

Approved Document B Volume 1 – Dwellinghouses

Volume 1 is in place to deal with fire safety within a dwelling or habitable property. It is broken down into the following five sections:

- **B1 - Means of warning and escape:** Suitable means of warning should exist to notify inhabitants of the presence of a fire and then allow them to vacate the dwelling easily and safely
- **B2 - Internal fire spread (linings):** The lining materials used within the construction of the property should exhibit the required fire resistant properties
- **B3 - Internal fire spread (structure):** The construction materials used in the structure of the building should feature the required fire resistant properties
- **B4 - External fire spread:** In the event of a fire its external spread should be limited
- **B5 - Access and facilities for fire services:** Stated access routes and facilities should be provided for fire service personnel and equipment

B1 - Means of Warning and Escape

This first section of the document states that a building should be constructed to ensure that early warning systems for fires (fire alarms, heat alarms, smoke alarms etc....) are included and also that all residents within the building can escape to a safe location outside that is accessible at all times of the day.

Types of Alarm System

Starting with the alerting side of things, all new dwellings need to be fitted with a fire detection or alarm system in line with the recommendations stated in BS 5839-6:2004 to a minimum of Grade D category LD3 standard. If installing a smoke and heat detection system, this will need to conform to BS EN 14604:2005 for smoke and heat alarms or BS5446-2:2003 for fire detection and fire alarm devices. In either case they need to be mains powered and feature a backup power system such as a battery.

When it comes to the types of smoke detection equipment available, there are two common types:

- Ionization chamber smoke detectors
- Optical or photo-electric smoke detectors

Each detectors reacts slightly differently to fires and smoke and whether the fire is fast burning or just smoldering. In both cases, either type of detector is adequate but you may want to pay some attention to your choice and also what type of fire is likely to happen.

Additionally, there is always a chance of a false alarm and this really needs to be minimised as much as possible e.g. placing an Ionization chamber alarm next to a kitchen where there is the chance of fumes that may set it off might not be the best choice. Instead, an optical detector may be more suitable

The type and scale of an alarm system also very much depends on the type and size of house it is to be installed in:

- **Large Houses - 2 Storeys:** Classed as a property with more than one storey or any area that is over 200m² (not including basement areas). Houses with two stories should feature at least a Grade B category LD3 fire detection and alarm system as outlined in BS 5839-6:2004
- **Large Houses - 3 Storeys:** For properties featuring three storeys, a Grade A category LD2 system as stated in BS 5839-6:2004 and it will also need detectors situated around the property using the guidelines stated BS 5839-1:2002 for an L2 system

If you are making alterations to an existing property and those alterations include adding rooms above ground level or in an area where there is no final exit for the room then this will require a fire and smoke alarm system installing within the circulation space. This will ensure that in the event of a fire, occupants are notified of the possible fire obstruction.

Another factor to look at is that of a sheltered house (One that includes numerous dwelling spaces). Where there is a supervisor present within the building they should have access to a central point or monitoring station that will signal the presence of a fire within the specific area of the building.

The above requirements for an alarm system do not apply to the common areas of such a building e.g. lounge etc.... nor to sheltered accommodation that is classes as institutional or other residential purpose. For more information on this see Approved Document B, Volume 2.

Positioning of Alarm Systems

Full details and specifications for the design and installation of such systems is outlined in BS 5839-6:2004 but in general terms the below guidelines should be followed:

- All smoke alarms should be situated in circulation space, primarily that space between bedrooms and the potential source of a fire e.g. living room or kitchen
- Dwellings should have at least one smoke alarm per floor or storey
- If the kitchen is not separated from the stairs or circulation space by a door, the property should feature an interlinked heat alarm or detector in the kitchen area. Smoke alarms should also be featured as required in circulation space
- If the property features more than one alarm then they should be linked so that in the event of a fire both systems are aware of this
- In terms of location for smoke detectors and alarms:
 - There should be a smoke alarm in the circulation space not more than 7.5m away from doors to habitable rooms
 - When ceiling mounted, detectors/alarms are situated a minimum of 300mm from walls and light fittings. Where wall mounted alarms/detectors are used they are above the level of any door opening into the space and are fixed according to manufacturers guidelines
 - Any sensors are mounted between 25mm and 600mm below ceiling level or 25 - 150mm if they are heat detectors or heat alarms
- Smoke detectors and alarms should be positioned so that they can be reached, tested and maintained easily (**NOTE:** Alarms and detectors should not be located above stairs or any other opening between floors)
- You should not fix any alarm or detector in an area that is subject to steam or fumes that could cause false alarms such as kitchens, garages, bathrooms or above heating sources
- Any alarm or detector should not be situated in an area that gets either very hot or very cold or on any surface that is either hotter or colder than the surrounding area as these temperature differences can cause fluctuations in air current and cause any smoke to be drawn away from the detector or alarm

Power Supply to Alarm and Detector Systems

Any new fire alarm or detector system that is installed should be run off of the dwellings mains electric feed. The system itself can either be run off of its own independent circuit or off of an existing lighting circuit.

