aspen aerogels™

Spaceloft Aerogel Blanket Insulation

23rd March 2012
Copenhagen

www.aerogel.com

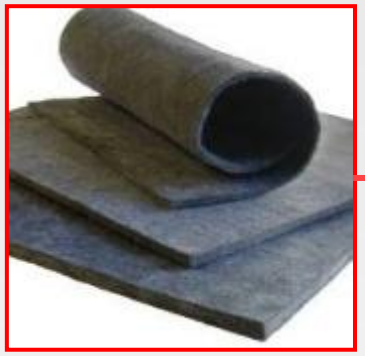
Building & Construction Europe

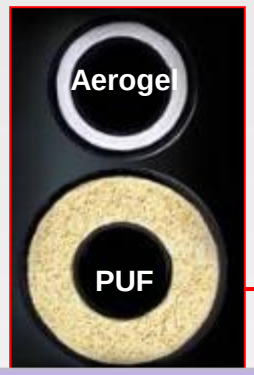
Begin

- Company Introduction
- Aerogel Technology
- Spaceloft Characteristics
- Applications
- Health & Safety
- Environmental
- Walls
- Floors
- Roofs
- Thermal Bridging

Company Introduction

Company Timeline





Pyrogel 6350 created for the petrochemical processing industry

1930s … **19** … **05** **2007**

Aerogels invented

Plant 2 opens

Aspen = **A**ero**SP**ace **E**ngineeri**N**g

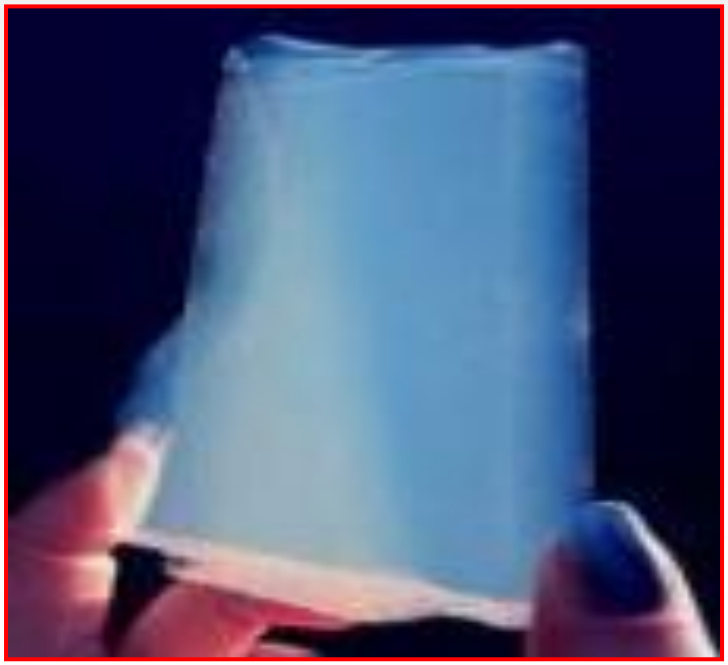
10 MM sqft capacity

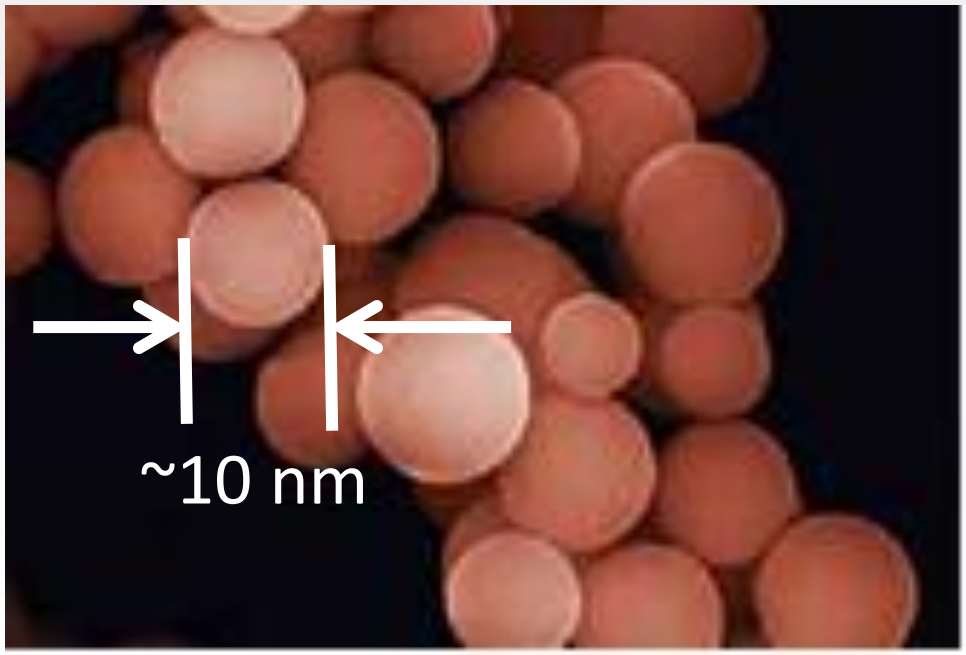
100 MM sqft capacity

Physical Properties

Silica Aerogel

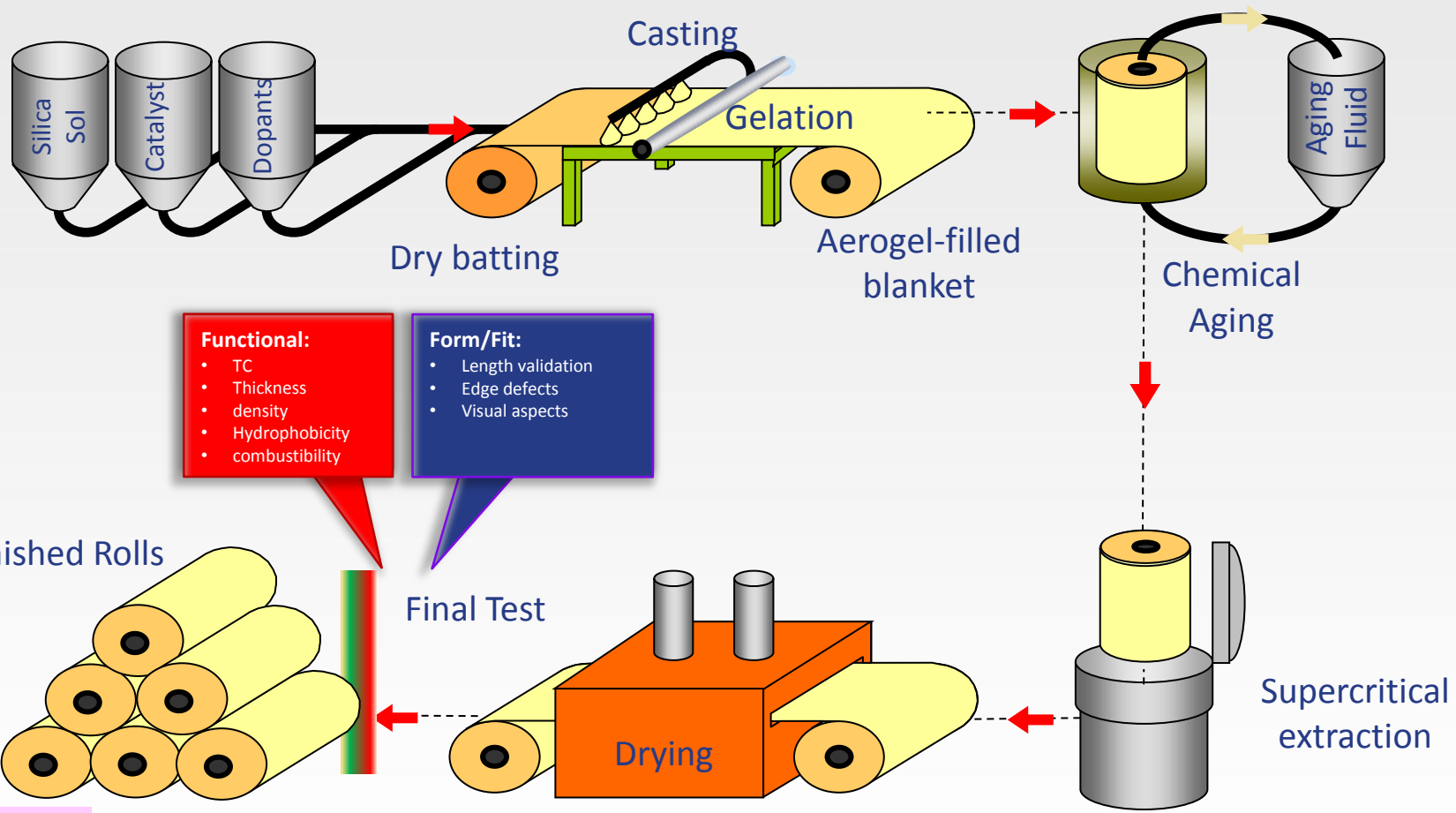
- Silica Aerogel contains 95 - 97% air
- Not vacuum based, do not require blowing agents
- Air is trapped within the nano-scale cells
- Very convoluted silica matrix
- Extremely Hydrophobic by design





