EN 179 or EN 1125 (as defined in the sections above), and can be part of a system tested to EN 13637 Building Hardware - Electrically controlled exit systems for use on escape routes.

NB. EN 13637 is not a harmonised standard but is recommended as a best practise solution.

Comment.
The requirements as defined above for both escape and for fire must be achieved. Any special electric lock defined suitable to provide escape must also have adequate fire test evidence to support the application into a given fire rated doorset. When installing these locks onto fire rated or escape doors, it is critical for life safety that the fire safety performance of the doorset is not compromised by the installation of the hardware and that the ability of occupants to easily and quickly escape through the door is not hindered in any way

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7.2.7 - Solenoid Deadbolt Locks

7.2.7.1 - Fire doors

Solenoid bolts are not recommended for use on doors and applications where a side load pressure may occur.

For an electronic deadbolt solenoid lock to be used on a fire door, it must be fire rated and included in a fire test to EN 1634-1 or assessed by a competent body.

In applications where a solenoid deadbolt lock is fitted to a door or double door, the installation of the wiring which provides signalling and/or power to the solenoid deadbolt lock should in no way reduce the integrity and fire performance of the door.

When installing a solenoid deadbolt lock on a fire door it is important that if intumescent was fitted when tested that the same specification is followed as per test or assessment report. When using intumescent it is usually fitted all around the lock and keep.

The solenoid deadbolt lock must be installed in accordance with the relevant test data applicable to the application.

Where a door is fire rated and has additional requirements to maintain fire and/or smoke control performance and integrity, there must be appropriate fire/smoke test evidence in accordance with tests carried out against BS 476-22, BS 476-31.1 or EN 1634-1 / EN 1634-2 / EN 1634-3 to support the use of the given hardware in the particular fire door assembly or fire doorset application and door configuration.

7.2.7.2 - Escape doors

Solenoid bolts are not recommended for use on escape doors.

7.2.7.3 - Fire rated escape doors

Solenoid bolts are not recommended for use on fire rated escape doors.

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7.3 Commentary

7.3.1 - Electromagnetic locks

7.3.1.1 - Introduction

For the purpose of this Code of Practice, electromagnetic locks are divided into the following two categories:

- Face to face electromagnetic locks which include fitted on the frame, in the frame or in a housing
- Shear-electromagnetic locks

Electromagnetic locks are used to hold doors secure. They are made up of two main component parts, the magnet housing and the armature plate. When energised, the magnet housing – usually fixed to the door frame - produces an electromagnetic field, the armature plate – usually fixed to the door - is attracted to the magnet housing and a magnetic bond is established. It is this magnetic bond that holds the door secure.

All electromagnetic locks can be classed as "fail safe" or "fail unlocked" in that when power is removed and the magnet is de-energised, the magnetic bond between the magnet housing and armature plate is no longer present, the door is no longer held secure and is free to open.

When used as part of an access control system, or an escape door system, power can be removed from the electromagnetic lock in several ways for example a request to exit switch, a micro-switched panic bar or the activation of a fire alarm interface point.

Electromagnetic locks are available in a range of designs and sizes, this has a bearing on the holding strength of the magnetic bond and the way in which the electromagnetic lock holds the door secure. Electromagnetic locks operate at Low voltage (12 / 24V DC), they should be carrying the appropriate conformity mark (such as UKCA / CE mark) for Electro Magnetic Compatibility testing.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

7.3.1.2 - Operation

Face to face electromagnetic locks are available in a range of types and sizes. They can be surface fixed to frames, mortice fitted within the frame or enclosed within a housing that is fixed to the door frame, with the armature on the door.

The armature plate of an electro-magnetic lock is often fixed to the door by use of a bolt through fixing. It is important that any bolt-through fixing does not affect the fire integrity of the door. When fitted to a fire door, suitable fire test evidence is required to confirm the installation of the electro-magnetic lock armature plate does not reduce the fire resisting performance of the door.

Shear-magnets are often selected for use on swing through doors. They are similar in basic operation to face to face magnets in that the magnet body is energised and attracts the armature plate. However, the main difference with shear-magnets is in their installation, they are transversely mounted at right angles to opening direction of the door. Shear-magnets rely on the interaction of shear stops and housings on the face of the magnet and armature plate to provide door holding force. If a lateral side pressure is applied to a door for example when pushing or pulling the door open, the shear stops and housings can often bind together under this side load pressure preventing the magnet from releasing the armature plate and preventing the door from opening.

As the operation of a shear-magnet can

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jam under side load conditions they are not acceptable for use on escape doors. For electromagnetic locks, a regular programme of maintenance must be undertaken to ensure that the correct operation performance is maintained for the life of the building.

7.3.1.3 - Application of Use

Face to face electromagnetic locks can be used on both internal and external fire and escape doors. When installing an electro-magnetic lock onto an escape route door, it is important that a headroom clearance of 2m is maintained in accordance with local building regulations and that the positioning of the magnet does not reduce this clearance.

For the final exit doors, a higher loading force should be considered to also offer a high level of security as against the electromagnetic locks used on internal doors.

7.3.1.4 - Product Standards

The performance standard for electromagnetic locks is DHF TS 010 Electromagnetic Locking Devices Performance Requirements and Test Methods. The classification code for the product can be found in the DHF Best Practice Guide Electromagnetic Locking Devices.

TS 010 designates a classification code which gives the minimum holding forces for the electromagnetic lock. Grades 2 and 3 are ideal for internal doors and Grades 4 and above are for external or security doors. Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

7.3.2 - Electromechanical striking plates (Electric strikes/releases)

7.3.2.1 - Introduction

Electromechanical striking plates, more commonly referred to as electric strikes and/or releases, fall into two main categories: -

(i) Mortice striking plates

(ii) Rim striking plates

Electric strikes are used within access control systems and are fitted in conjunction with a mechanical mortice or rim latch/lock.

Electric strikes are most commonly available in 12 or 24V AC or DC, other multi-voltage variants are available.

Some electric strikes are available in a single unit that offers field selectable fail locked (secure) and fail unlocked (open/safe) applications and in addition multiple voltage options.

Electric strikes can be fitted to fire doors and escape doors, however there are mandatory requirements that electric strikes will need to comply with in order to be suitable for these applications as below.

7.3.2.2 - Operation

Electric striking plates or as they are sometimes called “electric releases” are an electromechanical method of securing the latch/bolt of a door. They operate through

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the removal or application of a voltage to a coil or solenoid which in turn allows the rotation/securing of the keep locking/unlocking the door. As electric striking plates are available in both fail locked and fail unlocked formats, care must be taken when selecting the correct operating mode, particularly if the electric striking plate is to be used on a door that is classed as an escape door.

In a fail unlocked striking plate, the coil is permanently energised to secure the keep, holding the latch/bolt in place, and thus securing the door. When power is removed from the coil, for example by a control unit or operation of an integrated fire alarm interface, the coil de-energises allowing the keep to rotate, releasing the latch/bolt and allowing the door to be opened.

In a fail locked electric striking plate, the keep is only released when power is applied to the coil. When fail locked electric striking plates are to be used, a suitable mechanical means of escape to EN 179 or EN 1125 should be used. Or, the electric strike must be included within an EN 13637 Escape System.

7.3.2.3 - Application of Use

Electric strikes can be fitted on timber, metal and uPVC frames. For steel frames a standard face plate is fitted and for timber frames a longer face plate is used.

It is important that the choice of latch/bolt used with the electric strike is compatible with the dimensional tolerances provided by the electric strike manufacturer.

For outward opening door applications an astragal plate (security cover) should be fitted to prevent manipulation of the strike plate and/or latch of the lockcase. Consideration should be given to the design of the astragal plate which may protrude form the leading edge of the door (active leaf).

An electric strike tends to be used on fire doors that are single door applications. They are not recommended for used on rebated double timber doors as the thickness of the door is reduced from the door thickness at the overlap. On double steel doors an astragal plate can be used as this does not affect the door thickness as the doors would be flush.

7.3.2.4 - Product Standards

The performance standard for electric releases is EN 14846 Building hardware locks and Latches Electromechanically operated locks and striking plates: which is a harmonised standard and therefore will require the product to carry the appropriate conformity mark (such as UKCA / CE mark).

The classification for the product can be found in the DHF Best Practice Guide Electromechanically operated locks & striking plates.

The electric release may have to be also tested with other performance standards such as EN 179, EN 1125 or EN 13637 if used on an escape door.

For fire rating the product will have been included in a fire test to EN 1634-1 Fire resistance test for door and shutter assemblies and openable windows.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

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7.3.3 - Electric mortice locks

7.3.3.1 - Introduction

An electric mortice lock can be considered similar to a mechanical mortice lock but electrified to allow remote control by a 3rd party system such as an electronic access control system, automatic door system, intruder or fire alarm system.

Electric mortice locks are available in two main types of operation - solenoid controlled or motorised.

Electric mortice locks are generally installed within the door leaf, to facilitate this a cable is routed across or within the door leaf to provide power, control and monitoring functions. Electric mortice locks can provide a highly secure aesthetic solution, similar in appearance to a typical mechanical mortice lock.

Electric mortice locks can be fitted to fire doors and escape doors, however there are mandatory requirements that electric mortice locks will need to comply with in order to be suitable for these applications.

7.3.3.2 - Operation

Electric mortice locks are designed to provide controlled access through a door in one or both directions depending upon the variant.

Solenoid controlled mortice locks work by controlling the operation of the handle. When an electrical input signal is provided by a 3rd party control system the solenoid activates, allowing operation of the door handle.

Motorised electric locks differ in operation to a solenoid lock, in that on activation from a 3rd party control system, the motor activates to withdraw the locking bolts of the mortice lock, allowing the door to be pushed/pulled open.

7.3.3.3 - Application of Use

Electric mortice locks are generally installed within the door leaf, they are a highly secure and aesthetic solution. Commonly the internal (non-controlled) handle is mechanical in operation only, thus providing unrestricted egress, regardless of the power state of the lock. The internal mechanical operation may be a lever handle, emergency escape or panic device, depending upon the level of escape required eg lever handle for EN 179 and panic bar for EN 1125.

With some lock variations it is possible to provide control to lever handles on both sides of the door - requiring an electrical operation to operate. As these variants remove the mechanical escape function, they should not be installed on escape doors.

Due to their operation, solenoid handle controlled locks are not suitable for use on automated doorsets. Motorised locks are suitable for use with automated doorsets.

7.3.3.4 - Product Standards Coding & Classification

The performance standard for electric mortice locks is EN 14846 Building Hardware - Locks and Latches - Electromechanically operated locks and striking plates: which is a harmonised standard and therefore will require the product to carry the appropriate conformity mark (such as UKCA / CE mark).

The classification for the product can be found in the DHF Best Practice Guide Electromechanically operated locks & striking plates.

The electric mortice lock will also have to be tested with other performance standards such as EN 179, EN 1125 or EN 13637 if used in those applications. For fire rating the product will have been included in a fire test to EN 1634-1 Fire resistance test for door and shutter assemblies and openable windows.

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Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

7.3.4 - Electric multi-point mortice locks

7.3.4.1 - Introduction

An electric multi-point mortice lock (MPL) can be considered similar to a mechanical multi-point mortice lock but electrified to allow control by a 3rd party system such as an electronic access control, automatic door, intruder or fire alarm systems. These can be used in a variety of door types with specific variations suitable for composite and uPVC doors.

Electric multi-point locks are available in two main types of operation, solenoid controlled or motorised. These can be manufactured specifically designed as an electric lock or mechanical lock with an add-on motor drive. Mostly locks intended for use on uPVC or composite doors are motorised operation with an additional motor added to the mechanism to drive the lock bolts unlocked.

Electric multi-point locks are generally installed within the door leaf, to facilitate this a cable is routed across or within the door leaf to provide power, control and monitoring functions. Electric multi-point locks locks provide a highly secure aesthetic solution, similar in appearance to a typical mechanical mortice lock.

Electric multi-point locks can be fitted to fire doors and escape doors, however, there are mandatory requirements that electric multi-point locks must comply with, in order to be suitable for these applications as outlined below.

7.3.4.2 - Operation

Electric multi-point locks are designed to provide controlled access through a door in one or both directions depending upon the variant.

Solenoid-controlled multi-point locks work by controlling the operation of the external lever handle. When an electrical input signal is provided by a 3rd party control system the solenoid activates, enabling operation of the door handle.

Motorised electric multi-point locks differ in operation from a solenoid version, in that on activation from a 3rd party control system, the motor activates to withdraw the locking bolts of the mortice lock, thus allowing the door to be pushed/pulled open. These will then mechanically auto lock once the door has closed.

7.3.4.3 - Application of Use

Electric multi-point locks are generally installed within the door leaf, they are a highly secure and aesthetic solution.

Commonly the internal (non-controlled) handle is mechanical in operation only, thus providing unrestricted egress, regardless of the power state of the lock. The internal mechanical operation may be a lever handle, emergency escape or panic device, depending upon the level of escape required eg lever handle for EN 179 and panic bar for EN 1125.

With some lock variations, it is possible to provide control to lever handles on both sides of the door which requires an electrical operation to operate. As these variants remove the mechanical escape function, they should not be installed on escape doors.

Motorised versions are suitable for use with powered pedestrian doorsets unlike Solenoid handle controlled versions which are not, as they have no means of driving the bolts to the unlocked state.

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7.3.4.4 - Product Standards Coding & Classification

The performance standard for electric multi-point mortice locks is EN 14846 Building Hardware - Locks and Latches - Electromechanically operated locks and striking plates, a harmonised standard that will require the product to carry the appropriate conformity mark (such as UKCA / CE mark).

The classification for the product can be found in the DHF Best Practice Guide Electromechanically operated locks & striking plates.

Additionally, these locks will also fall within the scope of the DHF Technical Standard TS 621 Thief Resistant Electronic Door Locking Devices and the prEN 15685 Building hardware - Multipoint locks and their locking plates - Requirements and test methods European hardware performance standard which is imminent for publication.

The classification for the products against these standards can be found in the relevant DHF Best Practice Guides available.

The electric multi-point lock will also have to be tested with the performance standards EN 179 or EN 1125 if used in escape applications.

For fire rating the product will have been included in a fire test to EN 1634-1 Fire resistance test for door and shutter assemblies and openable windows.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

7.3.5 - Electronic cylinders

7.3.5.1 - Introduction

Like mechanical cylinders, electronic cylinders are offered for various lock types or profiles.

They are available in various designs and are also referred to as mechatronic or digital cylinders.

Electronic cylinders are similar in operation to mechanical cylinders. However, whereas a mechanical cylinder is operated via a mechanical key, an electronic cylinder is operated by electronic or mechatronic keys and credentials. This provides major advantages by allowing time control, replacement, deletion and audit of the electronic or mechatronic keys and credentials that are used.

An electronic cylinder may also be integrated within a wider access control, security or building management system.

7.3.5.2 - Operation

Depending on the product design, operation by the user can be as follows:

a) A cylinder with both electrically and mechanically operated locking parts

b) A cylinder with an electrically operated locking part and a key for mechanically rotating the plug

c) A cylinder with electrically operated locking part and with a manually operated internal locking/releasing function

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There are two different principles applied as to how the cam is released for access by the electronics:

1) The cam is blocked without authorisation (same principle as with mechanical cylinders: The cam may only be turned with an authorised key).
2) The cam is not coupled to the plug/barrel and cannot by turned without authorisation (e.g., cam is free turning).

The means of operation and the design must be considered for use in escape doors or in fire rated doors.

7.3.5.3 - Application of Use

In principle, the same application of use that applies to a mechanical cylinder. Mainly, locks that are used in buildings and hardware products operated by a cylinder lock or a key switch.

7.3.5.4 - Product Standards Coding & Classification

Classification according to EN 15684 – Building Hardware – Mechatronic Cylinders – Requirements and Test Methods.

DHF's TS 007-2 specification includes a classification method and references test methods and acceptance criteria for the assessment of enhanced security mechatronic cylinders and associated security hardware. Electronic cylinders are rated with one or three stars according to this standard.

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

7.3.6 - Electric locking for specialist applications

7.3.6.1 - Introduction

This section contains information relating to specialised lock applications that are not covered by other sections within this document. This is not an exhaustive list but aims to highlight the more common applications such as electric locking for sliding doors and gates or locks for double/single action swing doors.

