

**Application of B1 to
loft conversion works
& fire doors to
protected stairways**

04

**Issue 02.00
October 2019**

**Fire Safety:
Dwellings**



Building Control Alliance

Purpose | BCA Technical Guidance Note 04

BCA technical guidance notes are for the benefit of it's members and the construction industry, to provide information, promote good practice and encourage consistency of interpretation for the benefit of our clients. They are advisory in nature, and in all cases the responsibility for determining compliance with the Building Regulations remains with the building control body concerned.

This guidance note is based upon information available at the time of issue and may be subject to change. The Approved Documents should be consulted for full details in any particular case.

Status | BCA Technical Guidance Note 04[illegible]

Notes on issue status:

A minor amendment is issued as an incremental point on the original and is in the form of 04.01.01, where the first number is the TGN number, the second is the issue and the third is the minor revision to the issue.

A major rework or change in guidance is given a new issue number, this would be in the form of 04.**02.00** for a full re-issue.

Minor revisions are issued retaining the main issue number with a sequential revision number, this would be for updating standards or correction of errors. This would be in the form of 04.01.**01** for the first minor revision to the first issue

Always ensure you are using the most recent Guidance Note, these can be referenced at the BCA website:

Conventions used within this document:

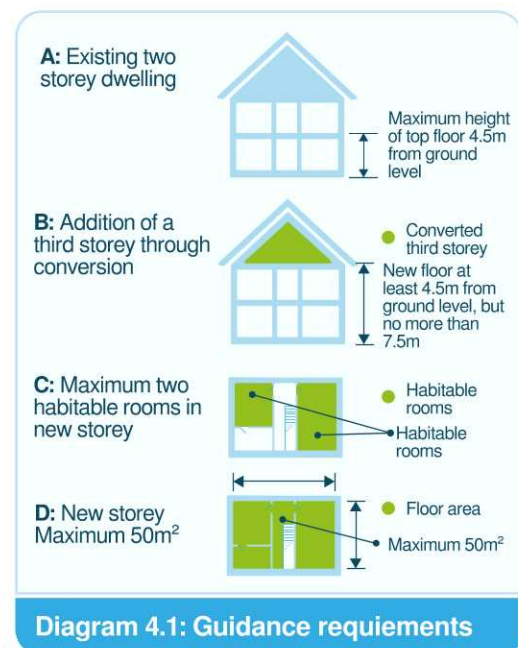
- Websites and links are shown in dark **blue underlined bold text**.
- Standards and referenced documents are shown in **bold text**.
- Defined terms within the glossary are shown in **light blue bold text**.
- Section and diagram references are shown in **purple text**.



Introduction | BCA Technical Guidance Note 04

This guidance is intended to provide an approach that aims to achieve the functional **requirement B1** for loft conversions and can only be used where all the following apply (see also **diagram 4.1**):

- Existing two storey dwellinghouse, converted to provide an additional third storey (**diagram 4.1 A & B**)
- The existing floors are no higher than 4.5m from ground level (**diagram 4.1 A**)
- The additional floor is more than 4.5m from ground level, but no more than 7.5m (**diagram 4.1 B**).
- A maximum of two new habitable rooms to the new third storey (**diagram 4.1 C**)
- The new storey has a maximum floor area of 50m² (**diagram 4.1 D**)



In 2010 the **Construction Products Association (CPA)** published the 'Loft Conversion Project Guide' to help the public; industry and **Building Control Bodies (BCB)** understand and comply with the Building Regulations. The guide was compiled with assistance from **ACAI, LABC, NHBC, FMB** and Energy Saving Trust with support from Andrew Stunell MP, Parliamentary Under-Secretary of State for **Communities and Local Government**.

In recognition, this best practice note offers guidance on the use of fire alarm and detection systems as a possible alternative to the traditional solutions covered in **Approved Document B, Volume 1 (ADBv1)**, with the aim of promoting a consistent approach to the application of Building Regulations.

Key Issues | BCA Technical Guidance Note 04

Where conversion of a loft space is proposed and the floor of the converted space will be above 4.5m from the outside ground level, guidance in **ADBv1** advises that a protected route will need to be provided leading to a final or separated alternative exit on the ground floor of the building.

Alternatives may often be desired which include:

- Retention of existing doors
- Omission of part of the **protected escape route**

Guidance on these variations are not necessarily included within the approved guidance and some options are considered in this guidance note

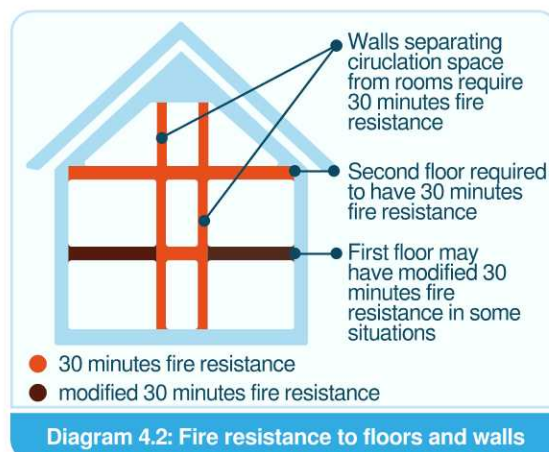
Guidance | BCA Technical Guidance Note 04

Floors, doors and alarms

Floors

In all solutions, the second floor and any walls that separate rooms from the circulation area (such as a **protected stairway**) are required to achieve 30 minutes fire resistance. Under certain circumstances the existing first floor may have a **modified 30 minutes fire resistance** where it separates only rooms, and not circulation spaces (See paragraph 5.4 and Table B4 in **ADBv1**)

See **diagram 4.2** for an indication of the relevant floors and walls.



