ULTRA THIN

SPACELOFT®

RESIDENTIAL
COMMERCIAL
INSTITUTIONAL

INSULATION

aspen aerogels™

NANOTECHNOLOGY AT WORK™

Best performing thermal insulation on the market today -- 13.5 K value

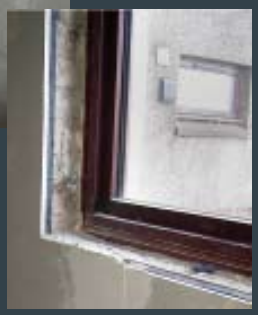
Suitable for a variety of building applications and installation techniques

Energy & CO_2 payback in less than 12 months for typical applications

Spaceloft® Delivers the Highest Thermal Performance in the Tightest Building Spaces

INTERIOR

Spaceloft's thin profile offers the same U-value as traditional thick insulation with minimum interior space lost.

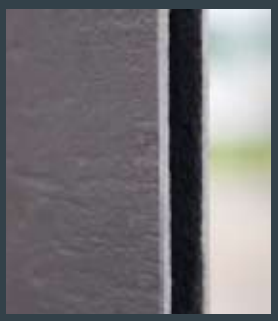


Spacetherm™ interior insulation panel from The Proctor Group

EXTERIOR

Spaceloft is easily installed on mobile home exterior cladding with minimum reveal disruption.

ParaClad™ mobile home exterior insulation panel from Parasol Panel Systems LLP



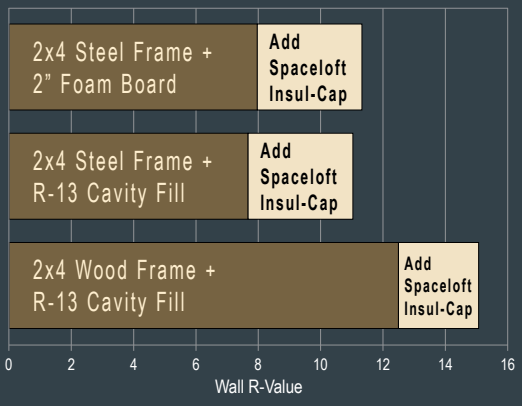
UNDER FLOOR

Spaceloft's thermal efficiency, good compression strength, and thin profile make it attractive as an underfloor insulating layer, ideal where height is an issue.

THERMAL BRIDGING SOLUTION

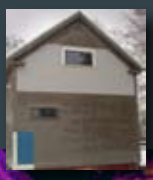
Spaceloft Insul-Cap improves the energy efficiency of wood- and steel-frame buildings. Applied between framing and internal and/or external sheathing, Spaceloft Insul-Cap eliminates thermal bridging and can add up to R4.0 to standard wall framing, with dramatic results.

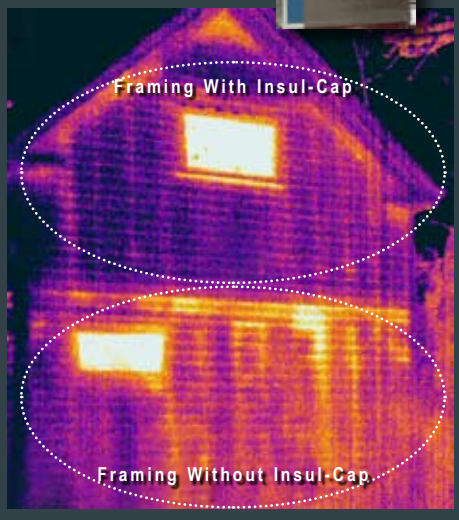
Typical Wall Thermal Improvement With Spaceloft Insul-Cap



The thermal performance of a **steel-frame wall** can improve up to 40 percent to R11, the equivalent of a wood-frame wall.

The thermal performance of a **wood-frame wall** can improve up to 15 percent.





BENEFITS OF ULTRA-THIN SPACELOFT INSULATION

in BUILDING and CONSTRUCTION

LOWEST THERMAL CONDUCTIVITY OF ANY INSULATION Thermal conductivity (FIW , Munchen Test Institute) 13,5mW/m-K at a 10°C mean wall temperature. Spaceloft insulation has an application range from -200°C to + 200°C.

