

BS 8524-1:2013



BSI Standards Publication

Active fire curtain barrier assemblies –

Part 1: Specification

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 42, 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This British Standard has been developed from PAS 121, which will be withdrawn on 31 July 2013.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*.

BS 8524-2 gives guidance on those issues that were originally specified in PAS 121 that have not been covered by the present part of BS 8524. These include specifying, installing and maintaining active fire curtain barrier assemblies, with recommendations for different assembly applications, wiring, power supplies and the emergency egress control.

Product testing. Users of this British Standard are advised to consider the desirability of third-party testing of product conformity with this British Standard. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

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.

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 "shall".

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 design 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 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. Recommendations on the suitability, selection, installation and maintenance of barrier assemblies are given in BS 8524-2.

0.3 Deployment of barrier assemblies

Some examples of how barrier assemblies could be deployed are:

- a) barriers deploy fully upon receipt of a signal from the fire alarm system;
- b) barriers remain retracted when the fire alarm system is activated and only deploy upon receipt of a signal from a local smoke/heat detector. In these circumstances, the only barrier assemblies to deploy are those where fire or smoke are in the vicinity;
- c) barriers deploy upon local thermal activation, e.g. upon parting of a fusible link;
- d) barriers remain retracted when the fire alarm system is activated for a predetermined time to allow for evacuation before deploying fully;
- e) barriers move to a given height above finished floor level when the fire alarm system is activated to contain smoke for a predetermined time before closing fully for fire containment;

- f) barriers move to a given height above finished floor level when a specific fire alarm system signal is provided to contain smoke when the fire location is such that the barrier assembly is not required to deploy fully;
- g) barriers deploy on loss of primary and auxiliary power supply.

NOTE Further information on the deployment of barrier assemblies is given in BS 8524-2.

0.4 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. Traditionally this has been established using insulation and radiation measurements.

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.

PAS 121 introduced the term “insulating zone” to describe the area created between the surface of the unexposed face of the barrier assembly when the assembly is exposed to fire, and the point at which the air temperature is 180 °C above ambient air temperature at any given time classification.

In this British Standard, the insulating zone concept that was introduced in PAS 121 has not been included. This is because the requirements associated with this concept relied on a test method that was not in line with European testing standards. There was also some misinterpretation of the term having an association with insulation. Both BS 8524-1 and BS 8524-2 use insulation and/or radiation test data instead, and further information regarding the application of test data can be found in BS 8524-2.

1 Scope

This part of BS 8524 specifies requirements for the design, testing and classification of active fire curtain barrier assemblies, for installation in accordance with the recommendations of BS 8524-2. It covers the reliability and durability, fire resistance, smoke containment and impact resistance performance of the active fire curtain barrier assemblies, their control devices and ancillary equipment.

The requirements within this part of BS 8524 are applicable to active fire curtain barrier assemblies of any material that are designed to provide fire resistance.

This part of BS 8524 does not cover active smoke barriers, or active fire curtain barrier assemblies that are used only for fire and smoke control as fire doors.

NOTE 1 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.

NOTE 2 Guidance on fire doors is given in BS 8214. Requirements for fire doors for fire and smoke control are given in prEN 16034 (currently in preparation).

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 476-6, *Fire tests on building materials and structures – Part 6: Method of test for fire propagation for products*

BS 476-7, *Fire tests on building materials and structures – Part 7: Method of test to determine the classification of the surface spread of flame of products*¹⁾

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

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 5234-2, *Partitions (including matching linings) – Part 2: Specification for performance requirements for strength and robustness including methods of test*

BS 5839 (all parts), *Fire detection and fire alarm systems for buildings*

BS 8524-2, *Active fire curtain barrier assemblies – Part 2: Code of practice for application, installation and maintenance*²⁾

BS 9999, *Code of practice for fire safety in the design, management and use of buildings*³⁾

BS EN 54 (all parts), *Fire detection and fire alarm systems*

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

BS EN 1363-2, *Fire resistance tests – Part 2: Alternative and additional procedures*

BS EN 1366-7, *Fire resistance tests for service installations – Part 7: Conveyor systems and their closures*

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 1634-3:2004, *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 12453:2001, *Industrial, commercial and garage doors and gates – Safety in use of power operated doors – Requirements*

BS EN 13501-1, *Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests*

BS EN 13501-2:2007+A1:2009, *Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services*

¹⁾ This standard also gives informative references to BS 476-7:1997.