These locks are used where standard types of electric locks are unsuitable due to size and function of the products. These locks are often fitted in the side frame or header frame to secure a door with a striker plate fitted to the door leaf, with the addition of accessories some of the locks can also be surface mounted.

Some of these locks are used as an alternative to a shear electro-magnetic locks, as a number of them have a bolt that when engaged in the striker will pull the door closed and secure or release under an high side load. They can be either fail secure or fail safe and generally are 12V or 24V DC and may be driven by an electric motor.

7.3.6.2 -Operation

These electric locks are designed to help provide controlled access through a door or gate in one or both directions subject to the variant.

Some of these locks when activated from a 3rd party control system may withdraw or release the locking bolts or latch of the lock, allowing the door to be pushed/pulled open manually, or by a powered pedestrian door drive. These locks will then automatically relock on the door closing.

Many of these locks will have an inbuilt sensor which detects the door reaching the fully closed position, triggering the relocking cycle.

7 ACCESS CONTROL & ELECTRONIC LOCKS

7.3.6.3 - Application of Use

The application requirement will determine which type of special electric lock is required, determine its application: -

Some electric locks are specifically designed for double action doors and may, by their operation, assist with correctly aligning the doors.

Electric locking for manual sliding doors' is designed to offer increased security due to the design of the locking bolt. The lock is usually installed in the frame and the auto-locking latch fitted in the door leaf.

There are locks that are designed for specific gate applications, some of which are designed for high security gates, roller doors, shipping containers and any other large doors applications. Some of these locks may operate similar to a mechanical rim latch but are electrified. These electric locks may be 12 to 48V AC/DC, some may have a higher holding force and some may be suitable for harsh external applications.

7.3.6.4 - Product Standards Coding & Classification

The performance standard for special electric locks used on doors is EN 14846 Building Hardware - Locks and Latches- Electro-mechanically operated locks and striking plates. This is a harmonised/ designated standard that will require the product to carry the appropriate conformity mark (such as UKCA / CE mark).

The classification for the product can be found in the DHF Best Practice Guide Electro-mechanically operated locks & striking plates.

EN 13637 will apply to any specialist locking when installed on an escape door.

For fire rating the product will have been included in a fire test to EN 1634-1 Fire resistance test for door and shutter assemblies and openable windows.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

7.3.7 - Solenoid Deadbolt Locks

7.3.7.1 - Introduction

A solenoid deadbolt lock can be considered as a type of electronic lock that is used to secure a door in access control applications. Solenoid deadbolt locks can be fail safe and fail secure in operation, across a range of voltages including AC and DC.

A solenoid deadbolt lock can be fitted to a fire door – in a limited number of applications. A solenoid deadbolt lock should not be fitted to an escape door.

7.3.7.2 - Operation

A solenoid deadbolt lock is made up of two main component parts, the lock body and the keep. Usually the main body which includes the solenoid and deadbolt mechanism is fitted to the frame and the keep is fitted to the door.

In fail safe operation, when energised, a magnetic field is generated within the solenoid which through magnetic effect repels a plunger. The plunger is connected via linkage to a cylindrical bolt which extends out from the body into the keep securing the door. When power is removed, the magnetic field collapses and the bolt – usually on a spring or some form of gearing – returns to unlocked position.

In fail secure operation, the bolt is extended to the locked position – usually on a spring or some form of gearing. When energised, a magnetic field is generated within the solenoid which through magnetic effect operates a plunger.

7 ACCESS CONTROL & ELECTRONIC LOCKS

The plunger is connected via linkage to the bolt which is withdrawn from the locked position. When power is removed, the magnetic field collapses and the bolt returns to the locked position.

Solenoid deadbolt locks may have a range of monitoring contact options to affect operation and monitor the position of the bolt and door. Door and frame alignment are crucial and must be precise, to ensure no side-loading of the bolt when extended, can occur. Even very slight side load or side pressure applied to the extended bolt of the solenoid bolt will impede or prevent the bolt from retracting to its unlocked position. This may lead to a door jamming in a locked position resulting in a significant risk to life safety.

7.3.7.3 - Application of Use

A solenoid deadbolt lock is an auxiliary locking device, and due to its nature of operation should only be considered for low use doors, in non-occupied areas such as a store room door.

Some solenoid bolts are not recommended for use on timber doors and frames.

Solenoid bolts vary in design offering a diverse range of physical security with some suitable for standard access control applications (break-in resistance of around 10,000N) to some offering a very high security solution used in custodial applications (break-in resistance around 50,000N)

Solenoid bolts are not recommended for use on escape doors or doors where a side load pressure may occur.

7.3.7.4 - Product Standards Coding & Classification

There are no recognised UK or EN performance standards for solenoid deadbolt locks.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

For further information see also the Best Practice Guides:

- **Electromagnetic Locking Devices**

published by the DHF and included on the DHF website.

Further information on hardware for fire and escape doors is available from the GAI website.

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SECTION 8
DOOR FURNITURE

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DOOR FURNITURE

8.1 Introduction

Fire-resisting doors usually incorporate either:

- Lever handles or knobs if the doors are latched, or
- Pull handles/push plates if unlatched.

Lever handles on a latch

Pull handles on a fire door

8.2 Critical Recommendations

8.2.1

Lever handles and knobs should comply fully with:

- EN 1906 - Building hardware - Lever handles and knobs,
- All evidence should be provided by an approved Third party certification or testing body.

Pull handles should comply with:

- BS 8424 Building hardware, pull handles, requirements and test methods,
- All evidence should be provided by an approved Third party certification or testing body.

(For further information on certification schemes see **1.5 Documentation**).

8.2.2

All door furniture should have demonstrated its suitability for the intended purpose, by inclusion in satisfactory fire tests to BS 476:22, EN 1634-1 or EN 1634-2, on a type of door and configuration on which it is proposed to be used. This evidence should be provided by an approved third party certification or testing body (see **1.5 Documentation**).

8.2.3

On timber doors the absolute minimum amount of wood should be removed in order to reduce the risk of fire or smoke penetration through the door.

8.2.4

The use of intumescent sleeves around the fixing holes might be a requirement of the applicable fire performance assessment schedule. Supplied fitting instructions for door furniture should always be followed.

8 DOOR FURNITURE

8.3 Commentary

8.3.1

Generally, metallic materials used in the construction of lever handles, knobs and pull handles/protection plates have not been found to greatly affect the fire performance of the timber doors to which they are fitted. However best practice for hardware manufacturers and suppliers would be to include a lever handle in a fire test to BS 476-22 or EN 1634-1 / EN 1634-2 to prove that melting points of those materials will not contribute to any integrity (burn through) failure in the event of fire.

Lever handles of a plastic or polyamide base material should always have a steel core if the product is to be used on fire doors, as the melting point for these materials is low and may cause the lever to be inoperable or fall from the door in the event of fire before occupants of a building have the opportunity to escape. These materials can also be flammable and there is a potential risk of the material flaming on the non-fire side of a door.

Lever furniture with back-to-back bolts (plan view)

8.3.2

Durability of fixings for lever handles will have an effect on the overall life of product and eventual safety of a building's occupants. Therefore, when considering specification of these items, preference should be given to products that demonstrate compliance with the higher durability levels contained in EN 1906.

Where lever handles and knobs are used on self-closing fire doors, a minimum category of use classification (first digit) of Grade 3 is recommended, as this will better withstand the opposing forces exerted by the closing device.

Such products are likely to have:

- Support roses or backplates fixed back-to-back through the lock case
- A performance bearing between the lever and rose
- The spindle securely fixed into the lever on both sides

8.3.3

Generally, the overall size of a lever handle or pull handle has no effect upon the fire performance of the doors to which it is fitted. However, best practice for hardware manufacturers and suppliers would be to include a pull handle in a fire test to BS 476-22, EN 1634-1 or EN 1634-2 to prove that melting points of materials will not contribute to any integrity (burn through) failure in the event of fire.

Pull handles

8 DOOR FURNITURE

8.3.4

Pull handles should use bolt-through fixings, rather than face-fixed screws, as these will prove to be more durable and the heads of those fixing bolts on single pull handles (rather than back to back pull handles), should be protected by a push plate or rose.

Care should be taken in the size of any bolt through fixing hole preparation if the pull handle is to be used on a fire door, as the larger the hole, the greater the risk of fire transfer from fire side to non-fire side of the door and an intumescent material may be required in the final fitting of any product on site. Fitting instruction detail should be provided and followed on the appropriate size of bolts/fixings.

Refer to relevant fire test evidence in respect of pull handles.

8.3.5

Door protection plates are generally acceptable on fire doors where they are:

- Wholly surface mounted
- Not occupying more than 20% of the door leaf in total or exceed 500mm in height for kickplates and 300mm for mid-plates, whichever is the smaller
- Manufactured from steel, brass or plastic/laminate for timber-based doorsets/assemblies
- Screw fixed or bonded on timber-based doorsets/assemblies
- Screw fixed only on steel doorsets/ assemblies
- No thicker than 2mm
- Not wrapped around the edge, or extend beneath the door stops on the frame

However, the limitations within 'Field of Application' for the specific door type shall always be followed.

8.3.6

Push plates of conventional sizes, which can be screwed or adhesive-fixed, can also be specified without problems.

8.3.7

When fitting to a fire door, letter plates of proven performance and durability should be selected, which have been included in satisfactory fire tests to BS 476-22, EN 1634-1 or EN 1634-2. These can only be fitted to a door tested to accept a letter plate and be of a similar type of construction to that in which they will be fitted.

Fire tested letter plates will come complete with the intumescent product with which it has been tested and should only be fitted with this intumescent and according to manufacturer's instructions.

8.3.8

Door viewers should not be fitted to timber or steel fire doors unless the door viewer model is supported by evidence of fire performance in a door of the relevant material.

As with all items of door hardware on fire resisting doors, it is essential that the hole cut in the door to fit the device should be as small as is practically possible and an intumescent material suitable for the fire resistance requirements of the door be used.

For further information see also the Best Practice Guide:

- Lever handles and knob furniture to EN 1906

published by the DHF and included on the DHF website. Further information on hardware for fire and escape doors is available from the GAI website.

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SECTION 9
MECHATRONIC DOOR FURNITURE

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9 MECHATRONIC DOOR FURNITURE

9.1 Introduction

Mechatronic door furniture, also referred to as electronic escutcheons or electronic door furniture are available in all the same forms as their mechanical counter parts including the different finishes and lever styles.

The operation of the mechatronic door furniture is achieved by introducing a credential (e.g. electronic token, digital key or mag stripe) to the furniture, much in the way a token and reader operate, the reader may be part of the escutcheon or may be independent to the lever or escutcheon.

When installing any of these locks onto fire rated or escape doors, it is critical for life safety that the fire safety performance of the door-set is not compromised by the installation of the hardware and the ability of occupants to easily and quickly escape through the door is not hindered in any way.

Irrespective of the management system being used, the hardware on the door will still have to be tested to the same standards as defined in this section.

The function of mechatronic door furniture is to deny unauthorised access by controlling the external lever or knob which will only become operational when a valid credential is presented to the reader.

In addition, mechatronic door furniture is available in different forms, if the proximity reader is installed onto a long plate door furniture that includes the lever handle and surrounds the key cylinder (if fitted), these tend to be referred to as electronic escutcheons. With these types of furniture, the batteries are often located into the internal fitting of the escutcheon set.

Alternative versions have the reader separate to the handle or knob, these types of furniture will be combined with a mortice lock with a built-in actuator which engages the external controlled lever or knob, these are generally supplied as a lockset solution.

9 MECHATRONIC DOOR FURNITURE

9.2 Critical Recommendations

9.2.1 - Fire doors

For mechatronic door furniture to be used on fire doors, the reader, electronics, mortice lock and escutcheons must be included in a fire test to EN 1634-1 or assessed by a competent body.

When using mechatronic door furniture with a fire door it is important that if intumescent was fitted when tested, that the specification is followed as per test or assessment report.

The mechatronic door furniture must be installed in accordance with the relevant test data applicable to the application.

In addition to the above requirements, additional 3rd party certification and accreditation may be required for residential applications, to cover fire performance.

9.2.2 - Escape doors

The operation of mechatronic door furniture on a door that is on an escape route, is a critical life safety application.

To always facilitate escape through a door the mechatronic door furniture will have a single action mechanical operation to release the locking mechanism from the inside.

Note: at the time of writing this document the mechatronic door furniture product standard EN 16867 is not a harmonised standard, therefore an mechatronic door furniture product cannot carry the appropriate conformity mark (such as UKCA / CE mark).

When used on an escape door the mechatronic door furniture must be tested as a lockset in accordance with EN 179 or EN 1125 standards.

The operation of these locks to a defined performance criteria ensures reliable unlocking of the door. Only locks that meet the performance requirements as defined, are suitable for use on escape doors.

Where the escape function is via a lever handle, push/pull pad or panic/ touch bar the operating furniture must be the 'As Tested' solution defined by the manufacturer. The substitution of any of these components for a non-tested alternative will invalidate the certification and result in non-compliance with the mandatory requirements and a performance that cannot be quantified. Installation of mechatronic door furniture must therefore be in accordance with the manufacturer's instructions.

9.2.3 - Fire rated escape doors

In some circumstances it may be necessary for a door to be an escape door and also to be fire rated, due to its location in a building or the type of building. Therefore, when used in these applications it is important that the mechatronic door furniture meets the requirements for both an escape door and a fire door as defined as above.

9 MECHATRONIC DOOR FURNITURE

9.3 Commentary

9.3.1 - Application of Use

These solutions are often used, but not limited to, hotel bedroom doors, residential apartments, in student accommodation and in commercial offices.

In the case of the electronic escutcheon variants these units can be used with single point or multi-point locking and be suitable for use on all types of door such as timber, steel, aluminum, composite and uPVC.

Mechatronic hardware where the reader is detached from the escutcheons are suitable for all types of doors such as timber, steel, aluminum, composite and uPVC, however generally must be supplied as a lockset as the actuator is generally incorporated within the mortice lock. These locks are intended for use to control a single leaf door but may be incorporated onto a double, leaf and half, single action door-set, where the slave leaf is bolted shut to provide a rigid structure for the lockset to secure too.

9.3.2 - Product Standards Coding & Classification

Under the requirements of the European Construction Products Regulation CPR and the UK Construction Products Regulation (UK-CPR) it is a mandatory requirement for essential hardware to be UKCA marked and Certificated in accordance with the requirements defined within the relevant harmonized (CPR) or designated (UK-CPR) performance standard. The requirements apply to all hardware defined as essential for the door they are fitted to and achieve its required function of providing fire compartmentation or escape.

The performance standard for mechatronic door furniture is EN 16867 Building hardware – Mechatronic Door Furniture – Requirements and test methods.

Mechatronic door furniture is combined with locks according to EN 12209 and EN 15856, or can be part of an emergency exit device according to EN 179 and EN 1125.

For fire rating the mechatronic door furniture products will need to have been successfully tested to EN 1634-1 Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware.

Optional 3rd Party testing and accreditation for security and connectivity may be required for certain applications.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

Further information on hardware for fire and escape doors is available from the DHF and GAI websites.

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SECTION 10
DOOR BOLTS

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10 DOOR BOLTS

10.1 Introduction

Fire-resisting door sets might be required to be held in the closed position using bolts. The most common application is on double doors, but bolts may also be used on restricted access openings which need to be fire resisting.

For the purpose of this Code of Practice door bolts are divided into two categories:

- Surface mounted bolts
- Recessed (flush) bolts and mortice bolts

Note: This does not imply suitability of any device for fire door use. Individual product certification should be checked prior to use on fire rated doors (see **10.2** and **10.3** for further information).

Surface mounted bolt

Mortice bolt with protruding knob slide

10.2 Critical Recommendations

10.2.1

The door bolt, keep and fixings should comply fully with:

- EN 12051 Building Hardware Door and Window Bolts, including Annex B. Note that this standard is not a harmonised/ designated standard under the EU Construction Products Regulation 305/2011 and UK Construction Products Regulations 2013 (as amended)
- Relevant test evidence should be provided by an approved third party certification or testing body

(For further information, see **1.5** Documentation).