FIRE PERFORMANCE Spaceloft has received an E rating in the Euroclass fire test. The rating is determined by the reinforcement fibre. Spaceloft has received a Class A rating in the ASTM E 84 fire test. This rating denotes flame spread less than 25. For other fire requirements, please contact Aspen Aerogels.

BREATHABILITY AND HYDROPHOBICITY Spaceloft's unique chemistry offers both a hydrophobic performance and an ability to breathe -- in the same material. This allows for the design of both venting concepts and also installation where water would be a problem to traditional insulation materials.

COMPRESSIVE STRENGTH Robustness of Spaceloft offers installation advantages.

AGEING Spaceloft's thermal insulation is derived from its nanoporous structure. The performance is passive. There are no blowing agents or vacuum requirements to deliver this performance. This offers a constant design performance independent of time within the realms of the building and construction domain temperature and humidity.

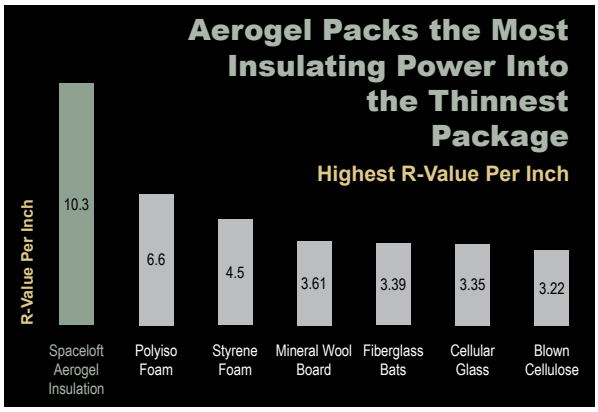
ACOUSTICS In addition to thermal characteristics, Spaceloft offers excellent acoustical properties, especially transmission loss and dampening.

ENVIRONMENTAL Spaceloft is a relatively low energy material to produce. Its insulative performance offers rapid payback on both energy & CO_2 in building and construction applications. (See chart on back page.) Spaceloft is fully compliant with RoHS. Aerogels are classified as a non irritant and do not support mould growth.

Backup data for above benefits available upon request

What is Aerogel?

FIRST DEVELOPED IN 1931, AEROGEL IS COMPOSED OF OVER 90 PERCENT AIR, MAKING IT A HIGHLY EFFECTIVE INSULATOR WITH THE LOWEST THERMAL CONDUCTIVITY OF ANY SOLID. ASPEN AEROGELS HAS TURNED AEROGEL INTO AN EXTREMELY STRONG, DURABLE, THIN, AND FLEXIBLE INSULATION MATERIAL THAT IS TWO TO EIGHT TIMES MORE EFFECTIVE THAN TRADITIONAL INSULATION – THE IDEAL CHOICE FOR A WIDE RANGE OF APPLICATIONS.



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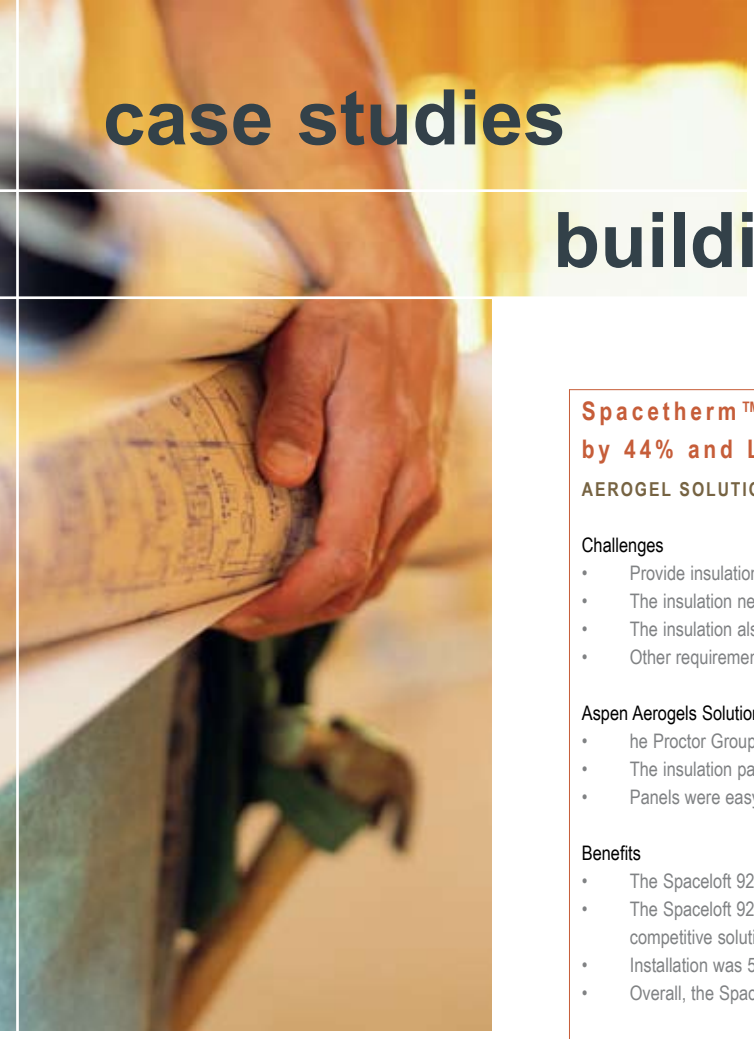