Continuity of fire separation

The **protected stairway** provided in association with a loft conversion will need to be enclosed within 30 minutes fire resistant construction. This construction will need to be continued around any roof space to maintain the separation from that roof space, void or other area above the **protected stairway**.

ADBv1 diagram 2.3 and paragraph 2.5 recommends that this is achieved by continuing the line of the fire **protected enclosure** within the roof space by cavity barriers taken up to the roof, or alternatively by the provision of a fire resisting ceiling above the whole of the highest storey as illustrated within **diagram 4.3** below.

Where cavity barriers are provided in the roof space over the line of the **protected enclosure** shown in **diagram 4.3a**, they should achieve a minimum of 30 minutes integrity (E 30) and 15 minutes insulation (EI 15) fire resistance from each side in accordance with item 17 of Table B4, Appendix B, **ADBv1**.

In the case of a fire-resisting ceiling over the whole of the highest storey shown in **diagram 4.3b**, this should achieve a minimum 30 minutes integrity and insulation (EI 30) fire resistance from the underside of the whole ceiling in accordance with item 18 of Table B4, Appendix B, **ADBv1**.

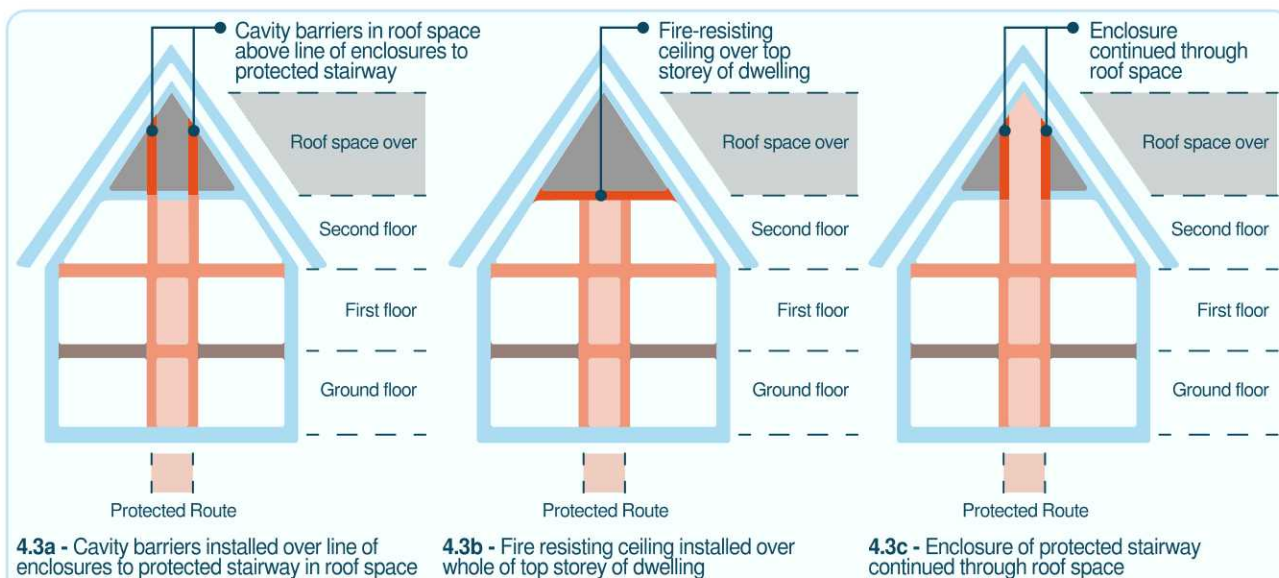


Diagram 4.3: Continuation of fire resisting construction through roof space over protected route

Doors

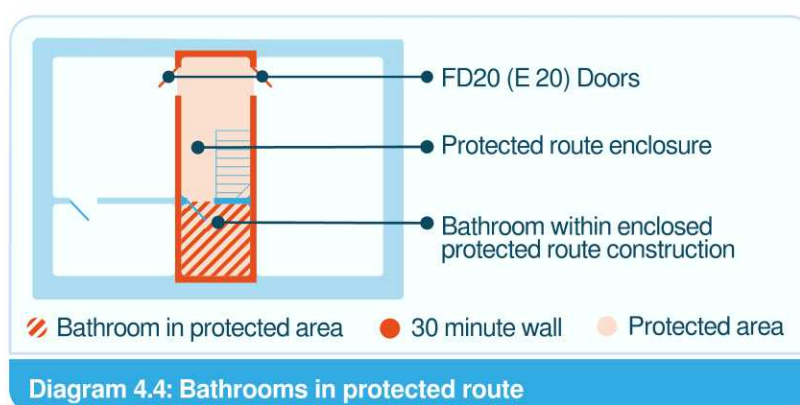
Experience has shown that home owners will often wish to retain existing doors rather than replace them. This section offers some solutions for when it may be possible to accept different types of doors.

