BS 8524-2:2013

BSI Standards Publication

Active fire curtain barrier assemblies –

Part 2: Code of practice for application, installation and maintenance

bsi.

...making excellence a habit.™

Publishing and copyright information

Published by BSI Standards Limited 2013

ISBN 978 0 580 68267 4

ICS 13.220.20

The following BSI references relate to the work on this document:
Committee reference FSH/25
Draft for comment 12/30205676 DC

Publication history

First published April 2013

Amendments issued since publication

Date	Text affected

Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 46, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 8524 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 April 2013. It was prepared by Technical Committee FSH/25, *Smoke, heat control systems and components*. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

This British Standard has been developed from PAS 121, which will be withdrawn on 31 July 2013. This British Standard is published in two parts:

- Part 1: *Specification*;
- Part 2: *Code of practice for application, installation and maintenance*.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Assessed capability. Users of this British Standard are advised to consider the desirability of sourcing active fire curtain barrier assemblies from suppliers who operate quality systems that have been assessed and registered against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

Installation and maintenance. Users of this British Standard are advised to consider the desirability of third-party certification of installers and maintainers of active fire curtain barrier assemblies. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

0 Introduction

0.1 Role and use of barrier assemblies

As fire-separating elements, barrier assemblies are required to provide two main functions:

a) to maintain any compartmentation of buildings needed to limit the spread of fire and smoke;

b) to allow access to protected escape routes, both vertical and horizontal, without any loss of fire resistance, and to limit smoke entry into these routes, i.e. protected corridors and protected shafts.

They can also be partially deployed to control the movement of fire effluent within buildings in the event of fire, prior to being fully deployed as a fire barrier.

Recommended positions and ratings for fire-separating elements for means of escape purposes are given in BS 9999, BS 9991 and BS 7974. The recommendations in BS 9999 and BS 9991 use a risk-based approach; those in BS 7974 are based on the principles of fire safety engineering.

When used as part of a fire-engineered design solution, barrier assemblies can become a critical element of that design. If barrier assemblies do not deploy to their operational position, the fire-engineered solution would be compromised. However, in the event that other fire protection systems or elements do not function, e.g. due to total power failure, the barriers in the fire-operational position will provide fire separation.

0.2 Application of barrier assemblies

Barrier assemblies used in life safety and property protection applications can be horizontal, vertical or angled. Depending upon the application, they could be used to replace fire doors, roller shutters, non-load-bearing walls, non-load-bearing ceilings, glazed elements, etc. They could also be used to form fire separation, e.g. forming protected routes or lobbies. They can provide some of the functionality of a fire door, but when used only for fire and smoke control, as a fire door, then different requirements apply. These requirements will be given in BS EN 16034 (currently in preparation as prEN 16034). Barrier assemblies can enable greater barrier widths and barrier movements using less space than other traditional methods.

It is essential that any proposed use of barrier assemblies is assessed in the context of the building use and perceived occupancy to ensure that it is ultimately suitable and fit for purpose, taking into consideration such factors as:

a) fire resistance;

b) reaction to fire;

c) smoke leakage;

d) occupancy type and risk profile;

e) occupancy load;

f) means of escape for egress;

g) ingress for fire and rescue service;

h) life safety and property protection objectives.

0.3 Heat transfer through barrier assemblies

In fire safety situations, it is often important to establish the heat transfer from one side of the separating element to the other in order to calculate escape route sizes and safe operating distances. This is usually established using insulation data. Due to the difficulty of measuring insulation on some barrier assemblies, guidance on the use of radiation data as an alternative is given in this standard.

NOTE National building regulations ([1] to [3]) only apply to life safety. Higher performance levels might be necessary for certain applications if property protection is required.

1 Scope

This part of BS 8524 gives recommendations for the application, installation and maintenance of active fire curtain barrier assemblies. It is applicable only to active fire curtain barrier assemblies conforming to BS 8524-1:2013 that are designed to provide fire resistance or fire and smoke resistance.

NOTE Smoke barriers, used solely for smoke control, are covered by BS EN 12101-1. Such smoke barriers are not considered to be active fire curtain barrier assemblies within the scope of BS 8524.

This part of BS 8524 is also intended to provide guidance and recommendations for designers, specifiers (e.g. architects, fire engineers), approving authorities, installers and maintainers for the following:

a) creating compartmentation;

b) creating protected routes for the purpose of means of escape;

c) providing protection at the location of non-fire-resisting elements, e.g. in front of non-fire-resisting glazing and doorsets, where required for compartmentation or protecting means of escape;

d) providing a fire- and smoke-resistant barrier in conjunction with non-smoke rated products protecting openings to reduce leakage of smoke.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 476-20, *Fire tests on building materials and structures – Part 20: Method for determination of the fire resistance of elements of construction (general principles)*

BS 476-31.1, *Fire tests on building materials and structures – Part 31: Methods for measuring smoke penetration through doorsets and shutter assemblies – Section 1: Method of measurement under ambient temperature conditions*

BS 5839-1:2002+A2:2008*, Fire detection and fire alarm systems for buildings – Part 1: Code of practice for system design, installation, commissioning and maintenance*

BS 5839-6:2004, *Fire detection and fire alarm systems for buildings – Part 6: Code of practice for the design, installation and maintenance of fire detection and fire alarm systems in dwellings*

BS 8519, *Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications – Code of practice*

BS 8524-1:2013, *Active fire curtain barrier assemblies – Specification*

BS 9991:2011, *Fire safety in the design, management and use of residential buildings – Code of practice*

BS 9999:2008, *Code of practice for fire safety in the design, management and use of buildings*

BS EN 1363-1, *Fire resistance tests – Part 1: General requirements*

BS EN 1634-3, *Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 3: Smoke control test for door and shutter assemblies*

BS EN 12101-10, *Smoke and heat control systems – Part 10: Power supplies*

BS EN 14600:2005, *Doorsets and openable windows with fire-resisting and/or smoke control characteristics – Requirements and classification*

BS EN ISO 13943, *Fire safety – Vocabulary*

BS ISO 21927-9, *Smoke and heat control systems – Part 9: Specification for control equipment*

3 Terms and definitions

For the purposes of this part of BS 8524, the terms and definitions given in BS EN ISO 13943 and the following apply.

3.1 active fire curtain barrier assembly
assembly manufactured from flexible materials, not hinged or pivoted, provided for the passage of persons, air and objects, which, together with its frame as installed in a building, is intended (when closed) to resist the passage of fire

NOTE For ease of reference, the active fire curtain barrier assembly is referred to as the "barrier assembly" throughout this British Standard.

3.2 barrier assembly with smoke rating
assembly manufactured from flexible materials, not hinged or pivoted, provided for the passage of persons, air or objects, which together with its frame as installed in a building is intended (when closed) to resist the passage of fire and gaseous products of combustion

3.3 barrier movement
travel distance of a barrier assembly from its retracted position to its fire-operational position

3.4 compartmentation
process of separating a building or part of a building, into one or more rooms, spaces or storeys, with the intention of preventing the spread of fire to or from another part of the same building or adjoining building

NOTE 1 Compartmentation is mainly implemented to assist the emergency services by confining the fire within a fire-resisting enclosure. In some instances it is employed to assist means of escape in buildings where evacuation might be delayed, e.g. where phased evacuation policy has been applied in premises such as hospitals and care homes or where a policy of non-evacuation (e.g. "defend in place" or "stay put strategy") is employed as in blocks of flats.

NOTE 2 Fire enclosures specifically for the purpose of means of escape, such as lobby protection to stairways and enclosure of special risks, are not regarded as compartments and may employ passive smoke containment measures.

3.5 competent person
person, suitably trained and qualified by knowledge and practical experience, and provided with the necessary instructions, to enable the required task(s) to be carried out correctly

3.6 deployment
movement of a barrier assembly from its retracted position to its fire-operational position

3.7 dwelling
unit of residential accommodation, occupied (whether or not as a sole or main residence):

a) by a single person or by people living together as a family; or

b) by not more than six residents living together as a single household, including a household where care is provided for residents

[SOURCE: BS 9991:2011, **3.17**]

3.8 fire-operational position
final configuration of a barrier assembly specified by its designer to achieve and be sustained in the ultimate fire condition of the design

3.9 fire separation
method of providing an element that is intended for use in maintaining separation between two adjacent areas of a building in the event of a fire to form protected routes and/or compartmentation

3.10 fire strategy
fire safety design for a particular building determined by prescriptive codes, fire safety engineering or fire risk assessment

3.11 gravity fail-safe
ability of a barrier assembly to move to its fire-operational position in a safe and controlled manner to facilitate fire separation when all consumable primary and auxiliary power supplies are removed, in the event of wiring or system corruption, open or short circuit, or any combination thereof

3.12 life safety application
application of the barrier assembly in its fire-operational condition for the period of time required for the occupants of the premises to be alerted, and to be able to exit the premises, with the barrier assembly assisting in the protection of the means of escape and access for the fire and rescue service

3.13 means of escape
means whereby a safe route (or routes) in the event of fire is (or are) provided for persons to travel from any point in a building to a place of ultimate safety

[SOURCE: BS 9999:2008, **3.76**]

3.14 multi-positional deployment
staged movement of barrier assemblies to provide initial smoke containment prior to full fire containment

3.15 property protection application
application of the barrier assembly in its fire-operational condition to protect a building's contents and structure

3.16 side retention
retention device which links the barrier fabric to the building structure to contain fire and smoke

3.17 smoke barrier
device to channel, control and/or prevent the migration of smoke

NOTE Smoke is often referred to as "fire effluent". Smoke barriers can also be referred to as smoke curtains, smoke blinds or smoke screens. These are specified in BS EN 12101-1.

4 Specifying barrier assemblies

When specifying a barrier assembly, a full description of the barrier assembly should be provided, including the level of fire resistance required. The description should include the following:

a) overall size (length and drop);

b) mode of operation;

c) details of surrounding building structure;

d) minimum integrity time;

e) permitted deflection zone, where applicable;

f) radiation limit, where applicable;

g) requirement for smoke seals, where applicable.

In dwellings, where the barrier assembly protects a means of escape, smoke seals should be fitted.

In the case of a barrier assembly, it is only the complete assembly, as described in the relevant fire test report, which should be deemed to provide the required performance.

NOTE Fire resistance is a property that can be possessed only by a complete construction, and not by the individual components or materials from which the construction is formed.

5 System design

*COMMENTARY ON CLAUSE **5***

*The recommendations given in Clause **5** are intended to provide the fire engineer and/or designer with a separating element which fulfils the means of escape and compartmentation requirements relating to life safety and property protection, and maintains appropriate access for fire-fighting activities.*

The building design parameters dictate the minimum classification and performance of barrier assemblies that can be used in any particular application. It is important that the criteria for the correct choice of barrier assembly take into account the total system, function and location requirements without hindering the means of escape or endangering life.

5.1 Barrier assembly selection

5.1.1 General

Barrier assemblies should conform to BS 8524-1:2013.

A copy of the product summary (see Note 1) should be obtained from the manufacturer. This may be used to check that the barrier assembly meets the selection criteria for the proposed application.

NOTE 1 See BS 8524-1:2013, Annex I, for an example of a product performance summary sheet.

NOTE 2 Users of this standard might wish to consider consulting the relevant approving authority prior to installation of the barrier assembly, in order to demonstrate that an appropriate product has been selected to fit the particular application with which it is to be used. An example of an approving authority pre-installation checklist is given in Annex A.

5.2 Selection of barrier assemblies

5.2.1 Operational performance

Barrier assemblies should be selected to meet the appropriate performance criteria given in Table 1 for the specific application. Details of the selected performance criteria should be provided by the supplier/installer.

5.2.2 Initiation of deployment

A barrier assembly should be initiated by one or more of the following methods, selected in accordance with Table 2, depending upon its application:

a) the automatic fire alarm system of the building or individual dwelling;

b) a separate detection system provided solely to initiate operation of fire protection systems and conforming to BS 5839-1:2002+A2:2008, category L5;

c) stand-alone initiation from a local detector or fusible device;

d) multi-positional deployment, e.g. partial descent upon operation of the building fire alarm system followed by full descent after a pre-set delay or upon operation of a local detector or fusible device.