case studies

building and construction

Spacetherm™ Aerogel Interior Wall Insulation Reduces U-Values by 44% and Lowers Energy Use and Carbon Emissions

AEROGEL SOLUTION IS THIN AND QUICKLY INSTALLED IN UK APARTMENT INTERIORS

Challenges

- Provide insulation for UK government program to upgrade insulation in public housing apartment units.
- The insulation needed to improve the units' U-values to save energy and reduce carbon emissions.
- The insulation also needed to be thin to minimize encroachment on living space in small rooms.
- Other requirements included water resistance, noise abatement, breathability, and easy installation.

Aspen Aerogels Solution

- he Proctor Group developed Spacetherm™, a double layer of Spaceloft™ 9251 laminated to a building facing board.
- The insulation panel met the functional requirements with a total thickness of only 30 mm.
- Panels were easy to install, simply screwed onto the existing wall with no framing needed.

Benefits

- The Spaceloft 9251 solution cost-effectively met all energy targets. (Details below.)
- The Spaceloft 9251 solution was three times thinner than the nearest installed competitive solution due to framing requirments.
- Installation was 50% faster than the nearest competitive solution.
- Overall, the Spaceloft 9251 was the best space/cost solution.

U-Value and Energy Savings From Installation of Spaceloft 9251*

- U-value reduction: 0.28 W/m2k, (0.63 - 0.35 W/m2K), a 44% reduction
- Energy reduction: 900 kWhr/yr
- Carbon emmission reduction: 400 kg/yr

*Calculations performed using the SAP-approved software package Northgate Maxim 5.

ParaClad™ Aerogel-Insulated Panel System Reduces U-Values of Mobile Home by 55% and Carbon Emission by 1 Metric Ton/Years

EXTERIOR INSULATION INSTALLS QUICKLY WITH MINIMAL OCCUPANCY DISRUPTION

Challenges

- Provide insulation for UK government program to upgrade insulation in mobile homes at a targeted cost.
- The insulation needed to improve the homes' U-values to save energy and reduce carbon emissions.
- Fast and cost effective installation was required.

Aspen Aerogels Solution

- Parasol Panel Systems LLP designed a solution of ParaClad™ panels using Spaceloft™ 9251 to cover the mobile home exterior.
- The solution was composed of a double skin laminate over Spaceloft 9251 with a total thickness of 13 mm.
- Two workers insulated the entire structure in two days with minimal occupancy disruption.
- The ParaClad™ panel system met U Value and other functional requirements.

Benefits

- The ParaClad™ panel system using Spaceloft 9251 cost-effectively met all energy targets. (Details below.)
- Using thin Spaceloft 9251 insulation eliminated the need to modify window and roof fixtures, which would have been necessary with conventional exterior insulation.
- The increased transmission loss of the new wall has greatly reduced the noise level within the home.

U-Value and Energy Savings From Installation of Spaceloft 9251*

- U-value reduction: 0.54 W/m2k, (0.98 - 0.44 W/m2K), a 55% reduction
- Energy reduction: 3,500 kWhr/yr
- Carbon emmission reduction: 950 kg/yr

*Calculations performed using the SAP-approved software package Northgate Maxim 5.