In general doors from rooms and cupboards opening on to the stairwell must be **FD20 (E20)** standard, but there is no requirement for them to be self-closing. Any glazing within the doors must achieve a 30 minute fire resisting standard.

The guidance within this note should be read in association with that of **BCA Technical Guidance Note 9 (Fire doors in dwellings)**.

All doors which separate a circulation space from an attached or integral garage are required to be **FD30 (E30)** standard (including intumescent strips), fitted with a self-closing device and incorporate adequate cold smoke seals.

An alternative to providing a fire door on a bathroom which cannot be entered through another room is to include the bathroom within the staircase enclosure. This could be achieved by the walls, floor and ceiling between the bathroom and other rooms achieving a 30 minute fire resisting standard. See example in [diagram 4.4](#).



Where this option is followed, careful consideration of any storage or areas within the bathroom should be made to ensure that there is no contribution to the fire load or risk, otherwise fire doors and fire-resisting construction may be required. This would be the case where an airing cupboard or similar is within a bathroom; or the storage of items compromising the 'sterile' nature of a protected route is likely.

Cupboards provided within the **protected enclosure** or in accordance with the previous paragraph should have **FD20 (E20)** fire doors following policy 9.3 of **BCA Technical Guidance Note 9 (Fire doors in dwellings)**.

Fire door options

a) New door openings

These doors are to be minimum **FD20 (E20)** fire rated doors fixed in suitable fire frames and should be tested/approved by an organisation having the **necessary expertise**.

b) Existing doors of historical or architectural merit

It may be possible to upgrade these doors to an acceptable fire resistant standard through the use of intumescent materials. A number of factors will affect this, including fit of door; quality of joints, glue and wood; type of hinges and hardware. Specialist advice should be sought for any upgrading proposed. Systems or materials used to upgrade the door must be compatible with one another to achieve the equivalent of **FD20 (E20)** performance and should be tested/approved by an organisation having the **necessary expertise**.

c) Existing panel doors in excess of 32mm of any thickness

It may be possible to upgrade these doors to an acceptable fire resistant standard. A number of factors will affect this, including fit of door; quality of joints, glue and wood; type of hinges and hardware. Specialist advice should be sought for any upgrading proposed. Systems or materials used to upgrade the door must be compatible with one another to achieve the equivalent of **FD20 (E20)** performance and should be tested/approved by an organisation having the **necessary expertise**.

d) Existing hardboard flush doors

Existing hardboard or other lightweight flush doors are not considered adequate to provide a reasonable level of fire protection to a stair enclosure and should be replaced with **FD20 (E20)** doors in accordance with the recommendations of the approved document and type (a) above.

e) Glazing in existing timber doors

Unless it can be clearly demonstrated that existing glazing can achieve 30 minutes fire resistance (integrity), it will need to be replaced with glazing and beading that is tested and approved to achieve 30 minutes in accordance with the approved installation method. If this is not possible, the door will need to be replaced with a tested and approved **FD20 (E20)** door in accordance with type (a) above.

Fire alarm and detection systems

All smoke and heat alarm and detection systems are to comply with the guidance in **ADBv1**, paragraphs 1.1 to 1.9, typically consisting of mains wired, interlinked alarms conforming to **BS EN 14604** or **BS 5446-2**, located at all 3 levels of accommodation in the circulation areas.

All alarms should benefit from a standby power supply as detailed in clause 15 of **BS 5839-6**. **BS 5839-6** recommends **optical smoke** detectors in circulation areas with **ionization detectors** being more suitable for living and dining rooms. **Optical sensors** are preferable in bedrooms, although either type would be considered acceptable.

Guidance | BCA Technical Guidance Note 04

Solutions for means of escape

This guidance considers 4 possible solutions to meeting the requirements of **Part B1** 'Means of warning and escape' and these are detailed as solutions 1 to 4 on the following few pages:

- 1 Protected single stair escape
- 2 Partially **protected staircase** and open plan ground floor
- 3 Alternative escape
- 4 Fire engineered approach