NOTE The building fire strategy might also require a sprinkler-flow switch conforming to BS EN 12259-5 to initiate barrier assembly deployment.

5.2.3 Method of deployment

A barrier assembly should be deployed in one of the following methods, selected in accordance with Table 3, depending upon its application:

a) immediate single deployment: barrier assembly deploys fully upon receipt of initiating signal;

b) immediate multi-positional deployment: barrier assembly moves to predetermined height upon receipt of initiating signal for a predetermined time or until receipt of a second signal (double-knock);

c) delayed single deployment: barrier assembly remains in place for a predetermined time before deploying fully;

d) delayed multi-positional deployment barrier assembly remains in place for a predetermined time before moving to a predetermined height for a further predetermined time or until receipt of a second signal (double-knock).

NOTE For any barrier assembly, only one form of deployment is required unless specified otherwise in the building fire strategy.

Where multi-positional deployment is used, where a barrier assembly crosses an access/egress route, the second and any subsequent movements should be actuated via a local detector or fusible device, depending upon the building fire strategy.

Table 1 **Performance criteria for barrier assemblies**

Parameter	Performance criteria for barrier assemblies forming part of protected route for means of escape purposes	Performance criteria for barrier assemblies used to provide compartmentation within the building
Fire resistance integrity (E) (BS 8524-1:2013, **5.6.2**)	Should be in accordance with BS 9999:2008, **31.2** or BS 9991:2011, **27.2**.	Should be in accordance with BS 9999:2008, **31.2** or BS 9991:2011, **27.2**.
Fire resistance insulation (I) (BS 8524-1:2013, **5.6.3**)	Should be in accordance with BS 9999:2008, **31.2** or BS 9991:2011, **27.2**. *NOTE Non-insulated barrier assemblies with sprinklers might be permitted in place of insulated barriers when ad hoc test evidence is used as part of a fire engineered approach.*	Should be in accordance with BS 9999:2008, **31.2** or BS 9991:2011, **27.2**. *NOTE Non-insulated barrier assemblies with sprinklers might be permitted in place of insulated barriers when ad hoc test evidence is used as part of a fire engineered approach.*
Fire resistance radiation (W) BS 8524-1:2013, **5.6.4**)	As determined by the building fire strategy. *NOTE For example, 30 min (EW30).*	As determined by the building fire strategy. *NOTE For example, 60 min (EW60).*
Radiation and tenability	Should be in accordance with **5.3.2** (see also Annex B).	As determined by the building fire strategy.
Deflection zone (BS 8524-1:2013, **5.6.5**)	The minimum width of the route should be increased by the depth of the measured deflection zone.	The measured deflection zone should be taken into account when designing for fire separation.
Smoke containment (BS 8524-1:2013, **5.5** and Annex F)	The demonstrated leakage rate of the barrier assembly should not exceed 3 $m^3/m/h$. [A)]	As determined by the building fire strategy.
Obstruction warning (see **5.2.5.2**)	Should incorporate a device giving a warning alarm.	Should incorporate a device giving a warning alarm, and/or permanent markings should be provided to indicate area to be kept clear.
Control panel (see **5.4**)	Should conform to BS ISO 21927-9.	Should conform to BS ISO 21927-9.
Power supplies (main and back-up) (see **5.4**)	Should conform to BS EN 12101-10.	Should conform to BS EN 12101-10.
Supporting construction	Declare as rigid, flexible or associated.	Declare as rigid, flexible or associated.
Frequency of intended use (cycle class) (see BS 8524-1:2013, Table 2 and Annex D)	Dependent upon end use, usually Class C1 in accordance with BS EN 14600:2005.	Dependent upon end-use but at least Class C1 in accordance with BS EN 14600:2005. *NOTE See BS 8524-1:2013, Table 2.*
Emergency egress and access facility (see **5.2.4**)	Dependent upon location and as determined by the building fire strategy. *NOTE See Table 3.*	Dependent upon location and as determined by the building fire strategy. *NOTE See Table 3.*

Table 1 **Performance criteria for barrier assemblies**

Parameter	Performance criteria for barrier assemblies forming part of protected route for means of escape purposes	Performance criteria for barrier assemblies used to provide compartmentation within the building
Self-test facility (BS 8524-1:2013, **5.8.7**)	Should be provided for dwellings in accordance with BS 9991:2011, Clause **34**, and for other buildings as determined by the building fire strategy.	As determined by the building fire strategy.

[A)] This includes protected routes in dwellings.

Table 2 **Selection of deployment initiation method**

Application	Suitability of initiation method for each application [A)]			
	Automatic building fire alarm system or category L5 system [B)]	Stand-alone initiation		
		Smoke detector	Heat detector or fusible device	Smoke and heat detector
Compartmentation (non-means of escape)				
Vertical compartmentation service shaft, escalator containment or similar areas	No	Yes, any one of these three methods depending upon fire strategy		
Atria	No, unless part of the fire strategy	Yes, any one of these three methods depending upon fire strategy		
Space separation				
Unprotected areas or external vertical	No, unless part of the fire strategy	No	Yes	No
Means of escape				
Holes in walls, lobbies, refuges, services, lift lobbies, cloakroom/reception counters, protected routes or similar areas	Yes, if required by the fire strategy	Yes	No	No
Kitchens or similar areas [C)]	Yes, if required by the fire strategy	Dining-side	Kitchen-side	No
Atria (where escape is less than 4.5 m from atria openings through floors)	Yes, if system is fitted	Yes	No	No
Across means of escape	No, unless multi-positional	Yes, any one of these three methods depending upon fire strategy		
Multi-positional deployment				
All areas	Yes, for first position and any time delay	Yes, any one of these three methods, if required as part of the fire strategy for the second or subsequent position(s)		
Dwellings				
All areas	Yes, LD1 system [D)]	Yes, any one of these three methods [C)]		

Table 2 **Selection of deployment initiation method**

Application	Suitability of initiation method for each application [A]		
	Automatic building fire alarm system or category L5 system [B]	Stand-alone initiation	
		Smoke detector	Heat detector or fusible device	Smoke and heat detector

[A] "Yes" means that a method should be used; "no" means that it is not usually used.
[B] As defined in BS 5839-1:2002+A2:2008. Category L5 does not apply to dwellings.
[C] Special consideration is advised for situations where the containment of kitchens (or similar areas) from a means of escape route is proposed, as installing smoke detection within kitchen areas is impractical. Under such circumstances, installing heat detection within the kitchen compartment with an appropriate smoke detector immediately outside the compartment opening(s) might be an acceptable approach. Operation of either the heat detector or the associated smoke detector would allow for the deployment of the barrier assembly, thereby maintaining the protection to the means of escape and reducing the risk of unwanted fire signals.
[D] As defined in BS 5839-6:2004.

Table 3 **Selection of deployment method**

Application	Suitability of deployment method for each application [A]			
	Immediate single deployment	Immediate multi-positional deployment	Delayed single deployment	Delayed multi-positional deployment
Compartmentation (non-means of escape)				
Vertical compartmentation	Yes	No	No	No
Horizontal, e.g. hole in floor	Yes	No	No	No
Atria	Yes, any one of these four methods depending upon fire strategy			
Space separation				
Unprotected areas or external vertical	Yes	No	No	No
Means of escape				
Vertical protection of holes in walls (e.g. doors/glass), cloakroom/reception counters, serveries, kitchens, stairs and staircases, lobbies, evacuation lifts, refuges and adjacent to external escape routes	Yes, either one of these two methods depending upon fire strategy		No	No
Walls forming a protected route	Yes	No	No	No
Floors forming a protected route	Yes	No	No	No
Atria (where escape is less than 4.5 m from atria openings through floors)	Yes	No	No	No
Across means of escape	Yes, either one of these two methods depending upon fire strategy		No	No
Service shafts	Yes	No	No	No
Dwellings				
All areas	Yes, any one of these four methods depending upon fire strategy			

[A] "Yes" means that a method should be used; "no" means that it is not usually used.

5.2.4 Barrier assemblies crossing access/egress routes

*COMMENTARY ON **5.2.4***

It is important to assess the capabilities of the likely occupants of a building when determining whether it is appropriate to provide barrier assemblies across egress routes as part of the fire strategy process.

Fire and rescue service access arrangements can vary significantly from building to building, and these can influence how barrier assemblies are applied within premises. It is important to assess the positioning, size and configuration of barrier assemblies in the context of the overall building fire safety design strategy so that fire and rescue service access is adequately maintained.

5.2.4.1 General

Where barrier assemblies cross access/egress routes, emergency access/egress controls should be installed in accordance with Table 4 to allow the barrier assembly to be temporarily retracted.

NOTE Emergency access controls are provided to allow access through the barrier assembly by the fire and rescue service. Emergency egress controls are provided to allow occupants to escape through the barrier assembly.

Barrier assemblies crossing egress or access routes should provide a clear height of at least 2 m when retracted.

Barrier assemblies should cross egress routes only when 60 persons or fewer are expected to use the route in question.

The motor of the barrier assembly should conform to BS 8524-1:2013, **5.6.7** for emergency egress control and BS 8524-1:2013, **5.6.8** for emergency access control.

The initiation device used to retract a barrier assembly should conform to BS 8524-1:2013, **5.4.3** for emergency egress control and BS 8524-1:2013, **5.4.4** for emergency access control.

Emergency access/egress controls should be located in a prominent, well-illuminated position and should be sited within 2 m of the associated barrier assembly, mounted against a contrasting background to assist with easy recognition. They should be easily accessible and free from potential obstruction.

5.2.4.2 Emergency egress controls

The emergency retract button should raise the barrier and hold it open for at least 5 s before redeploying. This period should be extended where more than six people are expected to use the exit, or as required by the building fire strategy, depending upon the occupancy level and type.

The height of the emergency egress retract control should be between 750 mm and 1 200 mm from the finished floor level. The measurement should be made between the finished floor level and the centre of the retract control.

The externally visible colour of the retract control unit should be green (except where located in dwellings where choice of colour is not specified). The retract control unit should be clearly labelled with permanent signage indicating its purpose and operation, using upper case letters of at least 10 mm in height on a contrasting background.

NOTE 1 An example of signage wording is: "IN EMERGENCY PUSH BUTTON TO RAISE FIRE CURTAIN".

Table 4 **Provision of emergency access/egress controls**

Application	Suitability of access/egress control for each application [A)]	
	Emergency egress control (press button; latched)	**Emergency access control (press button; hold on)**
Compartmentation (non-means of escape)		
Vertical compartmentation	Yes, if an emergency access control is fitted; otherwise no	Yes, if no other access; otherwise no
Horizontal, e.g. hole in floor	No	No
Atria	No	No
Space separation		
Unprotected areas or external vertical	No	No
Means of escape		
Vertical protection of holes in walls (e.g. doors/glass), stairs and staircases, lobbies, evacuation lifts, refuges	Yes	Yes
Walls and floors forming a protected route	No	No
Walls and floors forming a protected route where a door would have been incorporated	Yes	Yes
Cross-corridor separation	Yes, both sides (fire side and non-fire side)	No
Reception counters, serveries and cloakroom counters	Yes, if no alternative means of escape; otherwise no	No
Kitchen containment	Yes	Yes
Service shafts and adjacent to external escape routes	No	No
Across means of escape	Yes	Yes
Atria (where escape is less than 4.5 m from atria openings through floors)	No	No
Dwellings		
All areas	Yes, both sides (fire side and non-fire side)	No
Fire-fighting access		
Designated access routes	No	Yes

[A)] "Yes" means that the control should be provided; "no" means that it is not necessary.

In all domestic premises, there should be manual emergency egress controls on both sides of the barrier assembly to prevent people being trapped in non-emergency situations.

NOTE 2 This might also need to be considered for non-domestic premises.

5.2.4.3 Emergency access controls

NOTE 1 The emergency access controls retract the barrier assembly only while the control is being activated, i.e. while the button is being pushed. The barrier assembly redeploys to the fire-operational position once the activation ceases.

In order to differentiate emergency access controls, they should be positioned higher than any other controls provided, up to a maximum of 1 800 mm from the finished floor level. This measurement should be made between the finished floor level and the centre of the control.

