

Acceptability of common wall constructions containing combustible materials in high rise buildings



Compliance with Building Regulations

Requirement B4 (1) of the Building Regulations 2010 states that

"The external wall of a building shall adequately resist the spread of fire over the walls... having regard to the height, use and position of the building."

Section 12 of Approved Document B2 gives guidance on the acceptable use of combustible materials within the external cladding system.

Where a building has a floor level exceeding 18m from outside ground level, Approved Document B2 recommends (for the entire wall area both below and above 18m) either the use of materials of limited combustibility for all key components or to submit evidence that the complete proposed external cladding system has been assessed according to the acceptance criteria in BR135 - *Fire Performance of External Thermal Insulation for Walls of Multi-storey Buildings*.

Methods of demonstrating compliance

Building Control Alliance (BCA) Guidance Note 18 - Use of Combustible Cladding Materials on Buildings Exceeding 18m in Height provides guidance to builders on demonstrating compliance with NHBC Standards and Building Regulations when proposing to use combustible materials within the external wall construction of a building, with a finished floor level exceeding 18m above ground level. Four methods of demonstrating compliance are provided:

Option 1 - The use of materials of limited combustibility for all elements of the cladding system both above and below 18m.

Option 2 - Provide evidence that the system being used has been tested to BS8414 Parts 1 or 2 and assessed according to the acceptance criteria in BR135 - *Fire Performance of External Thermal Insulation for Walls of Multi-storey Buildings*.

Option 3 - Submission of a desktop assessment of the cladding system prepared by a suitably qualified fire specialist.

Option 4 - Submission of a holistic fire engineered approach for the entire building.

Copies of BCA Guidance Note 18 can be downloaded free of charge from the BCA Website (www.buildingcontrolalliance.org) or from your NHBC Surveyor or Project Manager.

BCA Guidance Note 18 Option 3 assessments

Where it is proposed to use combustible materials, and the system being used has not been tested or assessed according to the acceptance criteria in *BR135 - Fire Performance of External Thermal Insulation for Walls of Multi-storey Buildings*, BCA Guidance Note 18 Option 3 allows for a desktop assessment of the cladding system to be provided to demonstrate compliance as follows -

If no actual fire test data exists for a particular system, the client may instead submit a desktop study report from a suitably qualified fire specialist stating whether, in their opinion, BR135 criteria would be met with the proposed system. The report should be supported by test data from a suitable independent UKAS accredited testing body (BRE, Chiltern Fire or Warrington Fire) and so this option may not be of benefit if the products have not already been tested in multiple situations / arrangements. The report should also specifically reference the tests which have been carried out on the product.

This guidance document has been produced to provide advice to builders on some of the most common wall and facade types encountered on tall buildings where NHBC would no longer require a desktop assessment in accordance with BCA GN 18 Option 3 to demonstrate compliance.

This NHBC guidance document takes into account the significant quantity of data obtained to date from a range of BS8414 tests and subsequent desktop assessments of different combinations of combustible insulation and claddings and recommends a minimum specification which, if met or exceeded would be sufficient to meet NHBC Standards and Building Regulation requirements.

However, it is recognised that it is unlikely that a building will only have a single facade type and so, where other facade types are utilised, it will continue to be necessary to provide justification under BCA Guidance Note 18 for those facade types not featured in this guidance note.

Common wall and facade types accepted by NHBC

The following common wall and facade constructions are acceptable to NHBC without the need to provide an Option 3 assessment providing that the design specification and installation meets the minimum specifications set in the following appendices:-

- 1 Appendix 1 - Brickwork Facade
- 2 Appendix 2 - Timber Panelling
- 3 Appendix 3 - Aluminium Composite Panels

Appendix 1 - Brickwork facade

Key issues

It is considered that the most critical items associated with a brick clad wall build-up using a lightweight steel frame inner leaf are:

- The use of solid masonry (suggested minimum 75mm thick to tie in with AD B recommendations for use of combustible insulation within a masonry cavity wall).
- The use of a cement particle board behind the insulation (minimum Class B as used in several tests and a suggested thickness no less than 12mm).
- The use of reputable and robust cavity barriers - both mineral wool filled and Intumescent products to compartment lines and around all openings.

Restrictions on use

Note that this guidance note does not cover the use of brick-slip systems. Each such system should be considered independently based on individual BS8414 tests / BR135 assessment.

It is also imperative that substitution with a less fire resistant product doesn't take place on site

Guidance

Where a building has a floor level exceeding 18m from outside ground level, a masonry facade is specified and the builder can demonstrate that the following precautions are incorporated into the specification, design and installation of the facade, NHBC will accept the build-up as meeting Requirement B4(1).

From inside to out:

Double layer of 12.5mm plasterboard

Minimum 100mm lightweight steel frame internal leaf (which may incorporate combustible or non-combustible insulation)

No less than 12mm thick cement particle board of minimum combustibility Class B (when assessed to BS EN 13501:1)

Insulation (maximum 140mm thick) comprising one of:

- Kingspan K15

- Celotex RS5000

- Xtratherm SR/RS

Drained and vented cavity

Minimum 75mm solid masonry.

The use of reputable and robust cavity barriers to compartment lines and around all openings is imperative. These should be formed from one of the following materials:

- Steel at least 0.5mm thick
- Timber at least 38mm thick
- Polythene-sleeved mineral wool, or mineral wool slab, under compression
- Calcium silicate, cement-based or gypsum based boards at least 12mm thick
- Proprietary products which have been shown to achieve the requirements for closing cavity without needing to be covered by a plasterboard lining.