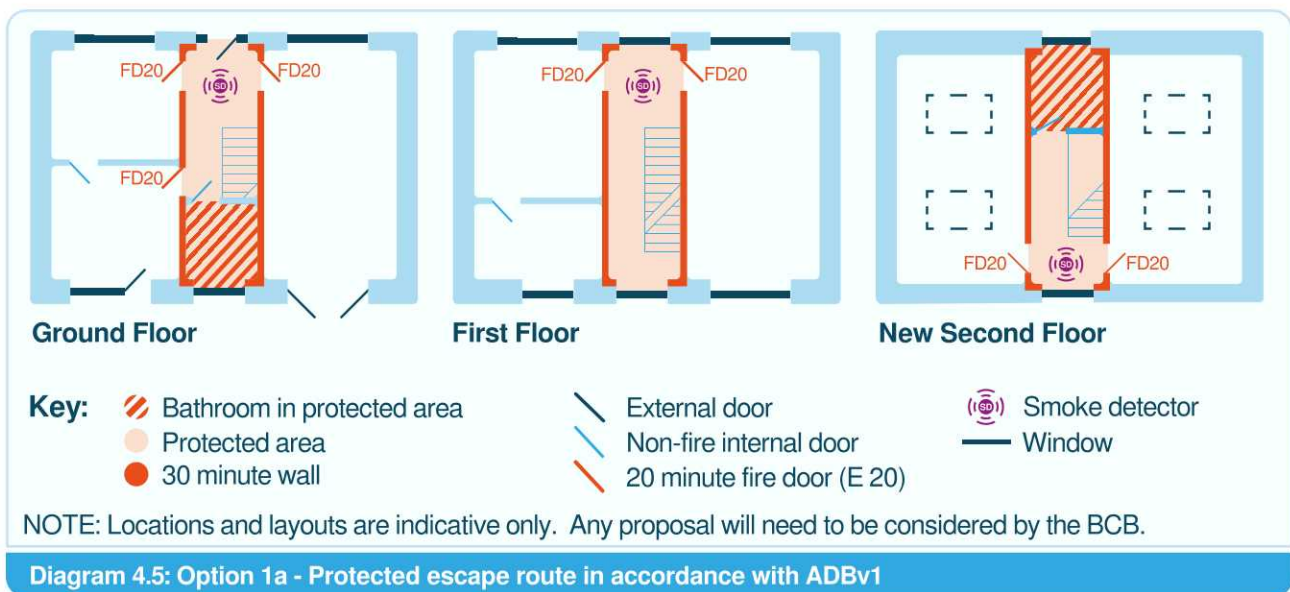
Option 1: Protected single stair

There are three variations of option 1 summarised below, these are:

- 1a. Protected escape route in accordance with ADBv1
- 1b. Alternative exits at ground floor level separated by fire resisting construction
- 1c. Additional smoke detection where doors cannot be upgraded

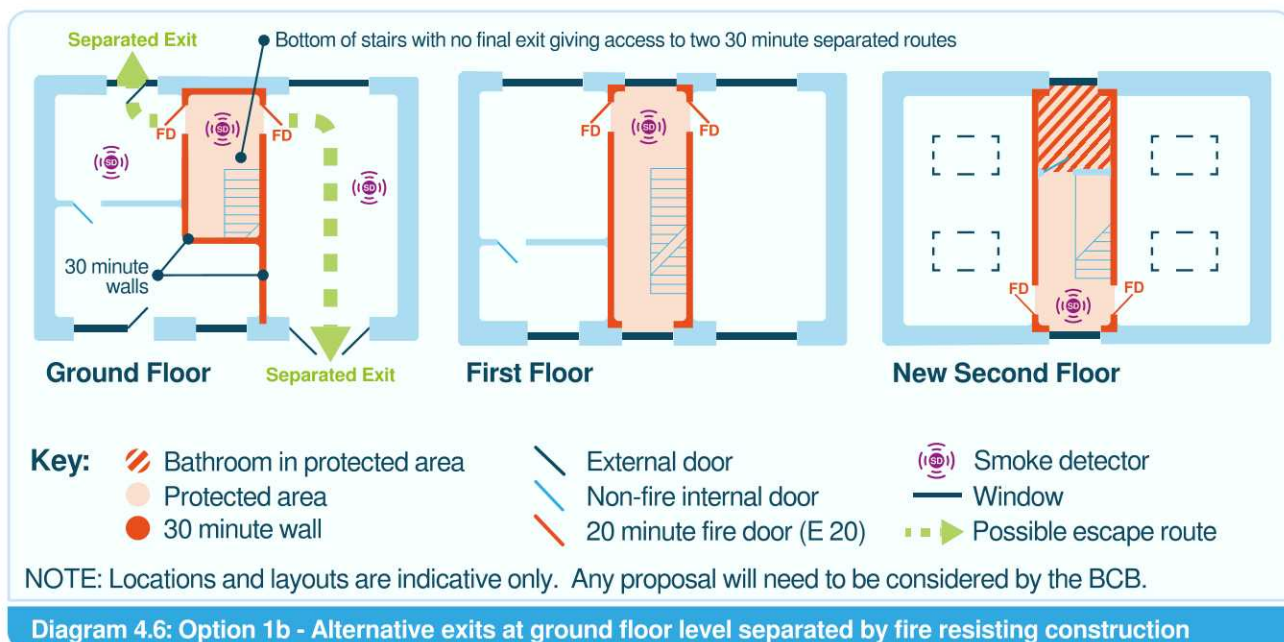
Option 1a: Protected escape route in accordance with ADBv1

A **protected stairway** should be provided throughout the height of the building to a final exit as shown in **diagram 4.5** below.



Option 1b: Alternative exits at ground floor level separated by fire resisting construction

Option 1a can be varied by giving access to two separate escape routes at ground level both of which lead to final exits that are each separated from the other. The enclosure must be to a 30 minute fire resistant standard with doors as detailed above. Interlinked smoke detection should be provided in circulation spaces at all levels and within the rooms at ground floor levels that form the route from the protected enclosure to each final exit as shown in **diagram 4.6** below.



Option 1c: Additional smoke detection where doors cannot be upgraded

Where it cannot be proved that existing doors of historical or architectural merit achieve the **FD20 (E20)** standard of fire resistance then it may be possible to use a fire engineered solution by a qualified fire engineer in accordance with Option 4 subject to **BCB** approval/acceptance.