The externally visible colour of the control unit should be orange. The control unit should be clearly labelled with permanent signage indicating its purpose and operation, using upper case letters of at least 10 mm on a contrasting background.

NOTE 2 An example of signage wording is: "EMERGENCY SERVICES USE ONLY: PUSH BUTTON TO RAISE FIRE CURTAIN".

In areas where emergency access controls are likely to be subject to operation by unauthorized persons or to damage, it might be acceptable, subject to the agreement of the relevant approving authorities, for a transparent, hinged cover (or similar protection measure) to be fitted to the control unit.

NOTE 3 While the provision of emergency access controls help to assist fire and rescue service access for some barrier assemblies, additional access measures might need to be provided elsewhere, depending on the nature of the end-use application of the barrier assembly and the use or occupancy of the building involved. The most effective way of dealing with this matter is to consult the local approving authorities and the fire and rescue service.

NOTE 4 Where barrier assemblies are to be used in non-domestic premises, it is important that the provision of suitable premises information for fire-fighters is considered and that the nature, operation and emergency access arrangements relating to these installations is documented.

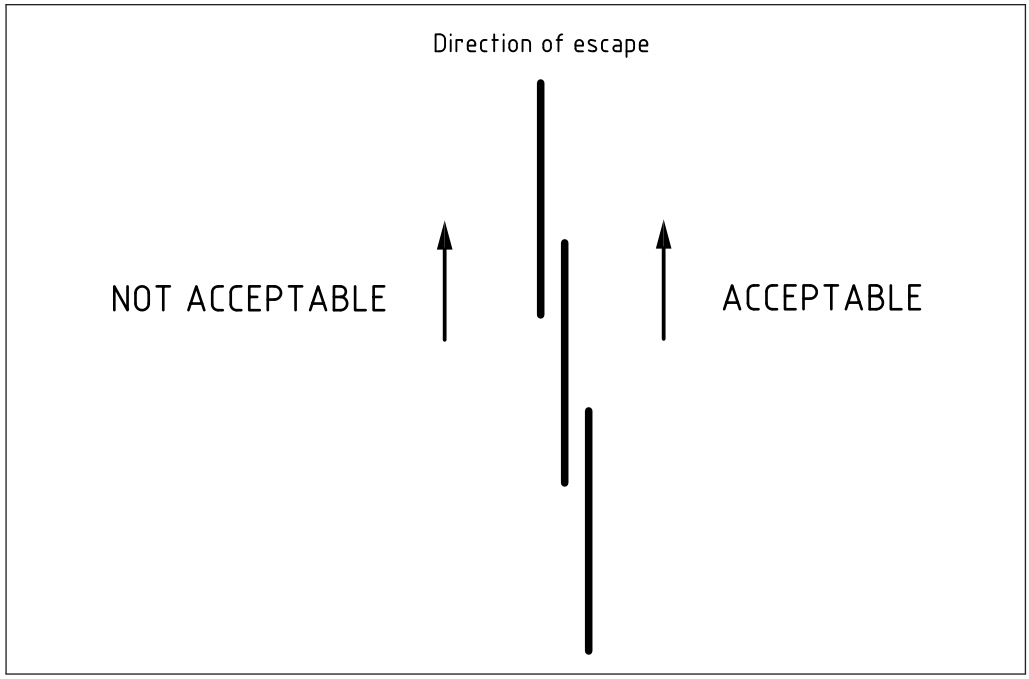
5.2.4.4 Overlapped barrier assemblies

Where barrier assemblies are overlapped, it might be possible to use the overlap as a means of providing emergency services access. This should be discussed in conjunction with the local approving authorities and the fire and rescue service.

5.2.4.5 Overlapped barrier assemblies on the side of a protected route

Where an overlapped barrier assembly forms the side of a protected route, the overlapping edge should face the direction of escape to prevent catch hazards (see Figure 1).

Figure 1 **Example of overlapping barrier assemblies on protected routes**



5.2.5 Warning systems

5.2.5.1 Deployment warning

Except in dwellings, deployment warning systems should be installed to barrier assemblies within circulation areas, means of escape routes, and areas such as lobbies, stairs and lifts. Such systems should be in the form of a beacon and either an audible or a voice warning.

5.2.5.2 Obstruction warning

Where barrier assemblies are to be deployed in areas which might be obstructed, e.g. by storage or furniture, one or more of the following obstruction warnings should be used:

a) markings on the closing surface, e.g. a yellow-hatched area;

b) a single beam (directional) which detects items left in the path of the barrier assembly and sounds an alarm;

c) a multi-beam detection system (covering the whole opening) which detects items left in the path of the barrier assembly and sounds an alarm.

A multi-beam detection system should always be provided if the barrier assembly is protecting a means of escape.

Alarms should sound after 5 min to 10 min of continuous interruption, unless otherwise agreed with the relevant authority.

5.3 Fire resistance

5.3.1 General

The fire resistance of the barrier assembly should be appropriate for the fire-separating element of structure in which it is installed, according to the relevant documentation.

NOTE 1 Guidance on determining the fire resistance of barrier assemblies is given in Annex C.

Integrity should be provided by all barrier assemblies.

Where insulation is required, the barrier assembly should either provide the appropriate insulation, or meet the radiation and tenability recommendations given in **5.3.2**.

*NOTE 2 Traditionally, insulation values are taken from the surface of an element as typically this is a static partition against which combustible items can be fixed or stored. The aim is to prevent fire spread by spontaneous non-piloted combustion and radiation (total heat flux) and to protect people against exposure to high temperatures and associated risks. Barrier assemblies replace static partitions and therefore have to descend within a clear space (see **6.1**). Therefore, the problems of surface temperatures do not apply, but integrity, radiation and occupant tenability are still relevant.*

NOTE 3 Where it is impracticable to fix or hang thermocouples to the surface of the test specimen, as it would prevent the intumescent process working, the insulation performance of the specimen cannot be determined and the barrier assembly can be tested only for integrity and radiation.

5.3.2 Radiation and tenability

5.3.2.1 General

Where radiated heat flux, as opposed to insulation, is to be used to assess whether conditions are tenable, one of the following approaches should be used:

a) simplified approach for horizontal routes in dwellings (see **5.3.2.2**);

b) fully fire engineered approach for horizontal escape routes;

NOTE Annex B gives an example of a fire engineered approach for horizontal escape routes.

c) fully fire engineered approach for all other applications.

5.3.2.2 Simplified approach for horizontal routes in dwellings

The recommendations given in **5.3.2** and Table 5 should be applied to barrier assemblies having a width of 5 m or less and a height of 3 m or less that are installed in dwellings:

- having a grade A LD1 fire alarm system conforming to BS 5839-6:2004;
- in which occupants are assumed to be capable of a travel speed of 0.8 m/s;
- having a separation distance between escaping occupants and the barrier assembly of >0.25 m, taking into account the deflection of the barrier assembly (see Annex B).

Radiation readings from the test evidence (see BS 8524-1:2013, Annex I) at 15 min should be no greater than the values given in Table 5.

NOTE In PD 7974-6, pre-movement times in dwellings that have a level A1 fire alarm system (this is referred to as a level D1 fire alarm system in BS 8524-1:2013 and BS 8524-2) installed is between 5 min and 10 min as the occupants might be sleeping. Travel time through the dwelling thereafter is generally short.

Table 5 **Radiation tenability at 15 min**

Length of barrier assembly run along escape route	**Max. radiation permitted** [A)]
m	kW/m^2
1	13.7
2	7.6
3	5.5
4	4.4
5	3.7

[A)] As measured in a fire resistance test in accordance with BS 8524-1:2013, **5.6.4**, the radiation measurement is taken after 15 min.

5.4 Power supplies

5.4.1 General

For non-vertical (e.g. horizontal or low-angle) barrier assemblies that do not permit fail-safe by gravity, both a primary and a secondary power supply should be provided.

NOTE Where barrier assemblies are held in position by a primary power source prior to deployment by gravity (gravity fail-safe), it might be beneficial to provide a secondary power supply, to avoid nuisance deployment in the event of mains failure.

Where emergency access or egress controls are provided and batteries are used as the primary or secondary power source, the batteries should be subjected to an active battery test at intervals not exceeding 60 min. It should be possible to test the batteries manually without the cabinet being opened (e.g. by use of a button). During this test the connected load should be at least 110% of the normal motor current and should be powered solely from the battery set. A fault-indicating signal should be given as a volt-free contact and as an optical indication on the control panel of:

a) an insufficiently charged battery set;

b) a faulty battery set (e.g. short circuit);

c) a battery set not connected to a load (e.g. open circuit).

5.4.2 Electrical

The power supply equipment to the barrier assemblies should either have inherent resistance to or be protected from mechanical damage.

Fire-resistant cables or protection in accordance with BS 8519 should be selected when:

a) wiring is required to carry current for initial deployment of a barrier assembly, e.g. for horizontal barrier assemblies;

b) emergency egress or access control is provided;

c) multi-positional deployment is provided;

d) a barrier assembly is required to stay in the raised position under some fire scenarios;

e) pressure-sensitive protective equipment is provided.

NOTE Fire-resisting cables are not otherwise required.

The power supply and related equipment should be permanently and legibly labelled as to their purpose and be secured against unauthorized operation.

The primary power supplies should be capable of operating the full load of the equipment including supplying the monitoring equipment and charging current for the batteries.

The control panel monitoring the primary and secondary power supplies should be capable of indicating the following faults:

1) loss of primary power source, within 30 min of the occurrence;

2) loss of secondary power source, within 15 min of the occurrence;

3) loss of battery charger, within 30 min of the occurrence;

4) reduction of the battery voltage to less than 90% of its rated voltage, within 30 min of the occurrence.

Where there is no main control panel (i.e. the system is controlled via numerous sub-panels), the status of the primary and secondary power supplies, including any charger, should be monitored and indication provided at a position of responsible manning.

5.4.3 Secondary power supplies

The primary and secondary power supplies should be provided from separate sources.

NOTE 1 Where mains supply provides power via transformers and also charges batteries, the batteries are regarded as a separate power source.

The changeover from primary power to secondary power should be automatic.

Where the secondary power source is battery or batteries, they should be:

a) the rechargeable type;

b) suitable to be maintained in a fully charged state; and

c) clearly labelled.

The charger for the secondary battery power source should be designed such that:

1) the battery is charged automatically;

2) if the battery has been discharged to its final minimum voltage, it can be recharged to at least 80% of its rated capacity within 24 h;

3) the charging characteristics are within the battery power source manufacturer's specification.

Where the secondary power source is by individual batteries, each battery should have the capacity to operate each individual device for five operations independently. If the secondary power source is by one central battery, the central battery should have the capacity to operate the complete system for five operations independently.

NOTE 2 For further information on power supplies, refer to BS EN 12101-10.

NOTE 3 The resistance to heat of equipment might determine its location. The location of equipment is, in effect, determined by its resistance to heat. Equipment can only be located in an area exposed to temperatures at which the equipment can be proven to work by test of a representative sample.