When running off of an existing light circuit, this should ensure that the system itself will not be offline and longer periods of time. When running off this type of setup, it should also be ensured that power to the fire detection system can be isolated independently from the lighting circuit so that lights can still be used if the alarm system needs to be shut down for maintenance.

When dealing with the power supply to a fire detection system and its installation:

- All electrical work should be carried out inline with the **guidelines stated in Approved Document P**

- In respect to the cabling used in the system - This can be any domestic cabling as long as it is suitable for the alarm type and electrical supply it is going to carry. It is not required to have any specific fire resistant properties, except when it comes to large houses: See BS 5839-6:2004 for more details. When dealing with the connection of alarm signal units, wiring should be visibly different from other wiring e.g. colour coded
- There are alternate options for system setup that can be found in BS 5839-1:2002 and also in BS 5839-6:2004

It is also possible to interconnect mains smoke and fire alarm systems via radio-link but this is only possible if the setup does not reduce the duration or lifetime of standby power below 72 hours. If this is found to be the case then smoke alarms will need to be connected to separate power circuits

Designing and Installing Fire Alarm Systems

Due to the nature of a fire alarm and detection system it is absolutely essential that it is designed to fulfill the needs of the particular dwelling it is installed into and the occupants that will be using it.

To these ends it will also need to be installed to a high level of quality and as proof of this an installation and commissioning certificate should be provided on completion.

When it comes to ensuring that a given system continues to operate at peak performance, it will need to be maintained. Although Building Control do not stipulate this as a requirement of passing a given system, it is generally regarded as a responsibility of the builder or developer to provide the home owner with information on how to use and maintain the system or what other company(s) they will need to contact for assistance with this.

In light of the above, both BS 5839-1 and BS 5839-6 state that the dwelling occupant should at least receive the manufacturers instructions that should be provided with the system.

Means of Escape from a Property

In the unfortunate event of a fire it is essential that any and all occupants are able to exit the property quickly and safely. The way in which this is done will largely depend on the type and size of the dwelling.

For typical one or two storey house, this will either be achieved by exiting through an external door or window and in respect to this, Document B Volume 1 states that all habitable rooms on the ground floor should lead directly into a hallway that in turn, leads to an external door or other exit. If this is not possible then a suitable window or door should be provided (see Approved Document B, Volume 1, paragraph 2.8 for more details).

When dealing with taller properties up to 4.5m above ground, the regulations state that, again, all habitable upstairs rooms (bar kitchens) that are only accessible via one set of stairs should provide a window or door (again, inline with paragraph 2.8) or direct access to a protected stairway for escape in the event of a fire.

In respect to the above for taller properties, it is possible to provide a single window that serves two separate rooms, providing that both rooms have their own access to the stairs. A door that connects the two rooms should also be featured so that it is then not necessary to access the stairs or hallway in the event that fire prevents this.

For a dwelling with only one floor but is taller than 4.5m above ground, it can either feature a protected stairway that will remain separate and protected in the event of fire or the entire top floor can be treated as separate and feature its own means of escape (such as an external fire escape staircase).

- **Protected Stairway:** The stairway will need to be protected at all levels and should either exit to a final exit point or provide access to a minimum of two separate escape routes, both at ground level and separated from each other
- **Separated Top Storey:** The storey should be separated from those below through the use of fire-resisting construction techniques and should feature an alternate means of escape with its own exit

When dealing with properties with two or more stories and also over 4.5m above ground, you will still need to meet the points outlined in the above list and accompanying paragraph and also the following:

- Alternate escape routes should be provided from every floor located 7.5m or more above ground level and access to this should be via: protected stairway to upper stories or landing area within protected stairway that leads to escape route on same storey. The area of protected stairway around the 7.5m above ground mark should be separated from lower stories using fire resisting construction techniques
- The dwelling property will also need to feature a full sprinkler system that has been installed and designed within the guidelines stated in BS 9251:2005.

For dwellinghouses above 4.5m with more than one floor, it may be possible to avoid the points in the above two paragraphs, in the case that two different internal stairways can be provided that then give external access and escape. When it comes to the term "seperate" this is very much down to judgment so you will need to consult with your local Building Control department for clarification.

