



**Association of Building  
Hardware Manufacturers**

# **Best practice guide**

**Controlled Door  
Closing Devices  
to  
BS EN 1154**

**in association with**



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## • ABHM BEST PRACTICE GUIDES

This publication is one in a series of guides addressing the major issues that should be considered when specifying, ordering or using the products it describes. It aims to provide the reader with a concise document which includes a summary of relevant sections from the new European Product Standard. The reader will then be in a position to seek further specialist advice where necessary and recognise genuine conformity to the new standards.

## • BS EN 1154: Controlled Door Closing Devices

The standard provides details on product types, classification by use, test cycles, door mass, corrosion resistance, as well as definitions, product performance requirements, test apparatus, test methods and marking of products. In addition, the published standards include annexes illustrating the various points made through diagrams and supplementary text.

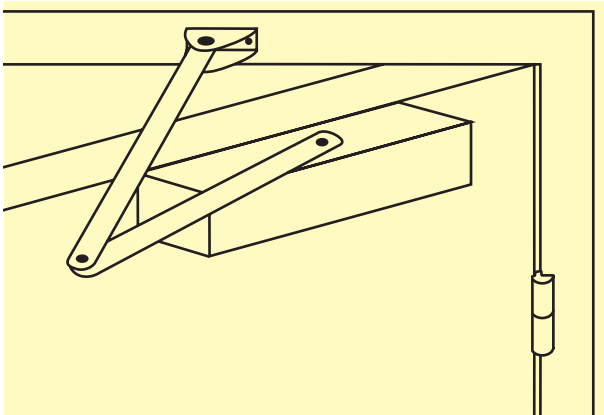
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The above European standard replaced existing national product performance standards in 1997. In the UK this meant the withdrawal of BS6459: Part 1: 1984: 'Door Closers - Specification for mechanical performance of crank and rack and pinion overhead closers'.

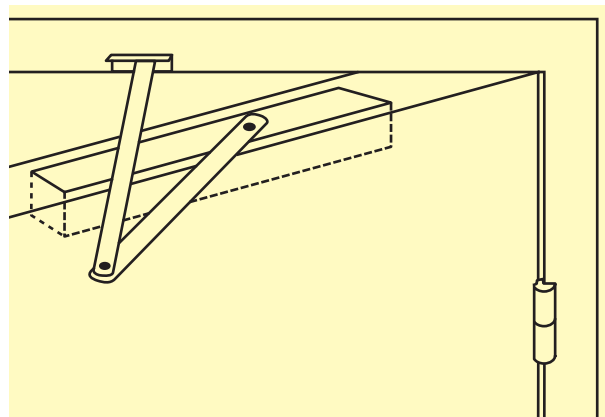
**Amendment A1 to BS EN 1154 was published early in 2003 and this amendment provides for CE marking of conforming products in accordance with the EU Construction Products Directive.**

## • SCOPE

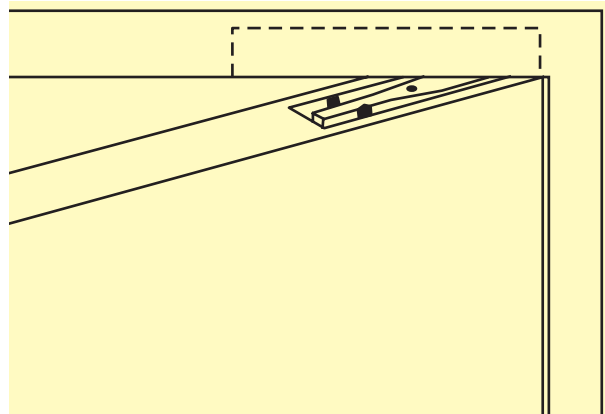
Products included within the standard are illustrated below and include a wider range than covered by BS6459.



