ROCKWOOL response to the Welsh Government's consultation on banning the use of combustible materials in the external walls of high-rise residential buildings

About ROCKWOOL

ROCKWOOL Ltd is part of the ROCKWOOL Group. With more than 11,000 colleagues in 39 countries, ROCKWOOL Group is the world leader in stone wool solutions. As the world's largest manufacturer of non-combustible stone wool insulation, the ROCKWOOL Group has 80 years of fire safety experience. We have worked with some of Europe's foremost fire safety experts, and campaigned at national and European levels for regulations that protect against the spread of fire in buildings as well as the risks of toxic smoke.

ROCKWOOL Ltd is the UK's leading manufacturer in sustainable stone wool insulation materials for thermal and acoustic purposes as well as fire resilience. Our insulation is non-combustible and is produced at our factory near Bridgend, South Wales.

ROCKWOOL has extensive experience of working with local authorities and housing associations around the UK on high-rise retrofit projects, including but not exclusively in relation to successive government schemes such as CERT-CESP, ECO and the Green Deal. Through this process, ROCKWOOL has engaged extensively with all key elements of the supply chain and we have an in-depth understanding of the policies, regulatory environment for and implementation of retrofit initiatives designed to improve energy efficiency.

We have also participated in major research and development programmes, including the UK Green Building Council's Regeneration and Refurbishment Task Group as well as collaborations with the London School of Economics (LSE) to produce in-depth evaluations of high-rise refurbishment projects, including 'High Rise Hope' – an evaluation of the refurbishment of the Edward Woods Estate in West London. An in-depth study of Wilmcote House, a Portsmouth Council-owned high-rise project where buildings are being renovated to EnerPhit (retrofit equivalent of Passivhaus) standards, will also be published in autumn 2018, including research from the LSE and the University of Southampton demonstrating the project's effectiveness in lifting households out of fuel poverty.

ROCKWOOL Ltd is also extensively involved in the Each Home Counts (EHC) Review and its predecessor the Bonfield Review. It is anticipated that the EHC work will lead to substantial improvements in the quality and performance of the energy efficiency measures installed in our homes. These outcomes and the work undertaken to support them have many important connections with the Hackitt Review of Building Regulations and the Grenfell Inquiry.

About this submission

ROCKWOOL Ltd welcomes the opportunity to respond to the Welsh Government's consultation on banning the use of combustible materials in the external walls of high-rise residential buildings. We have been operating manufacturing facilities in Wales for 39 years, and have long articulated our concerns in relation to the fire safety of combustible materials used on building façades as well as roofs and other applications. It is our long-held belief that both building fire regulations and construction industry practices require urgent reform.

We fully support a ban on the use of combustible materials in the external walls of high-rise residential buildings, and believe this should extend to all high-rise and high-risk buildings. This submission supplements our consultation form to provide more comprehensive information on our recommendations for improving fire safety in the Building Regulations.

Question 1

a. Do you agree that combustible materials in cladding systems should be banned?
Yes, we agree that combustible materials in cladding systems should be banned for high-rise and high-risk buildings. We believe that a ban is a straightforward, practical, enforceable and effective way to improve public safety in the event of a fire.

Specifically, we recommend that:

- All high-rise and high-risk buildings (such as hospitals and care homes, schools, hotels and sports arenas, where there may be challenges in exiting the premises regardless of their height) should be clad and insulated with Euroclass certified A1 and A2 materials only.
- To support this, we should adopt a simple binary system with building materials classified as either non-combustible (Euroclasses A1 and A2) or combustible (Euroclasses B-F).
- Alongside addressing issues of combustibility, regulations should take account of the creation of toxic smoke during fires. Materials testing and classification should be introduced for toxicity, with stringent limits set on their usage which take account of the fatal dangers of toxic smoke in a fire.

At present, the Building Regulations demand that external walls adequately resist the spread of fire. Approved Document B says this can be achieved through use of materials of limited combustibility (A1 or A2 rated on the Euroclass system), or by undertaking a large-scale BS 8414 test on a full façade system. As such, official guidance currently permits the use of combustible materials as part of a system which has been tested to BS 8414 and meets the criteria set out in BR135.

The difference between combustible and non-combustible materials is extremely significant in the context of a building's resistance to fire. For example, combustible plastic foam insulation materials are made from a variety of oil-based chemicals. As such, these materials contain fuel loads that contribute to the spread of fire.

A study by Angelo Lucchini, professor of architectural engineering at the Politecnico Milano, calculated that the combination of insulation and cladding materials used at Grenfell Tower on a dimensionally similar building would supply a fuel load of almost 1,100,000 megajoules of energy. This is equivalent to 32,329 litres of petrol.