Our Technology

The Manufacturing Process



Aerogel Blanket Range - Application

Cryogel

-200° C to +200° C

- Cryogenic
- LNG
- Petrochemical
- Industrial

Spaceloft

-50° C to +200° C

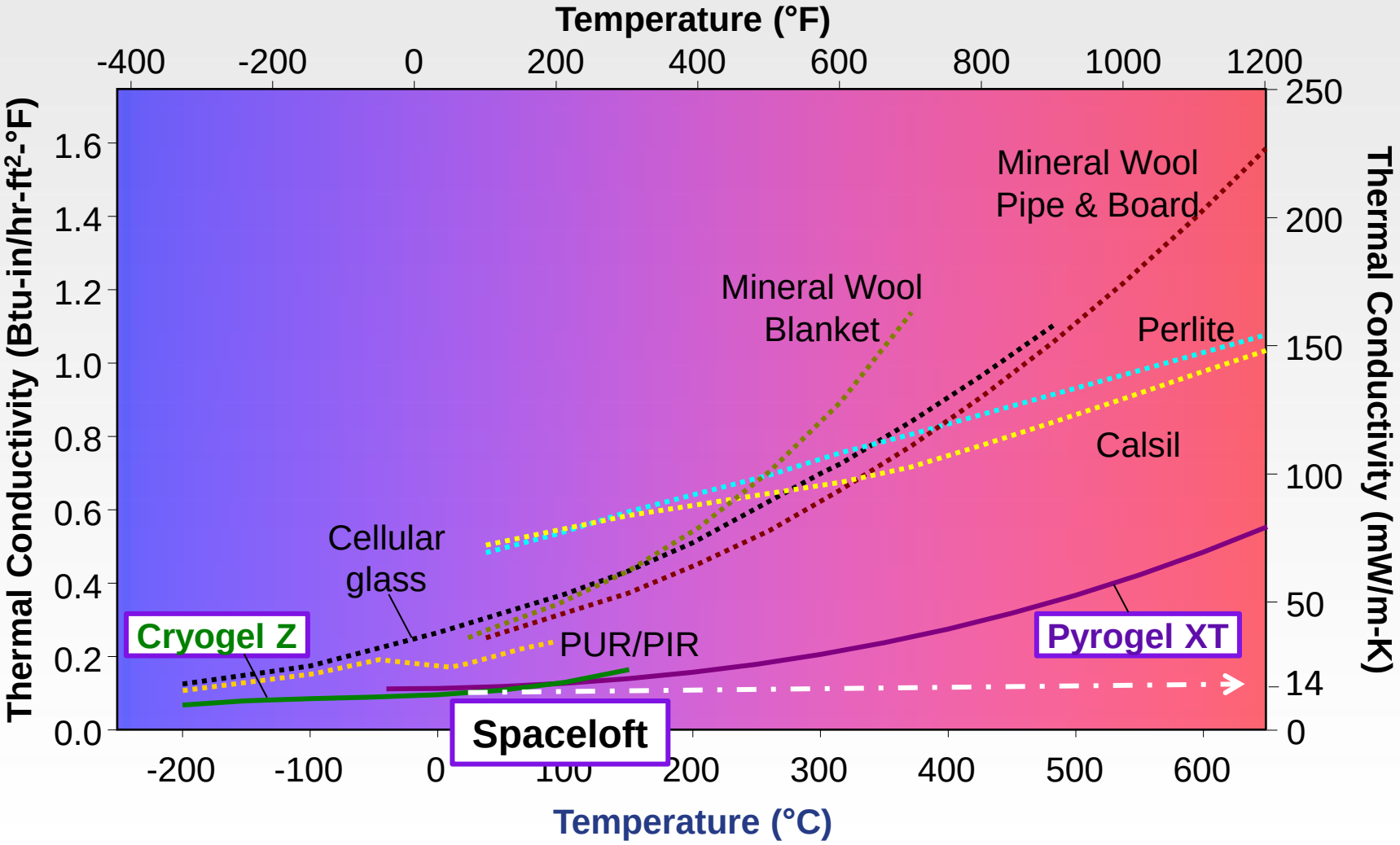
- Building & Construction
- Clothing
- Appliances
- Services