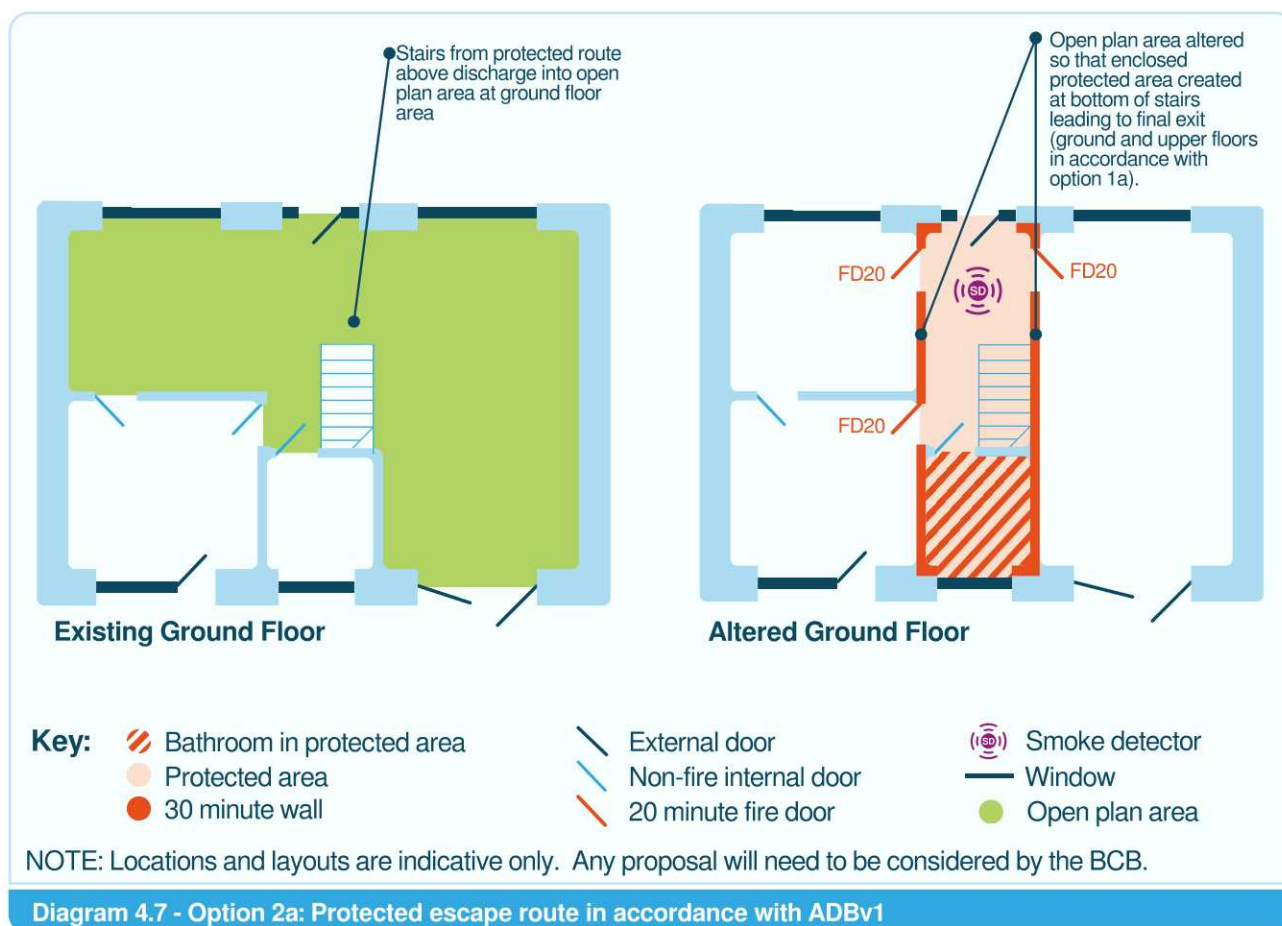
Option 2: Open plan ground floor

There are three variations of option 2 summarised below, these are:

- 2a. Enclosure of ground floor to complete protected route
- 2b. Open floor ground plan retained
- 2c. Additional smoke detection where doors cannot be upgraded

