ARC Building Solutions

Award-winning manufacturers of Cavity Fire Barriers and Cavity Closers

Rock Mineral Wool vs Glass Mineral Wool

The differences when it comes to fire performance

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ROCK MINERAL WOOL VS GLASS MINERAL WOOL: THE DIFFERENCES WHEN IT COMES TO FIRE PERFORMANCE

Introduction

This whitepaper will focus on mineral wool, a catch-all term that can be used to describe two different forms of material: glass mineral wool and rock mineral wool.

The two elements are commonly used across the construction industry, offering a versatile and effective solution for an extensive range of buildings. Both materials have several practical benefits for construction applications. Glass mineral wool and rock mineral wool can be used to limit heat loss within homes, as well as providing sound insulation. They can also both be used to improve fire resistance within residential and commercial properties, but to differing extents.

Whilst inherently similar, the two materials are different. As such, the aim of this whitepaper is to:

- Help specifiers and installers to better understand the performance attributes of each mineral wool material
- Highlight the key differences between them
- Outline why rock mineral wool is an ideal solution for cavity fire barrier and cavity closer solutions.

What are the differences between Glass and Rock Mineral Wool?

In this first section, we will break down the major differences between glass mineral wool and rock mineral wool, concentrating on what sets each material apart in terms of manufacturing techniques, as well as their respective performance values.

Rock Mineral Wool

Glass Mineral Wool

Rock mineral wool insulation

Production

Rock mineral wool is manufactured using rock, alongside blast furnace, or steel slags; this normally accounts for around 97% of the material. Additionally, a further two to three percent is made from organic content in the product, as well as an adhesive and a small amount of oil. These materials are combined using intense heat within a furnace and then are spun together to create a fibre-like structure.

Rock mineral wool can be produced in a variety of densities, according to format and function. As such, it is a highly versatile material, which can be used across a wide range of building applications.

Sustainability

Depending on how it is produced, rock mineral wool can be a highly sustainable material. In fact, some rock mineral wool solutions include nearly a quarter of secondary industrial waste. Additionally, rock mineral wool has great heat saving properties and can be used to help improve the energy efficiency of homes.

Performance

Solutions manufactured from rock mineral wool offer tremendous thermal and acoustic properties. In terms of preventing heat loss, rock mineral wool systems can attain R-values of around 3 to 3.3. What's more, as a dense material, rock mineral wool provides exceptional protection against excess noise and as such, can be used to insulate properties against sound just as effectively.

Installation

Rock mineral wool systems tend to be very easy to install. Whilst slightly heavier than glass mineral wool, rock mineral wool is easier to cut, move and fit into place. In fact, many rock mineral wool systems can be cut using basic construction tools and correctly fitted without the need for specialist equipment.

Glass mineral wool insulation

Production

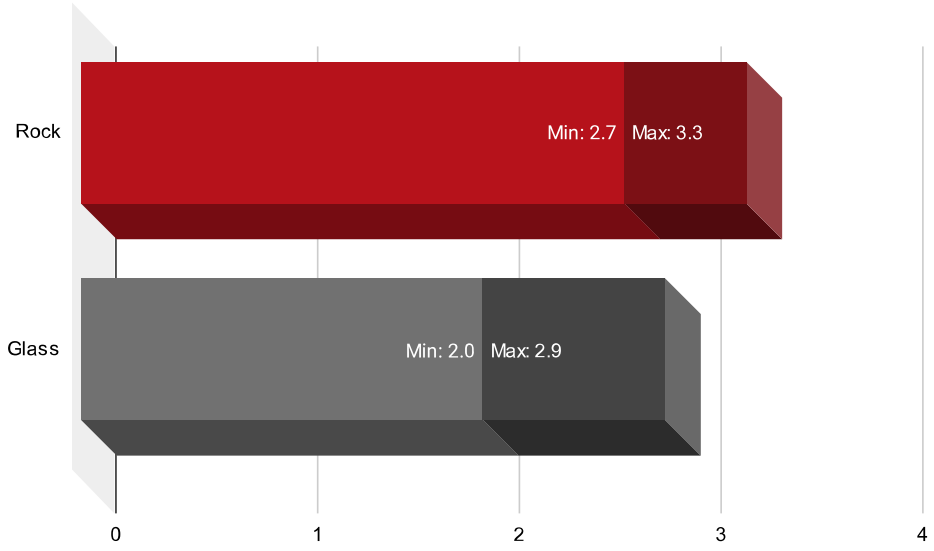
Similar to rock mineral wool, glass mineral wool is produced using incredibly high temperatures inside furnaces. Most of the time, glass mineral wool is manufactured from silica sand, recycled sand, limestone and soda ash. Akin to rock mineral wool, the material can be formed to different densities depending on its required application. As such, the material is versatile and can be used in a multitude of ways.