Pyrogel

+650° C

- Industrial
- Hot Process
- Fire Protection
- District heating
- Appliances
- Transport

Aerogels Have the Lowest *k*-Value of Any Conventional Insulation



Spaceloft Aerogel Blanket's Unique Physical Characteristics

- Lambda 14mW/mK to 18mW/mK
- 5mm & 10mm blanket thicknesses
- Excellent Vapour permeability (μ = 5), Extremely Hydrophobic – withstand hydrostatic Head test to 80cm
- Euro Fire class C or A2
- Will not promote mould growth, first class indoor air quality test result
- Good impact sound absorption, up to 20% light transmission
- Full technical data set for simulation of vapour transfer – example WUFI (Historic Buildings & Breathable Construction)
- European Technical Approval – 11_0471

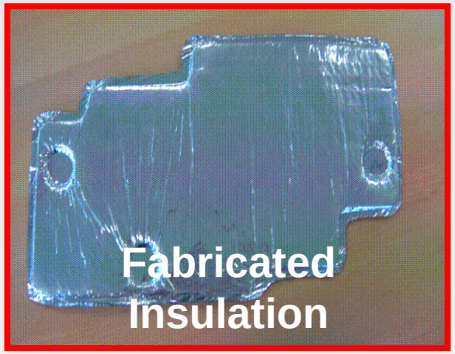
Spaceloft Aerogel Blankets for Construction

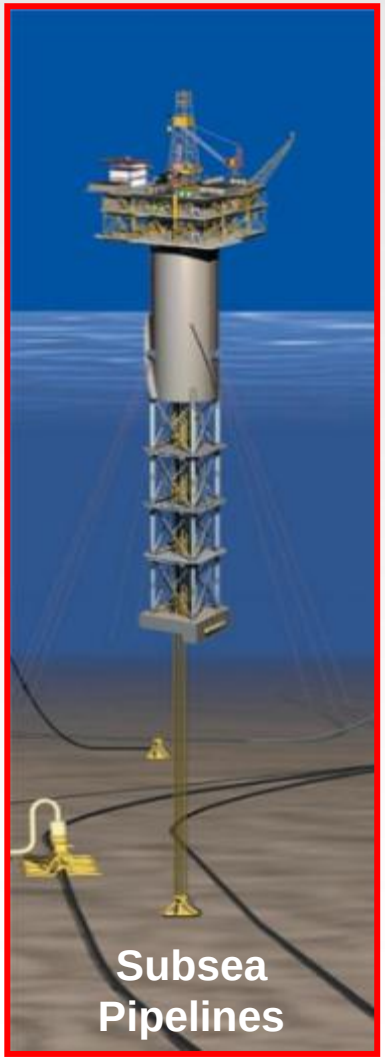
Characteristic	Spaceloft Classic	Spaceloft A2
5mm Blanket	Yes	No *
10mm Blanket	Yes	Yes
Euro Fire Class	C-s1,d0	A2-s1, d0
Thermal Conductivity	0.014 W/mK	0.018 W/mK
Density	150 kgs / m3	150 kgs / m3
Vapour Permeability Factor mu	5	5
Colour	White Grey	White