SPACELOFT® SPECS

Physical Properties

Thicknesses*	0.12 in (3 mm), 0.24 in (6 mm), 0.36 in (9 mm)
Max. Use Temp.	390°F (200°C)
Color	Dark Gray
Density*	9.4 lb/ft^3 (0.15 g/cc)
Hydrophobic	Yes
Material Form*	57 in (1,450 mm) wide

* Nominal Values

Spaceloft is a flexible, nanoporous aerogel blanket™ insulation designed to meet the demanding requirements of industrial, commercial, and residential applications.

Spaceloft's unique properties – extremely low thermal conductivity, superior flexibility, compression resistance, hydrophobicity, and ease of use – make it essential for those seeking the ultimate in thermal protection.

Using patented nanotechnology, Spaceloft insulation combines a silica aerogel with reinforcing fibers to deliver industry-leading thermal performance in an easy-to-handle and environmentally safe product.

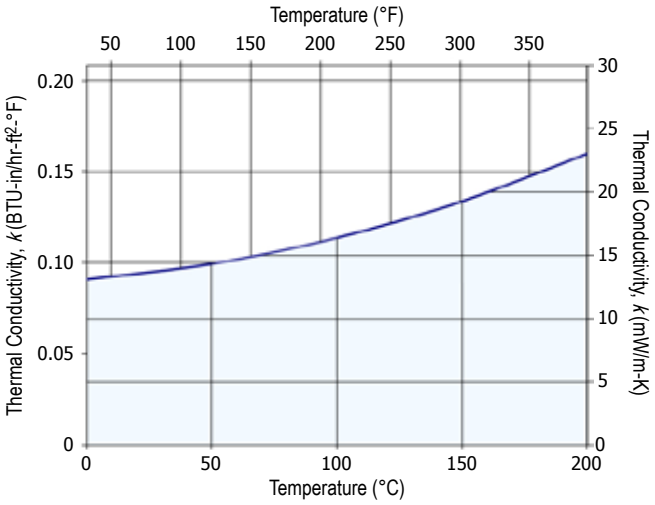
Spaceloft is a proven, effective insulator in Oil and Gas, Building and Construction, Aerospace, Automotive, Cold Chain and other industries requiring maximum thermal protection within tight space and weight constraints.

Fire Performance

Spaceloft has received a Class A rating in the ASTM E 84 fire test. This rating denotes flame spread less than 25.

Thermal Conductivity

ASTM C 177 Results



Mean Temp.										
°C	0	25	50	75	100	125	150	175	200
°F	32	77	122	167	212	257	302	347	392
k mW/m-K	13.1	13.6	14.3	15.3	16.4	17.7	19.3	21.0	23.0
BTU-in/hr-ft^2-°F	0.091	0.094	0.099	0.106	0.114	0.123	0.134	0.146	0.160

Embodied Energy and CO_2 Values for Spaceloft and Other Insulations

Material	Thermal Conductivity (mW/m-K) [1]	Thermal Resistance (R-value per inch) [1]	Embodied Energy (EE) (MJ/kg)	Embodied CO_2 (ECO_2) (kg of CO_2/kg)	EE per Thermal Resistance (EE/R-value per inch)	ECO_2 per Thermal Resistance (ECO_2/R-value per inch)
Aspen Aerogels' Spaceloft	12	12.0	53.0 [1]	4.2 [1]	4.42	0.35
Fiberglass (Recycled Glass)	40	3.8	28.0 [2]	1.4 [2]	7.37	0.36
Fiberglass (Virgin Glass)	40	3.8	39.2 [2]	1.9 [2]	10.32	0.50
Expanded Polystyrene	32	4.5	111.6 [3]	3.0 [2]	24.80	0.67
Polyisocyanurate	24	6.0	69.8 [3]	5.5 [2]	11.63	0.92

[1] Manufacturer data

[2] Inventory of Carbon and Energy, University of Bath, UK

[3] Comparison of Energy Evaluation of Plastic Products and Their Alternatives for the Building, Construction and Transportation Industries - The Society of the Plastics Industry

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