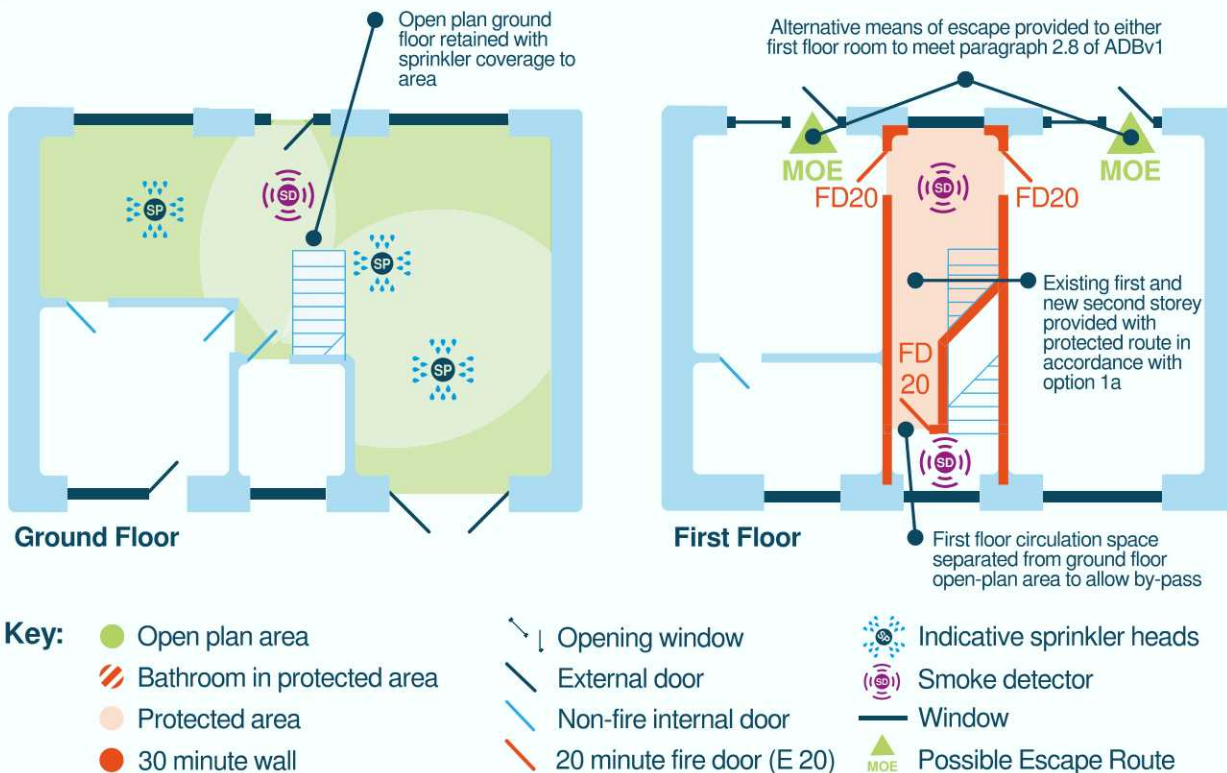
Option 2a: Enclosure of ground floor to complete protected route

If an open plan arrangement exists fire resistant partitions must be installed to enclose the escape route as shown in [diagram 4.7](#) below.



Option 2b: Open plan ground floor retained

Where retention of the open plan ground floor layout is desired, an **automatic water fire suppression system (AWFSS)** can be installed within the ground floor open plan area designed to the relevant British Standard. In such cases this will generally require exposed sprinkler heads that cover the full open plan area, and a fire resisting partition with a fire door to separate the ground floor from the upper storeys enabling access to a suitable egress window at first floor level within the safety zone provided by this door and partition. This is illustrated within [diagram 4.8](#) below.



NOTE: Locations and layouts are indicative only. Any proposal will need to be considered by the BCB.

Diagram 4.8: Option 2b - Open plan ground floor retained

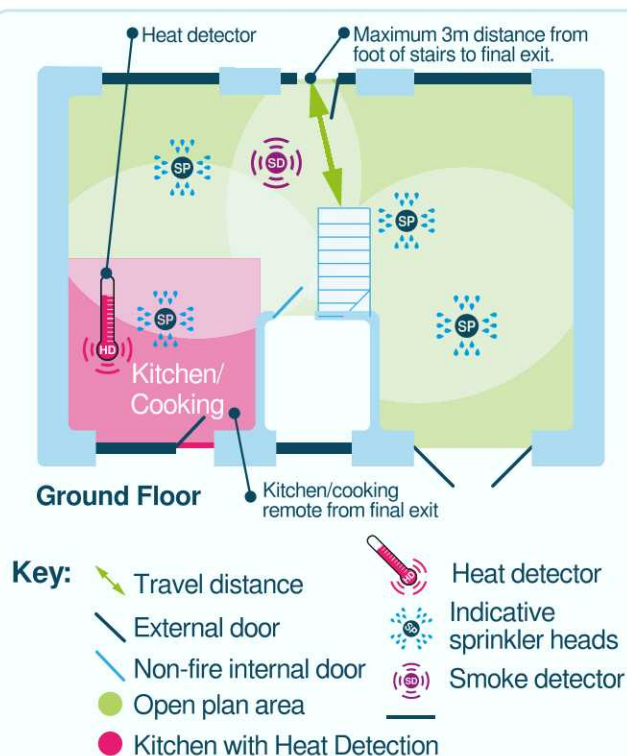
Option 2c: Kitchen/cooking open plan

In an extension of option 2b above, if the kitchen / cooking area is not enclosed the following will need to be incorporated:

- The kitchen/cooking area will need to be remote from the door of the final exit.
- The distance from the foot of the stair to the final exit must be no more than 3m.
- Suitable heat detection will need to be provided within the kitchen/cooking area.

This is illustrated in diagram 4.9 to the right.

Heat detectors will be required in the open plan kitchen area in addition to the interlinked smoke alarms installed within the ground, first and second floor circulation spaces.



NOTE: Locations and layouts are indicative only. Any proposal will need to be considered by the BCB.