²⁾ This standard also gives informative references to BS 8524-2:2013.

³⁾ This standard also gives informative references to BS 9999:2008.

BS EN 13823, *Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item*

BS EN 14600, *Doorsets and openable windows with fire resisting and/or smoke control characteristics – Requirements and classification*⁴⁾

BS EN ISO 1182, *Reaction to fire tests for products – Non-combustibility test*

BS EN ISO 1716, *Reaction to fire tests for products – Determination of the gross heat of combustion (calorific value)*

BS EN ISO 13943, *Fire safety – Vocabulary*

3 Terms and definitions

For the purposes of this part of BS 8524, the terms and definitions given in BS EN 13501-1, BS EN ISO 13943 and the following apply.

3.1 active fire curtain barrier assembly (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 Class 0 (material or surface)

material or surface that is either:

- a) of limited combustibility throughout; or
- b) classified as Class 1 when tested in accordance with BS 476-7, which has a fire propagation index of not more than 12, and a subindex i1 of not more than 6, when tested in accordance with BS 476-6

NOTE Class 0 is not identified in any British Standard test. European Classification B-s3, d2 is the general equivalent of Class 0. The European classifications are described in BS EN 13501-1. They are based on a combination of four European test methods, namely: BS EN ISO 1182; BS EN ISO 1716; BS EN 13823; and BS EN ISO 11925-2. The national classifications do not automatically equate with the equivalent classification in Europe, therefore, products cannot typically assume a European class, unless they have been tested accordingly.

3.5 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

⁴⁾ This standard also gives an informative reference to BS EN 14600:2005.

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.

3.6 deployment

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

3.7 dual-function barrier assembly

assembly that acts as both a fire-resisting barrier and an active smoke containment system

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 service override switch

manually operated switch to enable fire-fighters to initiate or terminate the operation of a fire safety system or other device

3.11 fusible link

device that releases a component such as a fire damper or fire shutter at a set temperature

NOTE This usually incorporates either a solder link or a frangible glass bulb.

[SOURCE: BS 9999:2008, 3.61, modified – note has been changed]

3.12 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

3.13 hold-open device

element of the hold-open system that allows a gravity fail-safe barrier assembly to remain open either at a pre-set or chosen position until released

3.14 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

3.15 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]

3.16 multi-positional deployment

staged movement of barrier assemblies to provide initial smoke containment prior to full fire containment

3.17 side retention

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

3.18 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 Barrier assembly design

4.1 General

The barrier assembly shall be designed and manufactured to create a fire-separating element in a horizontal, vertical or angled orientation.

NOTE Typical uses of the barrier assembly include:

- a) compartmentation;
- b) creating protected routes for the purpose of means of escape where using standard fire doors/shutters and non-load-bearing walls and ceilings would be prohibitive to the design;
- 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) meeting the requirements for smoke leakage in conjunction with other non-smoke rated products (e.g. lift door) protecting openings to reduce leakage of smoke.

Further information on the uses of barrier assemblies is given in BS 8524-2.

4.2 Side retention

Barrier assemblies, whether single or multiple barrier units, that are reliant on side retention as part of their integral design, shall have no gaps between the fabric edge and the leading edge of the retention guide that would fail integrity (see 5.6.2).

NOTE Barrier assemblies having side tabs (retention device which is fixed to, and extends beyond, the edge of the barrier assembly but is not integral to the barrier assembly itself) have been found in some circumstances to produce edge gaps in end-use applications. Care should be taken during installation to use side-retention that is identical to the tested samples.

