

# BUILDING REGULATIONS GUIDANCE NOTE NHBC BUILDING CONTROL

## COMBUSTIBLE STAIRS IN TIMBER FRAMED BUILDINGS

Approved Document B - Fire Safety; Volume 2, 5.19, recommends that single escape stairs in residential buildings over three storeys should be constructed of materials of limited combustibility. In addition, this was confirmed in a determination issued by Department of the Environment on 11 August 1994. However, this guidance poses a significant barrier to the efficient use of timber frame in buildings over three storeys in height, and can cause potential problems of differential movement if timber frame is used in conjunction with, for example, a concrete stair construction.

The factor affecting life safety that is different in a building with combustible stairs is the potential for the stair itself to become involved in the fire. Historically this has been viewed to be significant due to the risk of arson in the communal areas of flats. This is a particular risk where a stair is the only available route of escape.

In recent years there have been significant advances in the development of intumescent material technologies and research projects have demonstrated that a stair will not contribute to the development of a fire if treated adequately. Stairs constructed of both white wood timber and MDF have been tested and found to be satisfactory. White wood was chosen as it is in common use in stair construction and has a relatively low permeability. Pressure impregnated treatments may only penetrate 1-2mm. The results of tests can therefore be considered valid for other timber types with equal or higher permeability.

### FIRE RESISTANT TREATMENTS

Intumescent treatments should be factory applied, and is best achieved using pressure impregnation. Surface application is an alternative but it is vital that all surfaces, including the underside of the stair construction, are treated. Wear and tear of surface coatings will be limited to the upper surface of exposed treads and therefore is not considered to significantly influence the results.

Intumescent treatments should ensure that the stair construction is increased to a minimum of Class 1 reaction to fire performance and ideally Class 0.

The underside of stairs should also be protected with a single layer of fire board providing a minimum 30 minute fire protection. Increasing the protection to the underside of the stair is not an alternative to surface treatment on the underside. If two layers of fire board are used this increases the load on the fixings into the relatively narrow strings on the stair. Potential exposure of the string to the fire can potentially lead to premature failure and increased exposure of the underside of a stair to fire.

Although not controlled by Building Regulations, the surface coverings on stairs could potentially provide a path for fire spread. However, it has been shown, in full scale fire tests, that wool based carpet with a foam underlay has no significant detrimental results, and could reduce wear and tear on the surface treatment. No such evidence is available for synthetic based carpets.

### CONCLUSIONS

Where acceptance of a timber or MDF stair is deemed appropriate the following precautions should be taken:

- The building should not exceed 6 storeys with the top floor <18m above ground level
- Stairs should be constructed using thermosetting type glue (e.g. Cascamite).
- Stairs should be treated with an intumescent material to upgrade performance to a minimum of Class 1 reaction to fire performance
- Stairs should be underlined with a single layer of fire board providing a minimum 30 minute fire resistance.

- A secure door entry system shall be installed to the common entrance. Emergency lighting should be provided throughout the escape route.
- Architectural layout should discourage storage within the stair enclosure. Areas under the stair could be reduced/ removed by boxing in, but with no access for storage/cupboard.
- Each design is unique in terms of layout, occupant nature, ground levels and site access hence application of this guidance should take into consideration all individual circumstances of each case. However, it is considered the above information provides a clear framework within which a judgement can be made for developments up to 6 storeys.

## REFERENCES

Paragraph 5.19 Approved Document B Volume 1 2006

BRE Report CC1738 "The Fire Resistance of Timber Frame Buildings" 15th February 2000

DETR Framework Report: 200-711 "TF2000 Stair Fire Test" 21 July 2000

Enjily V - "The Fire Performance of a six storey timber frame building at BRE Cardington" Institution of Structural Engineers 13th February 2003

Unpublished witnessed fire tests, BRE Middlesborough 25th September 2006

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