Two-thirds of this fuel load comes from the insulation material. According to the Politecnico Milano study, the use of PIR insulation on a building of this size would supply a fuel load of 674,730 megajoules, which is the equivalent of 19,990 litres of petrol; the use of phenolic foam insulation would supply a fuel load of almost 695,000 megajoules – the equivalent of 20,580 litres of petrol.

In fact, this shows that one kilogram of phenolic foam or PIR insulation is equivalent to 0.8 litres of petrol, whilst a kilogram of either XPS or EPS insulation is equivalent to 1.36 litres of petrol. Phenolic foam and PIR insulation both carry a fuel load of 27MJ/kg, and XPS and EPS insulation both carry a fuel load of 46MJ/kg, which is higher than petrol.

In addition, the combustibility of these materials is now well-known, a fact which in itself is a cause for concern in an atmosphere of heightened security.

Combustible materials can also give off significant toxic smoke when burning due to the chemicals from which they are made, and the toxicity of these products is further increased with the addition of fire retardants and other chemicals.

Thick smoke reduces visibility and can significantly complicate rescue and evacuation. Further, toxic smoke is the single greatest cause of death from fire, according to a 2011 study by Professor Richard Hull and Anna Stec at the University of Central Lancashire.

By contrast, non-combustible materials such as ROCKWOOL stone wool insulation do not burn or release significant amounts of toxic smoke when exposed to fire.

Non-combustible products, as defined under the Euroclass classification system, cannot contain significant quantities of combustible materials, including any glues and binders, as this would prevent them from achieving a non-combustible classification (which for example includes testing to determine calorific content in accordance with BS EN ISO 1716:2010).

In principle, the BS 8414 test is designed to test whether a cladding system incorporating combustible cladding and/or insulation has been designed and installed in such a way as to not present a fire risk. However, evidence presented to the BSI by a number of parties including ROCKWOOL[1] and the ABI demonstrates that the BS 8414 test contains serious flaws and introduces an unacceptable level of risk to the building approval process.

Headline concerns include:

- A number of significant parameters are unfit for purpose. For example, the failure temperature and time are too high and too short respectively. Further, as highlighted in a study by the Association of British insurers, the fire load is not representative of modern domestic fires in which around 20% of the materials involved are plastic[2] – typically these are hotter and more intense in real life than under BS 8414.
- There are also key parameters missing from the test criteria. An important example is cavity barrier detailing, such as location and frequency of fire barriers, which can produce critical differences in the test performance. What's more, such details can be chosen by the test client and do not have to reflect real-life practice. Similarly, windows, vents and other common wall features are missing from the current BS 8414 test, meaning that the results are unrepresentative of façade performance in a real fire.
- Key principles of the BS 8414 test also present a concern. For example, in the interests of public safety, a worst case scenario should be tested for, with robust test criteria determined through an independent, rigorous process. These principles are not met by the existing BS 8414 and BR 135 test and performance criteria.
- Finally, a transparency requirement is lacking. For any systems placed on the market, a classification report should be required to be made publicly available, including key information on critical features, components and any performance limitations.

This is further supported by various expert reports stemming from the Grenfell Inquiry. For example:

Professor José L. Torero:

> "Tests such as BS 8414 provide a single scenario deemed consistent with an external fire, a very limited number of measurements and a very simple failure criterion. The combination of these three characteristics does not provide a sufficiently comprehensive assessment of performance."

[1] For further details, please see our submission to the BSI, which is enclosed with this submission.
[2] https://www.abi.org.uk/news/news-articles/2018/04/scale-of-fire-safety-testing-failures-laid-bare/

Dr Barbara Lane:

> "The absence of a body of relevant fire test evidence for rainscreen cladding systems, and the components of rainscreen cladding systems, based on the current submissions to the Public Inquiry, shows a serious failing in the testing and classification regime. A body of publicly available and relevant fire test evidence is urgently required to support common construction forms."

As such, we do not believe the BS 8414 test should be used as a method for approving materials for use on high-rise and high-risk buildings. These buildings are too vulnerable, and the conditions within and around them are too unpredictable, to allow the use of combustible materials approved by a testing regime that is fundamentally flawed.

In Germany for example there is already a requirement for the façades of all high-rise buildings to be clad and insulated in Euroclass A1 and A2 materials only – alternative testing routes for combustible materials are simply not permitted for high-rise buildings.

To truly ensure public safety and building resilience, Wales should require the use of Euroclass certified A1 and A2 materials only, on high-rise and high-risk buildings as well as sensitive and high occupancy buildings such as hospitals and care homes, schools, hotels and sports arenas, where there may be challenges in exiting the premises regardless of their height.