4.3 Additional requirements for multiple barrier assemblies

4.3.1 Where multiple single barrier assemblies are used to create a larger barrier assembly, they shall be overlapped and shall be continuously conjoined at the bottom edge.

NOTE 1 Figure 1 illustrates an example of the overlapping and conjoining of barrier assemblies. This configuration would not be suitable for use on an escape route (see BS 8524-2:2013, Figure 1).

NOTE 2 Figure 2 illustrates examples of typical overlapping barrier assemblies.

4.3.2 The amount of overlap required for assemblies other than the tested size shall be determined in accordance with Annex A.

4.3.3 For barrier assemblies larger than those tested, supporting assessment evidence shall be provided which specifies the necessary overlap dimensions.

NOTE The necessary overlap generally increases with the drop.

Figure 1 Overlapping and conjoining of barrier assemblies – typical example

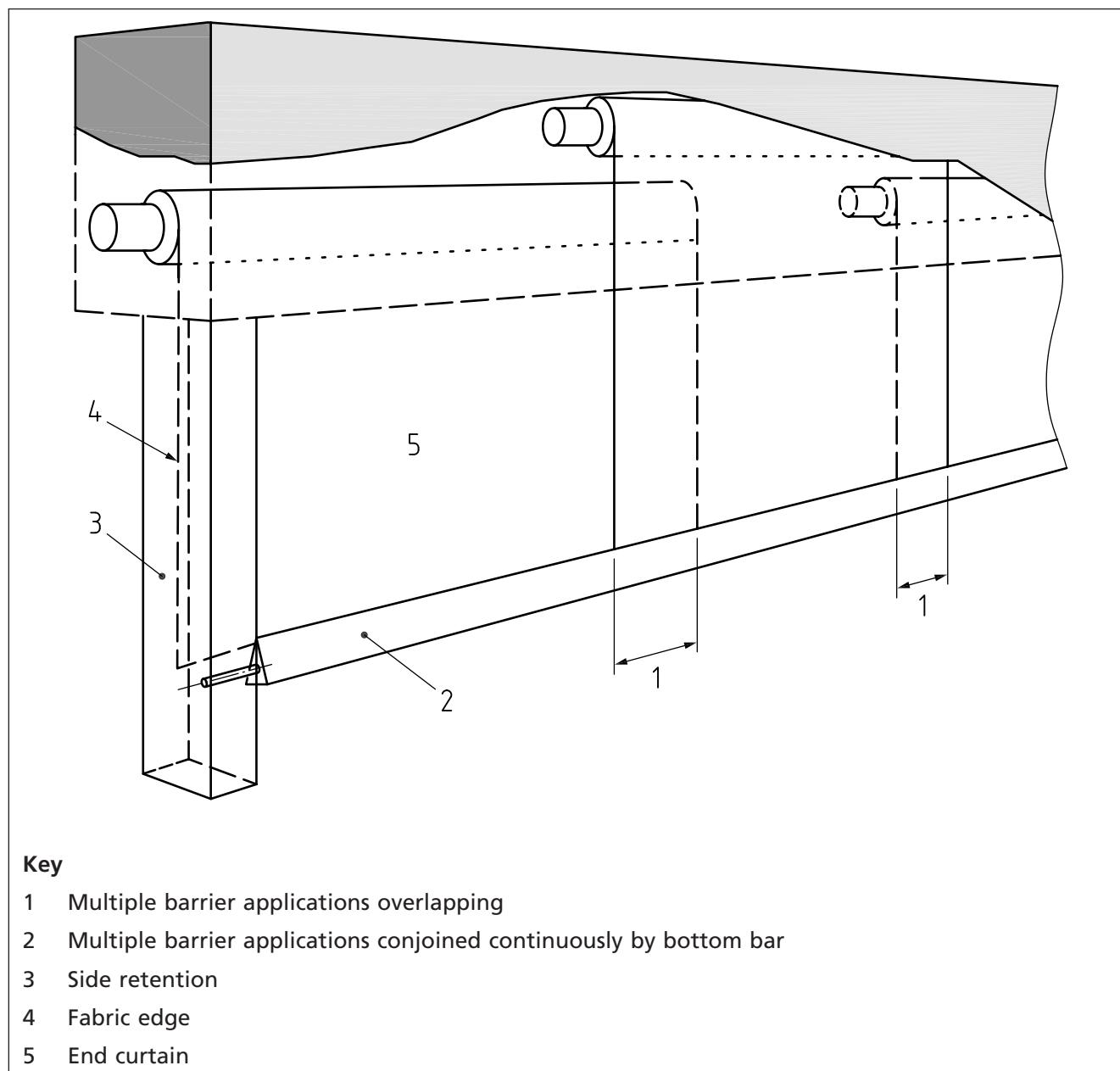
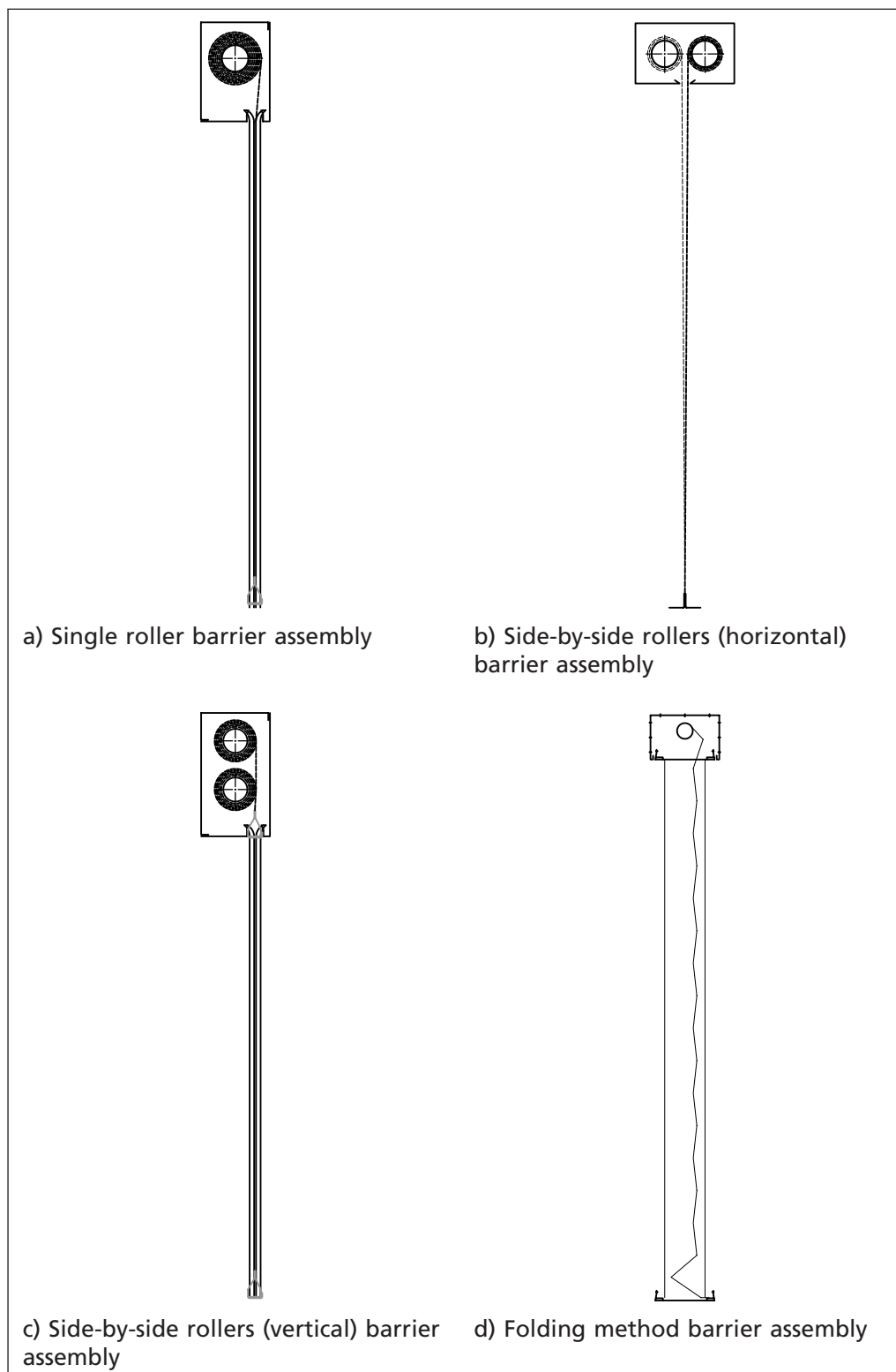


