



ABHM

**Association of Building
Hardware Manufacturers**

Best practice guide

**Electrically powered
hold-open devices
to
BS EN 1155**

in association with



*Extracts from BS EN 1155: 1997 +
A1: 2003 are reproduced with the
permission of BSI.*

• 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 1155 - Electrically powered hold-open devices for swing doors

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 standard includes annexes illustrating the various points made through diagrams and supplementary text.

Extracts from BS EN 1155 are reproduced with the permission of the British Standards Institution. BSI publications can be obtained from BSI Customer Services, 389 Chiswick High Road, London W4 4AL Tel +44 (0)20 8996 9001 Email: cservices@bsi-global.com.

Note: No previous British Standard existed for electrically powered hold-open devices incorporated in door closers and this is, therefore, a new standard. Devices not incorporated in door closers operating at 24 V dc are included in this standard. Devices not incorporated in door closers operating at 240 V ac are covered by BS 5839: Pt. 3: 1988, and this will be amended in due course.

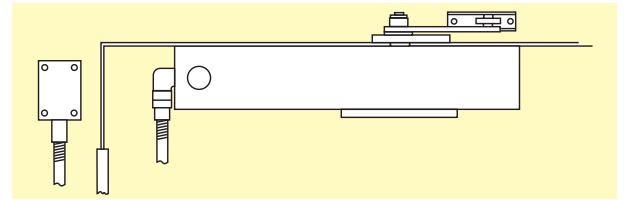
Amendment A1 to BS EN 1155 was published early in 2003 and this amendment provides for CE marking of conforming products in accordance with the EU Construction Products Directive.

• SCOPE

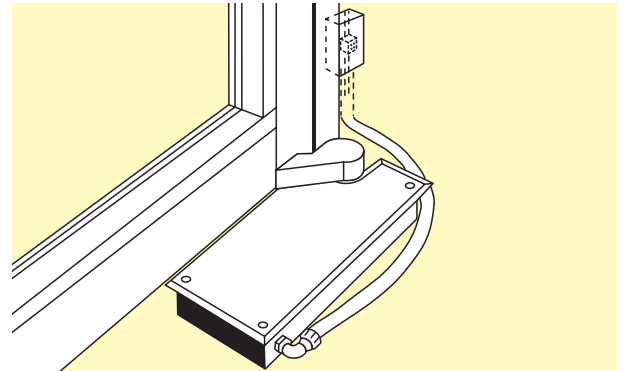
This European standard specifies requirements for separate hold-open devices and also for hold-open mechanisms incorporated in a door closer. Electrically powered hold-open devices for swing doors manufactured according to this European standard can hold a swing door at a fixed position or can allow the door to swing freely. In each case interruption of the electrical supply will cause the controlled door to close positively.

Electrically powered hold-open devices manufactured in accordance with this European standard are recommended for use wherever there is a requirement for reliable hold-open and release of self-closing fire/smoke door assemblies.

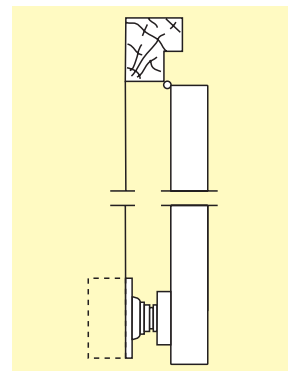
Whilst these devices can incorporate smoke or fire detection elements, the performance of those particular elements is outside the scope of this European standard.



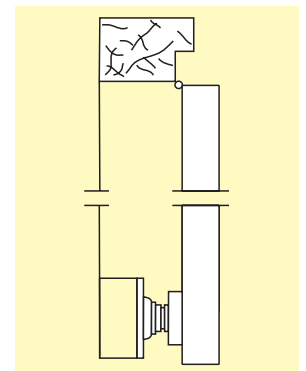
Electrically operated hold-open/free swing overhead door closer surface mounted



Electrically powered hold-open/free swing floor concealed closer



Semi-flush fixing



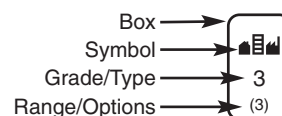
Surface fixing

Electrically powered separate hold-open devices for use with a separate door closing device

• CLASSIFICATION

BS EN 1155 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 1155 stipulates only grade 3.

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

Digit 1
 **Category of use**

Only one category of use is identified for electrically powered hold-open devices.

- grade 3: for 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.

Note: for electrically powered hold-open and free-swing door closers, where the opening angle is limited by the device, provision of a separate door stop should be considered.

Digit 2
 **Number of test cycles**

Two test durations are identified for devices manufactured to this European standard:

- grade 5: 50 000 test cycles. For all electrically powered hold-open devices
- grade 8: 500 000 test cycles. For all electrically powered hold-open and free-swing door closers and devices that contain operating arms.