10.2.2

The door bolt, keep and fixings should have demonstrated their suitability for the intended purpose, by inclusion in satisfactory fire tests to BS 476-22 , EN 1634-1 or EN 1634-2, on a type of door and configuration in which it is proposed to use them. This evidence should be provided by an approved third party certification or testing body (see **1.5 Documentation**).

10.2.3

Generally, bolts should NOT be fitted to doors on escape routes irrespective of whether the door is fire rated or not. This is particularly relevant in public buildings, shops and commercial premises on doors on escape routes from rooms with more than 60 people. (For further detail please refer to panic and escape hardware **Section 14**).

10.2.4

The size, strength and type of door bolt must be correct for the door to which it is fitted, bearing in mind:

- the type of door
- the way it is likely to be used

10 DOOR BOLTS

- whether subject to other factors such as:
  - air pressure, heavy traffic use
  - abusive treatment
  - use by elderly, infirm or disabled

Where pairs of timber or steel doors are limited to latched and bolted test evidence, the engagement of the bolt in the frame and at the floor should not be less than that supported by the evidence.

10.2.5

A regular programme of maintenance must be undertaken, to ensure that the correct function is maintained for the life of the building (see **Section 13**).

10.3 Commentary

10.3.1 General

Door bolts are available in a range of sizes and types, which are potentially suitable for use on fire-resisting doors. In addition to fire-resisting requirements, EN 12051 also details graded requirements and tests for:

- Category of use
- Durability
- Safety in use
- Corrosion resistance
- Security

These can be used to provide the basis for selection in **10.2.4.**

10.3.2 Installation

When installing bolts to fire resistant doors the door manufacturer's test evidence should always be consulted, and the bolts fitted within the scope of the certification. Always ensure that the intumescent protection when used, replicates the fire tested conditions.

10.3.3 Surface Mounted Bolts

Provided they are NOT let in or wrapped around the door edge and surface fixing screws are used (NOT bolt-through fixings) these types of bolt do not significantly affect a timber fire-resisting door's performance.

Any deviation from the above in a timber door will require test evidence or assessment to validate the application.

10.3.4 Recessed (flush) & Mortice Bolts

These types replace wood with metal when used on a timber door and, however fixed, conduct heat more effectively. As a result they will almost certainly require additional intumescent protection, and will always require test evidence or assessment to validate the application. Traditional flush bolts as used on timber doors are difficult to fit neatly to steel doors and it is recommended that flush bolts are selected which can be located away from the top and bottom edges of doors and have a facility for adjustment to ensure correct engagement into the frame and floor/sill.

10.3.5 Use on Escape Routes

Whilst provision is made within EN 12051 to ensure that operating forces are kept within reasonable limits (even after periods of abuse) door bolts are NOT suitable for emergency exit situations, and should NOT, therefore, be used on escape routes, except on the second leaf of double door assemblies where the first leaf in use is wide enough to meet relevant escape requirements.

For further information see also the Best Practice Guide:

- **Door and Window Bolts to EN 12051**

published by the DHF and included on the DHF website. A link is available from the GAI website:

www.dhfonline.org.uk **www.gai.org.uk**

SECTION 11
FIRE & SMOKE SEALS

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11 FIRE & SMOKE SEALS

11.1 Introduction

Intumescent door seals and smoke door seals are a vital part of fire-resisting doors. Whilst used on timber and composite fire-resisting doors, intumescent seals are rarely used on steel doorsets. Metal doorsets that require intumescent to achieve performance will have the type or brand of intumescent stipulated in their certificates or assessments.

Since the introduction of BS 476-8, intumescent fire seals have progressed substantially in both form and function. In today's complex market, there is a range of materials offering slightly different performance characteristics with differing and overlapping applications. Size is no longer the sole criterion on which to base selection. Whilst the latest testing and certification regimes offer some interchangeability, allowing more freedom of choice than before, the criteria for selection must be fully understood in order to maintain the performance of what is a critical life safety product. A hierarchy of test and assessment evidence will exist for tested intumescent products which give information on a range of door applications. Product without valid test evidence should not be considered.

11.2 Critical Recommendations

The testing of fire doors is described in Section 1 of this document. Test evidence for intumescent products on fire doors and, where necessary, together with hardware, could lie with a number of stakeholders. These include any of the following: the original material manufacturer, suppliers, doorset manufacturers, specialist distributors or hardware manufacturers. Between them there may exist a degree of variation in scope. Member companies of the Intumescent Fire Seals Association, have carried out tests to monitor the contribution of intumescent to fire door performance and are able to provide advice on the correct use of the material in association with the relevant test/ assessment evidence.

There are two main applications for Intumescent fire protection: Perimeter fire seals and hardware protection. Within these sectors the variation in form, function and application is considerable. In broad terms each sector can be broken into:

11.2.1 The fitting of perimeter fire and smoke seals

- Fire protection only – For non-smoke containment doors, e.g. FD30, FD60, E30, E60 etc., these seals fit into a rebate around the perimeter, jambs, meeting stile and head. They are more commonly located in the frame reveal at the jambs and head. For more challenging applications particularly at the meeting stile of double door assemblies, seals may be opposing, offset or just located in one leaf. In accordance with the relevant fire test evidence, these configurations represent an engineered solution. Any deviation from the tested configuration for a particular door can result in early failure.
- Fire and Smoke Protection – For smoke containment doors, e.g. FD30S, FD60S E30Sa, E60Sa etc., these can be fitted as either a combination seal (fire and smoke) or two separate seals comprising one fire only and one smoke specific seal. As per above they are generally fitted into the frame rebate. In the case of separate seals the smoke seal may be surface mounted. Where smoke seals are concerned the leaf edge would be preferred due to the lower resistance the leaf encounters on closing, avoiding sticking of door leaves on site. The arc described by the leading edge of a closing door gets closer to the frame than the usual 3 mm clearance allowed in the fully closed position. This means that the leading edge will contact a

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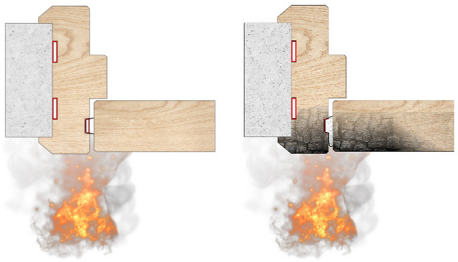
FIRE & SMOKE SEALS

frame-mounted seal near its base, thus requiring greater force to push over and beyond it. The arc described by a smoke seal fitted to the centre of the door leaf leading edge results in only the tip of the seal contacting the frame, consequently less force is required to complete the closing cycle. Practically however, in factory environments, seals are easier to rebate into the frame rather than the leaf, so in most cases combination seals are located in the frame rebate. Whereas, when fitting on site it is easier to rebate into the door leaf edge rather than frame.



Action of intumescent seals expanding to seal the perimeter

11.2.2 Perimeter Seals: Concealed Under Door Lipping

In some instances, the seal is concealed beneath the door lipping during manufacture. As the intumescent expands it pushes the lipping away from the door leaf to close the perimeter gap. These doors may be altered for fitting on site, but great care must be taken to ensure the intumescent is not altered or damaged in any way. This application is more prevalent in the US.

11.2.3 Perimeter Seals: Surface Mounted

Surface mounted fire only and fire and smoke seals are widely available, these are popular for certain tested applications, gun safes in the US for example, but are not suitable for general use as a replacement for tested rebated fire seals. However, surface mounted smoke only seals are available in a range of formats and perform very well under EN 1634-3 testing and so are used in conjunction with plain rebated fire seals to good effect. Any surface mounted fire seals should be carefully checked in terms of fire and/or smoke test evidence and suitability for the specific door type.

11.2.4 Factors Affecting Application

The choice of intumescent is critical. The factors for choosing a specific type or size of intumescent seal for a fire and smoke door depend on:

- The fire and smoke resistance required (e.g. FD30 / FD30S, E30/E30Sa FD60/ FD60S, E60/E60Sa)
- The form of the door, number of leaves and action (SASL - Single Action Single Leaf, SADL - Single Action Double Leaf, DASL - Double Action Single Leaf, DASL - Double Action Double Leaf)
- Door construction and material fire performance characteristics (Timber, GDC, lamel, steel, composite)
- The meeting stile detail if pairs of doors are involved. Plain meeting stile seals are fitted differently from those for rebated meeting stiles
- Location and degree of hardware interruption

11.2.5 Specification & evidence

Because intumescent materials vary in their characteristics, it is recommended that manufacturers or specialist intumescent distributors are consulted before final specification. As detailed above, door leaves are manufactured from a variety of core materials which affect the choice of intumescent which will be suitable to optimise fire and/or smoke resistance performance. Specifiers should consult the details offered by the door core manufacturer and stay within that guidance.

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FIRE & SMOKE SEALS

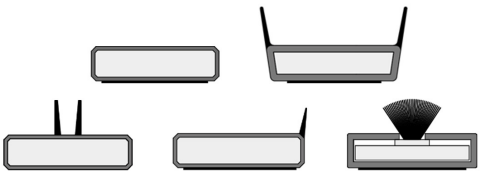
11.2.6 Intumescent Sizes / Options

The permissible size and configuration of intumescent seals relates directly to the test evidence. Whilst sizes are available from 10x2mm to 30x4mm or 15x6mm, with any variation in between, the most commonly used for 30 and 60 minute applications are 10x4mm, 15x4mm and 20x4mm. The evidence will dictate what type and size should be used; any deviation can result in a detrimental effect upon fire resistance.

All of these are available as simply "fire only", or with an additional cold smoke seal option. The smoke seal element may be constructed as an elastomeric fin or as a brush. Each have their pros and cons, brush is perceived as being more durable but does tend to become more compact with time and can lose its effectiveness. Elastomeric fins tend to perform better in terms of leakage (EN 1634-3) but have the perception of being less durable. Despite this perception, several third-party certification schemes require a leakage test to be carried before and after cycling a door through 100,000 cycles or more, which demonstrates that such seals are inherently durable. However, as mentioned above it is the door geometry which can have a bearing on damage to fins as well as the closing/opening forces. The same is true through a lack of door maintenance. Maintaining the correct perimeter gaps throughout the lifecycle of a door is paramount to effective smoke sealing. In an environment more susceptible to misuse, more frequent inspection and maintenance of the seals will be required.

Common 15mm x 4mm seals; fire only and with various smoke seal arrangements

11.3 Intumescent Hardware Protection



Common 15mm x 4mm seals; fire only and with various smoke seal arrangements

Door hardware in its various forms is fundamental to the functionality of a door and has important ramifications in terms of the fire performance. However, by installing hardware, often it creates a point of weakness in the door core or creates a pathway for heat transfer which can lead to premature failure of the system. Intumescent products can help mitigate these issues and help create a better performing system. As with perimeter seals, products should only be utilised which are fit for purpose and supported by test evidence, without compromising the fire integrity of the doorset.

Hardware applications in which Intumescent materials can improve fire performance, either through enhancing fire resistance, insulation or a combination of both:

- Behind hinge blades
- Around mortice lockcases
- Around concealed door closers
- Fire rated letterplates
- Door viewers
- Hardware secured with through bolts
- Cableways for electrical hardware

Typically, these materials are provided in sheet form, taking the form of either a simple sheet to be cut on site or during small scale door manufacturing, or more complex CNC cut patterns for fitting directly to the hardware, such as latch cases

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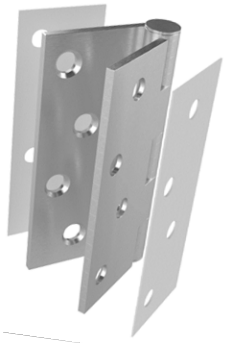
or concealed closers. Some thin extruded materials can also be found for simpler patterns such as flushbolt backing or as tubes to protect cableways and through bolts.

For hinge blade protection, various thicknesses are available e.g., 0.5 mm, 1 mm and 2 mm, all of which will offer protection to a greater or lesser degree. It is important to check that practical requirements fall in line with test evidence.

Likewise, mortice lock/latch cases and strikes, and mortice-concealed closers usually need to be protected by intumescent kits. The kit form is derived through development testing, generally performed by the hardware manufacturers. Subsequent testing by door manufacturers can lead to different kit requirements for the same hardware. In some cases, intumescent kit manufacturers may have several patterns available for a single lockset. There are no simple rules of thumb, so always seek advice as to the right intumescent product for the hardware and application.

Mortise lock protection kit



Intumescent hinge pads

11.4 Intumescent Material Types

There are, at time of publication, three recognised types of intumescent material used within the fire door market

- Hydrated Sodium Silicate
- Exfoliating Graphite
- Mono-ammonium Phosphate

11.4.1 Hydrated Sodium Silicate

Hydrated sodium silicate seals have been supplied for many years utilising either Palusol® or Type 617® filled PVC profiles. The major advantage of hydrated sodium silicate is that it activates at temperatures between 100°C-120°C, which is significantly lower than other intumescent materials. This means that there is a greater overlap between the temperature at which PVC carrier deteriorates and the intumescent fire seal expands. It is important that the correct type of Sodium Silicate is used, which will be identified within the door core or door manufacturer's evidence. Substitution is limited to one direction and so the manufacturers of seals should also be consulted to ensure the correct type of hydrated sodium silicate is used.

Intumescent seals based upon hydrated sodium silicate produce a hard, crack-free, rigid foam. The material displays thermoplastic properties at temperatures in excess of 120°C. The water of hydration is converted into steam, causing the material

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to expand. Sodium silicate produces a relatively high expansion pressure, which suits a wide range of applications.

Seals based on hydrated sodium silicate for use in exposed situations are protected from atmospheric carbon dioxide with a surface coating and commonly a PVC sleeve. Aging tests have shown that these seals have a life expectancy of approximately 50 years, if supplied without altering the unit, or if brought back up to manufacturer's sealed specification on site.

Seals based on hydrated sodium silicate are available in a wide range of sizes to suit various door configurations and door cores. They can also be supplied combined with a variety of smoke seals.

Wide strips of this intumescent seal protected by an epoxy resin coating are occasionally used in concealed situations under door lipping. The timber lipping provides the protection against both mechanical and chemical damage. The seal is fitted into a groove on the reverse side of the lipping. In a fire, the adhesive softens as the intumescent seals expand, and because of the positive pressure developed, the lipping is pushed off and the intumescent material forms an effective fire seal between the leaf and frame.

Seals based on hydrated sodium silicate can usually be over-painted without detracting from their fire performance, but care must be taken to prevent paint being applied to the smoke sealing element of a composite fire and smoke seal. Within BS 8214, Timber-based fire door assemblies – Code of practice, there is a recommendation as to the maximum thickness of overpainting, stating a maximum of 5 coats or 0.5mm, whichever is greater.

11.4.2 Exfoliating Graphite

This is an extensively used intumescent material. The material has many different forms and compositions, each of which will suit a specific application. Pressure development is variable depending upon the composition, but it is generally a grey or black material, which is durable and resistant to aging. For fire seal applications they can be supplied within a PVC carrier as with Sodium Silicate, along with integral brush or bladed smoke seals. For hardware protection they are normally provided as a sheet material.

A major component of graphite seals is the carrier material which provides the physical framework to support the graphite. In extruded profiles this is PVC, whereas for sheet materials it may be mineral fibres. Raw graphite also comes in many grades, which affect the temperature at which it begins to intumesce (typically between 150°C and 220°C), pressure, expansion ratio, the char characteristics etc. Substitution of one graphite profile for another is fraught with difficulty and must be backed up with test evidence.

One advantage of graphite systems is that they tend to be hydrophobic, which is why graphite is better suited on external applications or wet areas.

Seals based upon exfoliating graphite can usually be over-painted without detracting from their fire performance. Care must be taken to prevent paint being applied to the smoke sealing element of a combined seal as it will affect the sealing efficiency. Again, reference should be made to BS 8214 Timber-based fire door assemblies – Code of practice, as to the maximum thickness of overpainting.

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11.4.3 Mono-ammonium Phosphate

These tend to be low-pressure, high-volume expansion intumescent. The active ingredient is mono-ammonium phosphate, but polymers or glass fibres are also included to provide the framework or carrier. The physical characteristics are that of either a rigid sheet material or a flexible extruded profile.

Mono-ammonium Phosphate expands up to 40 times its original volume to form a soft, meringue like foam which fills voids without forcing off beads etc. The applications for these products include door seals, glazing and ironmongery protection. The foam produced by the mono-ammonium phosphate-based materials has good insulation properties, which is why it has been the prime material in hardware protection for many years.