Sustainability

Increasingly, recycled glass is used in the manufacture of glass mineral wool insulation. Like rock mineral wool, the material can theoretically be reused and recycled at the end of its life. However, it is worth noting that it's harder to do this within the UK as there are currently no 'take back' schemes available for the material.

Performance

Solutions manufactured from glass mineral wool offer solid thermal and acoustic properties but can be outperformed by rock mineral wool alternatives. In terms of heat loss, glass mineral wool can achieve R-values of around 2.2 to 2.9, which is effective, but not as effective as the values of some rock mineral wool. Likewise, as a typically less dense material, glass mineral wool can also offer inferior performance in terms of sound insulation.



Installation

Glass mineral wool is lighter than rock mineral wool because it is less dense, this makes glass mineral wool limper and very flexible. Rock mineral wool is denser and more rigid. Depending on the application, one may be easier to install than the other.

THE FIRE PERFORMANCE OF GLASS AND ROCK MINERAL WOOL

When it comes to a fire breaking out in domestic or commercial properties, the priority is to protect the lives of occupants. However, the building itself, and the assets within it, should not be forgotten. The better the building can perform in the event of a fire – the better the chances are of everyone getting to safety and firefighters gaining the access they need to deal with the fire itself.

As such, every building must be designed and constructed in such a way that in the event of an outbreak, the unseen spread of fire and smoke within concealed spaces, in its structure and fabric, is inhibited.

Therefore, it is vital that those with responsibility for specification understand how different materials will behave in the event of a fire. Notably, when it comes to insulation, the two forms of mineral wool (rock and glass) perform differently.

Understanding these differences is important in order to make an informed decision and to do this – it is imperative that you understand the terminology used by manufacturers first:

Reaction to Fire	At its most basic, reaction to fire denotes the response of various products in contributing to a fire through decomposition. In short, reaction to fire ratings consider the energy that different materials contribute to the growth of a blaze. Within this consideration, the combustibility and ignitability of different materials are the two main factors that must be studied. Reaction to Fire is also classified through the European Standard BS EN 13501-1 (also known as Euroclasses). Assessed through a scaled standard class, which runs from A through to F, the standard considers building products' reaction to fire.
Fire Resistance	Fire resistance is classified through the European Standard BS EN 13501-2, which assesses two key areas of fire resistance performance: integrity and insulation. The term relates to a material's capability to withstand fire and continue performing as expected for a specific period of time during a blaze. In serious fires, fire resistant components play a crucial role in helping to preserve the structural integrity of buildings and are essential in helping to prevent serious, long-lasting damage in structures.
Non-combustible	A material which will not ignite, burn or release flammable vapours when exposed to fire or heat.
Fire Stopping	Fire-stopping is a form of passive fire protection that is used to seal around openings and between joints in a fire-resistance-rated wall or floor assembly. Firestops are designed to maintain the fire-resistance rating of a wall or floor assembly intended to impede the spread of fire and smoke.
Passive Fire Protection	Passive Fire Protection is built into the structure of a building to provide stability and into walls and floors to separate the building into areas of manageable risk – compartments. These areas are designed to restrict the growth and spread of fire allowing occupants to escape and offering protection for firefighters.

So, what are the differences?

Despite glass mineral wool and rock mineral wool both being cited as non-combustible, the actual fire resistance of each product varies. We take an in depth look at each material here.

