High Rise Buildings with a Floor Level Above 18m

Meeting the guidance within the Requirements of Approved Document B Volume 2
Compliance Without Compromise: Ventilated Façades

How non-combustible ROCKWOOL insulation minimises the risk of fire spread within ventilated Rainscreen Cladding and External Wall Systems in high rise buildings with a floor level above 18m.

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Introduction

With literally thousands of material, texture and colour combinations available, Rainscreen Cladding and External Wall Systems offer designers increased flexibility and the freedom to design bespoke systems for clients and building owners.

Modern methods of construction, like ventilated rainscreen systems, are becoming increasingly popular and often replace more traditional building techniques. A combination of innovative construction methods and a stronger demand for improved thermal performance has resulted in an increase in the amount of thermal insulation used within cladding systems. This technical publication will provide a detailed look at both the fundamental requirement of Part B (Building Regulations) and the guidance offered in Approved Document B, when considering the use of insulation and other materials within the external wall systems of buildings with a floor level above 18m. Rainscreen systems can be created without having to compromise on design, so this publication will also look at how non-combustible products such as stone wool not only minimise risk but also provide a number of key benefits that support freedom for creative design.

Requirement: Part B of the Building Regulations

The Requirement B4(1) of the Building Regulations states that, “The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.”

When considering the external wall system of a high rise, multi-unit buildings there are many potential sources of ignition which can allow fire to attack the cladding:
- Flames issuing out of windows
- Fire radiation from adjacent buildings
- Ignition through arson

The use of non-combustible materials within the external wall system can limit the spread of fire and the risk of secondary compartment fires in other parts of the building.

The guidance offered within Approved Document B4 recognises the risks associated to the use of combustible materials within the cladding system and extended cavities.
The Importance of Defining Non-combustibility

The spirit of the guidance given in Approved Document B with respect to the fire safety of high rise building facades is succinctly summarised by Section 12.5:

“The external envelope of a building should not provide a medium for fire spread if it is likely to be a risk to health or safety. The use of combustible materials in the cladding system and extensive cavities may present such a risk in tall buildings.”

This guidance was echoed in DCLG “Advice for Building owners”, Section 8 Paragraph 3 (August 2017):

“An obvious option to ensure that the cladding system adequately resists external fire spread, is to replace the system with one where all of the elements of the wall are of limited combustibility. For example, a wall system which includes an ACM panel with limited combustibility filler (Category 1) and limited combustibility insulation such as stone wool.”

In order to understand the guidance quoted above, it is first necessary to understand how the terms ‘non-combustible’, ‘limited combustibility’ and ‘combustible’ are defined.

1. Understanding if an insulation product is combustible

By law, all building insulation products subject to a harmonised EN standard must be CE marked - which means manufacturers must declare a fire performance classification known as a Euroclass rating for each of their products.

The Euroclass system determines a product’s fire performance by measuring a comprehensive set of characteristics, including ignitability, flame spread, heat release, smoke production and propensity for producing flaming droplets/particles. The classifications run from A1 to F and are defined with examples in the table below. In summary:

- A1 is non-combustible
- A2 is of ‘limited combustibility’ (limited contribution to fire growth)
- B and below are combustible

<table>
<thead>
<tr>
<th>Euroclass</th>
<th>Definition</th>
<th>Example Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Non-combustible</td>
<td>Stone Wool, Glass Wool, Concrete, Bricks</td>
</tr>
<tr>
<td>A2</td>
<td>Limited combustibility</td>
<td>Some A1 Materials with Organic Facings</td>
</tr>
<tr>
<td>B</td>
<td>Combustible</td>
<td>Some Phenolic Foams</td>
</tr>
<tr>
<td>C</td>
<td>Combustible</td>
<td>Phenolic, some PIR</td>
</tr>
<tr>
<td>D</td>
<td>Combustible</td>
<td>PIR</td>
</tr>
<tr>
<td>E</td>
<td>Combustible</td>
<td>Flame Retarded EPS/XPS, PUR</td>
</tr>
<tr>
<td>F</td>
<td>Combustible</td>
<td>PUR</td>
</tr>
</tbody>
</table>

2. ‘Class 0’ is NOT an indication of a product’s combustibility

Some combustible insulation products focus on a ‘Class 0’ rating when discussing fire performance. However, it is important to note that this limited classification refers only to spread of flame, and therefore has limited relevance to a product’s combustibility.