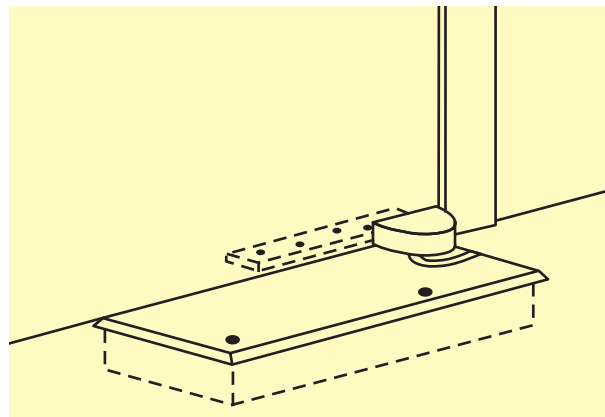
*Overhead door closer surface mounted*



*Overhead concealed door closer door mounted*



*Overhead concealed door closer transom mounted*

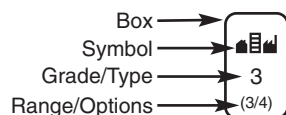


*Floor concealed door closer - Floor spring*

## • CLASSIFICATION

BS EN 1154 classifies door furniture by using an 6 digit coding system. A similar classification applies to all building hardware product standards so that complementary items of hardware can be specified to, for instance, a common level of corrosion resistance, category of use, etc. Each digit refers to a particular feature of the product measured against the standard's performance requirements.

The ABHM recommends the use of graphic icons to enhance clarity of information and has devised a system to facilitate assimilation of the various product classifications. Each feature within the product classification is represented by an icon comprising four elements; Symbol, Grade/Type, Range/Options and Box:-



The icon above is for a product which meets Grade 3 in the Category of Use classification, where EN 1154 stipulates two possible grades; 3 or 4.

Full details on the ABHM graphic icons system can be found [on this CD](#) or at [www.abhm.org.uk](http://www.abhm.org.uk)

## Digit 1 Category of use

For all internal and external doors for use by the public, and others, with little incentive to take care, i.e. where there is some chance of misuse of the door.

- grade 3: For closing doors from at least 105° open
- grade 4: For closing doors from 180° open

Note 1: Grade 4 classification assumes standard installation according to the manufacturer's instructions.

Note 2: For applications subject to extremes of abuse, or for particular limitations of opening angle, door closers incorporating a backcheck function or provision of a separate door stop should be considered.

## Digit 2 Number of test cycles

Only one test duration is identified for door closers manufactured to this standard:

- grade 8: 500 000 test cycles

## Digit 3 Test door mass/size

Seven test door mass grades and related door closer power sizes are identified according to table 1 of this standard.

Where a door closer provides a range of power sizes both the minimum and the maximum sizes shall be identified.

**Table 1**

Door closer power size	Recommended door leaf width max. mm	Test door mass kg
1	<750	20
2	850	40
3	950	60
4	1 100	80
5	1 250	100
6	1 400	120
7	1 600	160

**Note 1:** The door widths given are 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 should be used.

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

## Digit 4 Fire behaviour

Two grades of fire behaviour are identified for door closing devices manufactured to this standard:

- grade 0: Not suitable for use on fire/smoke door assemblies
- grade 1: Suitable for use on fire/smoke door assemblies, subject to satisfactory assessment of the contribution of the door closer to the fire resistance of specified

fire/smoke assemblies. Such assessment is outside the scope of this European Standard (See EN 1634-1).

## Digit 5 Safety

All door closers are required to satisfy the Essential Requirement of safety in use. Therefore only grade 1 is identified.

## Digit 6 Corrosion resistance

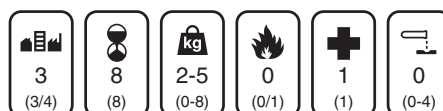
Five grades of corrosion resistance are identified according to EN 1670:

- grade 0: No defined corrosion resistance
- grade 1: Mild resistance
- grade 2: Moderate resistance
- grade 3: High resistance
- grade 4: Very high resistance

## • EXAMPLE:

The following marking denotes a closer capable of opening to at least 105°, and with ranging power size from size 2 to size 5.

Note that as the 4th digit is zero, such a closer would not be suitable for fire door use.