As mentioned previously, rigid sheet material Mono-ammonium Phosphate can be provided as a CNC cut pattern for hinges, lock sets and concealed closers. Graphite sheet materials may also be used in the same way, but the two have very different performance characteristics and so are not interchangeable without supporting evidence. In many cases hardware manufacturers choose to test with both materials, leaving the choice to the market.

11.5 What To Look Out For

Performance claims for intumescent material should be carefully checked:

- Valid documentary evidence must underpin any recommendation, this can take the form of:
- Door core manufacturers' global assessments.
- Door manufacturers' primary & EXAP evidence.
- Hardware and ancillary components (e.g. concealed door loops) manufacturers' primary and assessment evidence.
- Seal manufacturers' primary and assessment evidence.
- Third party certification which may be held by any of the above, either in isolation or in conjunction with another party
- Is the material offered as described on the test document - it might look similar but is it the same? This is particularly true of graphite, when looking at different manufacturers' offerings, or even different grades from the same manufacturer.
- Are the tests/assessments in date? (Test and assessments have time limits on their validity. These are recorded on the documents).

11.6 Threshold seals

Various guidance and code of practice documents (e.g. BS 8214 and BS 9999) clearly indicate that if a door set is to perform a smoke containment function that it must either be fitted with a smoke seal at the threshold or have a 3mm gap.

We have seen that floor finish tolerances are such that it makes the installation and maintenance of a 3mm gap at the threshold to be very difficult. The same guidance documents allow a threshold gap in accordance with the door manufacturer's specification, which in general is 8 to 10mm. In order to allow ease of operation of the door and provide an effective smoke seal, without friction across the floor or jamming, the fitment of auto drop threshold seals is a practical consideration.

Both BS 476-31.1 & EN 1634-3 leakage test requirements in the UK and Republic of Ireland are at ambient temperature. Also, sealing of the threshold is permissible within the test, i.e. not considering the threshold at all. This being based upon the assumption that this zone will be in

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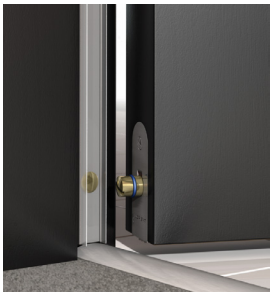
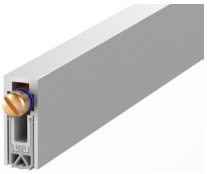
negative pressure and that air will be drawn into the fire side room, rather than smoke pushed out to the non-fire side. In certain situations that will not be true, such as in buildings with central corridors where smoke could build up quickly, without threshold seals there is the potential for considerable leakage at the threshold into other rooms. For example, the leakage rate at 10Pa would be 24 m3/hr across a threshold.

The recommendation is to follow these key points:

1. Threshold gaps purely for fire performance in line with manufacturers guidance, generally 8-10mm.
2. For smoke leakage compliance, install door leaves with ≤3mm threshold gap.
3. In practical terms to account for floor level irregularities increase the gap up to the gap specified in point 1 and install a suitable threshold seal with suitable test evidence to EN 1634-3 / BS 476-31.1
4. When fitting a smoke seal at the threshold, fit automatic drop seals to increase chances of complying with accessibility issues within BS 8300 -1 & -2 and Approved Document M and equivalent publications throughout UK and Ireland.

In certain situations, for FD60S applications for instance, the smoke seals such as automatic dropseals may require an intumescent cladding kit, just as other hardware components do. Details of this will be contained within the door core evidence or else consult with the product manufacturer.





Automatic dropseals are commonly rebated into the door, but also may be affixed to the door face. Other wipe style seals may be used, but generally in conjunction with a threshold plate.

11.7 Reference Points

The passive fire protection industry has various trade associations and third-party approval schemes in place. In addition to DHF and GAI some useful associations are as follows:

- **IFSA** (Intumescent Fire Seal Association) – www.ifsa.co.uk
- **ASDMA** (the Architectural and Specialist Door Manufacturers Association) – www.asdma.com
- **BWF** (The British Woodworking Federation) – www.bwf.org.uk
- **GGF** (The Glass and Glazing Federation) – www.ggf.co.uk

Further information on hardware for fire and escape doors is available from the DHF and GAI websites.

www.dhfonline.org.uk www.gai.org.uk

SECTION 12
FIRE SAFETY SIGNS

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12 FIRE SAFETY SIGNS

12.1 Introduction

Although fire safety signs do not play a direct role in the function of a fire-resisting door there is a need for the provision of the correct signage for safety purposes.

References in this Code of Practice relate only to non-illuminated signs.

Fire safety signs are divided into five categories but within the scope of this Code of Practice only two designations of sign are required according to the location of the sign and the purpose of the door.

- Safe condition signs, including escape route signs
- Mandatory signs: e.g. "Fire door keep shut"

The need for any sign within the building environment will be determined by the enforcing authority and/or the process of a formal risk assessment.

Certain signage applications such as for escape or fire doors fall within the scope of Approved Documents and their equivalents in the UK and Ireland and are mandatory in order to comply with local building regulations.

The use, application and correct position of the fire safety and escape signs are essential to the effectiveness of good fire safety management.

Reference in respect of fire and escape signage should also be made to the Regulatory Reform (Fire Safety) Order 2005 in England and Wales or equivalent legislation throughout UK and Ireland.

Doors which are provided on an escape route might require a mandatory notice sign according to their location and designation. They need to be identified as the opening through which an escape route passes. The signs used in these circumstances are ESCAPE ROUTE SIGNS.

These are not attached to the door but fixed above the door opening as part of escape route signing. BS 5499-4 Safety signs, - Code of practice for escape route signing provides guidance on the correct provision of signage for such routes. The fixing height for FIRE EXIT signs is also given in BS 5499-4.

Doors which are installed for fire resistance purposes within a building should be identified as intended for that purpose. These doors require a MANDATORY FIRE SAFETY NOTICE indicating that there is a requirement for the doors to perform a specific function, i.e. to provide a fire-resisting barrier in time of fire. Mandatory fire safety notices must be attached to the door to which they relate. Reference should be made to national building regulation guidance documents to ensure the correct provision of these signs. (Signs conforming to BS 5499-5, now withdrawn, are still acceptable in buildings.)

The fixing height for mandatory signs is recommended at 1500 mm ("eye level"). Each door must carry a sign on both faces unless it is an access to ducts etc. where there is no approach from the other side.

12 FIRE SAFETY SIGNS

12.2 Critical Recommendations

12.2.1

All signs, whether ESCAPE ROUTE SIGNS or MANDATORY FIRE SAFETY NOTICES are required to comply with the Health & Safety (Safety Signs and Signals) Regulations 1996 in GB, the Health & Safety (Safety Signs and Signals) Regulations (Northern Ireland) 1996 in NI and the Safety, Health and Welfare At Work (Signs) Regulations 1995 in RoI.

12.2.2

BS 5499:4- Safety signs - Code of practice for escape route signing and BS 5499-5 Signs with specific safety meanings (now withdrawn although still referred to in statutory guidance) or EN ISO 7010 Graphical symbols satisfy Used in conjunction with a formal risk assessment, these signs will satisfy all requirements under Building, and Health and Safety Regulations.

12.2.3

Signs with specific safety meanings in the form of three dimensional arrows or appropriate designated signs with supplementary text.

"Push bar to open" should be displayed where a panic exit device claims compliance with EN 1125, Building hardware – Panic exit devices operated by a horizontal bar – Requirements and test methods.

"Push pad to open" or "Down to open" are required to be displayed where an emergency exit device claims compliance with EN 179 Building hardware – Emergency exit devices operated by a lever handle or push pad – Requirements and test methods.

For electrically controlled exit systems, pictograms as in EN ISO 7010 should be used which indicate with or without a time delay where a system claims compliance with EN 13637 Building hardware – Electrically controlled exit systems for use on escape routes – Requirements and test methods, in addition to signage on the door as EN 1125 and EN 179 standards.

12 FIRE SAFETY SIGNS

12.3 Commentary

12.3.1

Exit signs above doors or indicating exit routes should be provided where they will help people to find a safe escape route. Signs on exit routes should have directional arrows according to the route to be taken. These signs are square or oblong, green background with white lettering. Signs should not be fixed to doors or positioned where they might be obscured by opened doors. Signs above doors or open spaces should be mounted between 2000 mm and 2500 mm from floor level measured to the base of the sign and be sited as close to the centre line of the escape route as practicable. When positioned on walls they should be mounted between 1700 mm and 2000 mm from floor level measured to the base of sign. Mounting heights greater than 2.5 m may be used, e.g. in large open spaces or for operational reasons, but such signs should be both conspicuous and identifiable and therefore larger signs might be necessary. Signs should be sited at the same height throughout the escape route, so far as is reasonably practicable. The use of arrows should correctly indicate the direction of travel leading to a place of safety. (See BS 5499:4 Code of Practice for escape route signing for further guidance).

12.3.2

The published guidance to Building Regulations throughout the UK and Ireland recommends that every escape route (other than those in ordinary use), every doorway or other exit providing access to a means of escape, other than exits in ordinary use (e.g. main entrances), should be distinctively and conspicuously marked by an exit sign in accordance with BS ISO 3864-1 and BS 5499-4. In some buildings, additional signs might be needed to meet requirements under other legislation.

12.3.3

Although Approved Document B 2019 edition incorporating 2020 and 2022 amendments – states a requirement for marking it does not set out any specific guidance as to the frequency or definitive location of the safe condition signs. This is left to the discretion and interpretation of persons responsible for the safety of the building through Risk Assessment. Advice on fire safety signs, including emergency escape signs, is given in an HSE publication: Safety Signs and Signals; Guidance on Regulations, and BS 5499:4.

12.3.4

According to HSE guidance, signage and pictograms should be used conforming to EN ISO 7010. These are similar to those in BS 5499-4. The most important principle is that the same design be used throughout the whole building and therefore consistency is maintained.

Supplementary text signs are desirable but not essential.

BS EN ISO 7010

12 FIRE SAFETY SIGNS

12.3.5

Mandatory notices to BS 5499-5: are required on all doors which are designated as fire-resisting. These signs are circular in shape, have a blue background with white lettering. Self-colour aluminium or satin stainless steel might be used as the lettering within the blue background but no other combinations are permitted. No supplementary signs are normally required. Designs of fire signage are available which do not conform to BS 5499:5; when using these permission from Building Control should be sought.

Examples of common fire door notices

12.3.6

Approved Document B 2019 edition incorporating 2020 and 2022 amendments – (Appendix C11) of the Building Regulations 2010 for England recommends that all fire-resisting doors* should be marked with the appropriate fire safety (mandatory) notice complying with BS 5499:5 according to whether the door is to be:

- Kept closed when not in use – mark 'Fire door keep shut'
- Kept locked when not in use – mark 'Fire door keep locked shut'
- Held open by an automatic release mechanism or free swing device – mark 'Automatic fire door keep clear'

Fire doorsets should be marked on both sides, except fire doorsets to cupboards and service ducts, which should be marked on the outside.

* The following are not required to comply as above:

a) Doors to and within flats and dwelling houses

b) Bedroom doors in 'residential (other) accommodation'

c) Lift entrance/landing doors

The recommended fixing height for these signs is 1500 mm (eye level).

12.3.7

For Scotland the requirements are stated in the Technical Handbooks for compliance with the Building Standards (Scotland) Regulations 2009 **Section 2**.

Wales has its own version of Approved Document B (Volumes 1 and 2) which supports the requirements of Part B of Schedule 1 to the Building Regulations 2010.

For Northern Ireland, guidance is given in Technical Booklet E regarding the technical requirements of the Building Regulations (Northern Ireland) 2012.

Guidance for the Republic of Ireland's requirements is in Technical Guidance Document B (Volumes 1 and 2), covering Part B of the Second Schedule to the Irish Regulations.

12 FIRE SAFETY SIGNS

12.3.8

BS 9999 (**10.4.3**) recommends that, where a fire risk assessment identifies the need for a sign, the sign should be displayed prominently, conspicuously and appropriately, having regard to the environment and occupancy characteristic of the building. Fire safety signs should not be sited such that they are overridden with other types of public information or property management signs, and should be consistent in style and design throughout the building. It further recommends that the location of all fire safety signs be recorded in the fire safety manual.

12.3.9

Guidance is given in BS 5499-4 stating that:

> "In order to ensure that occupants within a building are aware of their immediate escape route it is advised that the Exit or Fire Exit can be seen. If this is not possible then a sign or series of signs with a directional arrow will provide guidance to the final Exit or Fire Exit."

This recommendation is made to fulfil the employer's, manager's or occupier's obligation to ensure that building occupants know and are aware of their immediate escape route.

Acceptable signs

Signage for panic bar

12.3.10

Where doors on emergency exit routes are secured by panic or emergency exit devices it is necessary to use the appropriate signs for the mode of operation. For all exit devices, operated by a "push" movement, the three-dimensional arrow should be displayed showing the direction of operation. For panic devices conforming to EN 1125 an appropriate supplementary text sign should accompany the arrow and read "Push bar to open" or "Push to open". This is applicable to both type A and type B devices. For emergency exit devices conforming to BS EN 179 the supplementary sign should read "Push pad to open", "Pull to open", "Press to open" or "Turn (clockwise/anti-clockwise) to open" according to the method of operation. A directional arrow should also be included on the sign for "turn". In all cases a suitable sign should be includedas part of the installation instructions. A 15 mm letter height is recommended for the supplementary signs.

12 FIRE SAFETY SIGNS

12.3.11

For sliding doors the appropriate sign with text "Slide door to open" should be displayed. The arrow should show the direction of "Slide to open". These signs are available but sliding doors are not recommended on escape routes.

12.3.12

Where there is a danger that a door designated as a fire exit might become obstructed because its importance as a fire safety measure is not appreciated, e.g. a final exit door opening out from the face of the building in a secluded area or a seldom used intercommunicating door between rooms or occupancies, a conspicuous "FIRE ESCAPE - KEEP CLEAR" notice should be displayed on the appropriate face of the door. This is a mandatory sign and requires white lettering on a blue background.

In respect of signage for powered pedestrian doors the following signage should be used which conforms to the standard BS 7036-0.

12.3.12.1 General

The competent person or professional installation technician should ensure that appropriate signage is affixed to the power operated door system at a height of between 1300 mm and 1600 mm on completion of installation.

NOTE Responsibility for the continued display and maintenance of such signage lies with the building owner/occupier.

12.3.12.2 No entry sign

This sign should be used to indicate to users that entry from the side of approach is prohibited. The sign should consist of a red circle of 150 mm minimum diameter with a white rectangle placed horizontally.

12.3.12.3 Keep clear sign

This sign should be used to instruct and inform users to keep away from the space through which a power operated door travels. The sign should consist of a blue circle and a blue rectangle of width of at least 150 mm. The lettering should be in white and placed centrally in the blue rectangle. Blue should cover at least 50% of the area of the sign.

12 FIRE SAFETY SIGNS

12.3.12.4 Direction of travel sign

This sign should be used to indicate to users the direction of travel through the door. The sign should consist of a blue circle of 150 mm minimum diameter with a white arrow pointing upwards.

12.3.12.5 Automatic door sign

This sign should be used to indicate that the door is activated automatically and thus give users advance warning of operation. The sign should consist of a white square with sides of at least 150 mm and the lettering in black, placed centrally

12.3.12.6 Disabled person sign

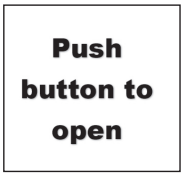
This sign should be used on doors or door activation switches that are specifically intended for use by disabled people. When fixed on doors, the sign should consist of a square with sides of at least 150 mm. The sign should consist of a black symbol on a white background as shown in Figure 6.

12.3.12.7 Emergency breakout sign

This sign should be used on doors which have an emergency breakout facility. The sign should be green and white with the vertical side at least 150 mm. NOTE There is no lettering on the breakout sign.

There are 3 additional signs which are not within the BS 7036-0 standard, but these also could be deemed as appropriate

12.3.12.8 Push button to open



This sign should be used to indicate that the door requires activation by pushing the button and cannot be used manually. The sign should consist of a white square with sides of at least 150 mm and the lettering in black

12.3.12.9 Access controlled Powered door

This sign should be used to indicate that the door requires activation by an access control system and cannot be used manually. The sign should consist of a white square with sides of at least 150 mm and the lettering in black.