As we have now dealt with the potential height of a dwelling, next comes the escape methods that should be used for the different types of room or features that could be found within a given property:

- **Gallery Floors:** When gallery floors are no more than 4.5m above ground they should have an emergency escape window (inline with rules stated in paragraph 2.8 of Approved Document B, Volume 1) or they should feature an alternate means of exit. Where they do not feature an alternate exit or escape window see paragraph 2.12 of Volume 1, Approved Document B
- **Cellars and Basements:** In most situations, a basement or cellar will only feature a single set of stairs to exit and this could easily become blocked by smoke and fire. In light of this, the stairway will need to be protected and lead straight to final exit or a window or door will need to be provided in the cellar for emergency exit
- **Protected Stairways and Cavity Barriers:** Where protected stairways are present in dwellings with a floor that exceeds 4.5m above ground cavity barriers should be provided above the enclosure of the stairway itself
- **External Escape Stairway:** External stairs should comply with the following
 - In pretty much all cases, all access doors leading to the stairs should be fire resistant (fire retardant paints can be used but will need to check that they conform to the specified regulations – more can be found in our **fire retardant paints**) project
 - Any section of a buildings external envelope within 1.8m and 9m below vertically any flights of stairs or landings, should be constructed using fire-resisting construction techniques and materials
 - For any part of a dwelling or building within 1.8m of an escape route from the stairs to a place of safety, this should be constructed using fire resistant materials and techniques. This also includes doors
 - Where a stairway extends more than 6m vertically, it should be protected from the effects of the weather. This may not mean fully enclosed as it will depend on position, location and shelter from other surrounding elements
 - Where glazing and windows are present, these should be fixed closed and also feature fire resistant glass
- **Air Circulation and Air Conditioning Systems:** For guidelines on these systems within dwellings that feature a floor over 4.5m from ground level, please see paragraphs 2.6 and 2.7 a - e of Approved Document B, Volume 1
- **Lifts:** Where a lift serves one or more floors that are over 4.5m in height, it should either be located within a protected stairway or within its own protected lift shaft

Alteration to an Existing Property

The majority of the information above concentrates on new constructions and states what fire protection and prevention features it should have. When it comes to renovation or home improvements works

(including replacing windows) on existing properties, please refer to paragraphs 2.19 and 2.20 of Approved Document B, Volume 1

B2 - Internal Fire Spread and Linings

In the event of a fire, the materials and objects within a given property can have a dramatic effect on how fast a fire can spread, the levels of heat that are produced and also the volume of fumes, smoke and gases that are allowed to buildup.

With this in mind, section B2 deals with how a building or property is lined in terms of the materials that are used to construct walls, ceilings and floors. To these ends all materials should resist flame spread over their surfaces and also, when ignited, any heat release or growth of the fire is limited as required.

Wall and Ceiling Linings

Any linings used on walls and ceilings will need to conform to set classifications that can be seen in Approved Document B, Volume 1 under Section 3, Table 1. The figures are for both National and European classes.

When it comes to walls, the following are included:

- Glazed surfaces except those that feature in doors
- All parts of a ceiling that slope more than 70° to the horizontal

In terms of what's not included, the following list is not classed as a wall lining:

- Any door frame or door (information on the fireproofing of doors can be found in our **fire retardant and intumescent paints**) project. As mentioned above, you will need to confirm that any paints used meet the required regulations
- Any window frame or framed section that houses glass
- Narrow timber sections such as skirting, architrave etc....
- Any fitted furniture such as fire surrounds and mantles etc....

When dealing with ceiling linings, the following are classed as such:

- Glazing surfaces
- Any section of wall that slopes at 70° or less from the horizontal
- The underside of a gallery floor
- Any section of roof that is exposed to the room below it

The following items are not classed as parts of the ceiling:

- A trap door including its frame
- The frames area of a roof light or section that holds glazing
- Timber sections such as exposed beams, moulded coverings and architrave

Plastic is a commonly used material for both windows and items such as skylights and roof windows. The rules state that it is possible to use a Thermoplastic material in place of the glass but not in situations where external windows run into circulation spaces or roof lights run into protected stairways. Additionally, they cannot be used in fire resisting or protecting ceilings.

Additional information on the usage limitations of Thermoplastic can be seen in Document B, Volume 1, Table 2 and positioning limitation information can be seen in Diagram 9.

B3 - Internal Fire Spread and Structure

As discussed above, the internal linings of a structure must limit the spread and affect of fire as much as possible and this is no different for the structure of the property.

Section B3 states that in the event of a fire, the structure of the building will maintain its strength for a reasonable amount of time. Where adjoining buildings share the same wall, the wall must be designed resist fire spreading between buildings.

Additionally, buildings should also be designed so that unseen fires (cavity spaces etc....) are inhibited, as well as any smoke and fumes

These requirements are two-fold in that any residents unable to escape require a fair amount of time for rescue and also any firefighters performing a rescue need to be protected from the possibility of the building collapsing around them

Loadbearing Structural Elements

In some situations a given supporting element may be providing stability or support to another. In this instance it must be ensured that the supporting material does not have any less fire resisting capabilities that the element it is supporting.