## • MARKING

The standard requires that each door closer and separately supplied accessory manufactured to the standard shall be marked with the following:

- The manufacturer's name or trade mark or other means of identification
- Product model identification
- The six digit classification listed above
- The number of the European Standard (BS EN 1154)
- The year and week of manufacture (may be coded)

## • CE marking

Door closers intended for use on fire resisting doors and smoke control doors are covered by a Construction Products Directive mandate issued by the European Commission. Consequently, this standard is regarded as a "harmonised" standard and compliance with it, supported by suitable evidence, allows the application of the CE mark.

As closers for fire/smoke doors have a critical safety function, application of the CE mark will require the involvement of a notified certification body to provide verification of the compliance claims. This will involve initial type-testing of the product to EN 1154, initial inspection of the manufacturer's factory production control and continuing surveillance and approval of the factory production control. On satisfactory fulfilment of these tasks, the notified body issues an EC Certificate of Conformity which then permits the manufacturer to declare compliance and affix the CE marking to his product.

The standard requires the following additional information to accompany the CE marking:-

- the identification number of the notified certification body
- the name or identifying mark of the manufacturer
- the registered address of the manufacturer
- the last two digits of the year in which the marking was applied
- the number of the EC certificate of conformity
- reference to EN 1154:1997 + A1: 2003
- the classification code of the product

Note that, although the notified body has to be involved to verify the manufacturer's claims, the manufacturer remains responsible for designing and producing the product, for affixing the CE marking, and for ensuring that the product meets the requirements of the Directive.

h) Where the door closer is intended for use with other, significantly different arm assemblies (for example slide tracks) which may be supplied separately, that combination shall also be tested according to the requirements of EN 1154.

### • RELATED STANDARDS

As companion to BS EN 1154, two further amended and harmonised product standards have been published. The first, BS EN 1155 covers electrically powered hold-open devices and replaces BS 5839:Pt3. The second, BS EN 1158 covers door coordinator devices (or selectors, to use UK terminology), and has no BS equivalent. Both these amended standards were published early in 2003.

### • FIRE DOORS

We referred above to fire door assemblies which will require self closing devices. BS EN 1154 makes recommendations as to the closing forces considered necessary for such devices fitted to fire doors.

- a) The door closer when installed in accordance with the manufacturer's installation instructions shall be capable of closing the test door from any angle to which it may be opened.
- b) Due to their low closing moments, door closers size 1 and 2 are not considered suitable for use on fire/smoke door assemblies. Door closers with adjustable closing force shall be capable of adjustment to at least power size 3.
- c) The door closer shall not include a hold open device unless it is an electrically powered device in accordance with EN 1155.

**Note: See further details below under 'Related Standards'.**

- d) Control regulators shall be either concealed or operable only by means of a tool.
- e) The design of a door closer shall be such that it is not possible to inhibit its closing action in any way without the use of a tool.
- f) Any incorporated delayed action function shall be capable of adjustment to less than 25 seconds between the door closing angles of 120° and the end of the delay zone.
- g) The door closer representative of its model shall have been incorporated in a door assembly that has satisfied the appropriate criteria of a fire test. The test shall have been on a full sized assembly in accordance with EN 1634-1.

## Where to place the CE mark

	On product – and visible after installation	On product	With installation instructions	On product packaging	On commercial documents
CE symbol	R	E	E	R	O
Notified Body number	R	E	E	R	O
Name of Producer	O	O	E	O	O
Address of Producer	O	O	E	O	O
Year of marking	O	O	E	O	O
C of C number	O	O	E	O	O
Product std number	O	R	E	R	O
Classification code	O	R	E	R	O

E = Essential  
 O = Optional  
 R = Recommended

For some products it may be appropriate to specify a combination of locations for the CE marking and the accompanying information. For example, a minimum of information could appear on the product itself, with the complete information appearing on the installation instructions or on the accompanying commercial documents. Where the information is split in this way, the location(s) lower in the hierarchy must always repeat that part of the information already placed higher up in the hierarchy.

## Additional important considerations

In addition to ensuring that products satisfy the requirements of this standard, other factors should be taken into consideration when selecting controlled door closing devices. These not only include sourcing products from a reputable manufacturer, but also quality assurance, support services and unequivocal conformity to the standard as detailed below:

### • QUALITY ASSURANCE

The internationally recognised standard for quality assurance, BS EN ISO 9000 provides confidence that the products are being manufactured to a consistent quality level. All ABHM members operate recognised BS EN ISO 9000 Quality Assurance Schemes.