Digit 3
 **Test door mass**

Five door mass grades and related hold-open power sizes are identified according to Table 1 of this European standard.

Where an electrically powered hold-open device is suitable for a range of door closer power sizes, both the minimum and maximum power sizes shall be shown.

Table 1

Hold-open power size	Recommended door leaf width max. mm	Test door mass kg
3	950	60
4	1100	80
5	1250	100
6	1400	120
7	1600	160

Digit 4
 **Fire resistance**

Only one grade of fire resistance is identified for electrically powered hold-open devices manufactured to this European standard:

- grade 1: Suitable for use on fire/smoke door assemblies subject to satisfactory assessment of the contribution of the electrically powered hold-open device to the fire resistance of specified fire/smoke door assemblies. Such assessment is outside the scope of this European standard (see EN 1634-1).

Digit 5
 **Safety**

Electrically powered hold-open devices 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 in accordance with 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 separate hold-open device suitable for a range of closer power sizes from 4 to 6, and with high resistance to corrosion:



• RELATED STANDARDS

As companion to BS EN 1155, two further amended and harmonised product standards have been published. The first, BS EN 1154 covers controlled door closing devices and has replaced BS 6459. 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.

• MARKING

Each electrically powered hold-open device manufactured to this European standard shall be marked with the following:

- manufacturer's name or trademark, or other means of identification.
- product model identification.
- the six digit classification listed above.
- power consumption and rated voltage of the device.
- number of this European standard.
- year and week of manufacture.

Note: This information can be in coded form.

• CE MARKING

Electrically powered hold open devices 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 electrically powered hold open devices 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 1155, 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 1155:1997 + 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.

• SPECIFICATION ISSUES

- All devices manufactured to this standard shall be designed for a rated supply voltage of 24V direct current with a ripple content of no more than 30%.

- Electrically powered hold open and free swing door closers shall conform to the requirements of BS EN 1154.

When designed for use on fire door assemblies, electrically powered hold-open devices representative of their type shall have been incorporated in successful, full size fire door tests (currently BS 476: Pt. 22).

- The Standard allows electrically powered door closers an element of creep towards the closed position (not more than 2° in 48 hours). Consideration should be given to this effect at the time of specifying. An alternative solution could be wall or floor mounted electro-magnets with standard floor spring independent door closers.

- When using independent wall or floor electro-magnets attention should be paid to the positioning of the magnet in order to minimise stress on the door assembly. Ideally the magnet and door closing device should be at the same level thus avoiding twist.

- It is important that, where separate electro-magnet devices are used, the holding power of the magnet is matched to the door closer strength.

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 electrically powered hold-open 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 specification and installation of electrically powered hold-open 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 1155

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.

(a) This product has been successfully type-tested for conformity to all of the requirements of BS EN 1155. Test reports and/or certificates are available upon request.

(b) This product has been successfully type-tested for conformity to all of the requirements of BS EN 1155 including the additional requirements covered by BS EN 1154 for latch action*/backcheck/adjustable closing force*/fire/smoke door use*. Test reports and/or certificate are available upon request.

* Add as appropriate.

(c) This product has been successfully type-tested for conformity to all of the requirements of BS EN 1155 including the additional requirements covered by BS EN 1154 latch action*/backcheck/adjustable closing force*/fire/smoke door use*. Regular audit testing is undertaken. Test reports and or certificates are available on 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 The British Standards Institution as being the authoritative body for locksmithing. It was formed to promote the membership to Central and Local Governments, Industry, Commerce and the Public.



ABHM

42 Heath Street, Tamworth, Staffs B79 7JH

Tel: 01827 52337 Fax: 01827 310827

E-mail: info@abhm.org.uk

Website: www.abhm.org.uk

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. Mechanically operated door closing devices fitted on fire-resisting doorsets to achieve this function can pose significant obstacles to the young, elderly, infirm or disabled, as the power that closes the door reliably after use has to be provided by the user each time the door is opened. 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.

To overcome these problems, electrically powered hold-open devices can be used to hold a self-closing fire-resisting doorset in the open position, these devices being linked either into a building fire alarm system or controlled from locally positioned smoke detectors.

Depending upon the actual use of the door, there are two basic functions available:-

- (i) *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 alarm system, local detector control, local pushbutton or by power failure, the device releases the door leaf and allows it to close under the control of a door closing device. With power subsequently restored, the leaf will again be held once it has been re-opened to the hold-open position.
- (ii) *Free-swing*: After priming, by moving the door leaf to the open position, this function prevents the door closing mechanism from reclosing 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 is no closing mechanism fitted. When triggered by the fire alarm system, local detector control, local pushbutton or by power failure, the device releases the closer mechanism, allowing it to close the door leaf in a controlled manner from whatever position it was in at the time. With power subsequently restored, the leaf will again achieve this free-swing function once it has been re-opened to the holding position.