** - enquire for availability*

Aerogel Blanket Applications

Aerogel Blanket Applications





Aerogel Blanket Applications in Building & Construction include…

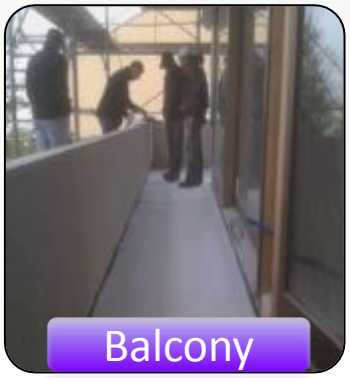

Roof

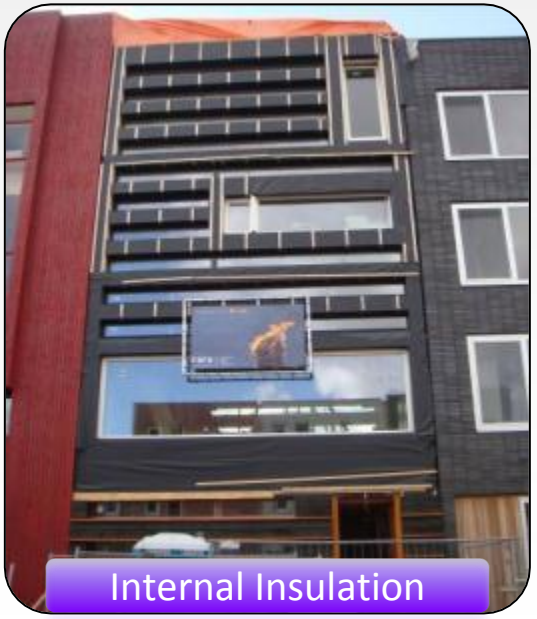

External Insulation


Internal Heritage


Heat Bridge

Services


Balcony


Internal Insulation

Spaceloft – Valuing Space

Preserve living space in small area properties

Improve energy performance - sustain investment income

Unrivalled U value improvement potential

Whole envelope solutions - treat problem areas

Walls

Internal

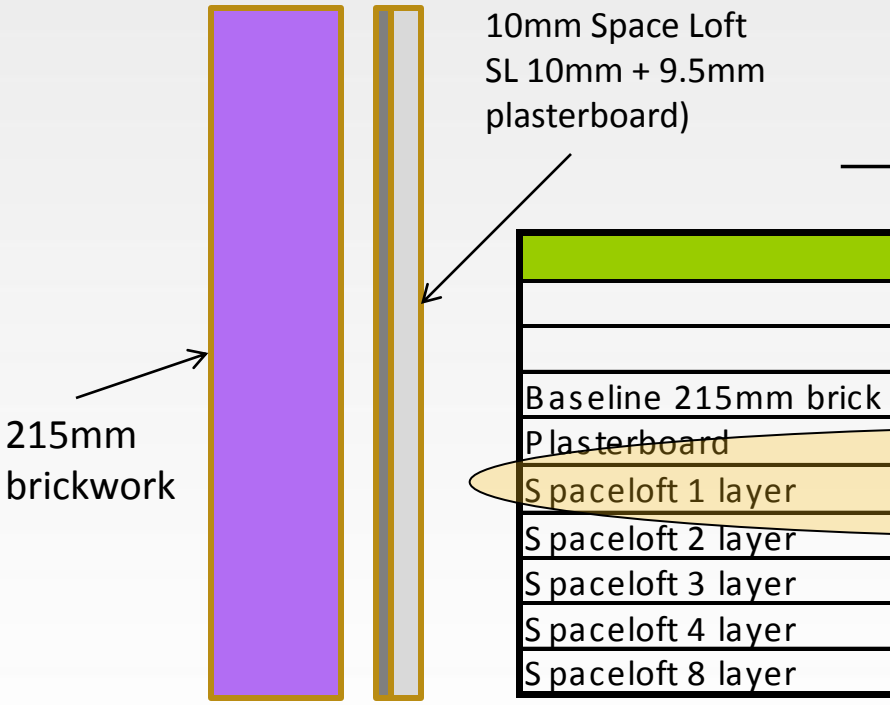
External

Internal Insulation

- Spaceloft is the thinnest insulation material available for internal insulation
- Thin sections = more space for occupants & preserves property value
- It can be laminated offsite or applied onsite in layers
- It can be be used in breathable form or with an integrated AVCL
- No foils required to maintain performance = no puncture risk
- Indoor air quality is maintained
- Data package available for software simulations