Companies displaying this symbol are registered under the BSI Registered Firm Scheme.

### • SUPPORT SERVICE

The correct installation of door closing devices is essential to ensure that they are able to operate efficiently within the performance levels described in this standard. Specialist advice is available from ABHM members in support of their products from specification stages through supply to effective operation on site.

### • CONFORMITY TO BS EN 1154

Conformity to the standard must be clearly and unequivocally stated. Such phrases as “tested to ...”, “designed to conform to ...”, “approved to ...”, are not sufficient. To avoid misleading or confusing claims it is recommended that one of the following phrases is used when stating conformity:

- This product has been successfully type-tested for conformity to all of the requirements of BS EN 1154. Test reports and/or certificates are available upon request.
- This product has been successfully type-tested for conformity to all of the requirements of BS EN 1154 including the additional requirements for latch action\*/backcheck\*/delayed closing\*/adjustable closing force\*/fire/smoke door use\*. Test reports and/or certificates are available upon request. *\*Add as appropriate.*
- This product has been successfully type-tested for conformity to all of the requirements of BS EN 1154 including the additional requirements for latch action\*/backcheck\*/delayed closing\*/adjustable closing force\*/fire/smoke door use\*. Regular audit testing is undertaken. Test reports and/or certificates are available upon request. *\*Add as appropriate.*

It is recommended that an [ARGE Declaration of Compliance](#) is also completed, as this gives a clear and unambiguous method of demonstrating test evidence and compliance.

## ABHM PROFILE

Formed in 1897 to represent the interests of brassfounders, the ABHM and its members has been instrumental in the industry's advancement over the last 100 years.

Innovations in material and manufacturing technologies as well as changes in the building industry throughout the world have resulted in the development of a wide range of new products and practices. These advances have, in turn, required new skills and knowledge from the designer and manufacturer of the products themselves through to the specifiers, stockists and installers in the various sectors of the building industry.

The Association and its members have consistently risen to this challenge, creating products which meet the needs of a changing world and developing performance standards alongside national and international organisations, such as BSI

and CEN, which enable the industry to select and compare hardware with confidence.

The advances made throughout the industry are reflected in the Association's structure, the diversity of its membership and the wide range of activities in which it is involved. The ABHM now represents the United Kingdom's leading manufacturers of building hardware, architectural ironmongery and door and window fittings as well as providing the technical expertise essential for the formulation of performance standards at home and abroad.

All members are listed [on this CD](#) and on the [ABHM website \(www.abhm.org.uk\)](#), which includes a guide to the products and services available from each member.

#### British Hardware Federation

BHF represents some 3,500 ironmongery, hardware and DIY shops in the United Kingdom. In addition, it embraces the Independent Builders Merchants Service, a specialist division of the federation.

#### Builders Merchants' Federation

The Builders Merchants' Federation represents the majority of bona fide merchants in the UK. Its members have a combined turnover of £6 billion a year. Members range from large nationals to small independents.

#### Guild of Architectural Ironmongers

Founded in 1961, the Guild represents 95% of bona fide distributors within the UK and the majority of manufacturers of architectural ironmongery. The Guild serves to further all aspects of architectural ironmongery by promoting the interchange of information to encourage better product design and high professional standards of ironmongery scheduling and specification.

#### Master Locksmiths Association

The MLA is recognised by the Home Office, Police and British Standards as being the authoritative body for locksmithing. It was formed to promote the membership to Central and Local Governments, Industry, Commerce and the Public.



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### 1.0 Introduction

Fire-resisting doorsets, other than those to locked cupboards and service ducts, may require to be self-closing in accordance with any local regulations. Door closing devices fitted on fire-resisting doorsets should be able to close the door leaf reliably from any angle to which it has been opened and overcome the resistance of a latch or any seals, where fitted.