12.3.12.10 Power assisted door (Push/Pull and go)

This sign should be used to indicate that the door should be pushed or pulled to start a powered cycle. Generally, only fitted in a low-risk environment, the manual forces to start the powered operation can sometimes be higher than allowed within BS 8300-2.

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12.3.13

Fire fighting equipment location signs and prohibition signs should be considered at the same time as escape route and mandatory signs. Hazard signs might require consideration after occupation of the building.

12.3.14 Continuous Improvement

If the formal risk assessment determines that fire safety signs are required, there is an obligation to ensure that they are inspected and maintained on a regular basis, and that they retain their functional purpose within the fire safety management process and procedures.

12.3.15 Maintenance

Any damaged, worn or missing signs should be replaced immediately.

12.3.16 Fire Safety Strategy

Fire safety signs, when used appropriately and positioned correctly, fulfil a continuous, conspicuous and effective role in endorsing all seven key elements of excellence in fire safety strategy:

- prevention of fire
- escape from fire
- suppression of fire
- confinement of fire
- communication of fire safety management
- communication of the emergency plan
- education and training of building occupants

12.3.17 Meaning of Geometric Shapes and Colours

12.3.17.1 Prohibition sign

Safety sign that indicates that a specific behaviour is forbidden. Comprising a red circular band with diagonal cross bar on a white background, the symbol within the circle to be black denoting the forbidden activity.

12.3.17.2 Hazard sign

Safety sign that gives warning of a hazard. Comprising a yellow triangle with black border and symbol within the yellow area denoting the designated hazard.

12.3.17.3 Mandatory sign/notice

Safety sign or notice that indicates that a specific course of action is to be taken. Comprising a blue circle with white symbol or lettering denoting the safety requirement.

12.3.17.4 Safe condition sign

Safety sign that indicates a safety action, the location of safety equipment or a safety facility, or an escape route comprising a green oblong or square with symbol or text in white.

12.3.17.5 Fire equipment sign

Safety sign that indicates the location or identification of fire equipment or how it should be used comprising a red oblong or square with symbol or lettering in white.

12.3.17.6 Supplementary sign

Sign that is supportive of a safety sign by providing additional clarification. This sign may comprise text or an arrow. When used with a safety sign it becomes part of the safety sign.

For details of safety colours and contrast colours for safety signs, geometric shapes and graphical symbols refer to BS ISO 3864

SECTION 13
FIRE-RESISTING DOORS ON ACCESSIBLE ROUTES

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13 FIRE-RESISTING DOORS ON ACCESSIBLE ROUTES

13.1 Introduction

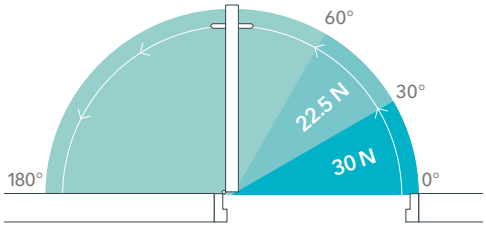
BS 8300-2, the accessibility standard entitled: Design of an accessible and inclusive built environment, Part 2: Buildings – Code of practice, recommends amongst many other issues, specific performance levels for all doors on accessible routes. This is mirrored in Building Regulations and guidance across the UK and Ireland specifically in the following publications:

- Approved Document M (England and Wales)
- Technical Handbooks Section 4 (Scotland)
- Technical Booklet R (Northern Ireland)
- Technical Guidance Document M (Republic of Ireland)

Accessible routes must be usable by all

In addition to making recommendations regarding sizes of door handles, their visual contrast from the door face, clear opening widths, vision panels, and other matters outside the scope of this document BS 8300-2 defines acceptable limits for operating forces required to open the doors, a statement on which is quoted here:

"For many people to have independent access through single or double swing doors, the opening force, when measured at the leading edge of the door, should be not more than 30 N from 0° (the door in the closed position) to 30° open, and not more than 22.5 N from 30° to 60° of the opening cycle".



Opening resistances for doorsets

Note: the opening force stated in BS 8300-2 relates to the force required at the opening position between 30° and 60°.

With careful selection of components, door closers may be specified that will meet the requirements of both the Construction Product Regulations in UK and in Europe (EN 1154 and BS 8300-2).

Higher efficiency door closing devices having an efficiency of significantly better than 65% should be specified in order to achieve the required minimum closing force of 18 N for EN 1154.

It is recommended that torque curves, verified by a third party, for closing devices be supplied to ensure the device alone will not result in non-compliance for the doorset opening forces which are laid out in BS 8300-2.

13 FIRE-RESISTING DOORS ON ACCESSIBLE ROUTES

Where, in order to meet the opening force recommendations of BS 8300-2, a door-closing device is unable to keep an entrance door closed against external conditions, consideration should be given to installing one of the following alternatives:

- a power operated (automatic) door - sliding, folding, balanced or swing
- a power operated revolving door;
  - note the caveats in respect of revolving doors in BS 8300-2 which states: "Where a revolving door is used, an accessible door should be provided immediately adjacent to the revolving door and available for use at all times. The accessible door could be a swing, sliding or folding door, and be automatic or power operated. It should be clearly identifiable."
- an entrance lobby or air lock system of inner and outer doors

Door automation with a low energy operator

Where hinged or pivoted fire-resisting doors need to be accessible by disabled people, the door closing devices fitted should have 'controlled' action, conforming to the requirements of EN 1154, Annex A, be of a variable power type and conform to the recommendations above.

Annex A to EN 1154 states that controlled door closing devices with a power size less than 3 are not considered suitable for use on fire/smoke door assemblies.

This means that, in general, only high efficiency door closers mounted on doors with a width greater than 900 mm are likely to meet fire door requirements as well as the opening force limits described above. Controlled door closing devices of a lower power size and those with relatively low efficiencies might only be suitable for non-fire-resisting doors.

Door-closing devices whose power is adjustable by template are not usually suitable for this application.

Where the force required to open a fire-resisting door on a circulation route exceeds the limits described above, an electrically powered hold open device conforming to the requirements of EN 1155, either stand-alone or integral in the body of the closer, should be installed.

Swing free closers offer no resistance to manual opening or closing

The use of "swing free" controlled door closing devices should be limited to applications where doors are located for access to rooms or similar locations and not part of a circulation route.

13 FIRE-RESISTING DOORS ON ACCESSIBLE ROUTES

The use of "delayed action" controlled door closing devices should be considered in respect of assisting with those with accessibility and mobility issues.

For non-fire-resisting doors which have a requirement to self-close for reasons of privacy, acoustics or energy control, controlled door closing devices should be selected, fitted and adjusted so that the opening forces are well below the limits set out above, consistent with the doors functioning as intended. For non-fire doors, door closing devices of a power size less than 3 can be accepted

The opening force should be checked using a plunger-type force measuring instrument. Where measurements cannot be taken at the leading edge, they may be taken at a point on the face of the door up to 60 mm from the leading edge, a position approximately in-line vertically with the spindle of a lever handle or the centre line of a pull handle or push plate, in which case the opening force limits can be increased by approximately 2 N.

The accuracy of force measuring instruments available on the market varies and there are inherent difficulties in measuring forces on site. It is recognized, therefore, that any measurements will be subject to a degree of imprecision which could give rise to variations of 2-3 N.

The ability of a controlled door closing device to close effectively while keeping within the opening force limits depends on:

- its efficiency
- the resistances from various door seals
- hinge friction
- latch resistance
- differential air pressure
- Incorrect/poor installation

The effect of using a low efficiency controlled door closing device is to reduce the closing force to a point where, coupled with the other resistances to closing, the door might not latch, or stay closed if unlatched. In this event, a fire door which is not fully closed into its frame will not function correctly. The use of high-efficiency closers can assist those with reduced mobility to pass through doors independently.

A controlled door closing device, with or without a backcheck, should allow the door to open sufficiently to provide the required effective clear width.

In some locations in a building, a controlled door closing device incorporating a backcheck is sometimes used to prevent damage to adjacent walls or furniture and to the closer mechanism if a door is flung open with some force. However, when the door is opened slowly, the resistance effect is minimal. With some controlled door closing devices, the backcheck starts to become effective when the door is open at 70°.

Note also that BS 9266, Design of accessible and adaptable general needs housing – Code of practice, states:

> "The type of backcheck on some door closing devices can make doors more difficult to open to 90° and beyond. Where required, a backcheck may be used which does not activate unless the door is pushed hard. Alternatively, a doorstop may be used."

The maximum closing force exerted by a controlled self-closing device should be between 0° and 15° of final closure. Controlled door closing devices that do not have this characteristic should be avoided.

It should be noted that once the fire alarm is activated then this may have a significant impact on the operating forces of doors, and the forces outlined in BS 8300-2 may not be achieved.

SECTION 14
PANIC & EMERGENCY EXIT DEVICES

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14 PANIC & EMERGENCY EXIT DEVICES

14.1 Introduction

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 should 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. This is addressed in **12.3.4**.
- 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 doors. Products fitted to a fire-resisting door must have corresponding fire test evidence.

For the purpose of this Code of Practice 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 doors
- Accessories for exit devices
- Electronic panic and escape hardware and accessories – this is reviewed in **Section 15**

Note: This list does not imply suitability of any device for fire or escape door use - see **Section 12.3** for further information.

14

PANIC & EMERGENCY EXIT DEVICES

14.2 Critical Recommendations

14.2.1 General Recommendations (for all exit devices)

14.2.1.1

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 conformity marked (such as UKCA / CE mark) to EN 1125 – "Panic exit devices operated by a horizontal bar" and preferably provided with additional product certification by an approved third-party certification body (see **1.5 Documentation**)
- devices for use by trained personnel may alternatively be conformity marked (such as UKCA / CE mark) to 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 (see **1.5 Documentation**)

Approved Document B 2019 edition incorporating 2020 and 2022 amendments – for England and Wales, in a similar way to the corresponding statutory guidance elsewhere in the UK and Ireland, recommends that panic exit devices be used if the area has more than 60 occupants, irrespective of the nature of the building. If there is any doubt about the conditions relating to building occupancy, it is recommended that devices covered by EN 1125 (panic exit devices operated by a horizontal bar) be specified.

14.2.1.2

Devices for use on pairs of doors should have been specifically tested and approved for that purpose (see **14.3.3.2**).

14.2.1.3

Standard projection exit devices should be used where there is restricted width for escape, or where the exit doors cannot open beyond 90°.

14.2.1.4

Care should be taken that hinges and any seals are correctly fitted so that the escape doors are able to open freely once the exit device is operated.

14.2.1.5

A regular routine maintenance must be undertaken to ensure that the correct operational performance is maintained for the life of the building (see **Section 16**).

14.2.1.6

No additional security devices should ever be fitted to escape route doors equipped with EN 1125 or EN 179 hardware unless specifically included in the Fire Risk Assessment (see **14.3.4**).

14.2.2

Additional recommendations for devices for use on fire-resisting doors.

14.2.2.1

The exit device and any accessories should have demonstrated their suitability for the intended purpose, by inclusion in satisfactory fire tests to EN 1634-1 or EN 1634-2, on the type of timber, steel or composite doorset and configuration in which it is proposed to be used. This evidence should be provided by an approved third-party certification or testing body (see **1.5 Documentation**).

14.2.2.2

Devices for use on pairs of doors should have been specifically fire tested on an appropriate set of double doors and approved for that purpose (see **14.3.3.2**).

14.2.2.3

The exit device should not include any holdback / dogging mechanism unless its use is proven by fire test evidence on self-closing unlatched fire doors (see **14.3.3.1**).

14 PANIC & EMERGENCY EXIT DEVICES

14.3 Commentary

14.3.1 General

Building Regulations Approved Document B 2019 edition incorporating 2020 and 2022 amendments – for England and Wales, similarly to the corresponding statutory guidance elsewhere in the UK and Ireland, requires that all doors on escape routes be fitted with escape hardware that is simple to operate and does not require specialist knowledge or tools for its operation (e.g. panic escape hardware).

European product standards have been developed to provide a benchmark for the performance and safety of escape building hardware and as such, they can be considered as describing best practice in this important area.

In relation to doors on escape routes, these are divided into three basic types:

- Panic exit devices to EN 1125: These devices are intended primarily for buildings where the public are likely to be present and a panic situation could arise if the building must be evacuated quickly. For this reason, the devices are designed to operate by body pressure alone and require no knowledge of their operation to enable safe and effective evacuation of a building. EN 1125 contains specific performance tests to ensure that a panic device will release by body pressure even if people are pushing heavily on the door leaf itself while the device is being operated.
- Emergency exit devices to EN 179: These devices are intended for escape from buildings where the public are unlikely to be present, and where the staff in the building have been trained both in emergency procedures and in the use of the specific emergency exit devices fitted. For this reason, panic situations are considered unlikely, and these devices are therefore permitted to have higher operating forces and do not have to release by body pressure alone.
- Electrically controlled exit systems for use on escape routes EN 13637: provides guidance on safe ways of combining physical security with effective means of escape. Details in the Access Control section of this Code of Practice

From the above descriptions it can be appreciated that it is very important that a device according to EN 1125 is always specified where there is a possibility that the public are present and that, subsequently, a panic situation could arise.

EN 179 devices should be specified only where it is intended that the occupants will be trained in emergency escape procedures and are therefore most unlikely to panic. If there is any doubt, then a device to EN 1125 should be specified.

14.3.2 Escape Considerations

14.3.2.1 Panic Exit Devices

The main purpose of the performance requirements contained in EN 1125 is to give safe and effective escape through a doorway with minimum effort and without prior knowledge of the panic exit device. The requirements emphasize the importance of ease of opening by the young, elderly and infirm.

Escape routes must be usable by all

14 PANIC & EMERGENCY EXIT DEVICES

Whilst varying degrees of external security will be provided by the panic exit devices covered in this standard, the main objective is to enable a door to be opened at all times by hand or body pressure on the panic exit device fitted along its inside face and not requiring the use of a key or any other object.

It is important that any panic exit device is able to operate safely for a realistic lifetime and tests are included in EN 1125 to verify the durability of the product. Two categories of durability are recognized:

- Grade 6 – 100,000 test cycles
- Grade 7 – 200,000 test cycles

If the escape door to which the panic device is fitted is also used during the day as a normal access door, it is important to ensure that the panic device is proven for at least 200,000 cycles (Grade 7).

Emergency escape lock with furniture.jpeg

Emergency escape latch with push pad

Panic devices are classified according to the amount that they project from the door face. When the door is in the open position at around 90° any projection of the panic device effectively reduces the clear escape width of the opening. It is important that a standard projection device (100 mm or less) is chosen where the door might only be able to open to around 90° in order to maintain a clear opening width. "Large projection" describes devices up to 150 mm projection.

14.3.2.2 Emergency Exit Devices

The main purpose of the performance requirements contained in EN 179 is to give safe and effective escape through a doorway with one single manual operation to release the emergency exit device, although this can require prior knowledge of its operation.

The European Standard deals with emergency exit devices designed to be used in emergency situations, where people are familiar with the emergency exit and its hardware and therefore a panic situation is most unlikely to develop.

It is important that any emergency exit device is able to operate safely for a realistic lifetime and tests are included in EN 179 to verify the durability of the product. Two categories of durability are recognized:

- Grade 6 – 100,000 test cycles
- Grade 7 – 200,000 test cycles

If the escape door to which the exit device is fitted is also used during the day as a normal access door, it is important to ensure that the exit device is proven for at least 200,000 cycles (Grade 7).

Emergency exit devices are also classified according to the amount that they project from the door face. When the door is in the open position at around 90°, any projection of the exit device effectively reduces the

14 PANIC & EMERGENCY EXIT DEVICES

clear escape width of the opening. It is therefore important that a low projection device (100 mm or less) is chosen where the door can only open to around 90°.

As emergency exit devices are intended for use by trained personnel only, they are permitted to have higher operating forces, and this in turn may permit higher security levels to be achieved. EN 179 includes static load tests for 1000, 2000, 3000 or 5000 N. The grade achieved will be shown by the 7th character of the classification system.