	Rock	Glass
Euroclass standard	Euroclass 'A1' standard	Euroclass 'A1' standard
Melting temperature	Over 1000°C	Around 400°C

Glass mineral wool

Glass mineral wool delivers effective fire-resistance. Many insulation solutions manufactured from this material will meet the highest standards covered under BS EN 13501-1. However, it is important to check this as and when glass mineral wool insulation is chosen for a project, to ensure it does comply to this standard. Products made from glass mineral wool are also able to meet the best possible Euroclass 'A1' standard for reaction to fire classification.

It has been well documented that glass mineral wool fibres have been tested to withstand temperatures of around 400°C. On account of this performance, glass mineral wool is far more fire resistant than alternative materials, such as fibreglass. Although glass mineral wool can be incorporated within a fire-stopping system, helping to meet increasingly stringent fire-related regulations – it doesn't match rock mineral wool insulation in terms of fire-resistant performance.

Rock mineral wool

The fire safety performance of rock mineral wool is arguably where the material most excels regarding its practical applications.

In fact, according to several mineral wool insulation manufacturers, rock mineral wool has a melting temperature of over 1000°C. As such, as a naturally non-combustible material, rock mineral wool lends itself for use in insulation solutions, but most notably in passive fire protection schemes.

Due to rock mineral wool's high melting point, this exceptional performance dramatically mitigates the risk of fire spreading within building structures. What's more, as rock mineral wool is highly fire resistant it can be relied on to prevent the passage of heat from one part of a building to another. Therefore, rock mineral wool is the most suitable material in providing prolonged periods of fire resistance.

Fire performance certifications and regulations

As well as understanding the performance of how each mineral wool reacts in the case of a fire, it is also important to understand the fire certifications products can obtain, as well as the relevant Building Regulations that need to be adhered to.

Building Regulation Part B	Last updated in July 2019, Building Regulation Part B, or Approved Document B addresses fire safety precautions that must be followed to uphold the safety of occupants, firefighters and those close to a building in the event of a blaze. Separated into two volumes, the requirement also addresses the spread of fire in internal environments and the relevant building and safety measures associated with this.
Building Regulation Part E	Building Regulation Part E, or Approved Document E provides advice on the resistance to the passage of sound in all manner of buildings. This guidance applies to new buildings, to alterations to pre-existing premises and to buildings being converted to flats. With regard to fire cavities and fire-resistant barriers, Building Regulation Part E states that building contractors must ensure solutions effectively insulate against sound to uphold the standard.
Certifire	An independent third-party certification scheme that guarantees levels of performance, quality, reliability and traceability of products and systems. The organisation is heralded by several relevant regulatory authorities across the world and recognised as an international mark of fire safety across a diverse range of products including hardware. Ensuring building solutions are Certifire accredited provides regulators, specifiers, customers and end-users with the utmost confidence that the chosen solutions will work as needed in the event of a blaze.
Robust Details	The robustdetails® scheme is an alternative to pre-completion sound testing for satisfying Part E of the Building Regulations. Thanks to this level of testing, uncertainties around pre-completion sound testing are removed. What's more, robustdetails® is a UKAS accredited product certification body.

Cavities and the importance for fire barriers / constructing fire safe buildings

When studying the Building Regulations and Approved Document B, compartmentalisation is a key part of a building's passive fire protection, with fire barriers separating distinct areas within a building. The creation of these smaller compartments and layered pockets of fire resistance within a building helps to ensure that, in the unfortunate event of a fire, it would be contained within a relatively small area, providing residents with the time and means to escape the building safely.

Cavity barriers and cavity closers are just a couple of solutions available on the market, which play a fundamental role within an effective fire stopping strategy. Used to close concealed voids and prevent penetration of smoke or flames to restrict the passage of fire within a building, cavity barriers are required within the cavity at every separating floor or wall junction. In timber frame construction, it is also necessary to fire stop around openings, such as windows and doors.

What is a cavity fire barrier and cavity closer?