Fire door closers are required to perform one of two functions, dependent upon whether or not a latch is fitted to the door. These functions are considered 'essential' in terms of the ability of the doorset to achieve its intended fire resisting rating.

- (i) Latched Doorset: 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.
- (ii) Unlatched Doorset: 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 against 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 document, door closing mechanisms are divided into the following categories:

- a) Face-fixed closers - overhead mounted
- b) Face-fixed closers - jamb mounted
- c) Concealed closers - overhead mounted
- d) Concealed closers - jamb mounted
- e) Floor mounted closers - floorsprings
- f) Spring hinges
- g) Rising butt hinges.

*Note: This list does not imply suitability of any device for fire door use – see Sections 2.0 and 3.0 for further information.*

### 2.0 Critical recommendations

- 2.1 The door closer and its accessories should comply fully with BS EN 1154 + A1:2002 – *Building hardware - Controlled door closing devices*, including its Annex A. Preferably, this compliance should be demonstrated by the application of the CE marking.
- 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 BS EN 1634-1, 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 Notified Bodies in the '[Guidance Notes on CE Marking](#)' section of this CD, clause 2.3).
- 2.3 The strength and features of the control must be correct for the size of door to which it is to be fitted, bearing in mind:
  - The application to the door; (see section 3.3);
  - Whether subject to other factors such as air pressure; draughts, heavy traffic use; abusive treatment; use by elderly, infirm or disabled;
  - Whether door is to be latched or unlatched;
  - Whether smoke or other seals are fitted to the doorset.

(For further information see section 3.1).
- 2.4 Overhead controls in which the arms/tracks are made of material with a melting point of less than 1000°C should **NOT** be used unless proven by specific tests (see section 3.4).
- 2.5 Concealed overhead controls should **NOT** be used unless they are provided with specially designed and proven intumescent protection (see section 3.6).
- 2.6 For floor mounted controls, it is preferred that straps are used (see section 3.10).

- 2.7 Spring hinges, which are purely spring urged and do not control the closing speed, are unable to comply with BS EN 1154 and therefore should **NOT** be used for fire doors (see section 3.7).
- 2.8 Rising butt hinges are **NOT** recommended for use on fire doors (see section 3.8).
- 2.9 Manually operated mechanical hold-open devices (i.e. mechanisms which require to be released manually) **SHOULD NOT BE USED ON FIRE DOORS** (see section 3.2).
- 2.10 The automation of fire doors should not detract from their essential primary function as a fire door. The device should meet all critical criteria applicable to manual closing devices.
- 2.11 A regular programme of maintenance should be undertaken to ensure that the correct operational performance is maintained for the life of the building (see ['Installation and maintenance advice'](#)).

## 3.0 Commentary

### 3.1 General

The England and Wales Building Regulations: Approved Document B requires that all fire doors (with the exception of locked cupboard/duct doors) be fitted with an appropriate self-closing device.

Controlled door closing devices intended for use on fire resisting and smoke control doors are covered by a Construction Products Directive mandate issued by the European Commission. Consequently, BS EN 1154 is regarded as 'harmonised' and compliance with it, supported by suitable evidence, allows application of the CE mark. It is strongly recommended that, once these products are available, only controlled door closing devices bearing the CE mark should be specified.

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

The following table, extracted from BS EN 1154 shows the range of door closer power sizes and related parameters:

Table 1								
1	2	3	4	5	6	7	8	9
Door closer power size	Recommended door leaf width  mm max.	Test door mass  kg	Closing moment			any other angle of opening Nm min.	Opening moment between 0° and 60°  Nm max.	Door closer efficiency between 0° and 4°  % min.
			between 0° and 4°		between 88° and 92° Nm min.			
			Nm min.	Nm max.				
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 widths given are 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 test door masses shown are only related to door closer power sizes for the purpose of the test procedure. They are not intended to indicate maximum values for actual use.



Clearly, an important factor is the closing moment; a fire door must be closed to be effective and situations may arise which dictate that a stronger closer should be specified (e.g. air pressure or fitted smoke seal considerations). Whilst this deals with the demand of the fire door, it will inevitably bring conflict from the user in terms of the greater effort required to open the door.