14.3.3 Exit Devices for Use on Fire-resisting Doors

Where panic or emergency exit devices are used on fire-resisting or smoke control doors there are additional performance requirements that should be met, beyond those required for escape, to ensure that the device does not jeopardise the fire compartmentation properties of the door.

The standards EN 1125 and EN 179 have three classification codes as follows: -

- 0 - Not tested for use on fire doors
- A – Suitable for us on smoke door assemblies
- B – Suitable for use on fire doors tested to EN 1634-1

14.3.3.1 Dogging (Holdback Devices)

Dogging is a method of holding the locking points (i.e. the bolts or latches) of the exit device in a withdrawn state, for easy passage through the door. Where the door relies on the provision of a locking point for its fire resistance rating, then devices with a dogging feature should never be used. However, dogging may be permitted where the fire test evidence has been obtained from unlatched fire doors, as these tests will have proved that the self-closing device fitted to that particular door is capable of maintaining the closed position without any support from a latch or bolt.

In these circumstances, it is essential that the fire test evidence covers the particular doorset assembly of door leaf, frame, closer, exit device and hinges. Endorsement by a good third-party certification scheme will have addressed all these points.

14.3.3.2 Double (pairs) Door Use Double (pairs) door use Field of Application

Both EN 1125 and EN 179 include specific durability and release tests depending on whether the device is intended for single or double door use. It is important to check that the device is approved for the correct end use, as there is no guarantee that a device approved for single door applications only will perform safely if used on a double door configuration. Classification digit 10 of the standards will show what application the device is intended for:

EN 1125

- A: Outward opening (Single and double exit doors; Active and inactive)
- B: Outward opening (Single exit door only)
- C: Outward opening (Double exit door; Inactive door)

EN 179

- A: Outward opening (Single and double exit doors; Active and inactive)
- B: Outward opening (Single exit door only)
- C: Outward opening (Double exit door; Inactive door)
- D: Inward opening (Single exit only)

The following configurations are recommended for double doors:

- A vertical bolt unit (fitted to inactive leaf) and a horizontal latch unit either single or multi-point (fitted on active leaf) should be used on rebated double doors

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- A vertical bolt unit should be fitted on both leaves of non-rebated double doors. A latch unit should not be used as this could damage the door leaf and thereby affect the performance of a fire resisting door

Where exit devices are intended for use on double fire doors, particular care should be taken that any intumescent material contained in the meeting stiles is not damaged during the installation or operation of the exit devices. In the case of rebated doors, it is important to ensure that door lippings and any intumescent material is protected from potential damage by the latch bolt action.

For safety and reliability reasons, the traditional UK double panic bolt consisting of a single bolt and slave arm connected by beveled plugs, is not permitted by EN 1125. For rebated pairs of doors, this product is now usually replaced by a panic latch on the first opening leaf and a panic bolt on the second opening leaf. More sophisticated multiple locking devices are also available. In all cases the manufacturer's installation instructions should be followed closely, particularly where supplementary intumescent protection is required to achieve the correct fire rating.

14.3.4 Security

Both EN 1125 and EN 179 are concerned primarily with quick and effective escape from a building and the question of security of the building and its contents from the outside is considered to be of secondary importance. All panic and emergency exit devices will provide a basic level of security against intrusion, but there is increasingly a need for higher security in buildings such as supermarkets and stores with high insured content, and even in schools and hospitals to protect the occupants against the attentions of intruders or to prevent them wandering out of the building.

For these cases there are additional security measures that can be taken to enhance the physical security of the building, without compromising the ability of people to escape during an emergency.

These devices are covered by the standard EN 13637 (Electrically controlled exit systems for use on escape routes) and, where necessary, such measures should always be discussed with local building and fire authorities and will generally be determined on a building occupancy and risk assessment basis.

In all cases it is essential that the escape function of the door is not compromised at any time while the building is occupied.

In particular, any additional dead bolt locking used must still enable the exit device to comply with the release requirements of EN 1125 or EN 179.

The use of plastic ties around panic bars is not acceptable as these would not have been tested within relevant standards and could impede easy egress and escape. They also considerably increase the degree of effort needed to open the doors. The disincentive to using the doors which they provide might still remain for many members of the public in an emergency situation, causing them to seek an alternative exit. There are alternative standards-compliant security measures available such as those tested to EN 13637 which should be used in this instance.

The use of chains around panic bars with a padlock is also not acceptable

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14.3.5.1 Accessories for Exit Devices

Outside access devices (OADs): These devices are used to enable authorised access from the opposite side to the escape direction, and can consist of a cylinder, lever/knob or keypad assembly. All are connected to the operating mechanism or bolt(s) of the exit device in some way, either through a mechanical link or an electrical connection.

From an escape point of view, it is essential that the provision of these OADs cannot override or inhibit the escape function from the inside, at any time. The manufacturer's data sheets should specify which OADs have been tested for use with a specific exit device, and this should be proved by checking that the test evidence covers the correct outside access devices. Use of a non-approved OAD might cause a dangerous situation in which the exit device would not release properly when called upon to do so in an emergency.

From a fire compartmentation point of view, care must be taken that any OAD chosen will not compromise the fire resistance of the complete door. It is therefore important to follow the manufacturer's installation instructions and also check that the fire test evidence includes the use of the appropriate OAD with the exit device.

Outside access device

14.3.5.2 Strike Plates

Most panic or emergency exit devices are offered with a choice of strike plates to suit different frame materials or configurations. For example, a panic latch might be approved for use on a single door, the active leaf of a rebated pair of doors, an aluminum profile frame, a timber frame or a steel rebated frame. In each case a different strike plate might be needed. The design of a strike plate can have a very significant effect on the release forces and correct operation of an exit device, so care should be taken that the test evidence and approval covers the particular strike plate required.

14.3.5.3 Other Components

Break-glass emergency bolts - these devices are generally unable to comply with the design requirements of EN 179, as they require more than a single hand operation to effect an exit. For this reason, this Code of Practice cannot recommend the use of such devices.

Many other components might be used in conjunction with panic or emergency exit devices. In all cases these components must not be allowed to inhibit the escape function in any way. If appropriate certification from a third party is not available, then specific test evidence should be sought for all combinations of building hardware intended for use together.

For further information see also the Best Practice Guide:

- **Panic and Emergency Exit Devices**

published by the DHF and included on the DHF website. Further information on hardware for fire and escape doors is available from the GAI website.

www.dhfonline.org.uk **www.gai.org.uk**

SECTION 15
ELECTRICALLY CONTROLLED EXIT SYSTEMS

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15 ELECTRICALLY CONTROLLED EXIT SYSTEMS

15.1 Introduction

Panic and emergency exit hardware fitted on escape doors, offer ease of opening with a single mechanical operation needed to unlock and open the door but the hardware that meets the performance standards EN 179 and EN 1125 is designed with escape as the primary function with little consideration to any security needs. For security measures which are sometimes needed to manage use of the escape door or to provide enhanced physical security of the door it can bring with it a number of disadvantages, such as the following: -

- Easily operated – allowing thieves to escape from retail stores, residents from care homes to wander out and children in nurseries to open doors
- The use of tamper seals that increase the operating force required to operate the hardware to overcome the locked door
- The use of secondary locking devices to achieve enhanced physical security
- No control of unauthorised exit allowing doors to be left insecure or misused

In addition to the above the use of panic exit hardware can be awkward to use, especially in high traffic applications which can present additional problems for security such as

- Doors left open or wedged open – leaving them vulnerable to intruders
- Doors that do not re-secure correctly when used for exit

These issues above are often overcome using chains and padlocks, cable ties or some form of restrictors on the push bars, none of which confirm to any exit hardware standards or current building regulations and are often considered dangerous practice in case of an emergency.

To improve security and avoid unsafe means of locking, electrical locking hardware can be used on escape doors. The standard for these systems is EN 13637 Electrically Controlled Exit Systems For Use On Escape Routes.

The EN 13637 standard describes a complete system for use to electrically control an escape route door and will consist of at least the following elements either separately or combined in a single unit:

- **Initiating element** for requesting the release of the electrical locking element, examples touch bar, push bar, lever handle or exit button
- **Electrical controlling element** for supplying, connecting and controlling the electrical locking element and the initiating element, example power supply unit, controller, CMC (Control Management Centre)
- **Electrical locking element** for securing the door, examples electromagnetic lock, electric release, electric lock

NOTE: (the electrical locking element must be capable of reliably releasing even when under a side load of up to 1000N, and must be an approved locking solution that has been tested as a component part of the whole escape door system - it is not permitted to use a non-approved locking element with an escape door system. Many types of electric locking solutions are not suitable for use on escape doors due to their inability to release when power is removed or under side load pressure).

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Additional products that can be used may include: -

- **Operating elements** to open the door such as lever handles, push bars touch bar or infrared bar, if not the initiating element
- **Outside Access Devices** such as mechanical OADs, proximity / keypad / biometric reader
- **Additional elements** such as pull handles, door entry systems, CCTV, automatic operators, exit buttons

The EN 13637 standard applies to both emergency and panic risks and the correct system solution will be commensurate to the specific risk applicable. The performance requirements of this standard ensure safe and effective escape through a doorway with a maximum of two operations to release the electrically controlled exit system. A risk assessment that takes account of the type and number of users must be undertaken to determine the correct system solution and be recorded as part of the fire safety information for the building.

In some applications, there will be a requirement to overlay the escape door system along with an EN 179 or EN 1125 mechanically operated exit hardware device on a door to achieve a Fail Locked solution to maintain security of the door in a power failure or alarm condition. The mechanical exit device must be performance tested in its own right as an exit device in accordance with the escape standards EN 179 and EN 1125.

For areas requiring additional security measures to be taken to enhance the physical security of the building, without compromising the ability of people to escape during an emergency, systems tested to EN 13637 can accommodate this, however such measures should always be discussed with local building and fire authorities and will generally be determined on a building occupancy and risk assessment basis.

Touch bar with electrical latch retraction

In all cases it is essential that the escape function of the door is not compromised at any time while the building is occupied.

In particular, any additional dead bolt locking used must still enable the exit device to comply with the release requirements of EN 13637

If delayed egress devices are to be used, they must be designed such that after the delay period approved by the building authority, the door will automatically be released. In the case of genuine emergency, such as a fire alarm or power failure, the door must be released immediately.

Any electrically controlled locking systems should be installed in compliance with BS 7273-4, Code of practice for the operation of fire protection measures. Actuation of release mechanisms for doors. The standard applies to all aspects of the interface between these mechanisms and a fire detection and fire alarm system.

Products are designed for both panic and/ or emergency situations and used on hinged or pivoted doors. When specifying a system, it must satisfy the building regulations of that area as these may vary from country to country.

15 ELECTRICALLY CONTROLLED EXIT SYSTEMS

15.2 Critical Recommendations

15.2.1 - Fire Doors

The exit device and any accessories should have demonstrated their ability to be suitable for the intended purpose, by inclusion in satisfactory fire tests to BS EN 1634-1 or BS EN 1634-2, on the type of timber or steel doorset and configuration in which it is proposed to be used.
This evidence should be provided by an approved third-party certification or testing body.

Devices for use on pairs of doors should have been specifically fire tested on an appropriate set of double doors and approved for that purpose by third-party certification.

The standard EN 13637 has three classification codes as follows: -

- 0 - Not tested for use on fire doors
- A – Suitable for us on smoke door assemblies
- B – Suitable for use on fire doors tested to EN 1634-1

15.2.1.1 - Dogging (Holdback Devices)

Dogging is a method of holding the locking points (i.e., the bolts or latches) of the exit device in a withdrawn state, for easy passage through the door. Where the door relies on the provision of a locking point for its fire resistance rating, then devices with a dogging feature should never be used. However, dogging may be permitted where the fire test evidence has been obtained from unlatched fire doors, as these tests will have proved that the self-closing device fitted to that particular door is capable of maintaining the closed position without any support from a latch or bolt.

In these circumstances, it is essential that the fire test evidence covers the particular doorset assembly of door leaf, frame, closer, exit device and hinges.

Endorsement by a third-party certification scheme will have addressed all these points.

15.2.2 - Escape Doors

The Building Regulations (England & Wales) Approved Document B (Fire safety) – Volume 2: Buildings other than dwellings -2019 edition requires that all doors on escape routes be fitted with escape hardware that is simple to operate and does not require specialist knowledge or tools for its operation (e.g., panic escape hardware).

UK and European product standards have been developed to provide a benchmark for the performance and safety of escape building hardware and as such, they can be considered as describing best practice in this important area.

The use of an exit system with any form of delay or denied exit mode must be carefully considered and justifiable. The delay of egress through any escape door can have severe consequences and be a risk to life. Dialogue with local building control authorities and fire authorities should be undertaken to ensure the solutions are acceptable. It must not be forgotten that fire is only one reason people may need to escape from a building or area, other scenarios such as terrorism or a gas leak can also require people to escape and the need to escape from these situations is just as important as the need to escape in a fire condition.

15.2.2.1 - Escape Considerations

System 0 – Immediate release with no time delay.

This system will operate similar to products tested to EN 1125 or EN 179 in that one operation of the device will release the door with no time delays available. Ideal for offices and areas where safe egress is priority over security.

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System 0 giving immediate egress

System 1 - Single time delay of 0 – 15 seconds

The system will have a time delay of up to 15 seconds and will sound an audible alarm and a visible counter, allowing a member of authority to investigate if the situation is a genuine emergency. Ideal for areas where young children or people in care may be present who should not be vacating the building without supervision.

System 1 prevents people in care wondering out of a building

System 2 - Double time delay with a second option of 15 – 180 seconds time delay or total shutdown.

The system is ideal for remote areas to prevent members of the public or staff from entering a dangerous area. With this system a CMC (Central Management Control) must be active who can monitor the door via CCTV and determine if the door should be released or denied.

System 2 - Central Managemeny Control using CCTV to monitor doors and areas

It is important that any electrically controlled exit system is able to operate safely for a realistic lifetime, and tests are included in EN 13637 to verify the durability of the product used on the system.

Four categories of durability are recognized:

- Grade 6 - 100,000 test cycles
- Grade 7 - 200,000 test cycles
- Grade 8 - 500,000 test cycles
- Grade 9 - 1,000,000 test cycles

If the escape door to which the panic device is fitted is also used during the day as a normal access door, it is important to ensure that the panic device is proven for at least 200,000 cycles (Grade 7).

15.2.3 - Fire Rated Escape Doors

Where an electrically controlled exit system is to be used on fire-resisting or smoke control doors there are additional performance requirements that have to be met, beyond those required for escape, to ensure that the device does not jeopardize the fire compartmentation properties of the door.

The standard EN 13637 has three classification codes as follows: -

- 0 - Not tested for use on fire doors
- A – Suitable for us on smoke door assemblies
- B – Suitable for use on fire doors tested to EN 1634-1

15 ELECTRICALLY CONTROLLED EXIT SYSTEMS

15.3 Commentary

15.3.1 - Product Standards

EN 13637 is not a harmonized standard and therefore it is not possible to carry the appropriate conformity mark (such as UKCA / CE mark), however products can still be tested to the standard and placed on the market. The classification for the product can be found in the DHF Best Practice Guide Electrically Controlled Exit Systems.

The electric release may have to be also tested with other performance standards such as EN179 or EN1125 if used on an escape door.

For fire rating the system will have been tested to EN1634-1 Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware Fire resistance test for door and shutter assemblies and openable windows or fire assessed by a third -party.

Approved Document B (England and Wales) recommends that panic exit devices be used if the area has more than 60 occupants, irrespective of the nature of the building. If there is any doubt about the conditions relating to building occupancy, it is recommended that devices covering at least 60% of the door width being used.

Electric locking must comply with:

- The Electromagnetic Compatibility Regulations 2016, which is the GB version of the Electromagnetic Compatibility Directive (2014/30/EU)
- Electrical Equipment (Safety) Regulations 2016 (2014/35/EU) Low Voltage Directive (2014/35/EU)

EN 179 devices should be specified only where it is intended that the occupants will be trained in emergency escape procedures and are therefore most unlikely to panic. If there is any doubt, then a device to EN 1125 should be specified.

15.3.2 - Delayed Egress

The EN 13637 standard introduces the concept of delayed egress through an escape door where there is a valid reason to do so, such as for enhanced security against theft or terrorism or for safety in nurseries or care homes.

