Abstract

Silicones constitute a class of polymeric materials of high technological relevance, whose structure based on siloxane bonds (Si–O–Si) imparts superior properties compared to conventional polymers. These properties include high thermal and chemical stability, hydrophobicity, low surface energy, flexibility over a wide temperature range, and high durability, making silicones particularly suitable for industrial applications that require long-lasting and reliable performance.

In the context of cement-based materials, especially fiber-cement, the incorporation or application of silicones plays a significant role in enhancing durability. Silicone treatments promote water repellence of both surfaces and the porous matrix of fiber-cement, reducing capillary water absorption without compromising vapor permeability. This is provided by reducing the water absorption during tests like karsten tube, water immersion or water uptake capillarity.

Beyond improvements in physical and chemical resistance, the use of silicones in fiber-cement directly contributes to material sustainability. The idea of reducing the water a fiber cement corrugate sheet will absorb after a rain for example could improve the service life of this construction element. We know water inside a fiber cement board promotes the growth of mold and other microorganisms, also could be a reason for efflorescence.

Moreover, enhanced dimensional stability and functional performance improve the overall quality of the final product, enabling compliance with increasingly stringent technical, regulatory, and performance requirements in the construction sector.

Therefore, the application of silicones in fiber-cement systems should not be regarded merely as an additive or surface treatment, but rather as a strategic technological solution that integrates performance, durability, sustainability, and quality, aligning materials innovation with current engineering and construction industry demands.