

AEROPAN: prefabricated flexible nanoporous aerogel based panel with superior performance for building insulation

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Invented in 1931 Aerogel is a lightweight silica solid derived from gel in which the liquid component of the gel has been replaced with gas. The silica solids, which are poor conductors, consist of very small, three-dimensional, intertwined clusters that comprise only 3% of the volume. The remaining 97% of the volume is composed of air in extremely small nanopores. These characteristics make Aerogel the world's lowest density solid and most effective thermal insulator.

AEROPAN project aims at developing a new kind of insulating panel based on flexible nanoporous silica Aerogel (NSA) with reinforcing fibers. NSA owns unique properties: extremely low thermal conductivity (13.1 mW/mK at 10°C) compared to traditional materials (Fig. 1a); unaltered performance over 60 years as shown by accelerated ageing tests (Fig. 1b); low thickness (only 10mm); superior flexibility, compression resistance and huge hydrophobicity with a water contact angle >150° (Fig. 1c); finally, once installed it contribute to reduce the U-value by 40-50% (Fig. 1d). The expected result of AEROPAN is the original combination of NSA and a patented coating plate made in thermoplastic composites to deliver industry-leading thermal performance in an easy-to-handle and environmentally safe panel with a thermal conductivity <14 mW/mK at 10°C with only 10mm thickness.

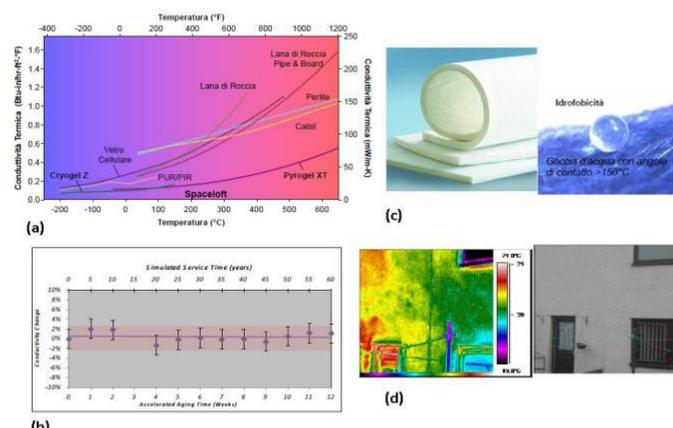


Fig.1 (a) Thermal conductivity vs T of NSA compared to other traditional materials; (b) Conductivity change vs simulated service time; (c) Flexible mats of NSA and its hydrophobic behavior; (d) Infrared analysis after NSA