We further recommend that materials in or on the external walls of any building with a storey 18m or more above ground level, should meet class A2-s1, d0 or better (rather than A2-s3, d2 or better, as provided in the current version of Approved Document B). Seeking to reduce the potential development of toxic smoke and burning droplets by requiring A2-s1, d0 materials mirrors the approach taken by countries such as Germany.

This approach would eliminate the ambiguity and room for interpretation that exists in the current system. It would be a simple, easily implementable, and effective way to safeguard lives and property – and to restore public confidence in the fire safety of the buildings they occupy.

b. Should the ban be implemented through changes to the Building Regulations (i.e through legislation rather than the Approved Documents)?
Yes, the ban should be implemented through changes to the Building Regulations. Without clear prescription in law with regards to the combustibility of materials on the façades of high-rise and high-risk buildings, official guidance provided in the Approved Documents can be bypassed in favour of alternative guidance created and favoured by industry.

Building Regulations should be amended to include a specific ban on the use of combustible cladding and insulation on the façades of high-rise and high-risk buildings, to ensure that it cannot be side-stepped and that those not complying with the ban will be open to prosecution.

c. If no, how else could the ban be achieved?
We do not believe that the ban can be as effectively achieved in any other way.

Question 2. Do you agree that the ban should apply:

a. to buildings 18m or over in height?
Yes, we agree that the ban should apply to **all** buildings 18m or over in height, including domestic buildings, hotels, offices, student accommodation and multi-purpose blocks.

In addition, the ban should apply to all buildings over 12m in height where only single escape routes are in place.
The ban should also apply to all **high-risk** buildings such as hospitals, care homes, schools, hotels, and entertainment venues, regardless of height.

b. If no, to what height, higher or lower, should the ban apply? Explain why
We believe that the ban should apply to all buildings, both residential and non-residential, over 18m in height where multiple escape routes are in place.
In addition, the ban should apply to all other buildings, both residential and non-residential, over 12m in height where single escape routes are in place.
Further, the ban should apply to all high-risk buildings such as hospitals, care homes, schools, hotels, and entertainment venues, regardless of height.

c. throughout the entire height of the wall, i.e. both below and above 18m?
Yes, we agree that the ban should apply throughout the entire height of the wall, i.e. both below and above 18m. This will ensure that the ban aligns with current building regulations guidance and is easily understood, hence reducing the possibility of misinterpretation. It will also ensure that the occupants in the floors at a height below 18m will enjoy no lesser standard of safety than those above.

d. to high-rise residential buildings only?
No, we believe that the ban should apply to all buildings 18m or over in height as well as to high-risk buildings such as hospitals, care homes, schools, student accommodation and entertainment venues, regardless of their height.

e. If no, should the ban apply to high-rise non-residential buildings e.g. offices and other buildings, as well as residential buildings?
Yes, we believe that the ban should apply to all residential and non-residential buildings 18m or over in height and to all those buildings 12m or over in height where only single escape routes are in place.
In addition, the ban should apply to high-risk buildings such as hospitals, care homes, schools and entertainment venues, regardless of their height.

f. Please provide any further information in relation to your answers above
A ban which incorporates all the building types highlighted above is essential for multiple reasons, including:

- Occupants of hotels and offices should enjoy no lesser standard of safety than those in residential buildings, especially as occupants may unfamiliar with the layout of the building and the placement of escape routes, and further may not understand English sufficiently to understand guidance and directions given.
- There is a significant trend towards multi-purpose buildings as well as the conversion of office buildings to residential buildings around the UK. It is imperative that our buildings are future-proofed to allow for changing use over their lifetimes in a manner than ensures continued public safety.
- A multi-tier system introduces significant complexity which goes against the need for clear and straightforward public safety requirements.

Question 3.

a. Do you agree that the European classification system should be used?
Yes, we agree that the European classification system should be used for all components used in wall construction.

b. If yes, do you consider that Class A2 or better is the correct classification for materials to be used in wall construction?
Yes, we agree that Class A2 or better is the correct classification for all substantive components such as insulation and cladding used in wall construction. A-class materials can make no significant contribution to any stage of a fire and this rigorous classification provides the necessary means of defining non-combustibility in line with many other EU Member States and in Scotland.

Further, this is why countries such as Germany, which already ban combustible materials on high rises, do this via a requirement for A1 and A2 materials only.

c. If no, what class should be allowed in wall construction and why?
As per our answer to Q3a, only A-class insulation and cladding materials should be used for substantive components such as insulation and cladding in wall construction.

