

Mineral wool is a general term for a light, manmade wool made of inorganic substance such as glass, stone or slag that was originally invented in the middle of the 19th century for thermal and acoustic insulation in the construction industry.

Recent advancements have been made in the manufacture of mineral wool offering environmental alternatives such as the product SW501 Needled Mineral Hydro Blanket which offers superior performance because it is manufactured without additives or binders. This engineered product supports long term stability and stormwater retention performance in outdoor applications such as vegetated roofing.

### **Traditional binders**

The most common mineral wool on the market is sprayed, or bound, with phenolic resin or diluted phenol-formaldehyde (PF) for dimensional stability. These binders also help make the product water repellent and fire resistant, which is ideal when the material is used as insulation in the construction industry. When the traditional mineral wool is modified with a hydrophilic

(or wetting) agent, it can be used as a growing media for hydroponic cultivation in a strictly controlled environment. If this type of mineral wool is used as an alternative to other growing media it requires uniform conditions such as a green house where usage cycles are relatively short - from one

to a few growing seasons. If this mineral wool is exposed to varying, uncontrolled climatic conditions (dry/wet periods, freeze/thaw cycles, high/low temperatures) for longer periods, the water holding characteristics will change significantly in terms of decreased hydrophilic ability. Therefore, cycles of drought or precipitation will negatively influence the long term performance and water absorption capacity. This phenomenon likely occurs due to the hydrophilic agent rinsing out, which causes the initial hydrophobic character to prevail.

Therefore, traditional mineral wool is not ideal for outdoor applications, such as vegetated roofing. Its hydrophobic propensity renders it:

- Inconsistent and unreliable stormwater management product over time
- Unable to effectively sustain rooftop plants during significant stress in hot and dry seasons.

### **Needled, or binderless, innovation**

The most recent industry advancement is the manufacture of needled mineral wool, a non-petroleum-based and formaldehyde-free alternative. This innovative needling process provides dimensional stability without the use of any binders. Mineral wool is formed by a mechanical interconnection of pure mineral fibres. This needling process forms a structurally stable, lightweight and porous material with longer fibres that maintains excellent water holding properties. It is consistently

hydrophilic, even after varying weather cycles throughout the year. When wet, it holds 90% of its volume in water, with the majority of the retained water being easily available for the plants uptake<sup>1</sup>. There is a minimum of 10% oxygen left in the needled mineral wool, enough to support the oxygen levels in the root zone to support healthy roots. Therefore, plant roots thrive in needled mineral wool. The material is inert with chemically stable fibres.

Needled RMW hydrophilic characteristics have long term stability as nothing rinses away. The physical attraction between fibres and water remains the same throughout the lifetime of the products.

Needled RMW is ideal for vegetated roofs, as it:

- is lightweight
- can supplement, or in some cases replace, heavy growing media
- can act as a water reservoir and support plant health
- achieves greater LEED credits
- performs exceptionally and reliably as a rooftop stormwater management tool over the lifespan of the vegetated roof

A needled manufacturing process does not require binders, ensures the product's natural hydrophilicity remains intact making it highly reliable for long term stormwater management performance in vegetated roofs. When it comes to long term water absorption, research shows that long term water absorption of needled mineral wool is

70%, whereas traditional phenol-based horticultural mineral wool absorbs significantly less, between 20 - 35%.