Appendix 2 - Timber panelling

Key issues

Unlike many cement based panels which crack and break up under sudden flame impingement, wood remains intact until the point where it burns through. Once burn-through occurs, flames affect both the internal and external faces of the timber panels, giving the potential for flames to spread via the cavity. For this reason, reliable cavity barriers are necessary around window/door openings (to reduce the likelihood of fire entering the cavities at these points) and at compartment lines to restrict the unseen spread within the wall build-up.

The performance criteria of BR135 - *Fire Performance of External Thermal Insulation for Walls of Multi-storey Buildings* are that fire spread should be restricted within the first fifteen minutes of breakout via an opening. With appropriate measures, it is considered that a suitably treated hardwood facade finish will meet these criteria.

These appropriate measures include:

- Timber should be hardwood with a minimum 18mm thickness
- The timber should be factory impregnated with a fire retardant which has been shown to reduce the combustibility of the timber to Class B (in accordance with BS EN 13501:1) and provide a Class O surface spread of flame
- The fire retardant coating should be assured for the building duration - this includes the provision of information to the building's ongoing management regarding retreatment, life span of the product with respect to weathering and UV light etc.
- The use of reputable and robust cavity barriers - either mineral wool filled or intumescent products to compartment lines and around all openings which subdivide timber support bearers.

Restrictions on use

The use of high pressure laminate boards and similar manufactured timber products falls outside of the scope of this guidance note. Each such system should be considered independently based on individual BS8414 tests / BR135 assessment.

It is also imperative that substitution with a less fire resistant product doesn't take place on site.

Guidance

Where a building has a floor level exceeding 18m from outside ground level, a solid hardwood timber panel finish is specified and the builder can demonstrate that the following precautions are incorporated into the specification, design and installation of the facade, NHBC will accept the build-up as meeting Requirement B4(1).

From inside to out:

- Double layer of 12.5mm plasterboard
- Minimum 100mm lightweight steel frame internal leaf (which may incorporate combustible or non-combustible insulation)
- No less than 12mm thick cement particle board of minimum combustibility Class B (when assessed to BS EN 13501:1)
- Insulation (maximum 140mm thick) comprising one of:

- Kingspan K15
- Celotex RS5000
- Xtratherm SR/RS

Drained and vented cavity

Factory treated (to Class B combustibility and Class O Surface Spread of Flame) timber bearers (softwood is acceptable) which are 'broken' at compartment lines by a suitably robust cavity barrier

Factory treated (to Class B combustibility and Class O Surface Spread of Flame) hardwood timber external cladding finish of minimum thickness 18mm.

The use of reputable and robust cavity barriers to compartment lines and around all openings is imperative. These should be formed from one of the following materials:

- Steel at least 0.5mm thick
- Timber at least 38mm thick
- Polythene-sleeved mineral wool, or mineral wool slab, under compression
- Calcium silicate, cement-based or gypsum based boards at least 12mm thick
- Proprietary products which have shown to achieve the requirements for closing cavity without needing to be covered by a plasterboard lining.

Appendix 3 - Aluminium composite panels

Key issues

Similar to cement based panels, mineral cored aluminium composite panels tend to crack and break up under sudden flame impingement. Once burn-through occurs, flames affect both the internal and external faces of the panels, giving the potential for flames to spread via the cavity. For this reason, reliable cavity barriers are necessary around window/door openings (to reduce the likelihood of fire entering the cavities at these points) and at compartment lines to restrict the unseen spread within the wall build-up.

The performance criteria of BR135 - *Fire Performance of External Thermal Insulation for Walls of Multistorey Buildings* are that fire spread should be restricted within the first fifteen minutes of breakout via an opening. With the measures below, it is considered that an aluminium composite panel facade finish will meet these criteria.

These appropriate measures include:

- The use of minimum Class B (in accordance with BS EN 13501:1) aluminium composite panels which provide a Class O surface spread of flame
- The use of a cement particle board behind the insulation (minimum Class B) and a thickness no less than 12mm)
- The use of reputable and robust cavity barriers - both mineral wool filled and intumescent products to compartment lines and around all openings.

Restrictions on use

The use of polythene or polythene / mineral cored aluminium composite panels which do not achieve a minimum Class B combustibility classification fall outside of the scope of this guidance note. Such products are unsuitable for use in high rise situations.

It is also imperative that substitution with a less fire resistant product doesn't take place on site.

Guidance

Where a building has a floor level exceeding 18m from outside ground level, a Class B aluminium composite panel finish is specified and the builder can demonstrate that the following precautions are incorporated into the specification, design and installation of the facade, NHBC will accept the build-up as meeting Requirement B4(i).

From inside to out:

- Double layer of 12.5mm plasterboard
- Minimum 100mm lightweight steel frame internal leaf (which may incorporate combustible or non-combustible insulation)

No less than 12mm thick cement particle board of minimum combustibility Class B (when assessed to BS EN 13501:1)

Insulation (maximum 140mm thick) comprising one of:

- Kingspan K15
- Celotex RS5000
- Xtratherm SR/RS
- Drained and vented cavity
- Aluminium support rails
- Minimum Class B (when assessed to BS EN 13501:1) aluminium composite material boards with a Class O surface spread of flame classification.

The use of reputable and robust cavity barriers to compartment lines and around all openings is imperative. These should be formed from one of the following materials:

- Steel at least 0.5mm thick
- Timber at least 38mm thick
- Polythene-sleeved mineral wool, or mineral wool slab, under compression
- Calcium silicate, cement-based or gypsum based boards at least 12mm thick
- Proprietary products which have shown to achieve the requirements for closing cavity without needing to be covered by a plasterboard lining.