Question 4.

a. Do you agree that a ban should cover the entire wall construction?
Yes, we agree that a ban should cover the entire wall assembly, through the wall, from its internal surface to its outermost face.

However, as per our response to Q5, we consider that specific, non-substantive components with minimal 'fuel source potential' should be exempted.

b. If no, what aspects of the wall should it cover?
As above, we agree that a ban should cover the entire wall assembly, through the wall, from its internal surface to its outermost face.

c. Should a ban also cover window spandrels, balconies, brise soleil and similar building elements?
Yes, a ban should also cover window spandrels, balconies, brise soleil and similar building elements.

d. Please provide any further information in relation to your answers above
The importance of a ban on substantive combustible elements such as balconies was highlighted most recently by a fire which spread to four balconies at a block of flats in West Hampstead[3]. However, as per our response to Question 5, we consider that specific, non-substantive components with minimal 'fuel source potential' could be exempted.

[3] https://www.bbc.com/news/uk-england-london-44698742

Question 5.

a. Do you agree that a limited number of wall system components should, by exception, be exempted from the proposed ban?
Yes, we agree that a restricted number of wall system components should, by exception, be exempted from the proposed ban. Exemptions should be limited to non-substantive components with minimal 'fuel source potential'.

b. If yes, what components should be included on an exemption list and what conditions should be imposed on their use?
Exemptions should be limited to non-substantive components with minimal 'fuel source potential'.

We suggest that exempted components be included on an exemption list which clearly and unambiguously defines:

- the description of the exempted component and its specific, allowed purpose;
- its composition and fire performance (Euroclass, calorific content, etc);
- any limiting dimensions;
- the required certification of the exempted component;
- the quantity of exempted component that may be used;
- the allowed location of the exempted component and/or any prohibited locations; and
- any restrictions on how the exempted component may be used in combination with other materials, notably other exempted components.

Components which should be reviewed under such a framework would include internal wallpaper and paint, window frames, gaskets and seals, vapour membranes, surface finishes and laminated glass.

c. If no, what alternative way of achieving the policy aims would you suggest??
We do not believe that there is a more effective way of achieving the policy aims, and we recommend a clearly defined list based on 'fuel source potential' as detailed above.

Question 6: Do you agree that:

a. the ban should apply to proposed alterations to existing buildings including over-cladding?
Yes, the ban should apply to proposed alterations to existing buildings.

b. the ban should extend to projects that have been notified before the ban takes effect but work has not begun on site?
Yes, the ban should apply to notified new build projects.

c. the ban should not affect projects where building work has already begun?
Combustible insulation and cladding materials should not be used even where building work has already begun.

Question 7.

a. Which wall elements are likely to be affected by the proposed change – i.e. where they would pass as part of a cladding system in a BS8414 test but would not meet the proposed Class A2 or better requirement (e.g. sheathing boards or vapour barriers)?
The primary elements affected would be combustible cladding and insulation materials, for which non-combustible alternatives are readily available.

We propose that non-substantive components with minimal 'fuel source potential' such as vapour barriers should be exempted from the proposed change.

b. In England there are suggestions that since the Grenfell Tower fire, a high proportion of relevant building work is already using elements which meet Class A2 or better. What is your experience?
No precise market data is available, but our own analysis suggests that prior to Grenfell, 80-90% of projects involving a cladding system (either new build or retrofit) involved systems using combustible insulation. Since the Grenfell fire, a significant shift has taken place such that approximately 20% of high-rise projects involving a cladding system (either new build or retrofit) are now using combustible insulation.

c. What the impact of removing access to the BS8414 for those buildings affected by the ban test is likely to be?
Non-combustible (Euroclass A-rated) solutions are readily available on the market, as is reflected in the market already switching to these solutions post-Grenfell.

d. How much extra cost would typically be involved in meeting the proposed new requirements (for buildings 18m or over) against a building which meets the current requirements? (Please provide any further details)
In a direct comparison of material costs, the cost of non-combustible insulation over combustible insulation may add an additional 0.1% to the overall project costs, which include other materials, plant such as scaffolding and labour. We have commissioned an external review to provide a more detailed breakdown of costs and would be pleased to make this available to the Welsh Government when complete.

In addition, durable non-combustible insulation materials such as mineral wool are more straightforward to install properly, which may deliver higher in-use energy savings than less effectively installed and less durable materials.

e. Please provide any further comments on the likely impact of this change for construction (eg supply chains).
Many countries have already switched to a ban on combustible materials for high-rise buildings. This has proved to be practical in every respect.

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