6 Installation

6.1 General

The barrier assembly should be installed in accordance with the manufacturer's instructions and as determined by site-specific conditions, taking account of the need for:

a) a deployment zone, to provide a clear area for the barrier to descend [see Figure 2a)]; and

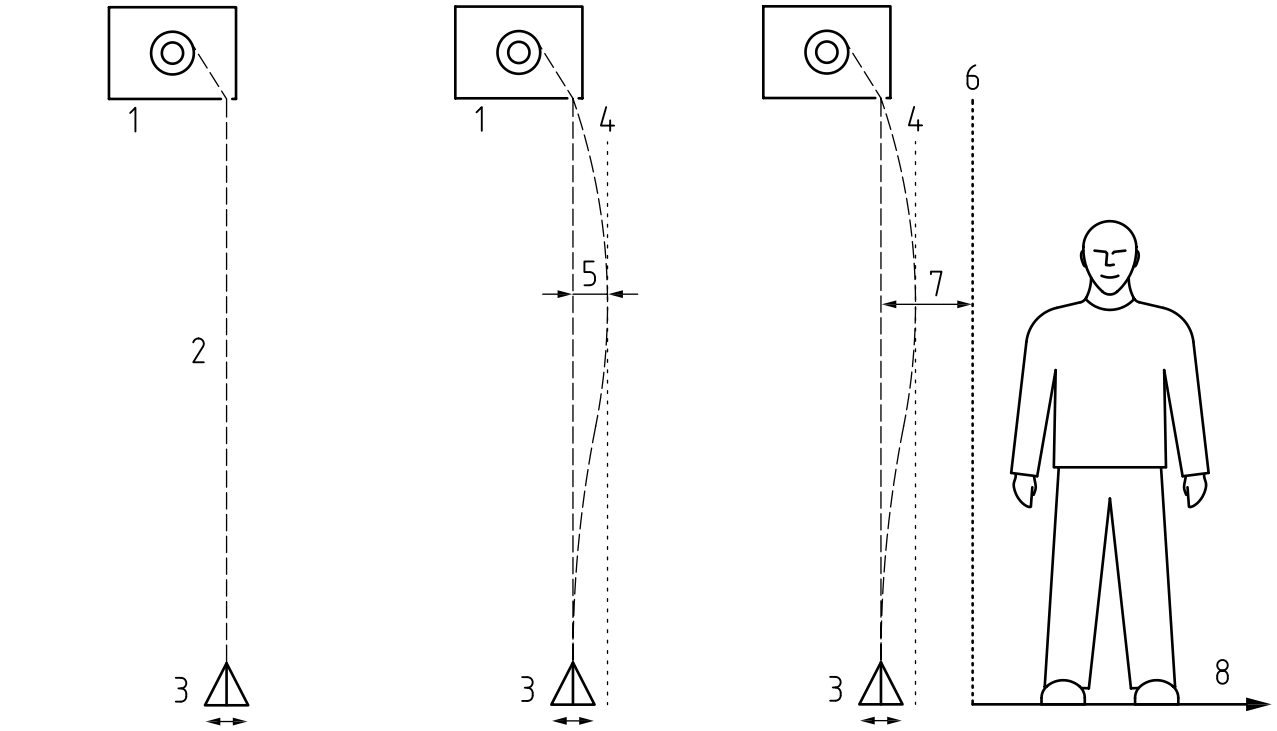
b) a deflection zone, taking into account the deflection of the barrier due to fire pressure [see Figure 2b)]; and where relevant

c) a tenable zone, taking into account the deployment zone, the deflection zone and radiative heat flux [see Figure 2c)], where the barrier assembly forms part of the boundary of an escape route; and/or

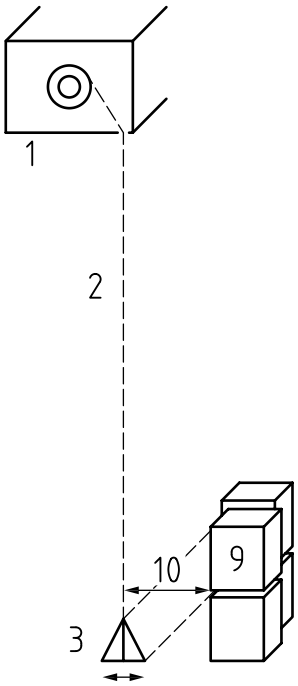
*NOTE 1 For radiation and tenability, see **5.3.2**.*

d) a clear zone, to provide a clear area to avoid combustion of nearby objects, e.g. stored goods and furniture, based on a maximum radiative heat flux of 15 kW/m^2 [see Figure 2d)].

Figure 2 **Clear areas for barrier deployment**



a) Deployment zone b) Deflection zone c) Tenable zone



d) Clear zones

Key

1 Top of barrier fabric, ceiling or housing, whichever is lower

2 Flexible fire barrier panel

3 Weighted bottom of barrier assembly (fire operational position deployment zone)

4 Boundary of calculated deflection

5 Deflection caused by fire pressure

6 Boundary of area of calculated untenable radiative heat flux

7 Untenable area

8 Tenable area

9 Combustible items

10 Area to be kept clear (radiative heat flux >15 kW/m^2)

Escape route widths should be increased as necessary to take into account the space needed for the deployment zone, deflection zone and untenable area.

NOTE The deflection zone is included in the untenable area, beyond which is the tenable zone for passing occupants.

Any adjacent surfaces which form part of the barrier to fire, e.g. false ceilings or fittings, should have at least equivalent properties to those of the fire/smoke barrier, e.g. resistance to temperature and permeability.

The pressure readings noted during the fire test (BS 476-20 or BS EN 1363-1) and the smoke containment test (BS 476-31.1 or BS EN 1634-3) should be taken into account when installing with pressure differential systems or areas of high pressure where a full fire engineered approach is required.

Using the product performance summary supplied by the manufacturer/supplier in accordance with BS 8524-1:2013, **6.3**, the installer should complete an installation checklist to ensure that the correct product has been supplied and installed.

NOTE 2 An example of an installation checklist is given in Annex D.

An installation certificate should also be completed.

NOTE 3 A model installation certificate is given in Annex E.

6.2 Side retention

Side retention should be installed within the building's structure unless measures are taken to protect the side retention from mechanical damage by using, for example, bollards (see Figure 3).

NOTE Protection is not needed in areas where there is only pedestrian traffic.

6.3 Support systems for barrier assemblies

The support system used for barrier assemblies should be confined to the system(s) specified by the manufacturer, including provisions for the type of fire separating element to be penetrated, and should conform to arrangements which have been fire tested or assessed in the appropriate substrate (masonry or dry wall construction, etc.).

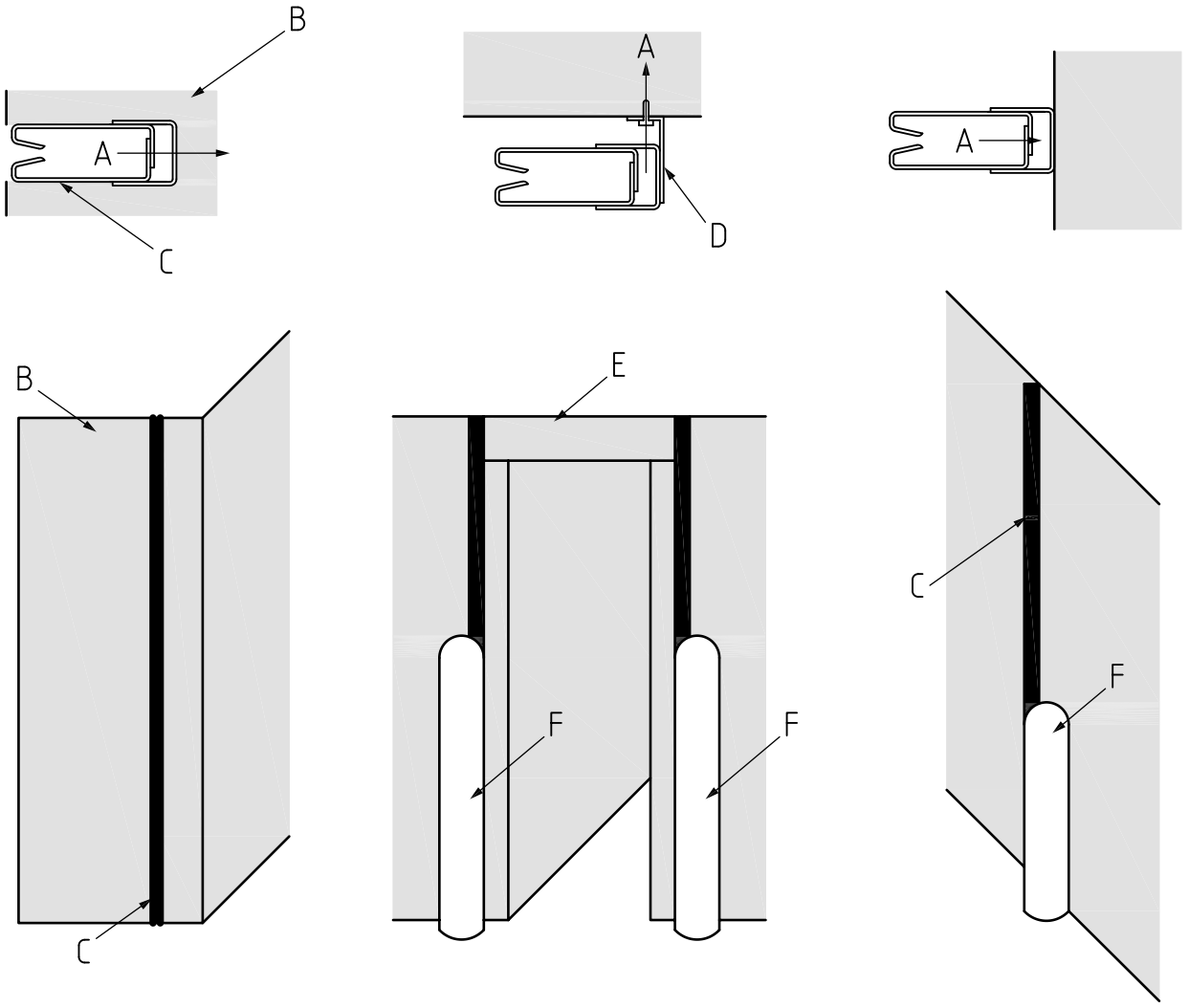
NOTE See BS EN 1363-1 for guidance on construction substrates.

6.4 Ancillary equipment

Ancillary equipment should be installed in accordance with the manufacturer's instructions.

NOTE Where a local heat detector is permitted by national legislation as part of a release mechanism, it is advisable that it is installed locally to the barrier assembly and that it responds at 70 °C to release the closing mechanism. Where normal ambient conditions exceed a value of 40 °C, it is advisable to use a higher rated local heat detector to activate the release at 30 °C above the ambient temperature.

Figure 3 **Typical example of how to protect side retention guides**



a) Side retention guides set into wall

b) Side retention guides face fixed (require protection to prevent distortion of guides by impact)

c) Side retention guides end-fixed (require protection from both sides)

Key

A Direction of fixing
B Wall
C Side retention guide
D Fixing bracket
E Head box
F Side protection, bollards or fixed protective framework

7 Commissioning

7.1 General

Once installed, the product should be commissioned in accordance with this clause.

NOTE 1 The installed system might need to be demonstrated to the relevant approving authority. An example of an inspection checklist is given in Annex F.

During commissioning, the following actions should be undertaken, where applicable.

a) Check that the barrier assembly is labelled in accordance with BS 8524-1:2013.

b) Visually inspect the guides in the passive open (up) position to check that they are free from debris and obstructions prior to operation.

c) Where smoke seals are installed, check that they are intact, free from obstructions and able to perform their function.

d) Simulate activation by each activation device and check that the assembly descends to the fire-operational position (e.g. down).

e) Check any multi-positioning (split drop) function, where relevant.

f) Firmly press the edges of the fabric where they interface with side retention guide channels to check that no gaps are visible beyond the leading edge of the retention guide.

g) Operate the barrier assembly using any emergency access controls (where installed). The barrier assembly should open only when the control is pressed and held. When the control is released, the barrier assembly should redeploy.

h) Operate the barrier assembly using any emergency egress controls (where installed). The barrier assembly should open, pause, and then redeploy. During redeployment, operate the control again. The barrier assembly should open, pause and redeploy.

i) Remove all primary power (e.g. mains) and check that the emergency access/egress controls operate correctly under secondary power (e.g. batteries).

j) Reinstate the assembly. Remove all auxiliary secondary power (e.g. batteries) and primary power (e.g. mains) in this order to check functionality of gravity fail-safe.

NOTE 2 See BS 7671 regarding disconnection of the control panel from the primary power (e.g. the mains) by a certified electrician.

k) Re-instate the auxiliary secondary power (e.g. batteries) and primary power (e.g. mains) in accordance with the manufacturer's instructions to close the assembly to its passive open (up) position.

l) With the barrier assembly in the open position, use the test switch (where provided) to deploy the barrier from the control panel to its fire-operational position (e.g. down).

m) Check that any obstruction warnings (e.g. single or multi-beam) are functioning correctly or that any specified markings are correctly provided.

n) Check that any deployment warnings (e.g. beacon, voice warning) are functioning correctly.

o) Check that overlaps, where installed, conform to the manufacturer's instructions.

p) Where an emergency access or egress control is installed, check that suitable cable has been installed, conforming to the fire-resisting standards of BS 8519.

q) Set any timers for activation (self-test facility).