Manufactured from blocks of fire-resistant materials, cavity barriers can be used to prevent the spread of fire within cavity spaces. To uphold appropriate fire safety standards, cavity barriers should be installed during construction. Once installed, this form of system can help to provide passive fire protection and prevent the spread of flames and smoke.

As a result, cavity fire barrier solutions refer to systems used within walls, enclosed by structural beams or other elements. However, cavity fire barrier solutions don't refer to systems used in pipes, flues, chutes, ducts or conduits. With that said, a cavity in an external wall can still be used as a chimney and will perform effectively.

Much like cavity barriers, cavity closers are used to seal barriers. They are also used to prevent external water vapour and damp from entering the cavity wall. As such, cavity closers are not used to prevent fire, but can be used as part of effective fire protection protocols.

On top of this performance, cavity closers are able to offer efficient insulation within built structures. In the UK, where cavity walls are highly common, cavity closers play an important role in reducing heat loss from homes and ensure that truly energy efficient

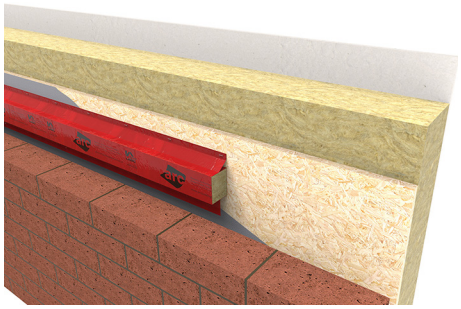
buildings can be delivered. The solution is likely to become more common soon, as energy efficiency targets become increasingly pressing.

As long as cavity closer solutions are fitted correctly, they are also capable of reducing the risk of water ingress within built structures. Such systems can act as a barrier for unprotected reveals, preventing the build-up of condensation as well as damp and mould. Similarly, cavity closer solutions can be used to help prevent cold bridging, which occurs in environments where a segment of a building experiences high levels of heat transfer.

ARC's Solutions

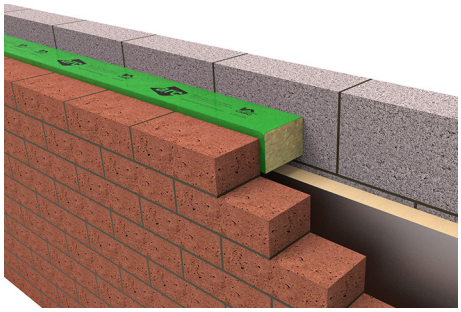
Due to its exceptional fire performance capabilities, ARC only manufactures its solutions using rock mineral wool. What's more, all of ARC's solutions have been appraised by the Certifire independent third-party accreditation scheme to assure performance, quality, reliability and traceability. Its fire barriers and cavity closers are also manufactured to NHBC requirements and hold LABC accreditation.

ARC offers a variety of cavity fire barrier and cavity closers solutions, including:



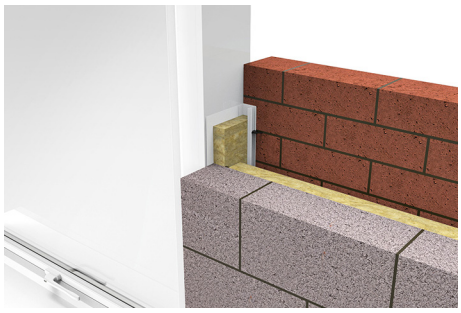
ARC TCB

This restricts the spread of smoke and flames within the cavity of timber frame walls, while also minimising the effect of flanking noise pollution. It is ideally suited for providing a cavity barrier within the external wall cavity, in line with a separating wall or floor, and around window and door openings, as specified in Approved Document B. The ARC TCB system is designed to suit specific cavity widths and is available in 5mm increments. To this end, it's important for the appropriate size to be fitted in order to achieve the required compression fit and to ensure the product performs as expected.