A door must be easy for occupants of the building to open, particularly where there are large numbers of old, young or infirm people. 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 and any seals. If, however, the force is only marginally in excess of that required to overcome the latch resistance and any seals, then reasonably high levels of maintenance will be required to ensure that the latch/seal resistance does not overcome the closer force. When considering the spring pressure, the anticipated degree of maintenance should also be taken into account.

Door closing devices which incorporate spring pressure adjustment provide a very useful way of adjusting the closing force on installation to suit the particular site conditions encountered. The adjustment should, however, 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 efficiency.

BS 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 at 90°. It requires that power adjustable closers should be capable of adjustment to at least power size 3.

BS EN 1154 permits delayed action closers to be used on fire-resisting doorsets, but it is important that any delay set is no more than that required for its use (e.g. for the ease of elderly or disabled persons) and is never more than 25 seconds.

### 3.2 Hold open and free-swing devices

Manually operated mechanical hold-open devices (i.e. mechanisms which require to be released manually) **SHOULD NOT BE USED ON FIRE DOORS** as they would inhibit the closing action of the door, even in the event of a fire. They are not permitted by the Building Regulations: Approved Document B.

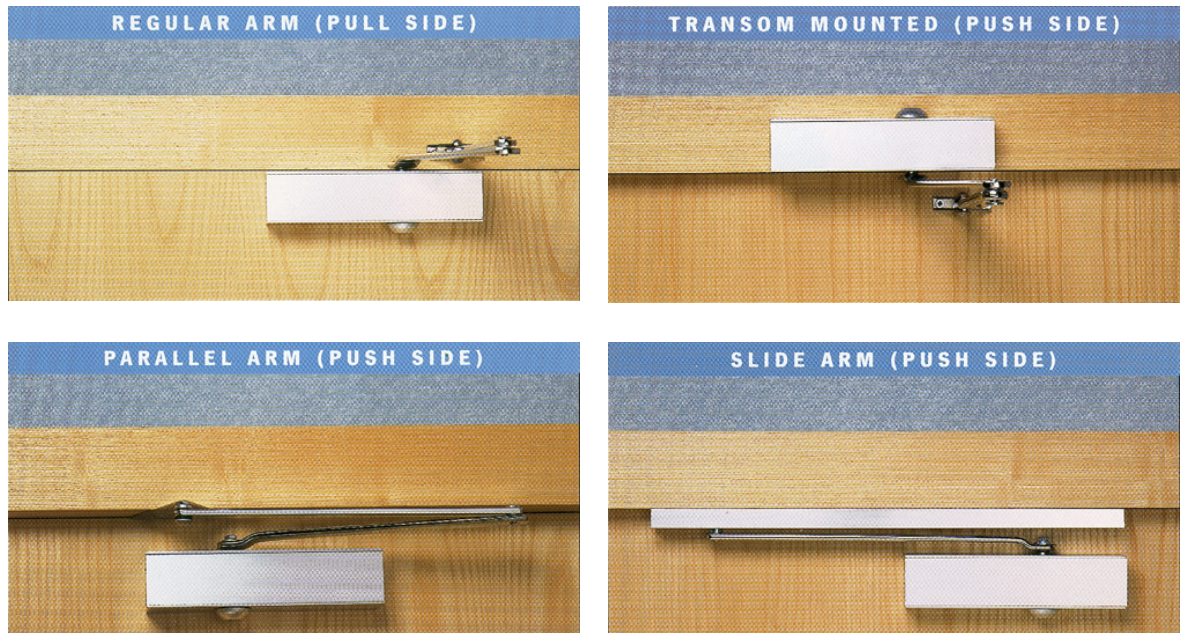
In situations where the fire door is required to be held open on busy traffic routes, or free swinging for the benefit of the elderly, infirm or disabled, specialist holding devices should be used which, being linked into the fire alarm/detection system, will release and close the door on receipt of a signal in the event of emergency. 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 BS EN 1155 - *Electrically powered hold-open devices for swing doors*. Further reading providing detailed recommendations for these devices can be found in the [relevant section](#) of this CD.