These exit systems can offer three grades of releasing the door: -

- 0 – Immediate release with no time delay
- 1 – Single time delay of 0–15 seconds
- 2 – Double time delay with a second option of 15–180 seconds time delay or total shutdown

All three systems must allow immediate release when the fire alarm is activated as the safety of people is of high importance.

In addition to the above three grades of releasing the door there are also two grades of denied exit mode;

- Grade 0 – No denied exit
- Grade 1 – denied exit available

Whereby, the door would be remotely controlled by security personnel in a control room, using a central management control (CMC). This type of solution would be used in applications where there is a need to control people movements for safety and security such as Sports Arena, Airports and stadiums.

If the hardware is fitted to rebated double doors, then a door co-ordinator should be fitted that is certified to EN 1158 to ensure that the doors fully close in the correct order.

15 ELECTRICALLY CONTROLLED EXIT SYSTEMS

15.3.3 - Accessories

15.3.3.1 - Outside Access Device

With electrically controlled exit systems gaining access from the outside by an authorized user may be offered in a number of ways depending on the security level required.

A mechanical outside access device may be used to withdraw mechanical locking elements on the inside or to unlock electrical locking elements a keypad, proximity or biometric reader will be needed.

Whatever device is used on the outside it must not hinder the hardware fitted on the inside from operating. The device if fitted to a fire door must not compromised the fire performance of the complete door.

Outside Access Devices - Biometric reader, card reader and mechanical OAD

15.3.3.2 - Strike Plates

Most panic or emergency exit devices are offered with a choice of strike plates to suit different frame materials or configurations. For example, a locking element might be approved for use on a single door, the active leaf of a rebated pair of doors, an aluminium profile frame, a timber frame or a steel rebated frame. In each case a different strike plate might be needed. The design of a strike plate can have a very significant effect on the release forces and correct operation of an exit device, so care should be taken that the test evidence and approval cover's the particular strike plate required.

15.3.3.3 - Other Components

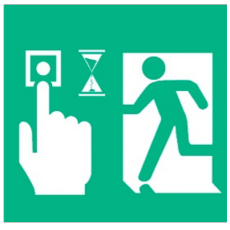
Many other components might be used in conjunction with electrically controlled exit systems. In all cases these components must not be allowed to inhibit the escape function in any way. If appropriate certification from a third party is not available, then specific test evidence should be sought for all combinations of building hardware intended for use together.

For compliance to a performance standard such as EN 179, EN 1125 or EN 13637 only nominated components can be used to complete the lockset solution or exit system. These components must have been successfully tested together collectively to achieve the performance criteria defined by the relevant performance standard. No substitution of a component will be allowable unless the substitute is a nominated alternative covered by the performance test data. It should also be noted that as these applications are life safety critical, the performance testing carried out against the performance standard is by a third party and not by the manufacturer of the hardware and is at the highest attestation level.

15.3.3.3 - Signage

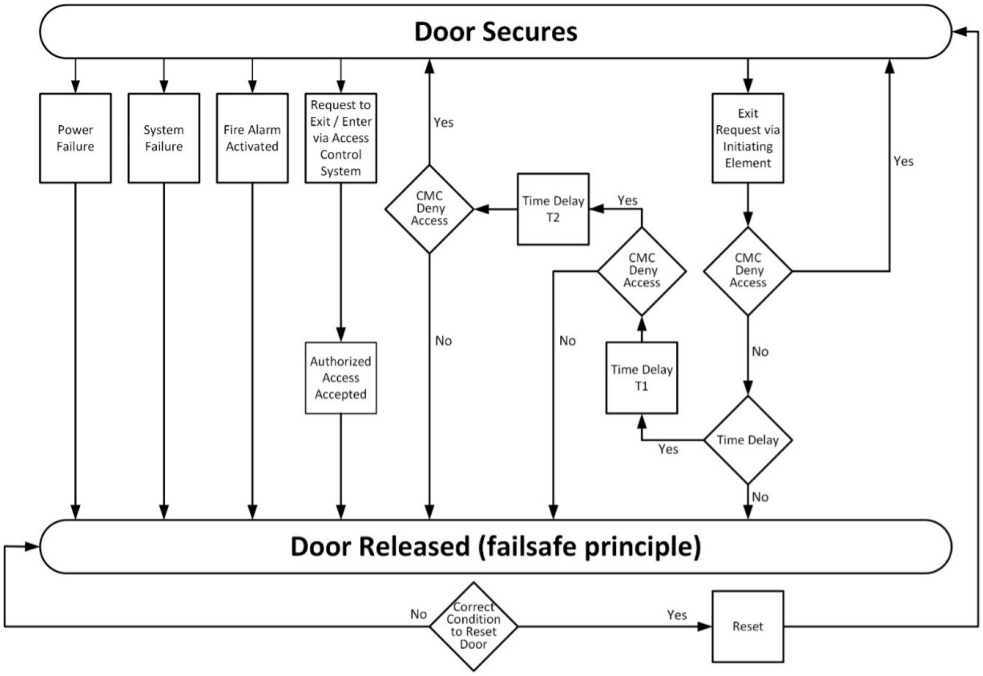
Two signs are available to indicate that an electrically controlled exit system is installed.

Signage for system without a time delay



Signage for system with a time delay

15 ELECTRICALLY CONTROLLED EXIT SYSTEMS



15.3.4 - Configurations

EN 13637 recognizes four categories of configuration to cover the options available and is identified by the 11th digit in the classification code.

- **Category A** – The initiating element being integrated in and activated by a horizontal bar in accordance with EN1125 such as a push bar or touch bar
- **Category B** – Initiating element being fitted outside the door leaf as part of an exit system which is functionally not linked to an exit device, such as an exit button on the wall
- **Category C** – Initiating element being integrated in an activated by a dummy bar or a dummy handle that is not an operating element
- **Category D** – Other exit systems not included in any of the above-mentioned categories

Where exit devices are intended for use on double fire doors, particular care should be taken that any intumescent material contained in the meeting stiles is not damaged during the installation or operation of the exit devices. In the case of rebated doors, it is important to ensure that door lipping's and any intumescent material is protected from potential damage.

Operation of a CMC (Controlled Management System)

The diagram above shows the operations and options used on a system 2 electrically controlled exit system which must be controlled with a CMC and permitting access or denied access.

For further information see also the Best Practice Guide:

- **Electrically Controlled Exit Systems to BS EN 13637.**

published by the DHF and included on the DHF website. Further information on hardware for fire and escape doors is available from the GAI website.

www.dhfonline.org.uk **www.gai.org.uk**

SECTION 16
MAINTENANCE OF BUILDING HARDWARE

CONTENTS

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16 MAINTENANCE OF BUILDING HARDWARE

16.1 Introduction

Owners and occupiers of non-domestic premises have a legal duty to maintain the facilities, equipment etc. provided for fire safety purposes. This clearly includes fire and escape doors. There is also a duty to conduct fire safety risk assessments and to act on the findings. The following legislation applies:

- Regulatory Reform (Fire Safety) Order 2005 – England and Wales
- Fire (Scotland) Act 2005; Fire Safety (Scotland) Regulations 2006
- Fire and Rescue Services (NI) Order 2006; Fire Safety Regulations (NI) 2010

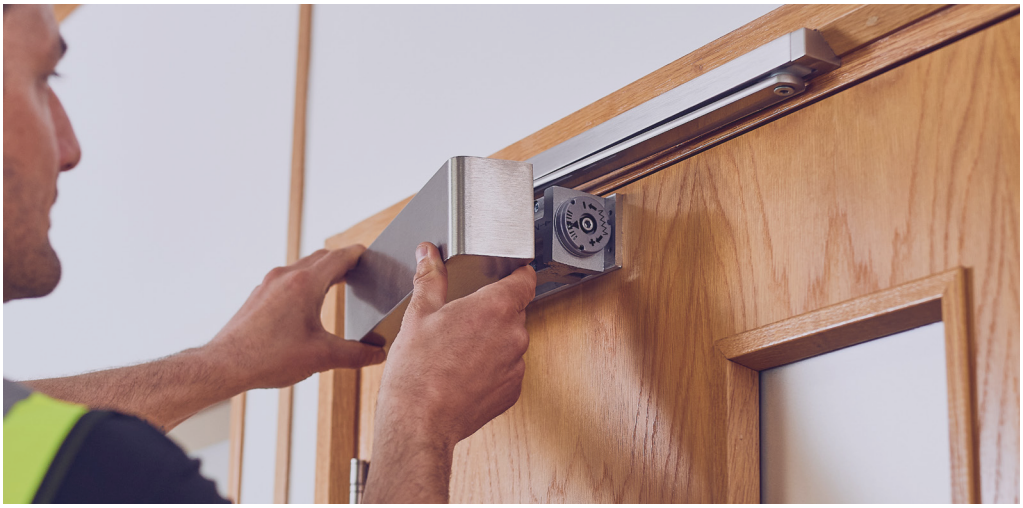
Guidance on fire safety risk assessments in relevant premises is available in all three jurisdictions:

England & Wales: www.gov.uk/government/collections/fire-safety-law-and-guidance-documents-for-business

Scotland: www.gov.scot/policies/fire-and-rescue/non-domestic-fire-safety/

Northern Ireland: www.nifrs.org/home/staying-safe/business-fire-safety/fire-safety-guides/

In England and Wales, Building Regulation 39 (previously Regulation 16) of the Building Regulations 2010 requires information on the fire safety measures in a building to be passed to the Responsible Person on completion or occupation of a new building, so that these measures might be operated and maintained in a satisfactory way. This should include information on the installation, adjustment (where appropriate), operation and maintenance of essential hardware on fire and escape doors. These documents should be consulted and their recommendations followed. Older buildings might not have such a file of information available. In such cases, the following details may assist the Responsible Person in fulfilling their duties with regard to the functioning of their fire and escape route doors.



16 MAINTENANCE OF BUILDING HARDWARE

16.1.1

Doors designated as:

- on a fire escape route
- fire and/or smoke resisting doors
- doors impacted by fire or smoke ventilation systems

must be periodically inspected to make sure that they meet the same standards as when they were originally installed and commissioned.

Note that Regulation 10 of The Fire Safety (England) Regulations 2022 requires that, if the top storey of the building is above 11m in height (typically, a building of more than four storeys) the Responsible Person must:

> use best endeavours to check all flat entrance fire doors at least every 12 months; and carry out checks of any fire doors in communal areas at least every 3 months.

Further detail on this can be found here: Fire Safety (England) Regulations 2022: fire door guidance - GOV.UK (www.gov.uk)

16.1.2

All doors, regardless of their function will require periodic inspection. Adjustment and maintenance of doors which are more regularly used may be more frequent.

16.1.3

Recommendations on the frequency of inspections are included in the risk assessment guides prepared for "Responsible Persons" or Duty holders in respect of the legislation listed in the Introduction above. These are available on government websites. Relevant premises are subject to a suitable system of maintenance. "Suitable" means, among other things:

- the maintenance is carried out regularly
- defects are remedied
- records of inspection and repair are kept

16.1.4

The conclusion is that the employer should ensure that fire-resisting doors and escape doors are kept in safe working order by a properly documented system of regular maintenance, carried out by qualified and/or competent individuals. There is no specific requirement as to the qualifications to be held by such individuals, although a number of fire door inspection and maintenance schemes are available such as:

- Fire Door Inspection Scheme (FDIS) www.fdis.co.uk
- Certified Fire Door Maintainers operated by BM TRADA Q-Mark www.bmtrada.com
- BRE and DHF Fire Door Inspection Classroom course.

16.1.5

Building controllers may thus include such inspections in their regular fire drills and routine fire precaution inspections.

16 MAINTENANCE OF BUILDING HARDWARE

16.2 Critical Recommendations

16.2.1

The Management should include requirements on the competence of people employed to assist in health and safety matters, including maintenance. It is important to employ properly trained personnel (see **13.1.4** above).

16.2.2

For the doors to work efficiently, regular and programmed maintenance must be carried out to all parts of the door. Work should be undertaken only by persons experienced in this type of work.

If outside contractors are used they should sign the maintenance log maintained by the company.

16.2.3

A maintenance log should be kept, and all doors given a unique number.

16.2.4

The maintenance period should be appropriate for the building; for high life risk, such as hospitals, schools, retired persons' accommodation, this may be monthly. Other buildings with low life risk may be annually. Refer to the Guide appropriate to the type of building.

16.2.5

The maintenance and replacement of components to maintain the correct performance of the door for the full life of the building is thus essential.

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MAINTENANCE OF BUILDING HARDWARE

16.3 Commentary

16.3.1 General

The most important factor is that these devices are designed to protect human life against fire and to ensure people can safely exit a building. Nothing must be done or neglected that could compromise this.

Building Regulations, and to some degree fire regulations, provide general guidance on the type of products to be used. If not already included in the building's fire safety file ("Regulation 38" in England & Wales), recommendations on the inspection and maintenance for each specific device and each part should be obtained from manufacturers and used against all such parts fitted to each door.

The types and uses of doors are many and each door will need to be treated as the situation dictates. The geographical location will also dictate the frequency and type of maintenance; wet salty areas will need special consideration. Wind-blown debris and illicit dumping of rubbish could render an emergency exit sealed. Emergency exit doors used for staff access will be subject to higher wear factors than those limited to occasional use.

Internal fire and smoke-resisting doors are at least as important as the final exit door, although it is unlikely that they will have the same hardware as the final exit. However, hinges, closers, co-ordinators and seals all have as much importance. The incorrect closing action of such doors might cause serious injury to the building occupants who are more likely to use these doors in the course of the normal day. They are often subject to a higher degree of wear than final exit doors.

Vandalism and attempted forced entry will cause damage to internal and external doors, as will misuse by building occupants. Only regular periodic inspection will pick up these faults.

External doors will also need inspecting during seasonal changes to ensure continuing functionality.

Only parts of equal or a better standard should be fitted as running replacements or additions to fire/smoke and final exit doors; anything less could invalidate fire certificates and breach the building owner's responsibility to keep the doors in safe working order. If there are concerns about suitability of replacements, test evidence from a competent authority should be obtained. Replacement hardware for CE or UKCA marked doorsets should wherever possible be obtained from the door manufacturer. Failure to do so could invalidate any fire certification. Hardware for steel doorsets should only be obtained from the manufacturer or replaced with an exact like for like product due to the manufacturing processes for the door leaf.

16.3.2 Hinges

Hinges bear the weight of the door, the whole load being applied to just two or more metal pivot devices. They should be checked for wear in the pivot pin. Also ensure that the fixing screws are tight and all are effectively holding. Light lubrication might be required by local conditions. The type of hinge may also impact on the frequency of maintenance and manufacturer's recommendations should always be followed. Hinges on doors in frequent use will wear more quickly than those which are only opened for inspection or for access to service ducts etc. CE or UKCA marking on hinges for Fire Resisting Doors should be checked, and replacement hinges on Fire Resisting doors must always comply with EN 1935 certified to Grade 1.

16

MAINTENANCE OF BUILDING HARDWARE

16.3.3 Floor Springs

Where floor spring or pivot devices are installed, careful inspection of the lower pivot should be undertaken to remove debris and any corrosive liquids deposited by inappropriate human use. The upper pivot should not show signs of wear and indicated wear must be rectified to prevent the door jamming at critical times.

16.3.4 Door Closing Devices

Door closing devices are designed and fitted to suit different uses.

Maintenance technicians should be aware that building use might change and they should make building supervisors aware in such cases.

Each type and make of closer will need servicing in differing ways but pivoting arms and terminal fixings should be checked for tightness and lubrication added as appropriate. Terminal fixings into the door and frame are subject to stress and should be carefully checked.

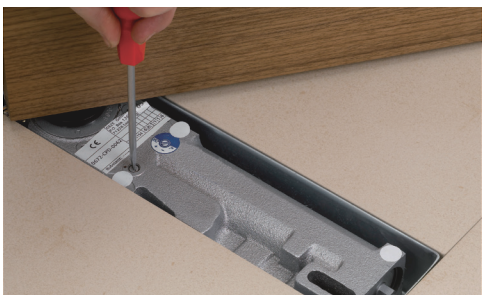
Opening forces should be checked for compliance to BS 8300-2 and fire, smoke or acoustic seals inspected to ensure they are not damaged and do not impede the smooth opening and closing action. Hydraulic units should be checked for loss of fluid which would indicate a failing device.