Diagram 4.9 - Option 2c: Kitchen/cooking open plan

Option 3: Alternative escape

There are two variations of option 3 summarised below, these are:

- 3a. Alternative escape by a new external staircase from the top storey
- 3b. Alternative escape by a new internal staircase from the top storey

Option 3a: Alternative escape by a new external staircase from the top storey

External escape could be provided from the new top storey to provide an alternative means of escape in accordance with paragraph 2.5b of **ADBv1**. This would need to follow the guidance in paragraph 2.17 of **ADBv1** to demonstrate suitable compliance.

Option 3b: Alternative escape by a new internal staircase from the top storey.

A second internal stair could be provided from the new top storey to provide an alternative means of escape in accordance with paragraphs 2.4 and 2.5b of **ADBv1**. This would need to have suitable separation from the primary route as identified within the Approved Document.

Option 4: Fire engineered approach

In certain circumstances it may be possible to provide a comprehensive fire alarm and detection system rather than providing a protected stair (Options 1 or 2) or an alternative escape route (Option 3). It should be appreciated that 'a comprehensive fire alarm and detection system' is a Grade A system of a type described in **BS 5839-6** (see Option 4 7.3.26/31 **CPA Loft Conversion Project Guide**). A number of factors must be taken into consideration with regard to choice of system and its design as well as the coverage required (i.e. LD1 /LD2). These include:

- The probability of fire occurring
- The probability of injury or death of occupants if fire occurs
- The probability of the system operating correctly in the event of fire
- The probability of early detection and warning of occupants in the event of fire.
- Any potential weakness in the integrity of stair enclosures and doors onto stairways.

However, it is considered fundamental to the success of this solution that any openings onto the stairwell from rooms and cupboards should be fitted with doors. Whilst these doors do not need to achieve the full **FD20 (E20)** fire resistance, they must be well fitted within their frames, with a maximum gap of 4mm at heads and sides. Similarly, whilst the physical integrity of the stair enclosure must be maintained there is no requirement to ensure the full 30 minutes fire resistant standard is achieved.

In every case where this solution is proposed, Building Control should request that a report from a suitably qualified fire engineer supports any scheme submitted.

Recommendation | BCA Technical Guidance Note 04

The above solutions are offered as alternative ways by which loft conversions to 2 storey dwellings can meet the requirements of **Part B1** with regard to means of escape and warning in the event of fire. This Best Practice note has been compiled with reference to **ADBv1** and the **CPA Loft Conversion Project Guide**, which can be accessed via www.constructionproducts/publications.org.uk

Glossary of Terms | BCA Technical Guidance Note 04

ACAI or **Association of Corporate Approved Inspectors.**

An organisation representing private corporate Building Control Bodies.
www.approvedinspectors.org.uk.

Automatic water fire suppression system or **AWFSS**

System designed to control or extinguish fires without human intervention and may be a sprinkler or appropriate Watermist system depending upon the application.

BCB or **Building Control Body**

Building Control Body; the organisation responsible for providing building regulation compliance services, either within Local Authority or private sector Approved Inspector.

Department of Communities and Local Government or **DCLG** or **CLG** or **MHCLG**

HM Government, department responsible for the administration and implementation of the Building Regulations. Former title 'Department of Communities and Local Government' (CLG or DCLG). Has since been renamed 'Ministry of Housing, Communities and Local Government' or MHCLG.

CPA or **Construction Products Association.**

An organisation representing manufacturers and distributors of construction products and materials in the UK. www.constructionproducts.org.uk.

E20

Doorset tested in accordance with **BS EN 1634-1** successfully resisting fire for a minimum of 20 minutes in terms of integrity (E).

E30

Doorset tested in accordance with **BS EN 1634-1** successfully resisting fire for a minimum of 30 minutes in terms of integrity (E).

FD20

Doorset tested in accordance with **BS 476-20:1987** or **BS 476-22:1987** successfully resisting fire for a minimum of 20 minutes.

FD30

Doorset tested in accordance with **BS 476-20:1987** or **BS 476-22:1987** successfully resisting fire for a minimum of 30 minutes.

FMB or **Federation of Master Builders.**

A trade association representing small and medium sized construction firms. www.fmb.org.uk

Ionization chamber smoke detector

Operates where electrical current between electrodes in an ionization chamber is reduced when smoke particles enter.

LABC or **Local Authority Building Control.**

An organisation representing the interests of Local Authority Building Control Departments.
www.labc.co.uk.

Necessary expertise

ADBv1 paragraph B5 of Appendix B states: organisations listed as “notified bodies” in accordance with the European Construction Products Regulation or laboratories accredited by UKAS for the relevant test standard can be assumed to have the necessary expertise.

Modified 30 minutes fire resistance

ADBv1 table B4, item 3(b) and paragraph 5.4 allows a modified 30 minutes fire resistance in certain situations of 30 minutes loadbearing capacity, 15 minutes integrity and 15 minutes insulation or R 30 and REI 15 in accordance with the European Standards.

NHBC or National House-Building Council.

Warranty provider within the UK and **Building Control Body** operating in England and Wales.

Optical smoke detector

Operates by detecting the scattering/absorption of light by smoke particles.

Protected escape route

A route within a flat or dwelling requiring a minimum 30 minutes fire separation to the remainder of the flat/dwelling in accordance with **ADBv1**.

Protected stairway or Protected enclosure

A stairway/enclosure within a dwelling requiring a minimum 30 minutes fire separation to the remainder of the dwelling in accordance with **ADBv1**.