From the above it can be seen that the use of these devices can make access around a building much easier, particularly for the young, elderly, disabled or those manipulating trolleys for instance, without compromising the fire compartmentation function of the fire-resisting doorset to which it is fitted.

For the purpose of this document, 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 floorspring mechanism.

2.0 Critical recommendations

- 2.1 Manually operated mechanical hold-open devices (i.e. mechanisms which require to be released manually) **SHOULD NOT BE USED ON FIRE DOORS UNDER ANY CIRCUMSTANCES.**
- 2.2 Electrically-powered hold-open devices and their accessories should comply fully with BS EN 1155+A1:2002 – Building Hardware - Electrically powered hold-open devices for swing doors. Preferably, this compliance should be demonstrated by the application of the CE marking.
- 2.3 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 with 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).
- 2.4 When used on fire-resisting doorsets, electrically powered hold-open devices must always be connected either to a building fire alarm system or a local smoke detector control. (see section 3.1).

- 2.5 For separate hold-open devices, the holding power and manual release force must be correct for the size of door 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 sections 3.1 and 3.2).

- 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 section 3.2).
- 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 doorset. This may require specially designed and proven intumescent protection (see section 3.5).
- 2.8 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 allows self-closing fire doors to be held open by electrically powered hold-open devices actuated by an automatic fire detection & alarm system in those situations where a normal self-closing device would be considered a hindrance to the normal approved use of the building.

Electrically powered hold open 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 1155 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 electrically powered hold-open devices bearing the CE mark should be specified.

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 table, extracted 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	Maximum recommended door leaf width mm	Test door mass kg	Overload test drop weight kg	Maximum 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

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

- (i) detection of smoke by either separate or integral smoke detectors;
- (ii) manual operation or operation of a hand operated switch fitted in a suitable position;
- (iii) failure of the electrical supply to the device;
- (iv) operation of the building fire alarm system, if any.

Clearly, it is important that the holding force of the hold-open device is higher than the closing force that is 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 doorset, it will be an annoyance to the building users, who may respond by wedging the door open to overcome this 'nuisance closing'.

If the holding force is too strong, the users may have difficulty in mechanically pulling the door leaf from the hold-open position. BS EN 1155 sets limits on the forces that would be required to manually pull the door leaf from hold-open, although it does also permit manual release by means of a local accessible pushbutton 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 and BS EN 1155 contains durability requirements and other performance tests to ensure that release will always occur, even when subject to variations of supply voltage.

3.2 Separate hold-open devices

These devices are independently mounted from 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 doorset. If the armature is let-in flush with the door face or through-bolts are used to fix it, there is an increased chance of the fire integrity being affected, 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'.

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 opposing corners, ultimately leading to permanent distortion of the door leaf.

3.3 Hold-open or free-swing devices incorporated into 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 'Further Reading in the [Door Closing Devices](#) section of this CD, clause 3.8).

Some types of device use an electrically operated valve to control the oil flow in the closer mechanism and these can, over a period of time, start to creep towards the closed position. This can prove both a hazard and an inconvenience for users. Other types operate directly on the closer arms and do not suffer from 'creep'. BS EN 1155 permits a maximum 'creep' of only 2° over a period of 48 hours. Irrespective of the type of device used, it is important that the manufacturer's recommendations for routine checks and maintenance are followed and it is also good practice 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.

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 that 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 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. These detectors can increase the overall size of the electrical hold-open device and hence its effect on fire integrity of the doorset, so it is important to check that the fire test evidence does also cover this type of combined device.

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 doorset:-

3.5.1 By concealed conductor hinge:

This method requires a special hinge (usually non-load-bearing) which contains small flexible conductors that 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 may 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.

3.5.2 By concealed flexible cable.

This method involves morticing a steel housing containing an armoured flexible cable into the hanging stile of the doorset; the other end of the cable being fixed to the hanging edge of the door. Again, holes are drilled to carry wires to the hold-open device and to connect to the fire alarm system and these may need intumescent protection to maintain fire integrity.

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

3.5.3 By exposed flexible cable;

This type of connection has a minimal effect on the integrity of the doorset as the components are generally small and are surface mounted. Although the flexible cable is fully exposed, no evidence has been found that this type of connection has ever caused a fire integrity failure.

3.6 Devices incorporated into a floorspring mechanism

Electrical hold-open and release devices incorporated in a floorspring are contained within the floorspring cement box and generally will have no effect on the fire integrity of the doorset. (see 'Further Reading' in the [Door closing devices](#) section of this CD, clause 3.8).

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

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