A commissioning certificate should be completed which confirms that testing has been undertaken and indicates any limits of application. Ancillary equipment should also undergo testing during commissioning (see **7.2**).

NOTE 3 A model commissioning certificate is given in Annex G.

NOTE 4 The commissioning checklist is intended to supplement information supplied by the manufacturer relating to testing that has been undertaken on the product and the classifications achieved, e.g. fire and smoke resistance, to provide a consolidated record for the user, maintenance personnel and, where applicable, approving authorities. See BS 8524-1:2013 for further guidance.

On completion of the installation and commissioning work, a written document confirming conformity to BS 8524-1:2013 and BS 8524-2 should be issued by the installer.

NOTE 5 A model completion certificate is given in Annex H.

NOTE 6 Where applicable, the standard user might wish to check that the barrier assemblies are recorded as working correctly by the approving authority, and entered into the fire safety log.

7.2 Commissioning of ancillary equipment

7.2.1 Initiating equipment

All means of initiation provided should undergo testing during commissioning.

NOTE Examples of such equipment include:

- *smoke detector (optical or ionizing);*
- *heat detector;*
- *fusible link;*
- *electro-mechanical fusible link;*
- *sprinkler-flow switch;*
- *emergency access/egress control;*
- *manual call point (break glass).*

After each initiation, the component should be reset and any part requiring replacement after use, e.g. fusible links, should be replaced before the next initiation. Thermally activated links that are not resettable should be replaced in full.

7.2.2 Operational equipment

The following equipment should be tested:

a) deployment delay;

b) multi-positional deployment;

c) voice warning system;

d) flashing warning beacon.

Check that the operation and delay times of the ancillary control equipment listed in a) to d) match the fire strategy documentation, and that warning devices operate continuously upon initiation and cease when the specimen is deployed or is reset.

7.2.3 Obstruction warning

Obstruction warning devices (where fitted) should be tested to check that they operate when items are placed in the deployment zone of the barrier assembly under test.

7.2.4 Self-test facility

When the barrier assembly is operated by the self-test facility, the device should be tested to check that it operates correctly and records the date and time of operation.

8 Inspection, testing and maintenance

8.1 General

Planned inspection, testing and maintenance should be carried out by a competent person who is able to check and confirm that barrier assemblies are operating and performing effectively, when required. A log detailing frequency and results of inspections, tests and maintenance should be kept.

Any alterations, additions, repairs or modifications to barrier assemblies should be carried out only by competent persons.

NOTE 1 BS 9999:2008 and BS 9991:2011 contain further guidance relating to the maintenance of fire protection measures and fire safety manuals.

During the lifetime of the product, only components tested with the product should be used as replacement parts during servicing and maintenance.

When maintenance and servicing is carried out on a barrier assembly, a servicing certificate should be provided.

NOTE 2 A model servicing certificate is given in Annex I.

8.2 Inspection and testing

*COMMENTARY ON **8.2***

It is essential that regular testing is carried out to:

a) confirm that there has not been any failure of the barrier assembly;

b) allow the occupants of the premises to become, and remain, familiar with the barrier assembly.

Adhering to the manufacturer's instructions is particularly important when battery-powered devices are being tested.

Inspection and tests should be carried out in accordance with the manufacturer's instructions and Table 6. Any faults should be logged and remedial action taken.

Those tests to be carried out on a weekly basis should be undertaken at approximately the same time each week. In non-domestic premises where some employees only work outside the hours in which tests are normally undertaken, the tests should be repeated at least once every month so that these employees are familiar with the barrier assembly.

If it is found that alterations, additions, repairs or modifications to barrier assemblies are required, these should be carried out immediately or as soon as practicably possible.

NOTE Attention is drawn to the Regulatory Reform (Fire Safety) Order 2005 [4], the Fire (Scotland) Act 2005 [5] as amended, the Fire Safety (Scotland) Regulations 2006 [6] and the Fire Safety Regulations (Northern Ireland) 2010 [7] in respect of the need for fire risk assessments.

Occupants and/or owners should be given a copy of the inspection and testing regime, as shown in Table 6.

Table 6 **Inspection and testing of barrier assemblies**

Frequency	Inspection and testing
Daily	Where no sensory equipment is installed, check for obstructions to operational areas, e.g. by alterations to cosmetic finishes, lighting, shelving, sales displays or racking or by furniture or temporary or moveable displays.
Weekly	Operate all barrier assemblies. Where a barrier assembly forms part of a smoke control system protecting a means of escape, the barrier assembly should be operated in conjunction with the smoke control system. [A)]
Monthly	Test the release of self-closing devices and automatic release mechanisms via a test switch. Check that any sensory detection equipment is functioning correctly. Check that the barrier fabric is undamaged. Check that the self-test facility is functioning correctly.
Every three months	Operate any barrier assembly forming part of any smoke control system, testing all zones separately. [A)]
Every six months	Check that smoke seals are undamaged. Check that the barrier assembly is not structurally damaged or excessively bowed or deformed. Arrange inspection and testing of the barrier assembly by competent persons.

[A)] A smoke control system might include fans and powered exhaust ventilators, smoke dampers, natural exhaust ventilators, automatic smoke curtains, etc.

8.3 Maintenance

8.3.1 General

In addition to the inspection and testing recommended in **8.2**, the barrier assembly and its controls should be maintained in accordance with the manufacturer's instructions.

NOTE The building owner/occupier is responsible for the completion of the prescribed programme of maintenance, as specified by the manufacturer.

8.3.2 Replacement of smoke seals

*NOTE There are different types of edge seals available to minimize smoke leakage through barrier assemblies. These seals are designed to restrict the flow of smoke while maintaining integrity when installed to the barrier assembly (see Clause **6**).*

Damage to or degradation of smoke seals can have a significant and adverse impact on the ability of a barrier assembly to perform its designated function. Where a seal is missing in part or in total, it should be replaced immediately. To maintain the design performance, the replacement seal should be of the same formulation, dimensions and configuration as that in the manufacturer's fire test report.

Replacement seals should be fitted in accordance with the manufacturer's instructions.

Smoke seals should be replaced if they are damaged or are not making adequate contact with adjacent barrier assembly components. Such seals should be replaced as continuous lengths, as joints are a further source of potential leakage.

Annex A (informative) Typical approving authority pre-installation checklist

Figure A.1 shows an example of a typical approving authority pre-installation checklist.

Figure A.1 **Example of a typical approving authority pre-installation checklist**

Approving authority pre-installation of barrier assembly checklist Site address:		
Details of applicant:		
Details of installer:		
Details of manufacturer:		
The following document(s) should be obtained: Product summary: BS 8524-1:2013, Annex I		
Approving authority pre-installation checklist	**Yes/No**	**Notes**
Has the correct product been selected by the designer to meet the design being applied for?		
Has the correct paperwork been submitted by the manufacturer, their agent, or the person who will be installing the barrier assembly?		
Has the barrier assembly been checked for its ability to be installed into the intended substrate and is this within the supporting evidence?		
Have the fixings to be used by the installer for the substrate been confirmed to be the same as those that are intended to be used in accordance with the manufacturer's instructions?		
Have the fire resistance materials to be used for any gaps between the barrier assembly and the intended substrate been confirmed?		
Has cabling been selected in accordance with the end use application and the manufacturer's instructions?		
Are those persons who have been selected to carry out the electrical works qualified to do so in accordance with BS 7671?		
Name of approving authority……..		Date……

Annex B (informative) An engineered approach to using radiative heat flux for tenable conditions for single-level horizontal routes

NOTE 1 This annex relates to means of escape. It does not give detailed guidance on ignition of stored goods and subsequent fire spread.

NOTE 2 This annex is intended for use only by people who are suitably qualified or experienced in the field of fire engineering.

B.1 Guidance on the determination of the acceptability of barrier assemblies in terms of radiative heat flux received by escaping occupants

In the absence of a bespoke fire engineering analysis of the conditions local to the installation, and subject to the assumptions and limitations outlined within **B.3**, generic engineering guidance on the determination of the acceptability of barrier assemblies in terms of radiation is given in Table B.1 and Table B.2. Figure B.1 shows this process as a flow chart.

These tables are provided to give guidance so that the measured radiation, as determined in a fire resistance test carried out on a barrier assembly of the size dictated by the relevant test standard (see Note), can be used to establish whether the radiation performance of the proposed assembly is acceptable for a given proposed installation or real-life scenario. There are several factors which define the scenario. These include, for example, the length of the assembly being traversed, the speed of the escaping occupants and the available separation distance between the escaping occupants and the barrier assembly.

NOTE The exposed dimensions of a barrier assembly tested to BS EN 1634-1:2008 are typically restricted to 2.8 m high × 2.6 m wide, and when tested in accordance with BS 476-22, these are typically restricted to 3.0 m wide × 3.0 m high. This is based on a typical furnace opening size of 3.0 m wide × 3.0 m high.

Table B.1 and Table B.2 cover life safety situations (as opposed to stored goods or wider property protection design objectives), for applications where ceiling heights are limited to 3 m (e.g. typically small office and residential situations). When using Table B.1 and Table B.2, it is important that the standard user reviews the limitations and assumptions given in **B.3**.

Table B.1 **Permitted radiation performance, R_{max}** [A)]

Minimum separation between escaping occupants and barrier assembly, $d_{separation}$	Speed of escaping occupants, $v_{occupants}$	Permitted radiation performance, R_{max}											
		For $l_{curtain}$ 1 m [B)]	For $l_{curtain}$ 2 m [B)]	For $l_{curtain}$ 3 m [B)]	For $l_{curtain}$ 4 m [B)]	For $l_{curtain}$ 5 m [B)]	For $l_{curtain}$ 6 m [B)]	For $l_{curtain}$ 7 m [B)]	For $l_{curtain}$ 8 m [B)]	For $l_{curtain}$ 9 m [B)]	For $l_{curtain}$ 10 m [B)]	For $l_{curtain}$ 11 m [B)]	For $l_{curtain}$ 12 m [B)]
m	m/s	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²
0.25	0.3	6.9	3.9	2.8	2.2	1.9	1.6	1.4	1.3	1.2	1.1	1.0	0.9
0.25	0.8	14.5	8.1	5.9	4.7	3.9	3.4	3.0	2.7	2.5	2.3	2.1	2.0
0.25	1.0	17.0	9.6	6.9	5.5	4.6	4.0	3.6	3.2	2.9	2.7	2.5	2.3
0.25	1.2	19.7	11.0	8.0	6.4	5.4	4.6	4.1	3.7	3.4	3.1	2.9	2.7
0.25	1.4	22.1	12.3	8.8	7.0	6.0	5.1	4.6	4.1	3.8	3.5	3.2	3.0
0.5	0.3	7.9	4.2	3.0	2.4	2.0	1.7	1.5	1.3	1.2	1.1	1.0	1.0
0.5	0.8	16.5	8.9	6.3	5.0	4.2	3.6	3.2	2.9	2.6	2.4	2.2	2.1
0.5	1.0	19.5	10.5	7.5	5.9	4.9	4.3	3.8	3.4	3.1	2.8	2.6	2.5
0.5	1.2	22.4	12.1	8.6	6.8	5.7	4.9	4.3	3.9	3.6	3.3	3.0	2.8
0.5	1.4	24.8	13.5	9.6	7.6	6.4	5.5	4.9	4.4	4.0	3.7	3.4	3.2
0.75	0.3	9.0	4.7	3.3	2.6	2.1	1.8	1.6	1.4	1.3	1.2	1.1	1.0
0.75	0.8	18.7	9.8	6.9	5.4	4.5	3.9	3.4	3.1	2.8	2.6	2.4	2.2
0.75	1.0	22.1	11.6	8.2	6.4	5.3	4.6	4.1	3.6	3.3	3.0	2.8	2.6
0.75	1.2	25.4	13.3	9.4	7.4	6.1	5.3	4.7	4.2	3.8	3.5	3.2	3.0
0.75	1.4	28.5	15.0	10.5	8.3	6.9	5.9	5.2	4.7	4.3	3.9	3.7	3.4
1.0	0.3	10.1	5.2	3.6	2.8	2.3	2.0	1.8	1.6	1.4	1.3	1.2	1.1
1.0	0.8	21.2	11.0	7.6	5.9	4.9	4.2	3.7	3.3	3.0	2.8	2.6	2.4
1.0	1.0	25.0	13.0	9.0	7.0	5.8	5.0	4.4	4.0	3.6	3.3	3.1	2.9
1.0	1.2	28.7	14.9	10.4	8.1	6.7	5.8	5.1	4.5	4.1	3.8	3.5	3.3
1.0	1.4	32.2	16.7	11.6	9.1	7.5	6.5	5.7	5.1	4.6	4.3	4.0	3.7
1.25	0.3	11.5	5.9	4.0	3.1	2.6	2.2	1.9	1.7	1.6	1.4	1.3	1.2
1.25	0.8	23.9	12.3	8.5	6.6	5.4	4.6	4.1	3.7	3.3	3.1	2.8	2.6
1.25	1.0	28.3	14.5	10.0	7.8	6.4	5.5	4.8	4.3	3.9	3.6	3.3	3.1
1.25	1.2	32.4	16.7	11.5	8.9	7.4	6.3	5.6	5.0	4.5	4.2	3.8	3.6
1.25	1.4	36.4	18.7	12.9	10.0	8.3	7.1	6.2	5.6	5.1	4.7	4.3	4.0
1.5	0.3	12.9	6.6	4.5	3.5	2.8	2.4	2.1	1.9	1.7	1.6	1.5	1.4
1.5	0.8	27.0	13.8	9.4	7.3	6.0	5.1	4.5	4.0	3.7	3.3	3.1	2.9
1.5	1.0	31.9	16.3	11.2	8.6	7.1	6.1	5.3	4.8	4.3	4.0	3.7	3.4
1.5	1.2	36.6	18.7	12.8	9.9	8.1	7.0	6.1	5.5	5.0	4.6	4.2	3.9
1.5	1.4	41.0	21.0	14.4	11.1	9.1	7.8	6.9	6.1	5.6	5.1	4.7	4.4