There are a few items that are not classed as an element of structure, these are as follows:

- Any structure that just supports a roof
- The lowest floor area of a building

When a loft conversion is involved it must be ensured that both floors - the old, existing floor and the new floor retain a full 30 minute fire resistant standard, providing the following are met:

- A maximum of one storey is added
- No more than 2 additional, habitable rooms are created
- The area of the new floor space does not exceed 50m²

Compartmentation and compartment walls form the focus of much of this section of the document due to the fact that they can be present in pretty much all structures and in a variety of different ways. Due to this additional information on their construction and materials that can be used should be sought in Document B, Volume 1, Section 5

Concealed Spaces and Cavities

As with the above and the fact that cavities exist in most properties and dwellings, these need special attention due to the ease in which smoke and fire can spread through them with ease if they are not controlled

To these ends it is important that cavity barriers are used when relevant to prevent the spread of flame, fumes and smoke. For information on how they should be used and featured, please refer to Document B, Volume 1, Section 6.

Protecting Openings

In light of the requirements of the above and blocking any open areas that could enable fire to spread, it is inevitable that doors and windows will need to feature in the building somewhere to provide access etc...., pipes need to run through walls as do vents and ducting.

This will potentially break any elements that are in place to limit fire spread so these openings also need special attention. Further information on this can be found in Document B, Volume 1, Section 7.

B4 - External Fire Spread

The basis of section B4 of this document looks at the external area of the building (e.g. walls and roof) and aims to ensure that, in the event of a fire, both of these elements resist the spread of flame across their surfaces and on to any surrounding structures. The position, usage and surroundings of the given structure are also taken into account.

External Wall Construction

The level of fire resistance of external walls very much depends on size and height of the building and also how close it is to surrounding buildings.

If a given structure is more than 1000mm from its boundary then it is possible to have the external wall fire resisting capabilities reduced, with only the inner walls requiring fire resistant properties.

However, inline with Section 4 of this document, any external or internal loadbearing walls are required to retain their load bearing features in the event of a fire, regardless of other factors

Separation Space and Fire Resistance

When calculating the external area of a building that requires fire proofing, a given structure is measured to the edge of its boundary rather than how close it is to surrounding buildings. This is really so that assumptions can be made rather than trying to calculate individually for every structure as attempting to produce guidelines in this situation would be nigh on impossible.

An area or wall is taken to be facing a boundary if it faces the boundary at 80° or less.

When it comes to the space between actual structures - It is assumed that there is a boundary between the structures. This assumed boundary is referred to as the notional boundary.

Exterior Walls Less than 1000mm from Boundary

When a wall is located less than 1000mm from a boundary, the following points need to be met:

- The only unprotected areas can be those stated in Diagram 20 of Section 9, Volume 1 of Approved Document B
- The remainder of the wall needs to be fire resisting from both of its sides

Exterior Walls More than 1000mm from Boundary

When a wall is located more than 1000mm from a boundary, the following items will need to be met:

- The total unprotected area does not exceed any of the methods stated in paragraph 9.13 of Document B

Calculating Acceptable Unprotected Areas

There are several different ways in which an acceptable level of unprotected wall is calculated. As these methods need some consideration, please refer to Section 9 of Volume one of Document B for more information

Roof Coverings

For the most part, this section deals with the performance of a roof when exposed to fire. In this respect, roof covering refers to a construction that may contain at least one or more layers of material. It should be noted that it does not reference the roof structure as a whole.

Other sections will also need to be referenced when dealing with this particular section - B1 (paragraph 2.10) that deals with escape routes on roofs and also paragraph B2 that deals with roof lights.

In respect to roof areas and the separation distance to surrounding boundaries, the separation distance is measured from the roof to the respective boundary (that can also be a notional boundary). For more information on separation distances and roofing types you will need to refer to Table 5, Section 10, Volume 1 Document B.

Plastic roofing is quite commonly used today and, as you would imagine, is subject to its own set of guidelines. For information on this see Table 6 in this document.

When it comes to wood shingle and thatch roof coverings, please see paragraph 10.9 of this document

B5 - Access and Facilities for Fire Services

As you might expect, a given building or structure should be designed and constructed so that it gives adequate access to firefighters and the fire service so that they are able to deal with a fire as required. This also goes for fire appliances and machinery.

Access at the rear of a building should be provided so that high-access machinery such as turntable ladders and platforms can access areas of the structure as required

In respect to vehicle access, this will need to conform with Table 8 of Document B, Volume 1.

Where dead-end access is present, a turning area will need to be provided, where the access route is over 20m in length.