### 3.3 Closer installation

Some rack and pinion closers designed for use on the pull side of the door can lose power significantly when installed on the push side or if used with single arms and slide channels. BS EN 1154 requires that the manufacturer must state clearly the door closer power size for each installation of fitting position that he recommends. If it is intended to install a closer in other than its standard installation, then the manufacturers' instructions must be consulted to ensure that size 3 is still achievable.

### 3.4 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 push face, on the pull face, or mounted on the transom on either the push side or 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 resistance tests and the results have largely shown that mechanism bodies of aluminium do not adversely affect the fire resistance of the door assembly. The use of low melt material in the arm linkage has, however, been shown to be of risk in some applications. In these cases it is particularly important to check that the fire test evidence covers that particular arm assembly in the fixing application that is intended.

In consideration of which door face is most likely to be exposed to fire, it is advisable to assume that either face could be exposed and that suitable hardware be specified to achieve ultimate performance and safety. These characteristics can only really be established by subjecting the closer to a test as part of a complete timber doorset. The flammability of the damping fluid is normally of little consequence on timber doorsets; if the closer is on the unexposed face of a timber door assembly, then the temperature is unlikely to get high enough to cause fluid leakage, although this may become important where a significant area of the door leaf is glazed and where escaping fluid may be ignited by contact with the glazing. If the closer is on the exposed face then the additional fuel that the damping fluid would contribute would be negligible.

### 3.4 Face fixed jamb closers

These closers are totally exposed to the fire conditions and are normally of low power and low mass. For this reason they are unlikely to remain operative for a period of time long enough for an unlatched door to satisfy the test requirement whether the doorset incorporates a thermally-activated sealing system or not. Certain designs may, however, satisfy this requirement; it is particularly important, therefore, to check whether they have satisfied the test requirements when used in conjunction with an unlatched door assembly.

Face fixed jamb closers are generally unsuitable for use on a latched door assembly unless they comply fully with the requirements of BS EN 1154 to ensure that they apply enough force to overcome the frictional resistance of the latch. It is also important to be sure that the design does not create a thermal bridge across the thickness of the door so fire test evidence must be obtained from the manufacturer. There are various types of face fixed jamb closers, some of which can have the spring pressure relaxed very easily. In the absence of specific test evidence this type of closer should **NOT** be considered for fire doorset use.

### 3.6 Concealed closers

As concealed closers are mortised into the door leaf or its frame, thus removing a significant amount of the fire-resisting doorset material, intumescent protection of some kind will usually be required to protect the doorset from early integrity failure. This intumescent protection should be supplied by the manufacturer with every concealed closer intended for use on a fire-resisting doorset. It is particularly important with these closers to check that the fire test evidence is relevant to the door application intended.

- 3.6.1 Concealed 'In Door': These devices are mounted into the top rail 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 house these types they are generally considered unsuitable for fire door use unless they are installed using specially designed intumescent protection to protect from integrity failure during fire conditions. It is therefore particularly important to check that the fire test evidence is relevant to the door application intended.

Again, to ensure sufficient durability and closing strength, it is also important that such closers also comply fully with BS EN 1154.

- 3.6.2 Concealed "In Head": 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. Although some devices have been satisfactorily tested and approved, their use requires specific intumescent protection and precise preparation of the door leaf and frame prior to fitting of the device. In the absence of such provisions and documented evidence of satisfactory testing for the specific doorset intended, they should not be considered for fire doorset use.

- 3.6.3 Concealed Jamb Closers: These closers are normally inserted in the hanging edge of the door leaf and are anchored to the frame edge by means of a small linkage. In view of the inherently lower power characteristics of this arrangement, it is important to check that the closer complies with the power size requirements of BS EN 1154, whether intended for use on latched or unlatched doorsets (See section 1.0). Because these closers are morticed 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. A new European standard for "spring closers" is in preparation, which, when published, will permit the classification and CE marking of such devices.

### 3.7 Spring hinges

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 and, on unlatched doors, 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. Because they do not contain a damped, or controlled closing mechanism they are unable to comply with BS EN 1154. They are **NOT** recommended for fire resisting doorsets. A new European standard for "spring closers" is in preparation, which, when published, will permit the classification and CE marking of such devices.