A) Based on a 3 m high × 3 m wide test specimen with radiation measured at 1 m from the geometric centre.

B) Length of barrier assembly along escape route, $l_{curtain}$, in metres (m).

Table B.2 **Permitted radiation performance, R_{max}** [A)]

Minimum separation between escaping occupants and barrier assembly, $d_{separation}$	Speed of escaping occupants, $v_{occupants}$	Permitted radiation performance, R_{max}											
		For $l_{curtain}$ 1 m [B)]	For $l_{curtain}$ 2 m [B)]	For $l_{curtain}$ 3 m [B)]	For $l_{curtain}$ 4 m [B)]	For $l_{curtain}$ 5 m [B)]	For $l_{curtain}$ 6 m [B)]	For $l_{curtain}$ 7 m [B)]	For $l_{curtain}$ 8 m [B)]	For $l_{curtain}$ 9 m [B)]	For $l_{curtain}$ 10 m [B)]	For $l_{curtain}$ 11 m [B)]	For $l_{curtain}$ 12 m [B)]
m	m/s	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²	kW/m²
0.25	0.3	6.5	3.6	2.6	2.1	1.7	1.5	1.3	1.2	1.1	1.0	0.9	0.9
0.25	0.8	13.7	7.6	5.5	4.4	3.7	3.2	2.8	2.5	2.3	2.1	2.0	1.9
0.25	1	16.0	9.0	6.5	5.2	4.4	3.8	3.4	3.0	2.8	2.5	2.4	2.2
0.25	1.2	18.5	10.4	7.5	6.0	5.0	4.3	3.9	3.5	3.2	2.9	2.7	2.5
0.25	1.4	19.0	11.6	8.3	6.6	5.6	4.8	4.3	3.9	3.6	3.3	3.0	2.9
0.5	0.3	7.4	4.0	2.8	2.2	1.8	1.6	1.4	1.3	1.1	1.1	1.0	0.9
0.5	0.8	15.5	8.3	5.9	4.7	3.9	3.4	3.0	2.7	2.4	2.3	2.1	2.0
0.5	1.0	18.3	9.9	7.0	5.5	4.6	4.0	3.5	3.2	2.9	2.7	2.5	2.3
0.5	1.2	21.0	11.3	8.0	6.4	5.3	4.6	4.1	3.7	3.3	3.1	2.9	2.7
0.5	1.4	23.3	12.7	9.0	7.1	6.0	5.2	4.6	4.1	3.8	3.5	3.2	3.0
0.75	0.3	8.4	4.4	3.1	2.4	2.0	1.7	1.5	1.4	1.2	1.1	1.0	1.0
0.75	0.8	17.6	9.2	6.5	5.1	4.2	3.6	3.2	2.9	2.6	2.4	2.2	2.1
0.75	1.0	20.8	10.9	7.7	6.0	5.0	4.3	3.8	3.4	3.1	2.9	2.7	2.5
0.75	1.2	23.8	12.5	8.8	6.9	5.7	4.9	4.4	3.9	3.6	3.3	3.1	2.8
0.75	1.4	26.8	14.1	9.9	7.8	6.4	5.6	4.9	4.4	4.0	3.7	3.4	3.2
1.0	0.3	9.5	4.9	3.4	2.7	2.2	1.9	1.7	1.5	1.3	1.2	1.1	1.1
1.0	0.8	20.0	10.3	7.2	5.6	4.6	4.0	3.5	3.1	2.9	2.6	2.4	2.3
1.0	1.0	23.5	12.2	8.5	6.6	5.5	4.7	4.2	3.7	3.4	3.1	2.9	2.7
1.0	1.2	27.0	14.0	9.7	7.6	6.3	5.4	4.8	4.3	3.9	3.6	3.3	3.1
1.0	1.4	30.3	15.7	10.9	8.5	7.1	6.1	5.4	4.8	4.4	4.0	3.7	3.5
1.25	0.3	10.8	5.5	3.8	2.9	2.4	2.1	1.8	1.6	1.5	1.3	1.2	1.2
1.25	0.8	22.5	11.6	8.0	6.2	5.1	4.4	3.8	3.4	3.1	2.9	2.7	2.5
1.25	1.0	26.6	13.7	9.4	7.3	6.0	5.2	4.6	4.1	3.7	3.4	3.1	2.9
1.25	1.2	30.5	15.7	10.8	8.4	6.9	5.9	5.2	4.7	4.3	3.9	3.6	3.4
1.25	1.4	34.3	17.6	12.1	9.4	7.8	6.7	5.9	5.3	4.8	4.4	4.1	3.8
1.5	0.3	12.2	6.2	4.2	3.3	2.7	2.3	2.0	1.8	1.6	1.5	1.4	1.3
1.5	0.8	25.4	12.9	8.9	6.8	5.6	4.8	4.2	3.8	3.4	3.1	2.9	2.7
1.5	1.0	30.0	15.3	10.5	8.1	6.7	5.7	5.0	4.5	4.1	3.7	3.5	3.2
1.5	1.2	34.4	17.6	12.0	9.3	7.6	6.5	5.8	5.1	4.7	4.3	4.0	3.7
1.5	1.4	38.6	19.7	13.5	10.4	8.6	7.3	6.5	5.8	5.2	4.8	4.5	4.2

A) Based on a 2.8 m high × 2.6 m wide test specimen with radiation measured at 1 m from the geometric centre.

B) Length of barrier assembly along escape route, $l_{curtain}$, in metres (m).

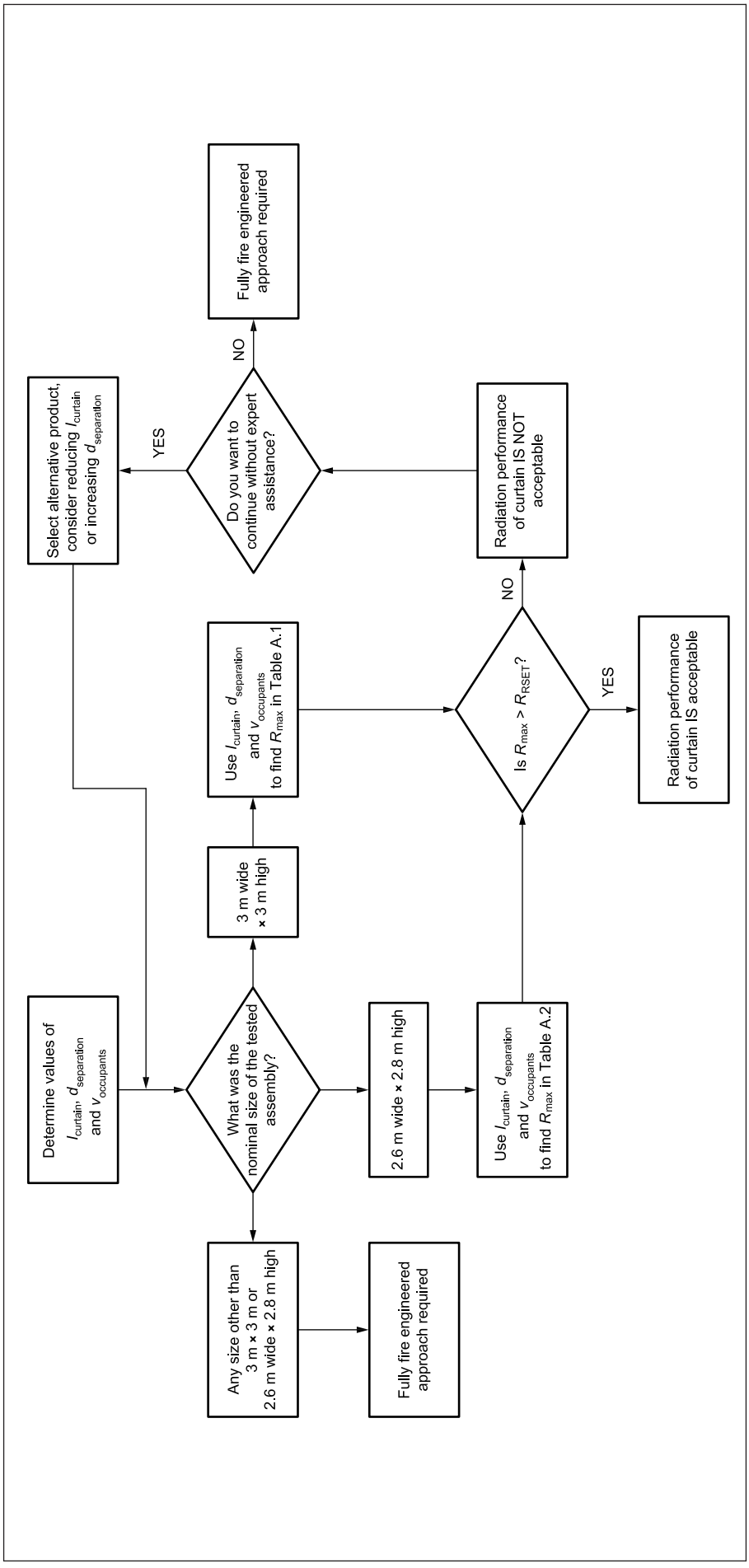


Figure B.1 **Radiative heat flux process**

Notes on the background to the development of Table B.1 and Table B.2

The characteristics of a radiating surface (surface temperature and emissivity) that would result in escaping occupants being exposed to the maximum permitted thermal dose [measured in thermal dose units (TDUs) with units of $(kW/m^2)^{4/3}s$], has been determined for each scenario in Table B.1 and Table B.2, i.e. for each combination of curtain length that occupants are expected to escape past, separation distance and walking speed. These characteristics (surface temperature and emissivity) have then been used to determine what the radiative heat flux would be if the barrier assembly were 3 m × 3 m or 2.8 m high × 2.6 m wide as would typically be tested in the fire resistance test, and had the radiative heat flux been measured at a distance of 1 m away from the geometric centre.

There is a more simplistic way to understand this explanation. Consider a barrier assembly that for a given fire scenario results in the maximum permitted thermal dose threshold being achieved. Everything except a sample corresponding to the tested size of the radiating surface is then removed. The value in Table B.1 or Table B.2, as appropriate, is the radiative heat flux that the new geometry gives when it is measured in the same way as in the fire resistance test.