Where floor springs are used, it is important that the door is in alignment with the frame, or in the case of pairs of doors, alignment of both.

Closing and latching speeds should be checked and adjusted as appropriate. The correct opening travel should be checked to ensure that doorstops are correctly positioned to avoid over-stressing the arm assembly or over-rotation of the cam within the unit. This over-rotation will result in the door attempting to close in the opposite direction. The door must overcome any latch fitted to the door and must close from any angle; this is particularly important for fire and smoke resisting doors. The door should be tested to show that it fully closes into the frame and overcomes the latch if fitted when released at 75mm from the fully closed position.

16.3.5 Electromagnetic devices

Electromagnetic devices should be checked to ensure that the doors immediately release upon activation. The hold open device, when it is a separate unit, should be fitted on the same plane as the door closer. If this is not the case, then it should be checked that no distortion of the door leaf has occurred affecting the closing of the door leaf into the frame. A frequent check should be undertaken in conjunction with regular fire/smoke alarm testing as advised/required by local regulation. Closing speeds should also be checked to ensure they are suitable for their environment.



Floor spring adjustments

Overhead door closer adjustments

16 MAINTENANCE OF BUILDING HARDWARE

16.3.6 Door co-ordinating devices

These devices are used to ensure the correct closing sequence of pairs of doors with rebates or astragals. The maintenance schedule should include a check to ensure that each part is securely located and the screw fixings are tight. Any moving parts, protruding arms or carry bars should be checked for wear and functionality. The function should be checked over the full range of door openings and all parts lubricated as required. All parts supplied should have been fitted as per the manufacturers fitting instructions.

16.3.7 Locks, Latches, Bolts and Furniture

All fittings should be examined and checked for secure fixings; moving parts should be lubricated and/or adjusted as defined by the manufacturer. Bolts, rods and other protrusions should be checked to ensure they are straight and undamaged. Bolts for locks and latches should be checked to ensure they are fitting centrally into their respective keeps. Parts liable to corrosive influence should be cleaned, lubricated and protected. It should be checked that any door closing device overcomes the latchbolt from any angle.

16.3.8 Seals

Fire, smoke, acoustic and weather seals should be examined to ensure they are unbroken and secure in the door. Worn or damaged seals must be replaced with a product of the same dimension, formulation and configuration. It should be checked that seals do not impede the closing of the door leaf into the frame.

Perimeter door gaps should be checked as part of regular inspections to ensure that they are within the door manufacturer's permitted tolerance.

16.3.9 Panic and Emergency Exit Devices

Moving parts should be inspected for signs of wear and replaced as required. Lubrication should be used where indicated; screws and all fixings should be tested to ensure they are secure. Electrically controlled devices should be tested with power off to ensure their continued functionality following power failure. Floor sockets, whether easy clean or dust-excluding, should be checked and cleaned out.

Top trip mechanisms, designed to hold the device back when the door is open should be checked that they do not impede the closing of the door, but release the bolts when the door closes.

Lock tightening

Panic hardware lubrication

16 MAINTENANCE OF BUILDING HARDWARE

16.3.10 Access control & Electronic Locking

Access control devices perform a wide range of operations and each will need to be approached specific to the type. They should be checked that they perform the intended function. Any emergency escape devices such as egress buttons or lever handles should be checked so they release the door when operated. Electronic locking systems on fire escape routes should be checked to ensure they release on activation of fire alarm and in fail safe conditions.

16.3.11 Powered Pedestrian Doors

For safety reasons it should not be assumed that equipment is working safely. The occupier is responsible for undertaking a test procedure which should be carried out at least weekly unless a different frequency for tests is identified in the Hazard Analysis and Risk Assessment.

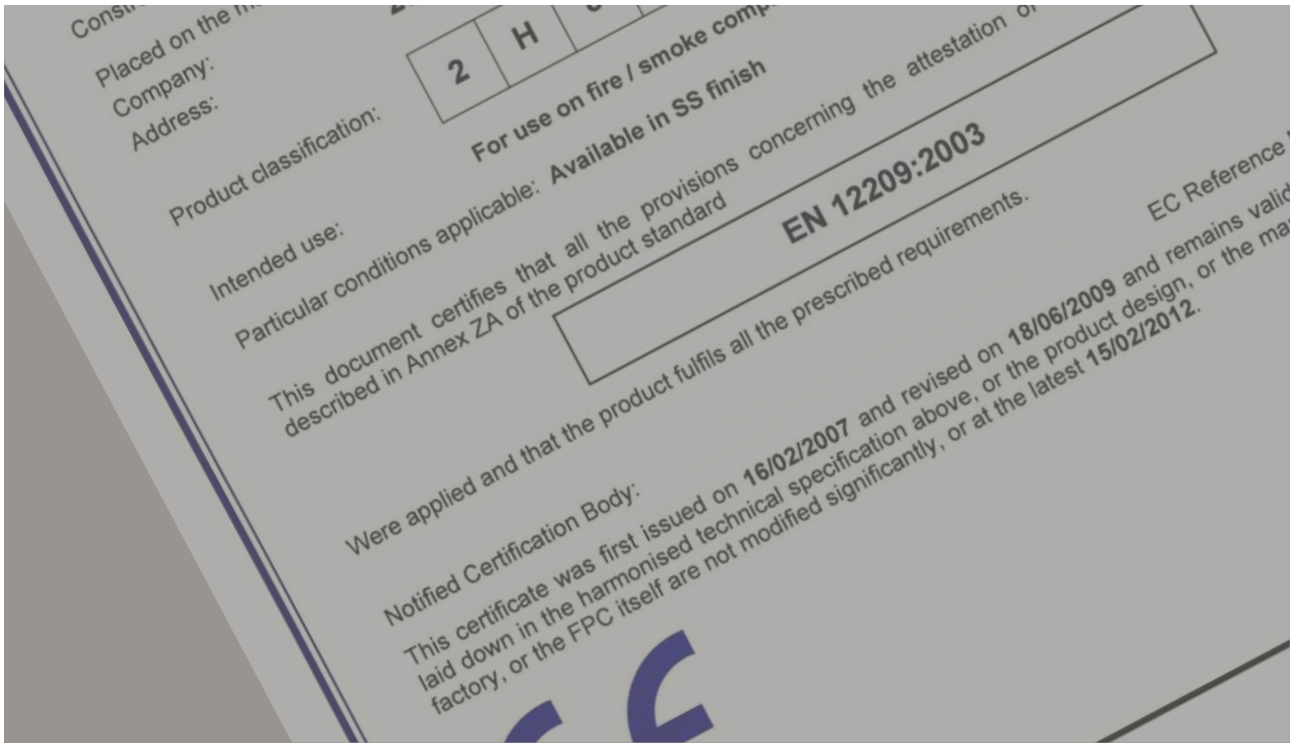
These tests should be recorded and kept for at least a year.

If a fault is found which affects safe operation of the door, the door operating equipment should be switched off and the door made safe. Use of the door should not be reinstated until repairs have been undertaken by an authorised technician. Authorised technicians will require to do a planned preventative maintenance frequently depending on regulations. Safety inspection will be required at least annually.

16.3.12

In almost all cases, the installed products will have been supplied complete with fixing instructions and the correct maintenance data sheets. It is important that these documents are retained by the Building Manager and used as the basis of the maintenance schedule.

Further information on maintenance of door hardware and fire doors can be found in GAI End User Guides on www.gai.org.uk/user.



SECTION 17
PRODUCT STANDARDS AND DEFINITIONS

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17 PRODUCT STANDARDS AND DEFINITIONS

17.1 Standards

17.1.1 European Standards

Architectural hardware (building hardware) can fall within the scope of BS (British Standards), EN (European Standards) and ISO (International Standards).

European Standards apply equally in all countries where the National Standards Body are full members of CEN. Generally, they cover a wide range of performance levels from domestic to heavy public usage and where appropriate, levels of security performance and also corrosion resistance are categorised.

In order to help users, almost all of these standards use the same simple categorisation system. Although some products have extra categories, the first seven digits generally (but not always) relate to the same performances. These are fully described in **Section 1.**

Care must be taken to ensure that any claims made about a product's conformity to a standard, or a particular grade of a standard, can be shown to be accurate and truthful. Such claims must be clearly and unequivocally stated. Such phrases as "tested to...." "designed to conform to...", "approved to..." , are not sufficient.

17.1.2

The European and UK versions of the Construction Products Regulation (CPR) have made compliance with harmonised and designated standards mandatory for any products falling under the scope of such standards. It is currently illegal to place a non-conformity marked construction product on the UK and European market if it is covered by a harmonised/designated standard where applicable.

Under the Windsor Framework, Northern Ireland still retains full market access to the single European Market. It therefore still requires CE marking or CE+UKNI marking in order to place relevant products on to the market.

The following European standards are harmonised/designated standards under the relevant CPR. This means that products successfully certified to them can be conformity marked (such as UKCA / CE mark). At time of writing, the year of standard identified below is the version which is harmonised/designated, although more recent versions of these standards may exist. A list of harmonised standards can be found **https://ec.europa.eu/docsroom/documents/52375** and a list of designated standards can be found **https://www.gov.uk/government/publications/designated-standards-construction-products.**

- **EN 179** - Emergency exit devices operated by a lever handle or push pad
- **EN 1125** - Panic exit devices operated by a horizontal bar
- **EN 1154** - Controlled door closing devices*
- **EN 1155** - Electrically powered hold-open devices for swing doors*
- **EN 1158** - Door coordinator devices*

17 PRODUCT STANDARDS AND DEFINITIONS

- **EN 1935** - Single axis hinges*
- **EN 12209** - Locks and latches - Mechanically operated locks, latches and locking plates*
- **EN 14846** - Electromechanically operated locks*

The following standards are not harmonised/designated but are still of importance and relevance within the building hardware industry.

- **EN 13637** – Electrically controlled exit systems
- **EN 1303** - Cylinders for locks
- **EN 1527** - Hardware for sliding doors and folding doors
- **EN 1906** - Lever handles and knob furniture
- **EN 12051** - Door and window bolts
- **EN 12320** - Padlocks and padlock fittings
- **EN 13724** - Apertures of private letter boxes and letter plates
- **EN 14637** - Electrically released hold open systems
- **EN 1670** - Corrosion resistance
- **EN 1634-1** - Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Fire resistance test for door and shutter assemblies and openable windows
- **EN 1634-2** - Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware. Fire resistance characterisation test for elements of building hardware.
- **EN 1634-3** - Fire resistance tests for door and shutter assemblies. Smoke control doors and shutters.
- **EN 13501-2** - Fire classification of construction products and building elements

The following standard is harmonised/designated but falls within the Machinery Directive and not the CPR. This is not, strictly speaking mandatory but is regarded as establishing the “state of the art” for safety.

- **EN 16005** - Power operated pedestrian doorsets. Safety in use. Requirements and test methods

Hinges tested to EN 1935

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17.1.3 British Standards

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

BS 476-31.1
Fire tests on building materials and structures - Methods of measuring smoke penetration through doorsets and shutter assemblies: measurement under ambient temperature conditions.

BS 4787-1
Internal and external wood doorsets, door leaves and frames: Specification for dimensional requirements.

BS 7273-4
Code of Practice for the operation of fire protection measures - Activation of release mechanisms of doors.

BS 8214
Code of Practice for Fire door assemblies with non-metallic leaves.

BS 5499-4
Safety signs, including fire safety signs Code of Practice for Escape Route Signing.

BS ISO 7010
Registered safety signs.

BS 7036-0
Power operated pedestrian doorsets. Safety in use - Code of practice for risk assessment and risk reduction

BS 8424
Building hardware. Pull handles. Requirements and test methods.

BS 9991
Fire safety in the design, management and use of residential buildings. Code of practice

BS 9999
Code of Practice for fire safety in the design, management and use of buildings.

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PRODUCT STANDARDS AND DEFINITIONS

17.2 Definitions

Accessible route
Any route that is used to approach, or move around or within a building, and is accessible to disabled people.

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

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.

Electric strike
Locking plate using electrically operated means to enable locking and/or unlocking.

Electromechanical lock
Mechanical locking device with electrical control of components or linkages e.g. solenoid or motor lock.

Electromagnetic lock
Locking device with electric control of main elements e.g. maglock

Electronic key
Device containing credential(s) necessary to authorize operation of the (mechatronic) cylinder mechatronic cylinder; MC device with an integrated or a remote electronic system, which is to be used with a lock for the purpose of operating the lock and/ or detaining elements after verifying the authorisation of an electronic key.

Emergency Exit Device
An exit device operated with a lever handle or push / pull pad on the inside of the door and for use where panic situations are not foreseen, such as non-public areas, offices, factories etc.

Fail safe/ fail unlocked
Released when power is cut.

Fail secure/fail locked
Secure when power is cut.

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 door
A door leaf, frame, all hardware and any fire/smoke seals, supplied as a doorset by one legal entity, or supplied as components from separate sources for assembly on site.

Fire integrity
Measure of the ability of a specified door 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).

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

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

Latch bolt
Moving part of a latch that engages the locking plate.

Mechanical digital lock
A lock that is operated by a keypad with buttons set to a pre-determined code. Entering the correct code operates the lock.

Mechatronic door furniture
Combination of lever handles or knobs on backplates or roses with an integrated or a remote electronic system, which is to be used with a mechanical or electromechanical lock for the purpose of operating the lock after verifying the authorization of a credential mechatronic door furniture.

Mortice latch
Latch for fixing in a mortice, usually in the closing edge of a door leaf or window.

Mortice lock
Lock for fixing in a mortice, usually in the closing edge of a door leaf or window.

Outside Access Device (OAD)
A mechanism for opening a panic or emergency exit device from the outside of the door, either by lever or knob. A cylinder key is generally used to lock and unlock the OAD. This action does not affect the emergency operation of the escape device.

Panic Exit Device
An exit device conforming to BS EN 1125, operated by either a cross bar or touch bar on the inside of the door and for use where panic situations may be foreseen, such as areas accessed by the public, places of entertainment, etc.

Powered pedestrian doorset
Doorset for pedestrian passage only with one or more leaves that is moved, at least in one direction, by an external energy supply (e.g. electrically) instead of manual or stored mechanical energy.

Rim lock
Lock for fixing on the face of a door leaf.

Tubular latch
Mortice latch, which has a case shaped to fit into a cylindrical mortice.

Further definitions can be found in the relevant standards as well as GAI Glossary of Architectural Hardware Terms on **www.gai.org.uk/user**

17.3 Abbreviations

CEN
European Committee for Standardization

EN
Euronorm (European standard)

FDIS
Fire Door Inspection Scheme

ISO
International Organization for Standardization as well as BSI British Standards Institution and CPR Construction Products Regulation.

Guild of Architectural Ironmongers

The Guild of Architectural Ironmongers (GAI) is the only trade body in the UK that represents the interests of the whole architectural ironmongery industry - architectural ironmongers, wholesalers and manufacturers. Its reputation is built on three key areas: education, technical support and community.

Its qualifications, education and CPD programmes are widely respected in the UK and overseas, including the GCC and Hong Kong. Its technical information service is the only specialist service of its kind, providing GAI members with comprehensive advice on issues relating to the legislation, regulations and standards governing the use of architectural ironmongery and related hardware. The GAI is run by the industry for the industry.

www.gai.org.uk

Door & Hardware Federation

DHF is a not-for-profit membership organisation that represents all the key players in locks and building hardware, doorsets, industrial doors and shutters, domestic garage doors and automated gates.

Due to its dedication for maintaining and raising quality standards, DHF has become the industry's 'go to expert' on training and technical advice, with its team sitting on various UK and European committees. It contributes to relevant industry standards and provides legislative and regulatory advice for professionals.

Through its commitment to educating the market, DHF has created comprehensive training and CPD programmes that benefit the industry. It is an accredited assessment centre for the Awarding Body in the Built Environment (ABBE) providing formal qualifications, forms part of an NOCN assessment centre for the industry specific NVQ and offers a wide range of fire and non-fire doorset courses in collaboration with BRE.

DHF continually produces publications such as best practice guides and technical specifications for the industry and was fundamental in the creation of DHF TS 007.

www.dhfonline.org.uk