### 3.8 Rising butt hinges

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 leaf 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, a gap will exist at the vulnerable head of the door, which could compromise the fire integrity of the door assembly.

The closing force exerted by such a device is extremely low and will not overcome air pressure differences or resistance from latches, seals or carpets that may be fitted and, therefore, they cannot be considered as reliable door closing devices. Whilst such devices are still permitted under current Building Regulations (Approved Document B) for certain domestic applications only, they are **NOT** recommended for any fire door application by this document.

### 3.9 Floor springs

By virtue of its position within the door construction, the floor spring is amongst the most successful items of hardware for fire resisting applications. 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 doorset and so, with the exception of the cover plate, is protected by the floor screed. The performance of the closer is aided 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.

### 3.10 Floor spring accessories

- 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, therefore, concealed. This fitting has shown itself to be most successful as an item of fire door hardware, for, like the closing control, its position within the doorset 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.
- 3.10.2 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 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.
- 3.10.3 Double Action Top Centre: This fitting is complementary to both strap and shoe, forming the upper pivotal member of the doorset. It comprises two assemblies; the upper part, housing the pivot pin, which is retractable to assist installation and morticed into the underside of the head frame, and 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, it is essential that they are manufactured from materials with a melting point in excess of 1000°C unless otherwise proven by test. They should be fitted carefully and accurately. Where intumescent seals cannot be diverted around the profile of the fitting, the use of intumescent plugs, fitted into the housing itself, should be considered to maintain as great a degree of insulation as possible. The fire test evidence should record the details of any such additional intumescent protection required.

- 3.10.4 Single Action Offset Strap: Of the same principle as '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. Protection may be provided by incorporating intumescent gaskets.
- 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 may benefit from insulation with intumescent gaskets.
- 3.10.6 Single Action Offset Top Centre: Complementary to single action strap and shoe, these fittings do not usually incorporate or need retraction means for the pivot pin. As with the double action top centre, this is sited in the most onerous position on the door and the projecting mass of metal housing the pivot point and its bush accentuates the absorption of heat, requiring careful attention to insulation.

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

### 3.11 Automatic swing door operators

- 3.11.1 Automatic swing door operators generally look like a larger version of a manual door closing device and are fitted in a similar way. However, there are safety considerations that are detailed in BS 7036 and prEN 12650. An important consideration is the need to fit finger guards onto the door and to introduce anti finger trap measure.
- 3.11.2 The automatic mechanism should be capable of being interfaced with the fire alarm system, causing the doors to close in the event of an emergency the alarm system.
- 3.11.3 Automatic mechanisms normally power open and close under spring pressure and consideration should be given to external forces such as wind pressure in the same way as for manual devices.
- 3.11.4 By nature of their power driven mechanisms and electrical componentry, automatic swing door operators are likely to be covered by the LVD (Low Voltage Directive), MD (Machinery Directive) and EMC Directive (Electromagnetic Compatibility Directive). CE marking of the product is already required under these directives. It is the manufacturer's responsibility to determine which directives apply to his product, and to ensure that the necessary conformity procedures are carried out.

## 4.0 Fire issues

Many of the best practice guides in this section refer to classification of the suitability of the associated products for use on fire resistant and/or smoke control doors.

Currently the following test methods and classification documents are relevant:

**BS EN 1634-1: 2000** - *Fire resistance tests for door and shutter assemblies: Part 1 – Fire doors and shutters;*

**BS EN 1634-3: 2001** - *Fire resistance tests for door & shutter assemblies: Part 3 - Smoke control doors & shutters*

**BS EN 13501-2: 2003\*** - *Fire classification of construction products and building elements: Part 2 – Classification using data from fire resistance tests (excluding products for use in ventilation systems).*

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

\* Standard in course of publication

## 5.0 Further reading

Further useful information on the application of door closers can be found in clause 7.3 'doors fitted with a door closing device' of BS 8300: 2001 - *Design of buildings and their approaches to meet the needs of disabled people – Code of Practice.*

See also the Product /application related questions in the [FAQ section](#) of this CD.