It follows that the applicable table enables the standard user to determine the acceptability of a barrier assembly in terms of the radiation received by the escaping occupants when compared with the radiation data resulting from a fire resistance test.

B.2 How to use Table B.1 and Table B.2

Tables B.1 and Table B.2 use the following parameters:

$l_{curtain}$ proposed length/width (m) of the barrier assembly that occupants are expected to escape alongside en route to leaving the building, without divergence

$d_{separation}$ proximity of the escaping occupants to the barrier assembly as the minimum separation distance (m), taking into account anticipated curtain deflection in the hot state

NOTE 1 Measurements are expected to be taken at the nearest side of the escaping occupant to the barrier assembly.

$V_{occupants}$ minimum speed of the escaping occupants (m/s)

NOTE 2 See PD 7974-6 for further guidance.

These three parameters can be used to identify and make note of the corresponding radiative heat flux value from either Table B.1 or Table B.2. This is R_{max} (kW/m^2). A larger value in the tables is to be used in instances where there is no exact corresponding value of $l_{curtain}$. Similarly, where there are no exact corresponding values for $d_{separation}$ and $v_{occupants}$, then a lower value is to be used in the tables.

Whether Table B.1 or Table B.2 is selected is dependent upon the test specimen size. Table B.1 is intended to be used in cases where the test specimen barrier assembly has overall nominal dimensions of 3 m high × 3 m wide and Table B.2 is intended to be used in cases where the test specimen barrier assembly has nominal overall dimensions of 2.8 m high × 2.6 m wide. The guidance given herein is not applicable where different test assembly dimensions are used to those stated. Where the tested dimensions do not correspond to 2.8 m high × 2.6 m wide or 3.0 m high × 3.0 m wide then it is advisable to consult a specialist fire consultant or a fire safety engineer to evaluate whether the radiative heat flux levels are acceptable.

It is important that the radiative heat flux is determined. The radiative heat flux is measured during the fire resistance test at the time corresponding to the required safe evacuation time (RSET) as appropriate for the use of the property with an appropriate margin of safety. The radiative heat flux is measured in kilowatts per metre squared (kW/m^2), 1 m away from the geometric centre of a full size barrier assembly (see Note to **B.1**). The radiation value from the fire test evidence is R_{RSET}.

The barrier assembly may be deemed acceptable in terms of the radiative heat flux received by escaping occupants, provided that the radiative heat flux identified in the test report is lower than that noted from Table B.1 or Table B.2, as appropriate, i.e. the radiative heat flux is acceptable if R_{RSET} is a value lower than R_{max}.

B.3 Assumptions and limitations of Table B.1 and Table B.2

NOTE Table B.1 and Table B.2 are based around life safety and are not suitable for determining the potential for objects on the protected side of the barrier to ignite.

Table B.1 and Table B.2 are based upon a number of assumptions. The most critical assumptions that could influence judgement regarding the applicability of the tables are as follows.

a) The tables are only designed to be used for typical applications with ceiling heights of up to 3 m. The height of the proposed barrier assembly for installation is assumed to be 3 m. Incident radiation levels increase with an increased curtain area and therefore the tables are not appropriate for use where the proposed barrier assembly height is greater than 3 m.

b) The proposed head box design, in particular its height, is identical to the barrier assembly tested.

c) Deflection of the fabric is to be considered when establishing the separation distance. This approach is not suitable if queuing in front of the barrier assembly is likely during emergency evacuation.

d) The period required for the proposed barrier assembly fire resistance (integrity) is greater than the required safe egress time (RSET) value.

e) The critical height for escaping occupants is assumed to be 1.5 m. This height has been chosen on the basis that the greatest radiation levels are received by the escaping occupants at the mid-height of the barrier assembly; the heads of such escaping occupants are likely to be exposed and therefore most susceptible to the effects of thermal radiation.

f) The limits for the maximum acceptable dose of thermal energy is expressed in terms of thermal dose unit (TDU) and has been chosen as a value of 75 $(kW/m^2)^{4/3}s$. This threshold can be regarded as being experienced by the escaping person just prior to the onset of pain. In order to introduce a margin of safety, the TDU threshold has been reduced by multiplying by a factor of 0.75, i.e. a value of 56.25 $(kW/m^2)^{4/3}s$ is used. This does not mean that the values stated in Table B.1 and Table B.2 can be multiplied by 1.33 (1/0.75).

g) The radiation performance of a barrier assembly is product-specific, i.e. the radiative heat flux varies between products, even at the same dimensions. It is important that the test report that gives the measured radiation data is checked and established to be the correct test report for the proposed product.

h) Table B.1 and Table B.2 were designed with relation to those situations where the standard temperature/time exposure conditions are deemed to apply. Where the heating conditions of the design fire are more onerous than that of the fire resistance test conditions, the tables are not applicable.

i) It is essential that when any of the input parameters used for the analysis (see **B.2**) change during the life of the property, then the suitability of the barrier assembly is re-evaluated.

j) Table B.1 and Table B.2 are not applicable for vertical movement barrier assemblies, e.g. on stairs.

Where the barrier assembly scenario differs from those indicated in the stated assumptions and incident radiation levels cannot be confirmed as being acceptable, it is essential that a specialist fire consultant or fire safety engineer evaluates whether the radiative heat flux levels are acceptable.

Those factors that a specialist fire consultant is likely to consider within a bespoke fire engineering analysis as a minimum might be:

- fire load analysis;
- fire growth, development and exposure conditions;
- smoke production and temperature analysis;
- radiation analysis;
- building configuration;
- boundary types, construction and orientation;
- type and distribution of fuel (i.e. high bay racking, hazard types, layouts);
- ventilation and any smoke control provisions (e.g. inlet and outlet as well as fan and louvre locations and capacities);
- fire stability and thermal characteristics of compartment boundaries;
- fire alarm and detection influences on egress time;
- means of escape;
- management procedures;
- available set egress time (ASET) and required safe egress time (RSET) calculations;
- reaction to fire issues;
- structural fire protection.

B.4 Worked example of the methodology

B.4.1 General

A barrier assembly is proposed for installation alongside an escape route. The particulars of the worked example scenario are given in **B.4.2** to **B.4.5**.

B.4.2 Site geometry

The proposed barrier assembly runs for a length of 3.9 m and creates a corridor width of 1.3 m (based on the fabric descending directly downwards and no deflection of the fabric).

B.4.3 Human factors

The escaping occupants are expected to move at a minimum speed of 1.2 m/s and the RSET time is determined as 23 min.

B.4.4 Product data

The proposed barrier assembly is tested for fire resistance at a size of 3 m × 3 m and gives radiation measurements taken at a distance of 1 m from the geometric centre of the specimen. The supporting documentation states that the anticipated deflection of the barrier assembly at the proposed size is 180 mm.

Based on this data, the following values of $l_{curtain}$, $v_{occupants}$ and $d_{separation}$ can be assigned:

- $l_{curtain}$ = 3.9 m;
- $v_{occupants}$ = 1.2 m/s;
- $d_{separation}$ = 0.52 m;

when $d_{separation}$ is based on the calculation:

(1.3 – 0.6) – 0.18 = 0.52

where:

corridor width is 1.3 m;

width of person is 0.6 m;

anticipated deflection is 0.18 m.

B.4.5 Evaluating the radiative heat flux using the tables provided

As the specimen was tested at an overall size of 3 m × 3 m, Table B.1 is selected. Using the values given in **B.4.4**, the R_{max} value is obtained. The table does not have a column for $l_{curtain}$ corresponding to 3.9 m, so the 4 m column is used. Similarly, the table does not give values corresponding to a $d_{separation}$ of 0.52 m, therefore the figure is rounded down to 0.5 m, which corresponds to the table. The value of R_{max} from Table B.1 is 6.8 kW/m^2.

Examination of the fire resistance evidence shows that after 23 min of heating, the radiation reading was 5.4 kW/m^2, i.e. R_{RSET} is 5.4 kW/m^2. Since the value of R_{max} is greater than the value of R_{RSET}, the radiative heat flux on escaping persons is acceptable.

B.5 Mathematical background

B.5.1 General

A summary of the fundamental equations that have been used in preparation of this guidance is given in **B.5.2** to **B.5.4**.

B.5.2 Radiative heat flux

Radiative heat flux is calculated using the following equation:

$$Q = \varepsilon F \sigma T^4 \qquad (B.1)$$

where:

Q is the heat flux (W/m^2);

T is the surface temperature of the radiator (K);

ε is the emissivity;

F is the configuration factor;

σ is Stefan Boltzmann's constant [W/(m^{2}K^4)].

B.5.3 Configuration factor

The configuration factor, *F*, which is a dimensionless property, accounts for the geometry of the problem. The configuration factor for a flat rectangular radiator with a height, *a*, a width, *b*, and a receiver positioned a perpendicular distance, *c*, from one of the radiator corners is given by the following equation.

$$F = \frac{\Pi}{2}\left\{\left(\frac{a}{\sqrt{a^2+c^2}}\right)\left[\tan^{-1}\left(\frac{b}{\sqrt{a^2+c^2}}\right)\right]+ \left(\frac{b}{\sqrt{b^2+c^2}}\right)\left[\tan^{-1}\left(\frac{a}{\sqrt{b^2+c^2}}\right)\right]\right\} \quad (B.2)$$

where:

a is the height of the radiating surface (m);

b is the width of the radiating surface (m);

c is the perpendicular distance from the corner of the radiating surface (m).

It is to be noted that here the configuration factor is calculated in relation to a receiver located a perpendicular distance from a corner of the rectangular radiator. In the cases under consideration the receiver is not at a distance perpendicularly to one of the corners. In order to overcome this the quadrant rule, given below, has been applied.

$$F_{\text{overall}} = F_{\text{quadrant1}} + F_{\text{quadrant2}} + F_{\text{quadrant3}} + F_{\text{quadrant4}} \quad (B.3)$$

B.5.4 Thermal dose unit (TDU)

The therrmal dose unit is given by the following equation.

$$TDU = I^{4/3}t \quad (B.4)$$

where:

I is the radiation heat flux (kW/m^2);

t is the exposure time (s).

Due to variations in the TDU as occupants escape past the assembly, the overall TDU has been established based upon integration of the TDU value at 0.5 s intervals.

Annex C (informative) Determining the fire resistance of barrier assemblies

The fire resistance of a barrier assembly can be determined by testing a full size construction in accordance with BS 8524-1:2013.

The fire resistance is expressed in terms of the number of minutes for which the barrier assembly meets the relevant criteria. Though dependant on the test method used for the evaluation, the criteria are likely to be integrity and (where required) insulation and/or radiation.

Barrier assemblies are classified according to the last specific fire resistance period that has been passed during the test before failure occurs. Where more than one criterion is assessed during the test, it is possible that for each of these criteria a different classification period might apply (see BS EN 13501-2).

NOTE 1 The classification period required for a specific location is dictated by the relevant legislation.

It is generally the responsibility of the building designer to check that the barrier assemblies to be used are of a design that has been tested or assessed for the required fire resistance period, and that documentary evidence exists to that effect.

Where a barrier assembly is intended to be larger than it is possible to test using a typical test method (this is normally where it exceeds 3 m × 3 m), it is always advisable that the barrier assembly undergoes an assessment by a fire safety engineer to check its ability to achieve the relevant fire resistance.

Establishing that evidence of performance exists which meets with the approval of a relevant approving authority can be a way of ascertaining the level of fire resistance of a barrier assembly.

NOTE 2 A direct field of application is allowed for in BS 1634-1:2008, Annex C.

Annex D (informative) Typical installation checklist

Figure D.1 shows an example of the installation checklist which is to be completed by the installer after commissioning.

