STRATMO by TerraVac STRATMO+ by TerraVac

TECHSHEET STRATMO AND STRATMO+

FILM-BASED PERLITE VACUUM INSULATION FOR INDUSTRIAL SERIES PRODUCTS

Product description

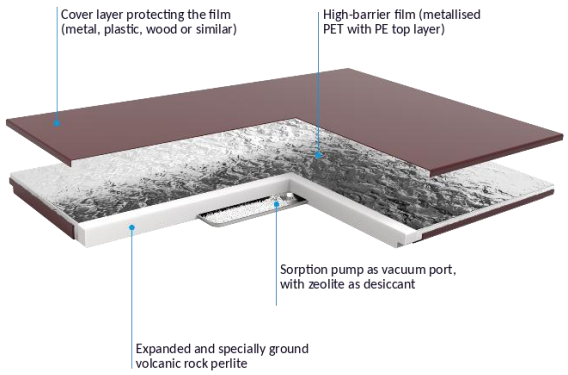
STRATMO is TerraVac's film-based perlite vacuum insulation. Expanded volcanic rock is enclosed in a metallised high-barrier film and evacuated. The result is a self-supporting vacuum body that combines insulation and structure in a single component and outperforms conventional insulation of the same thickness many times over.

STRATMO+ additionally embeds a glass fibre vacuum panel in the vacuum space of a STRATMO body. As a standalone panel, glass fibre ages too quickly for products with a service life of several years. Inside the second vacuum space, its very low thermal conductivity is retained over the long term. STRATMO+ is more complex to design, but delivers the best insulation performance overall and the best insulation performance per unit of weight.

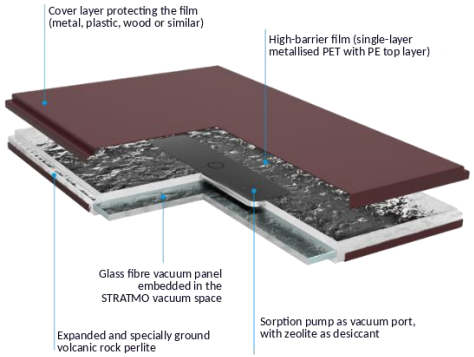
The technology has been in series production since 2019 and in high-volume production of refrigerators and freezers since 2022.

Design

- Vacuum body made of expanded and specially ground perlite, enclosed in a metallised high-barrier film. Parts of the envelope can be formed by metal components using a special metal-to-film bonding.
- Sorption pump with zeolite as vacuum port, permanently binds residual moisture and secures insulation performance over the product's service life
- Cover layer protecting the film, available in metal, plastic, wood or other materials. The sandwich structure gives the component its stiffness.
- For STRATMO+, an additional glass fibre vacuum panel embedded in the vacuum space of the STRATMO body
- Built in the shape of the product rather than inserted as a panel. Three-dimensional geometries are possible, and joints with their typical thermal bridges are eliminated.
- *STRATMO design, illustrated using a panel*



- *STRATMO+ design, illustrated using a panel*



Features

- Thinner insulation layer for the same insulation performance, giving more usable volume within unchanged outer dimensions or more compact products
- Self-supporting vacuum body, eliminating structural parts and enabling new product architectures
- As a volcanic rock, perlite is non-combustible, pressure-resistant, inert and pH-neutral, and free of blowing agents and halogenated flame retardants
- Low energy input for extracting and processing the core material, and perlite can be recovered after use
- Maintenance-free over the product's service life, closed system with no moving parts

Applications

STRATMO is suitable wherever larger volumes or complex geometries need high-quality insulation. These include refrigerators and freezers, refrigerated furniture and cold room construction, transport and pharma boxes, hot water and cold storage tanks, district heating and cryogenic pipes, and insulation panels for cold stores and building applications. STRATMO+ is intended for panels and boards with the highest insulation requirements or low weight, such as doors of ultra-low temperature freezers.

TerraVac works exclusively with industrial customers and system providers who integrate the technology into their own series products. We do not supply private customers or tradespeople.

Properties (without facing)

Property	STRATMO	STRATMO+
Thermal conductivity of core material at 10 °C mean temperature	approx. 7 mW/m·K	approx. 1.5 mW/m·K
System heat ingress	determined for each project	determined for each project
Temperature range	-270 °C to +150 °C, film-only envelope -40 °C to +50 °C	-270 °C to +150 °C, film-only envelope -40 °C to +50 °C
Internal pressure on delivery	≤ 0.1 mbar	≤ 0.1 mbar
Density of vacuum body	approx. 200 kg/m³	approx. 300 kg/m³
Compressive strength	typ. 1,000 kPa at 10 % compression	depends on application
Flexural stiffness	20 MPa Young's modulus	depends on application
Thermal expansion	< $1 \cdot 10^{-6}$ per K	< $1 \cdot 10^{-6}$ per K
Minimum practical insulation thickness	30 mm	10 mm
Service life	more than 20 years	more than 20 years
Thermal conductivity after loss of vacuum	approx. 55 mW/m·K	approx. 35 mW/m·K
Fire behaviour	Core material non-combustible, classification of the complete build-up per application	Core material non-combustible, classification of the complete build-up per application
Maintenance	maintenance-free, closed system	maintenance-free, closed system
Geometries	three-dimensional, containers, pipes, panels, drawers	panels and boards, can be integrated into three-dimensional structures
Maximum dimensions	on request	on request
Maturity	high-volume production, in series production since 2019, in high-volume production since 2022	series development, used in small series

Thermal conductivity refers to the core material. System heat ingress is the relevant value for design.

Design notes

- Design is governed by system heat ingress, not by the thermal conductivity of the core material. It accounts for edge losses, thermal bridges and ageing, is correspondingly higher and is the reliable basis for comparing insulation technologies. TerraVac determines it for each project.
- The robustness of the build-up is designed for each specific application. If a body loses its vacuum, the perlite remains as a mineral fill, with significantly higher thermal conductivity.
- Manufacturing the vacuum body requires a dedicated process step with film handling, perlite filling and evacuation. One-to-one integration into existing production lines is not possible. TerraVac initially sets up this step at its own plant and supplies the customer until volumes justify a dedicated line.

Test standards and quality assurance

- Thermal conductivity measurements to EN 12667
- Batch-wise incoming inspection of the core material, covering gas-pressure-dependent thermal conductivity based on EN 12667 and compressibility under uniaxial load
- Batch-wise incoming inspection of the high-barrier film by permeation rate measurement
- Every vacuum body goes through quarantine storage and is then leak-tested with a heat flux sensor. Quality assurance is carried out entirely at TerraVac using methods proven in high-volume production
- Gas analysis on the finished component, e.g. after ageing (destructive test)

Contact

TerraVac GmbH, Weinbergstraße 7, 97753 Karlstadt, Germany; www.terravac.de;
info@terravac.de

The information describes typical properties and does not constitute guaranteed properties. Binding values are defined for each project. Subject to change.