Figure 2 Examples of typical barrier arrangements



5 Performance requirements

NOTE 1 The performance characteristics and levels of the barrier assembly are summarized in Table 1.

NOTE 2 The fabric used with the construction of the barrier assembly is critical to its performance.

Table 1 Summary of performance characteristics

Performance measure	Related subclause	Test method(s)	Performance level
Pressure and impact	5.2	BS 5234-2	SD
Reliability and durability of barrier assembly	5.3.1	BS 8524-1:2013, Annex D	C0–C5
Reliability/durability of alternative or additional motor	5.3.2	BS 8524-1:2013, Annex E	C0–C5
Response time and velocity	5.4	BS 8524-1:2013, Annex D	Vertical: ≥ 0.06 m/s at any height; ≤ 0.15 m/s below 2 m Horizontal: ≥ 0.06 m/s at any height; ≤ 0.3 m/s below 2 m
Smoke containment: • smoke leakage, where applicable	5.5	BS 476-31.1 or BS EN 1634-3:2004	S_a or S
Fire resistance: • integrity • insulation, where applicable • radiation, where applicable	5.6 5.6.2 5.6.3 5.6.4	BS 8524-1:2013, Table 3	E, I and/or W plus time (min) or time (min) plus integrity, insulation and/or radiation
Deflection zone	5.6.5	BS EN 1634-1:2008	Distance (mm)
Motor operation, where applicable	5.6.6	BS 8524-1:2013, Annex G	Pass/fail
Reaction to fire	5.7	BS 476-6 and BS 476-7 or BS EN 13501-1 ^{A)}	Class 0 or Class 1 ^{B)} B-s3,d2 or C-s3,d2
Ancillary equipment, where applicable	5.8	BS 8524-1:2013, Annex H	Pass/fail

^{A)} This standard is a classification standard that specifies test methods.

^{B)} Class 0 is defined in 3.4. Class 1 is defined in BS 476-7:1997.

5.1 General

5.1.1 When tested in accordance with 5.2, 5.3, 5.7 and the relevant parts of 5.4, 5.5, 5.6 and 5.8, the barrier assembly shall meet the pass criteria specified in those subclauses.

NOTE Whilst some tests and equipment are optional, the exclusion of some of these might limit the application of the barrier assemblies in accordance with BS 8524-2.

5.1.2 Tests shall be undertaken in the order specified in Annex B.

5.2 Pressure and impact

5.2.1 When a specimen of the barrier assembly conforming to Annex C, C.2.2.2a) is tested for large soft body impact and crowd pressure in accordance with BS 5234-2, having a pendulum drop height set at double that specified for the

severe duty (SD) level, the assembly shall remain operable afterwards, and gaps shall not develop between the fabric and beyond the retention device (side guides).

NOTE Where soft body impact or crowd pressure testing is required in the hot state for a fire-engineered solution, the methodology outlined in BS EN 1363-2 may also be used. However, the forces applied should be in accordance with BS 5234-2.

5.2.2 For non-vertical orientations, e.g. horizontal or angled, the equivalent impact shall be applied.

5.2.3 Following the initial impact test, the barrier assembly shall undergo testing for reliability and durability in accordance with **5.3**, and deployment in accordance with **5.4**. A second impact test shall then be undertaken on the same barrier assembly, in accordance with **5.2.1** and **5.2.2**, and the barrier assembly shall remain operable afterwards.