3. Where can Euroclass ratings be found?

The Euroclass rating of a product can often be missing from its data sheet, particularly for combustible products with poor ratings. However, manufacturers are legally bound to report this information in the product’s ‘Declaration of Performance’ (or ‘DoP’).

The DoP is a legal document in which the manufacturer identifies the product and its intended use, indicating compliance in relation to the relevant Harmonised Product Standard and performance in relation to specified “essential characteristics”.

These documents should be freely available from the manufacturer’s website, but you may find that you have to specifically ask for a copy.

All ROCKWOOL DoPs are available online at rockwool.com/dop

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Declarations of Performance

Declaration of Performance No: UK-0031-01_english

Rainscreen Duoslab

1. Unique identification code of the product type
   UK-WER-0031-01_english

2. Intended use of the construction product as foreseen by the manufacturer, in accordance with the applicable harmonised technical specification
   Thermal insulation for buildings

3. Name, registered trade name or registered trade mark and contact address of the manufacturer, as required pursuant to Article 11(5) of regulation (EU) No 305/2011
   ROCKWOOL Limited
   Pencoed, Bridgend, CF35 6NY

4. Applicable System or Systems of Assessment and Verification of Conformity of Performance (AVCP)
   SYSTEM 1 for uses subject to regulations on reaction to fire
   SYSTEM 3 for all other intended uses

5. Harmonised Standard reference number and date of issue
   BS EN 13162:2012
   Issued on 28 February 2013

6. Notified Body identification number
   046

7. Declared Performance
   Please refer to the table below
   (NPD – No Performance Determined)

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Essential Characteristics

<table>
<thead>
<tr>
<th>Requirement classes in this European Standard</th>
<th>Requirement classes in this European Standard</th>
<th>Declared value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction to fire</td>
<td>4.2.6 Reaction to fire</td>
<td>Euroscales A1</td>
</tr>
</tbody>
</table>
Option 1

The first and foremost way to comply with Building Regulations is to follow the guidance in Approved Document B that restricts the combustibility of the two major components of a building façade: the insulation and the outer cladding.

When combined with cavity barriers, this common-sense approach to fire safety is known to severely limit any potential for fire spread across the face of a building.

- **Insulation**
  
  Approved Document B states simply and clearly, “In a building with a storey 18m or more above ground level, any insulation product used in the external wall construction should be of limited combustibility.”
  
  Under the Euroclass system defined previously, only insulation materials meeting Euroclass A2 or better should be used on buildings over 18 metres in height.

- **Cladding**
  
  Whilst Approved Document B states that the outer cladding on buildings over 18m should be Euroclass B-s3,d0 or better, ROCKWOOL would always advocate the use of a limited combustibility cladding with a minimum rating of A2, such as ROCKANEL FS-Xtra.

- **Cavity Barriers**
  
  Cavity barriers should be provided to close the edges of cavities, including around openings and should also include:
  a. The junction between the external cladding and compartment wall (e.g. ROCKWOOL SP Firestop).
  b. The junction between the cladding and the compartment floor (e.g. ROCKWOOL SP Firestop VRB).

  For more information on the primary route to compliance, please see sections 12.6 –12.9 of Approved Document B.

At ROCKWOOL we strongly believe that all materials (insulation, lining boards and cladding panels) used within external cladding systems on mid-high rise buildings, as well as buildings of a sensitive nature with high occupancy rates, such as schools, hospitals and care homes, should be of limited combustibility or better.

“An obvious option to ensure that the cladding system adequately resists external fire spread, is to replace the system with one where all of the elements of the wall are of limited combustibility. For example, a wall system which includes an ACM panel with limited combustibility filler (category 1) and limited combustibility insulation such as stone wool.”

DCLG “Advice for Building owners”, Section 8 Paragraph 3 (August 2017).
Option 2

BR 135

Recognising the risks associated with the rapidly-increasing use of combustible insulation materials on high rise buildings, in 1987 the government released a guidance document called BR 135 - Fire Performance of External Thermal Insulation for Walls of Multi-storey Buildings.