Requirement B1 or Part B1

Requirement B1 of Schedule 1 to the Building Regulations 2010, requirements for means of warning and escape in case of fire.

References | BCA Technical Guidance Note 04

Approved Document B, Volume 1 or ADBv1

HM Government (2019) Approved Document B Volume 1 – Dwellings: 2019 Edition. London: RIBA Books. Also Available from www.gov.uk.

BCA Technical Guidance Note 09 (Fire doors in dwellings)

BCA (2019), TGN 09. Fire doors in dwellings (Second edition). Available from www.buildingcontrolalliance.org.uk

BS EN 1634-1

BSI (2018), BS EN 1634-1:2014+A1:2018. Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware. Fire resistance test for door and shutter assemblies and openable windows. London: British Standards Institution.

BS EN 14604

BSI (2005), BS EN 14604:2005. Smoke alarm devices. London: British Standards Institution.

BS 476-20

BSI (1987), BS 476-20:1987. Fire tests on building materials and structures. Method for determination of the fire resistance of elements of construction. London: British Standards Institution.

BS 476-22

BSI (1987), BS 476-22:1987. Fire tests on building materials and structures. Method for determination of the fire resistance of non-loadbearing elements of construction. London: British Standards Institution.

BS 5446-2

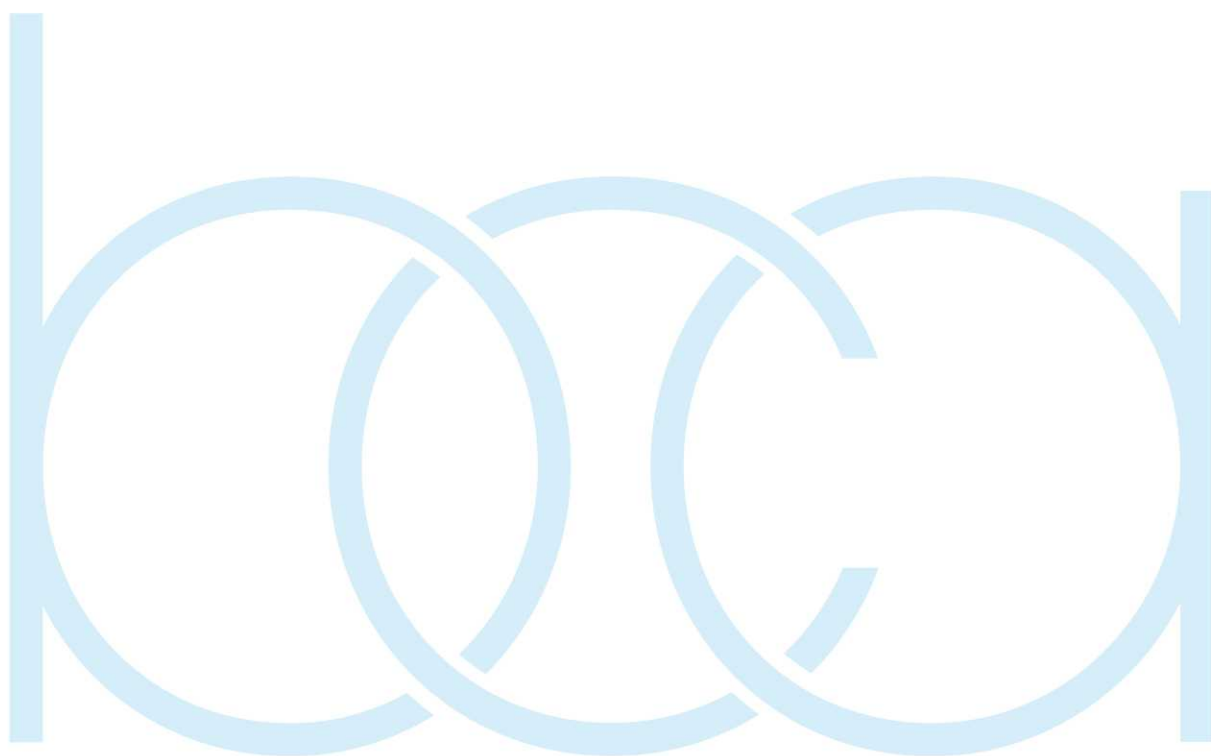
BSI (2003), BS 5446-2:2003. Fire detection and fire alarm devices for dwellings. Specification for heat alarms. London: British Standards Institution.

BS 5839-6

BSI (2013), BS 5839-6:2013. Fire detection and fire alarm systems for buildings – Part 6: Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises. London: British Standards Institution.

CPA Loft Conversion Guide

Construction Products Association (2010), Loft conversion project guide. London: RIBA Publishing. Available for free download from www.constructionproducts.org.uk.



Building Control Alliance



Building Control Alliance

The Building Control Alliance is a unique industry group made up of representatives from clients, stakeholders and all the organisations directly involved in building control in England and Wales.

It includes the organisations supporting the many thousands of building control professionals –

- Chartered Institute of Building
- Chartered Association of Building Engineers
- Royal Institution of Chartered Surveyors

and the professional associations promoting public and private sector building control –

- Local Authority Building Control
- Association of Consultant Approved Inspectors.



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