5.2.4 The deflection criteria shall not be used to determine failure of the barrier assembly following each impact test.

5.3 Reliability and durability

5.3.1 When tested in accordance with Annex D, the barrier assembly shall complete without failure the number of cycles that are relevant to the intended classification in Table 2 (see **D.5**). It shall subsequently be classified in accordance with Table 2 according to the test result obtained.

NOTE A successful test for a given number of cycles also covers all classifications for lower numbers of cycles. e.g. Class C3 also covers classes C1 and C2.

Table 2 **Durability of self-closing**

Frequency of intended use	Minimum number of cycles	Class
No performance determined	0	C0
Retained in the open position	500	C1
Low frequency of use by those with high incentive to exercise care	10 000	C2
Medium frequency of use primarily by those with some incentive to exercise care	50 000	C3
High frequency of use by public with little incentive to exercise care	100 000	C4
Subject to very frequent usage	200 000	C5

NOTE These classifications are given in BS EN 14600:2005.

5.3.2 When tested in accordance with Annex E, alternative or additional motors to those tested as part of the barrier assembly shall complete without failure the number of cycles that are relevant to the intended classification in Table 2. They shall subsequently be classified in accordance with Table 2 according to the test result obtained.

5.4 Deployment

5.4.1 Response time and velocity

5.4.1.1 When tested in accordance with Annex D, the barrier assembly shall commence deployment within 3 s of receipt of an initiation signal and move to its fire-operational position in all operating modes.

5.4.1.2 The barrier assembly shall have a velocity of not less than 0.06 m/s. Within 2 m of floor level, the velocity shall be not more than 0.15 m/s for vertical movement or 0.3 m/s for horizontal movement.

5.4.1.3 All vertical barrier assemblies shall be gravity fail-safe. For vertical barrier assemblies, and for non-vertical barrier assemblies that are capable of gravity fail-safe, when all consumable primary and auxiliary power sources are removed, in the event of wiring or system corruption (e.g. open or short circuit, or any combination thereof), the barrier assembly shall gravity fail-safe to the fire-operational position, in a controlled manner and within the relevant velocity range, as specified in **5.4.1.2**.

5.4.1.4 For non-vertical (e.g. horizontal or low-angle) barrier assemblies that do not permit fail-safe by gravity, a power supply for life safety equipment for fire protection shall be provided in accordance with BS 9999.

5.4.2 Delayed and/or multi-positional deployment

Where a barrier assembly is used with delayed and/or multi-positional deployment, its full range of positions and delay times shall be specified.

The operation of multi-positional deployment shall be tested in accordance with **H.6**.

NOTE An example of multi-positional deployment is where, upon fire/smoke detection, the barrier assembly moves to limit smoke movement prior to full deployment as a fire barrier.

5.4.3 Emergency egress control

Where the barrier assembly includes an emergency egress control for opening the assembly, e.g. for barrier assemblies crossing egress routes, when tested in accordance with **H.7**, the retract button shall be capable of opening and re-closing the assembly with an adjustable pause of up to 30 s before re-closing. It shall be possible to interrupt the descent at any stage by pressing the retract button again.

NOTE The length of the pause depends upon the occupancy level and type; see BS 8524-2.

5.4.4 Emergency access control

Where the barrier assembly includes a retract control for fire and rescue service use, when tested in accordance with **H.8**, the control shall retract the barrier assembly when pressed and shall allow the barrier assembly to redeploy once pressure is released.

5.5 Smoke containment

5.5.1 General

Where smoke containment is required, the barrier assemblies shall conform to the smoke leakage requirements specified in **5.5.2**.

5.5.2 Total smoke leakage of barrier assemblies with smoke rating

5.5.2.1 The barrier assembly shall be tested in accordance with BS EN 14600 and shall complete a test for smoke leakage at ambient temperature in accordance with BS 476-31.1 or BS EN 1634-3:2004 or and with the additional measurements required in Annex F. The test shall be carried out on a specimen that conforms to Annex C, **C.2.5**.