Today BR 135 exists as an onerous and expensive secondary route to compliance in Approved Document B, whereby external wall systems incorporating combustible insulation are assessed using data from fire tests conducted on a full-scale section of the completed system.

BS 8414

The test standard, BS 8414 – Fire performance of insulated cladding systems, is split into two parts:

- Part 1: Test method for non-loadbearing external cladding systems applied to the face of the building
- Part 2: Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame.

The tests should always be carried out by an independent UKAS accredited testing body. The BS 8414 tests do not give a pass/fail result because the data obtained is used by different bodies with different minimum requirements.

Hence for the purposes of complying with Building Regulations, any test using this method needs to be supported with a classification report for the proposed specification confirming that the specification criteria of BR 135 have been met.

These acceptance criteria are listed in Annex A or Annex B of BR 135 and include the following:

**External and Internal Fire Spread** - determined by a 600°C rise in temperature on the external/internal face of the building (measured at a point approximately one storey above the fire floor) for thirty seconds or more during the initial fifteen minutes of the test.

**Mechanical Performance** - determined by an assessment of building collapse, spalling, delamination, flaming debris or fire pools.
Step-by-step Guide to Compliance
Simplicity, cost-effectiveness and safety of using non-combustible materials.

START
Does the building have a floor at a height of 18m or greater above ground level?

COMPLIANCE ACHIEVED
These regulations do not apply to buildings of under 18m in height.

NO

YES

OPTION 1
Do the materials proposed for use within the Rainscreen Façade System have an EN reaction to fire classification of A1 (non-combustible) or A2 (limited combustibility)?

COMPLIANCE ACHIEVED
No additional test or qualification reports are required and none of the other routes to compliance are needed, saving significant time and expense.
All ROCKWOOL insulation products achieve these standards.

NO

YES

OPTION 2
Testing-based Route
Does the proposed façade system meet the performance criteria given in the BR135 report?

If the proposed cladding system consists of combustible components which include; the insulation, the cladding panel or both, then in order to satisfy the guidance given within Approved Document B4 the system must be subjected to a full scale system test in accordance with BS 8414-1:2002 or BS 8414-2:2005.

It is important to note that a BS 8414 test is specific to the system and components that are being tested. The resulting classification report does not offer any scope and can only cover the details of the system as tested.
Designing external cladding systems that consist of materials which are classified as being of ‘limited combustibility’ (or better) removes the need for any additional testing.
Compliance Without Compromise

Designing Out Risk

Using non-combustible materials wherever possible is the simplest and easiest method of designing out risk and meeting the criteria of Building Regulations. ROCKWOOL RAINSCREEN DUO SLAB® has been rigorously tested to BS EN 13501: 2007, achieving the highest possible European Reaction to Fire Classification - A1 Non-Combustible.

As well as offering low risk solutions, ROCKWOOL Rainscreen products also provide many other benefits including:

- Patented Dual-Density technology
- Pliable fit which results in fewer gaps and reduced thermal bridging
- Improved acoustic performance.

Non-combustible ROCKWOOL insulation also provides a compliant solution for non-ventilated cladding systems that are specified for use above 18 metres.

ROCKWOOL Rainscreen Products

Using stone wool products within the rainscreen cavity does not mean you have to compromise on thermal performance.

**ROCKWOOL FLEXI®**
- Patented ‘Flexi’ edge provides an accurate fit
- Excellent thermal, acoustic and fire performance

**ROCKWOOL SP Firestop VRB**
- Tested to ASFP TGD 19 for use with RAINSCREEN DUO SLAB®
- 60 minutes fire integrity and insulation

Using stone wool products within the rainscreen cavity does not mean you have to compromise on thermal performance.

**Rockpanel®**
- Euroclass A2

**Rockclad FS-Xtra**
- Euroclass A2

<table>
<thead>
<tr>
<th>RAINSCREEN DUO SLAB® Thickness (mm)</th>
<th>FLEXI® Thickness (mm)</th>
<th>Overall Wall Thickness (mm)*</th>
<th>U-values W/m²K</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>140</td>
<td>319</td>
<td>0.22</td>
</tr>
<tr>
<td>125</td>
<td>140</td>
<td>344</td>
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<tr>
<td>150</td>
<td>140</td>
<td>369</td>
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</tr>
<tr>
<td>180</td>
<td>140</td>
<td>399</td>
<td>0.17</td>
</tr>
</tbody>
</table>

* The overall wall thickness is based on the system shown in the image and has been calculated with a 50mm ventilated cavity zone.

