



8 facts about

Stone wool's mechanical performance



Good mechanical performance is an important parameter for insulation materials. Stone wool products' mechanical properties are designed to meet the needs of individual applications. Dimensional stability and fit-ability are inherent properties for all stone wool products.

ROCKWOOL stone wool can be engineered to offer the best performance for a diverse range of applications. Our double-density technology, for example, supports better distribution of point load in roof constructions; the firmness and fibrous nature of the product will guarantee perfect adhesion to timber frame construction; dimensional stability provides outstanding functional performance under all weather conditions; and some specific patented double-density slabs can even be used under trains to absorb vibration.

1

What happens when a force is applied to a product?

The application of force results in the product's deformation. This may be temporary, referred to as "elastic deformation", or permanent, called "plastic deformation". A classic example of elastic deformation, and indeed, of highly elastic behaviour, is a sponge: it can be deformed many times its original size, but upon release, it returns to its original shape. Examples of plastic deformation, on the other hand, include the bending of a steel rod or a spoon under tension. The difference between the two cases can be seen in Figure 1.



Figure 1.

2

How should you choose an insulation product according to its mechanical performance?

The mechanical performance of an insulation product should be designed in accordance with the application the product will be used for. It is important to consider the type of construction, the use and the surrounding conditions to make the most informed decision on the mechanical performance needed. For example, ROCKWOOL's ETICS double-density boards are designed to better support render application and to improve the resistance of the panel to wind load suction. They also provide superior surface resistance against accidental impact.

When it comes to roofs, ROCKWOOL's boards offer a wide range of compressive strengths that are optimised to best fit the usage. Boards are also characterised by double-density technology with a more rigid upper crust, which improves mechanical behaviour, especially with concentrated load (point load) by sharing the load on a wider surface portion. For example, a permanent point load is a PV panel, while an accidental point load would be the heels of people walking on the roof for maintenance reasons.

2 (continued)

Stone wool's mechanical performance also fits timber frame constructions and between rafters in pitched roofs. This is due to the inherently fibrous nature of the product that perfectly adheres to uneven surfaces and edges, together with its natural rigidity, which ensures that the product will remain in place throughout the construction's life. The good fit-ability results in lower heat loss and thus lower heating and cooling costs for the building.

3

Is there a difference in mechanical performance between stone wool and other insulation products?

What is unique with stone wool is that its mechanical performance can be designed to fit different types of applications. High compressive strength can only be an advantage in certain types of constructions whilst in others it can lead to poor fit-ability. That is why, for example, in roofing there are several classes based on the product's compressive strength, which must be matched with its use. A high class corresponds to a product that can withstand a specific load on a regular basis.

4

Can stone wool be deformed permanently by sun, heat, water or fit-for-use loads?

No, stone wool boards do not shrink, warp or deform over time, they provide a highly stable substrate without causing undesirable stress, for example, on the render of the ETICS, or on the roofing membrane.

Stone wool presents only a temporary deformation, meaning that it can return to its original shape

shortly after. In fact, it is characterised as "dimensionally stable", as the changes in length, width and thickness under specific temperature and humidity variations are expected to be less than one percent¹. Considering ETICS application, where the surface temperature can reach higher than 80°C, a stable product means that you will be avoiding gaps (and therefore cracks) on render. This will help avoid repair costs and increased heating and cooling costs from the reduced thermal performance due to the gaps.

5

Can stone wool withstand vibration?

Yes, some ROCKWOOL products are engineered precisely to control unwanted ground-borne noise and vibrations through our new unique technology. This offers ultra-high fatigue resistance slabs which provide durable, low maintenance solutions for railway tracks. In fact, our anti-vibration stone wool mats provide vibration reduction by resiliently decoupling the track from the ground due to its dynamic properties with high volume compressibility. The mats are also able to sustain very high pressure and keep functional performance under any climatic conditions, even down to sub-zero temperatures.

6

What is walkability and how does it affect stone wool's mechanical performance on roofs?

Walkability refers to the capability of the insulation product to withstand and not change shape and thickness when exposed to repeated loads on a regular basis, such as people walking on a roof on a daily basis. If a product is walkable, it means that its mechanical properties and shape are not affected by this continuous load, resulting in a stable mechanical performance over time.

7

Is walkability considered an issue for stone wool insulation products in roof applications?

No. We provide stone wool products for roof applications that are intended for areas with both heavy and less heavy traffic. When designing a roof system, the point load needed for the insulation product should be specified; this will allow for relevant product selection. In short, when we can provide products that can carry the load of trains, we can certainly carry the load on a roof.

After reading these facts on the mechanical performance of insulation materials, you are now ready to make informed decisions on the insulation materials you are installing and can make sure that they are always fit for purpose.

8

Does the mechanical performance of stone wool roof boards deteriorate after their installation?

Stone wool products are dimensionally stable. Their inherent fit-ability properties support easy installation, which avoid gaps and adheres perfectly to all edges. If stone wool is properly installed and fits the intended use, it demonstrates a consistent mechanical performance over time with no deterioration. This has been confirmed by a study conducted by European Insulation Manufacturers Association (EURIMA)², where samples from installed roofs were tested after long-term use. It was found that the mechanical performance properties of the products were sufficient over time.



2 - FIW, Durability Project Mineral Wool (2016), "Conclusions and Outlook." Available via EURIMA (European Insulation Manufacturers Association) at https://www.eurima.org/uploads/ModuleXtender/Publications/168/2017-02-21_EURIMA-55YearsOfUse_Info_Sheet_V08_final.pdf, accessed at 23 Jan.2020