ARC Cavity Stop Socks

ARC's Cavity Stop Socks restricts the spread of smoke and flames within the cavity of external masonry walls. It is ideally suited for providing a cavity barrier within the external wall cavity, in line with a separating wall or floor as specified in Approved Document B, and for closing the cavity at eaves level. The Cavity Stop Sock will provide effective fire and thermal performance when used around window and door openings. When using the product, contractors and specifiers will need to consider moisture penetration in their designs, as the product does not include an integral DPC. Akin to ARC TCB, the system can suit specific cavity widths and is available in 5mm increments. Again, to ensure the product performs as expected, it's crucial for the appropriate size to be fitted.



ARC Eco-Closer

ARC Eco-Closer closes the cavity around any window and door openings in masonry walls, providing up to 60 minutes fire integrity. The rigid PVCu profile is insulated with non-combustible rock mineral wool. As such, the system provides strong fire, thermal and acoustic properties. What's more, these high-performance levels can be achieved without the need for any additional fixings.

Project: Roofspace Solutions

Description

Brought to the market in 2008, i-Roof was developed by Roofspace as an innovative new solution to the traditionally built roof. The room-in-roof product uses modern methods of construction to support housebuilders, speeding up build times and reducing the risk of health and safety on site.

Over recent years, the system was adapted to include firestopping materials to ensure the correct firestopping was installed and to provide clients with the complete package.

Solution

Instead, the i-Roof system now uses the ARC Cavity Stop Sock, ARC Soffit Slab and ARC TCB. The Cavity Stop Sock restricts the spread of smoke and flames within the cavity of external masonry walls and the Soffit Slab is designed to fill the void within the soffit, providing a fire, thermal and acoustic barrier between dwellings.

TCBs restrict the spread of smoke and flames within the cavity of timber frame walls, providing up to 60 minutes of fire integrity. All products have achieved CERTIFIRE, an independent third-party certification scheme that assures performance, quality, reliability and traceability.

Products used in this project

- Cavity Stop Sock
  Used to restrict the spread of smoke and flames within the cavity of external masonry walls.
- Soffit Slab
  Was designed to fill the void within the soffit, providing a fire, thermal and acoustic barrier between dwellings.
- TCB
  Used to restrict the spread of smoke and flames within the cavity of timber frame walls, while also minimising the effect of flanking noise pollution.

Results

By utilising modern methods of construction, where the build of the room-in-roof solution takes place offsite in a factory, the i-Roof system allows for a quick and easy on-site installation. To this end, Roofspace can deliver and install the full i-Roof system in just one day.

> We know that there will continue to be a shift in fire regulations, and it is reassuring to know that we have a partner, ARC, that we will be able to develop new solutions and share information with. We want to be proactive rather than reactive, and together with ARC, we will be able to build homes that are fit for the future.
>
> **Mark Gray, Head of Design and Technical at Roofspace Solutions**

Conclusion

Both glass mineral wool and rock mineral wool are effective insulation materials that can be used to great effect within the construction sector. Through their usage, the industry can help to make the UK's building stock more energy efficient and fire safe, while delivering more comfortable internal environments for occupants.

The two materials can play a pivotal role in helping to ensure buildings are properly insulated, reducing demands for energy usage and in turn, helping to lower energy bills – an important consideration, if the UK is to meet its Net Zero targets. Recent developments in the sustainable production of both materials are helping to further enhance this energy efficient performance and enabling the built environment to limit its associated carbon footprint.

Whilst both materials offer strong performance, rock mineral wool is the superior option, as across almost every aspect of performance, the material delivers greater results. Most notably, rock mineral wool delivers far more effective performance regarding fire resistance. That's why at ARC, we use the material across our range of cavity fire barrier and cavity closer solutions.

As demonstrated, solutions manufactured from rock mineral wool can deliver exceptional fire-resistant performance across a wide range of applications. Through their specification, contractors and specifiers can uphold the highest fire safety standards and meet all relevant requirements and regulations on several construction projects, both domestic and commercial.

To achieve the best results, those in the industry are advised to liaise with a genuine rock mineral wool insulation expert, such as ARC Building Solutions. With nearly 15 years' experience in the sector, our unique and innovative products can deliver safer and more sustainable homes and buildings.

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