Figure D.1 **Example of a typical installation checklist**

	Barrier assembly performance characteristic	**YES**	**NO**
1	TIME OF FIRE RESISTANCE BS 8524-1:2013, **5.6.2**		
	20 min		
	30 min		
	60 min		
	Other time (insert requirement)		
2	INTEGRITY Barrier assembly has fire resistance conforming to BS 8524-1:2013, **5.6.2**		
3	INSULATION Barrier assembly has fire resistance conforming to BS 8524-1:2013, **5.6.3**		
4	RADIATION FOR COMPARTMENTATION Barrier assembly has fire resistance conforming to BS 8524-1:2013, **5.6.4**		
5	RADIATION AND TENABILITY Barrier assembly on escape route has fire resistance in accordance with BS 8524-2:2013, **5.3.2**		
6	RADIATION AND TENABILITY Barrier assembly on escape route has fire resistance in accordance with BS 8524-2:2013, Annex B		
7	RADIATION AND TENABILITY Barrier assembly on escape route has fire resistance in accordance with an alternative fire-engineered approach		
8	PROVIDES SMOKE CONTAINMENT As required by BS 8524-1:2013, **5.5**, and BS 8524-2:2013, Table 1		
9	PROVIDES COMPARTMENTATION Intended to maintain compartmentation (refer to national building regulations [1] to [3])		
10	OBSTRUCTION PREVENTION/WARNING (where required) In accordance with BS 8524-1:2013, **5.8.5**, and BS 8524-2:2013, **5.2.5.2**		
	Markings		
	Detection		
11	DEPLOYMENT WARNING In accordance with BS 8524-2:2013, **5.2.5.1**		
	Beacon and audible or voice warning		
12	EMERGENCY ACCESS/EGRESS CONTROLS Provided to allow temporary opening of the barrier assembly In accordance with BS 8524-1:2013, **5.4.3** and **5.4.4**, and BS 8524-2:2013, **5.2.4.2** and **5.2.4.3**		
	Emergency egress control (press button latched)		
	Emergency access control (press button hold on)		
13	INITIATION TYPE In accordance with BS 8524-1:2013, **5.8.4**, and BS 8524-2:2013, Table 2 (e.g. heat or smoke detector)		
	(list detection/activation type used)		
14	DEPLOYMENT POWER In accordance with BS 8524-1:2013, **5.4.1**		
	Gravity fail-safe		
	Powered, e.g. by mains (for horizontal barrier assemblies only)		
15	BARRIER MOVEMENT In accordance with BS 8524-1:2013, **5.4.1** and **5.4.2**, and BS 8524-2:2013, **5.2.3** and Table 3		
	Immediate single movement		
	Immediate multi-positional deployment		
	Delayed deployment		
	Delayed deployment; multi-positional deployment		
16	SELF-TESTING FACILITY In accordance with BS 8524-1:2013, **5.8.7**		

Annex E (informative) Model installation certificate

A model installation certificate, which is to be completed by the installer after commissioning, is shown in Figure E.1.

Figure E.1 **Model installation certificate** *(1 of 2)*

Installation certificate

Certificate of installation for the active fire curtain barrier assembly(s) at:

Address: .....

.....

..... Postcode: .....

I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the installation of the barrier assembly(s) system, particulars of which are set out below, CERTIFY that the said installation for which I/we have been responsible conforms to the best of my/our knowledge and belief to the specification described below and with the recommendations of BS 8524-2:2013, Clause **6**, except for variations if any stated in this certificate.

Name (in block letters): ..... Position: .....

Signature: ..... Date: .....

For and on behalf of: .....

Address: .....

.....

..... Postcode: .....

The extent of liability of the signatory is limited to barrier assembly(s) described below.

Extent of installation work covered by this certificate:

.....

.....

.....

.....

Specification against which the assembly(s) was/were installed:

.....

.....

.....

.....

Figure E.1 **Model installation certificate** *(2 of 2)*

Variations from the specification and/or BS 8524-2:2013, Clause **6**:

.....

.....

.....

.....

Wiring has been tested in accordance with BS 7671

Test results have been recorded and provided to:

.....

Unless supplied by others, the "as fitted" drawings have been supplied to the persons responsible for commissioning the system.

.....

Annex F (informative) Typical inspection checklist

The installer might be required by an approving authority to demonstrate procedures on the installed system. Figure F.1 shows an example of a typical installation checklist.

Figure F.1 **Example of a typical inspection checklist**

Inspection checklist	Pass/fail/NA
Name of installer:	
Address:	
Commence the inspection with the barrier assembly in the retracted position; check the barrier assembly guides are free from debris and obstructions prior to operation. *NOTE 1 This needs to be carried out at construction stage before the retention guides are enclosed.* *NOTE 2 Where smoke seals are installed, check that they are intact and can perform their function.*	
Check that the barrier assembly descends to the fire-operational position (i.e. down) when initiated by the installer, as follows.	
1. Initiate using an ancillary device, e.g. smoke detector.	
2. Disconnect primary power to the control panel, e.g. mains, and initiate.	
3. Disconnect both auxiliary power (e.g. batteries) and primary (e.g. mains) in this order to ensure fail-safe by gravity.	
4. Disconnect cable at control panel to prove fail-safe by gravity in the corrupted position.	
5. Ensure all tests are within velocity range of 0.06 m/s and 0.15 m/s when the bottom bar is within 2 m of floor level.	
NOTE 3 Unless disconnection of primary power can be achieved by switching off an isolator or switch, BS 7671 requires the disconnection to be carried out by a certified electrician.	
Check multi-positioning, e.g. split drop.	
Check the edges of the fabric by firmly pressing where it interfaces with the side retention guides to ensure that no gaps are present beyond the leading edge of the retention guide. *NOTE 4 Through gaps are not acceptable as this would constitute a fire resistance integrity failure.*	
Operate the emergency egress device and check that it operates, holds open for at least 5 s and redeploys.	
Operate the emergency access device and check that it raises the barrier assembly and redeploys when the device is released.	
Check that fire rated cables have been used where emergency egress/access devices, e.g. buttons, is installed.	
Check that obstruction detection and/or warning devices are functioning correctly and any audio or visual warning device is functioning correctly.	

Annex G (informative) Model commissioning certificate

A model commissioning certificate is shown in Figure G.1.

Figure G.1 **Model commissioning certificate** *(1 of 2)*

Commissioning certificate

Certificate of commissioning for the active fire curtain barrier assembly(s) at:

Address: .....

.....

..... Postcode: .....

I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the installation of the barrier assembly(s) system, particulars of which are set out below, CERTIFY that the said installation for which I/we have been responsible conforms to the best of my/our knowledge and belief to the specification described below and with the recommendations of BS 8524-2 2013, Clause **7**, except for variations if any stated in this certificate.

Name (in block letters): ..... Position: .....

Signature: ..... Date: .....

For and on behalf of: .....

Address: .....

.....

..... Postcode: .....

The extent of liability of the signatory is limited to assembly(s) described below.

Extent of installation work covered by this certificate

.....

.....

.....

.....

Specification against which the assembly(s) was/were installed:

.....

.....

.....

.....

Figure G.1 **Model commissioning certificate** *(2 of 2)*

Variations from the recommendations of BS 8524-2 2013, Clause **7**:

.....

.....

.....

.....

Using BS 8524-2:2013, **7.1** and Table D.1 as a checklist the following can be confirmed:

☐ All equipment operates correctly.

☐ Installation work is, as far as can be reasonably ascertained, of an acceptable standard.

☐ The entire system has been inspected and tested in accordance with the recommendations of BS 8524-2:2013, Clause **7**, Table 6 and Table D.1.

☐ The system performs as required by the product summary (see BS 8524-1:2013, Annex I) prepared by:

.....

☐ I/we have been supplied with a copy of the product summary (see BS 8524-1:2013, Annex I)

The following work should be completed before/after (delete as applicable) the system becomes operational:

.....

.....

Annex H (informative)

Model completion certificate

A model completion certificate is shown in Figure H.1.

Figure H.1 **Model completion certificate** *(1 of 2)*

Completion acceptance certificate

Certificate of completion and acceptance for the active fire curtain barrier assembly(s) at:

Address: ……

……

…… Postcode: …….

I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the completion of the barrier assembly(s) system, particulars of which are set out below, CERTIFY that the said installation is complete and that it conforms to BS 8524-1:2013 and BS 8524-2:2013.

Name (in block letters): …… Position: ……...

Signature: …… Date: ……

I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the acceptance of the barrier assembly(s) system, particulars of which are set out below, ACCEPT the system for and on behalf of:

……

Address:……

……

……

…… Postcode: …….

Name (in block letters): …… Position: ……...

Signature: …… Date:……

For and on behalf of: ……...

The extent of liability of the signatory is limited to assembly(s) described below.

Extent of installation work covered by this certificate:

……

……

Figure H.1 **Model completion certificate** *(2 of 2)*

☐ All installation work appears satisfactory

☐ The system is capable of giving warning signals

The following documents have been provided to the purchaser or user:

☐ Operating and maintenance instructions

☐ Certificates of installation and commissioning and a product summary

☐ Sufficient representatives of the user have been properly instructed in the use of the system, including testing and resetting the system avoiding false alarms and deployment.

☐ All relevant tests, defined in the product summary and specifications, have been witnessed.

The following work/action is considered necessary before the system can be accepted:

.....

.....

.....

.....

.....

.....

.....

.....

Annex I (informative)

Model servicing certificate

A model servicing certificate is shown in Figure I.1.

Figure I.1 **Model servicing certificate** *(1 of 2)*

Inspection and servicing certificate

Certificate of inspection for the active fire curtain barrier assembly(s) at:

Address: .....

.....

..... Postcode: .....

I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the installation of the barrier assembly(s) system, particulars of which are set out below, CERTIFY that the said installation for which I/we have been responsible conforms to the best of my/our knowledge and belief to the specification described below and with the recommendations of BS 8524-2:2013, Clause **8**, except for variations if any stated in this certificate.

Name (in block letters): ..... Position: .....

Signature: ..... Date: .....

For and on behalf of: .....

Address: .....

.....

..... Postcode: .....

The extent of liability of the signatory is limited to assembly(s) described below.

Extent of installation work covered by this certificate

.....

.....

.....

.....

Variations from the recommendations of BS 8524-2 2013, Clause **8** for periodic or annual inspection and test (as applicable):

.....

.....

.....

.....

Figure I.1 **Model servicing certificate** *(2 of 2)*

☐ Relevant details of the work carried out and faults identified have been entered into the system log book

During the last 12 months the following faults were noted:

.....

The following work/action is considered necessary:

.....

.....

.....

.....

.....

.....

.....

.....

.....

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

BS 7671, *Requirements for electrical installations – IET Wiring Regulations – Seventeenth edition*

BS 7974, *Application of fire safety engineering principles to the design of buildings – Code of practice*

BS EN 1634-1:2008, *Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware – Part 1: Fire resistance tests for doors, shutters and openable windows*

BS EN 12101-1, *Smoke and heat control systems – Part 1: Specification for smoke barriers*

BS EN 12259-5, *Fixed firefighting systems – Components for sprinkler and water spray systems – Part 5: Water flow detectors*

BS EN 13501-2, *Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services*

PAS 121 (withdrawn), *Specification for active fire curtain barrier assemblies and active fire barrier assemblies with smoke rating*

PD 7974-6, *The application of fire safety engineering principles to fire safety design of buildings – Part 6: Human factors – Life safety strategies – Occupant evacuation, behaviour and condition (Sub-system 6)*

prEN 16034 [1)], *Pedestrian doorsets, industrial, commercial, garage doors and windows – Product standard, performance characteristics – Fire resistance and/or smoke control characteristics*

Other publications

[1] GREAT BRITAIN. Building Regulations 2010. London: The Stationery Office.

[2] GREAT BRITAIN. Building (Scotland) Regulations 2004, as amended. Edinburgh: The Stationery Office.

[3] GREAT BRITAIN. Building Regulations (Northern Ireland) 2000, as amended. London: The Stationery Office.

[4] UNITED KINGDOM. The Regulatory Reform (Fire Safety) Order 2005. London; The Stationery Office.

[5] SCOTLAND. Fire (Scotland) Act 2005 as amended. Edinburgh: The Stationery Office.

[6] SCOTLAND. Fire Safety (Scotland) Regulations 2006. Edinburgh: The Stationery Office.

[7] NORTHERN IRELAND. Fire Safety Regulations (Northern Ireland) 2010. Belfast: The Stationery Office.

[1)] In preparation.

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™