**U-value, or thermal calculators, are not new to the construction world**

Download the latest calculator (incorporating BIM) from the ROCKWOOL website for access to all the technical and construction information you need to calculate the thermal performance of walls, floors and roofs for your project.

To download go to [www.rockwool.co.uk](http://www.rockwool.co.uk)
ROCKWOOL® and Rockpanel® partner in award-winning Midlands development

ROCKWOOL® and Rockpanel® have joined forces in developing a high performance, fire resilient cladding project which has transformed three high-rise residential towers for Sandwell Borough Council.

The Challenge

The Crofts in Smethwick consists of 270 homes within Ashcroft, Birchcroft and Elmcroft houses. This development is located on a major arterial route into the city of Birmingham within a district that ranked 12th out of 326 in terms of deprivation in a 2010 study of the country. The three tower blocks, originally constructed in the 1960s, were in universally poor condition, showing signs of major wear and tear to the building fabric, windows, roofing and balconies. In the absence of any wall insulation, they were also proving very difficult to heat and especially challenging to keep warm for those tenants living in fuel poverty.

Refurbishment at The Crofts also offered an opportunity for Sandwell Borough Council to rejuvenate not just these high-rise homes but also the wider area as they sought to bring a renewed sense of pride in their surroundings to residents and the local community.

The Solution

This two year, £11 million project for specialist contractor, Keepmoat, has involved a dramatic, top-to-bottom renovation of each tower at The Crofts.

Substantial improvements have included flat-to-pitched roof conversions with solar panel installations, new windows and striking new balcony enclosures, redecorated communal areas, asbestos removal and the installation of a highly efficient and aesthetically attractive cladding solution, supplied by sister brands ROCKWOOL and Rockpanel®, featuring a non-combustible insulation.

ROCKWOOL RAINSCREEN DUO SLAB® is the non-combustible dual density insulation board fitted at The Crofts. It incorporates patented dual density technology specifically for application to this type of high rise development. Made from stone wool, ROCKWOOL RAINSCREEN DUO SLAB® achieves the highest A1 non-combustible fire rating. It also has the benefit of high resistance to wind and rain during construction, which, together with the minimal number of fixings required, makes installation quicker and easier for contractors. At The Crofts, the product has been tightly butt jointed, to deliver effective thermal insulation at 0.035 W/mK at the same time as it minimises any heat loss that could arise from gaps between insulation boards.

For the exterior cladding, Rockpanel FS-Xtra has been used to provide the attractive aesthetic finish on the project. Applied on top of an aluminium supporting structure and fixed with blind rivets, these Rockpanel ‘FS-Xtra’ boards meet the requirements for European fire classA2-s1,d0. The boards also weigh very little compared to other board materials and can be easily worked with on site, with no special tools required. This saves installation time and costs. Installed on this project by Astley Facades, Rockpanel FS-Xtra boards are available in a wide range of different finishes and colours. A mixture of vibrant Rockpanel Colours such as RAL 3009 and 5011 have been supplied at The Crofts.

The Result

“I’m extremely proud of the work we have been able to do here at The Crofts,” said Darren Cooper, leader of Sandwell Borough Council. “These improvements have made a massive impact on both the internal and external appearance of the blocks, as well as the local skyline. And, the much improved insulation offered by the eye-catching cladding will help reduce fuel bills for tenants.”

A huge uplift in energy performance will result from these improvements. In fact, Sandwell Borough Council estimates that, in total, approximately 9,600 tonnes of carbon will be saved every year.

The Crofts has picked up two awards for corporate social responsibility, including a Bronze in the 2015 International Corporate Social Responsibility Awards and a first prize in the Delivering Social Value category at the 2016 National Federation of Builders Awards.

Ultimately, the project has made a significant impact in the local community. These three tower blocks are not merely visibly transformed, more efficient residences, they are also beacons of hope for tenants and the community of Smethwick.