Loft conversions in two storey houses

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Introduction

This guidance is intended to provide an approach that aims to achieve the functional requirements of regulation B1 for loft conversions and applies to two storey single family unit houses that are converted to form 3 storeys, with a maximum of 2 habitable rooms and a floor area not more than 50m^2 to the new 3rd storey level where only that floor is more than 4.5m above ground level.

In 2010 the Construction Products Association (CPA) published a detailed guidance document '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 an endorsement from Andrew Stunell MP, Parliamentary Under-Secretary of State for Communities and Local Government. In recognition of this document 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.

This best practice note is intended to provide guidance that will promote a consistent approach to applying the Building Regulations.

Key Issues

Floors

The new 2nd floor is in all solutions required to achieve 30 minutes fire resistance along with walls that separate any rooms from a circulation area such as a stairwell enclosure. Under certain circumstances the existing 1st floor may have a modified 30 minutes fire resistance where it separates only rooms and not circulation spaces (B3 4.7).

Doors

From experience it has been found that home owners will often wish to retain doors rather than replace them. This section offers some solutions to when it would or would not be acceptable to accept different types of doors.

In general doors from rooms and cupboards opening on to the stairwell must be FD20 standard, but there is no requirement for them to be self closing. Any glazing in the doors must be of a 30 minutes fire resistant standard. 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 by ensuring that the enclosing walls, floor and ceiling achieve the 30 minutes fire resisting standard. It should also be noted that it may not always be necessary to provide fire doors to certain cupboards if they are small and the fire risk is considered to be low. However, doors which separate a circulation space from an attached or integral garage are required to be FD30, be fitted with a self-closing device and incorporate adequate cold smoke seals.

Options for various doors include:

(a) *New door openings*
These doors are to be minimum FD20 fire rated doors fixed in suitable fire frames.

(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

(c) *Existing panel doors in excess of 32mm thickness*
The door should be attached to the door frame with steel hinges, not be visibly warped,

fit well into its frame (4mm gap at head and sides maximum) and there should be no visible defects particularly in the panels.

There should be no significant defects to adjacent walls or around door frames forming the stair enclosure.

(d) *Existing Panel doors less than 32mm in thickness*
In addition to the recommendations for panel doors in excess of 32mm it will be necessary to upgrade this door type by the application of a suitable fire-resistant proprietary treatment, which may include treatment to the panels and stiles on the room side of the door. The doors should be provided with a certificate from a specialist supplier confirming their fire-resistant integrity.

Alternatively, the door can be upgraded, on the room side, by infilling the panel with a fire-resistant board and applying a similar board glued and screwed over the entire door.

(e) *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 FD 20 doors in accordance with the recommendations of the approved document and type (a) above.

(f) *Glazed doors*
Existing glazed doors which do not provide the required fire protection to a stair enclosure should be replaced with FD20 doors in accordance with type (a) above or the glazing should be replaced with suitable fire-resisting glass with appropriate beading etc.

Glazing in existing doors: Unless it can be clearly demonstrated that existing glazing within timber doors can achieve 30-minutes fire resistance (integrity) then it should be removed and replaced with glazing and beading which does, or alternatively, the full door should be substituted with a new FD20 fire door.

Fire alarm and detection systems

All smoke and heat alarm and detection systems are to comply with the guidance note in B1, paragraph 1.10 onwards, typically consisting of mains-wired, interlinked alarms conforming to BS 5446-1:2000 or BS 5446-2:2003, located at all 3 levels of accommodation in the circulation areas. All alarms should benefit from a standby power supply as detailed in cl.15 of BS 5839-6:2004. BS 5839:6 recommends optical smoke detectors in circulation areas with ionization detectors being better for living and dining rooms. Optical sensors may be better in bedrooms although either type would be considered acceptable.

Solutions

This guidance considers 4 possible solutions to meeting the requirements of Part B1 ‘Means of warning and escape’.

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

1. Protected single stair

A protected stairway should be provided throughout the height of the building to a final exit. This 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.

Where it cannot be proved that existing doors of historical or architectural merit achieve the FD20 standard of fire resistance then smoke detectors will be needed at every storey level (including half landing levels adjacent to habitable rooms) with

smoke detectors in all habitable rooms entered from the stair enclosure and a heat detector in the kitchen.

2. Partially protected (loft and 1st floor level) single stair and open plan ground floor

If an open plan arrangement exists fire resistant partitions must be installed to enclose the escape route, or a fast response sprinkler system can be installed within the ground floor open plan area which must be designed to BS 9251:2005. In such cases this will generally require exposed sprinkler heads that cover the full open plan area, and a fire resisting partition and fire door to separate the ground floor from the upper storeys with access being provided to a suitable egress window at first floor level within the safety zone provided by this door and partition.

It should be noted that all alarms should be mains powered with standby backup, and interlinked so that detection of heat or smoke in one unit operates the alarm in all others. In addition, BS 5839:6 recommends optical smoke detectors in circulation areas with ionization detectors being better for living and dining rooms. Optical sensors may be better in bedrooms although either type would be considered acceptable.

3. Alternative escape

When the dwelling has only one stair, the top storey should be separated from the lower storeys by fire resisting construction to give 30 minutes fire resistance and have an alternative escape route at the upper level that leads to its own exit.

To be considered an alternative the route must be separated from the primary route (staircase enclosure) by either direction and space or fire resisting construction. This approach will ensure that one escape is viable at all times in the event of fire.

The alternative route may be an external stair, in which case attention has to be given to proximity of unprotected areas adjacent to the stairs, glazed areas and doors at other levels which give access to this staircase. For further guidance refer to Approved Document B1 (Vol. 1) paragraph 2.15 onwards.

Smoke detection is also required as outlined above.

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 (Solution 1) or an alternative escape route (Solution 3).

It should be appreciated that ‘a comprehensive fire alarm and detection system’ is either a Grade A or B system of a type described in BS 5839-6 and BS 5839-1 as appropriate (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 fire resistance, they must be well fitting in

their frames, with a maximum of 4mm at heads and sides being considered acceptable. 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 all cases where this solution is proposed Building Control should request that a report from a suitably qualified fire engineer supports any scheme submitted under Option 4.

Recommendation

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 Approved Document Part B1 and the CPA Loft Conversion Project Guide, which can be accessed via
www.constructionproducts/publications.org.uk

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