Solid Wall – Performance Improvement

Wall construction



Solid wall (9” brickwork)

U value estimation				
	Thickness	TC	U value	
	mm	W/m-K	W/m²K	Improvement
Baseline 215mm brick	215	0.450	2.10	
Plasterboard	12.5	0.140		
Spaceloft 1 layer	10	0.014	0.77	63%
Spaceloft 2 layer	20	0.014	0.49	77%
Spaceloft 3 layer	30	0.014	0.36	83%
Spaceloft 4 layer	40	0.014	0.29	86%
Spaceloft 8 layer	80	0.014	0.16	93%

Interior Walls

Project	Victorian period renovation
Location	UK
Bldg. Type	Solid Masonry
Application	Interior Walls
Benefit	Saves Space

Case Study – Nottingham

- The homeowner remained in the property during the work.
- The house is much warmer than before.
- The job took 3 days from start to finish
- This job included a bay window

Interior Walls

Project	Stone Cottage Renovation
Location	England
Bldg. Type	Stone
Application	Internal insulation
Benefit	U value from 2,1 to 0,3 in 40mm

Interior Walls

Project	My Space Pod
Location	London
Bldg. Type	Reconstituted Sea Container
Application	Internal Walls, Partition Walls, Floor
Benefit	Saves Internal Space

Historic Villa - Italy

Project	Renovation
Location	Italy
Bldg. Type	House
Application	Internal Wall
Benefit	Energy Saving, Space Saving

Historic Stable Block Terrace - UK

Project	Renovation
Location	Luton
Bldg. Type	Stable Block
Application	Internal Wall
Benefit	Energy Saving, Space Saving

Amsterdam Passive House : Tomatsu Sugi

True to traditional to Amsterdam architecture
Row houses have 6cm spacing between units.
Thin wall insulation maximises internal space.
50mm & 100mm thicknesses applied

Problem Zone? – Curved Stairwell

20mm Spaceloft applied to the curved concrete wall
Impact protection with 3mm Magnesium Silicate board

External Insulation

Applications

Case Studies

Installation Tips

Spaceloft – External Insulation

- Whole wall solution, single or multiple layer
- Compatible with all render systems
- Mechanical and / or adhesive fix
- With or without construction board
- Targeted application with other insulations eg. gable walls, stairwells, archways
- Solve Thermal Bridging at reveals, returns & cills

External Insulation - Traditional Swiss Mill House

a. Before
b. Spaceloft mechanically fixed to walls
c. Rendered

External Insulation - Traditional Swiss Mill HouseExternal Rendering

Compact Site Storage

Lime Render ~ 25mm

Mushroom & SS Mesh

External Insulation Heritage External Render - Venice

Detail

25mm reveal depth
10mm Spaceloft
5mm render
10mm reveal remaining

- Improved wall U value (50-60%)
- Meets local authority approval
- Unique solution
- Standard B&C practices

Heritage External Render

Press Spaceloft into wet basecoat

Wet lime render over Spaceloft

New Build ETICS

Spaceloft 10 cut to length

Spaceloft 10 easily handled

External Insulation - Fixing

Punch through layer(s) of Spaceloft

Drill hole for fixing as normal

Apply mesh & hammer low TC mushroom fixing

External Insulation - Switzerland

External Insulation - Switzerland

Project	Fascia Insulation
Location	Switzerand
Bldg. Type	Concrete
Application	External Insulation
Benefit	Continuous fascia dimension

Floor Insulation

Applications

Case Studies

Floor Insulation

- Thin section facilitates non disruptive upgrades
- Suitable for domestic compressive loadings
- Compatible with all floor finishes and under-floor heating
- Fast Installation in roll or board format

Underfloor Heating Insulation

Project	Renovation
Location	Switzerland
Bldg. Type	concrete floor
Application	Underfloor Insulation
Benefit	Significant height gain / minimum disruption to fittings & fixtures

Terrace Insulation

Project	New Build concrete
Location	Switzerland
Bldg. Type	Concrete
Application	External Insulation
Benefit	Height / Space management

Under Floor – Laminated Boards

Under parquet.
Panels to facilitate fast install

Roof Insulation

Pitched

Flat

Flat Roof upgrade

2 or 3 layers of SL 10mm

To compliment roof U value

In restricted height conditions

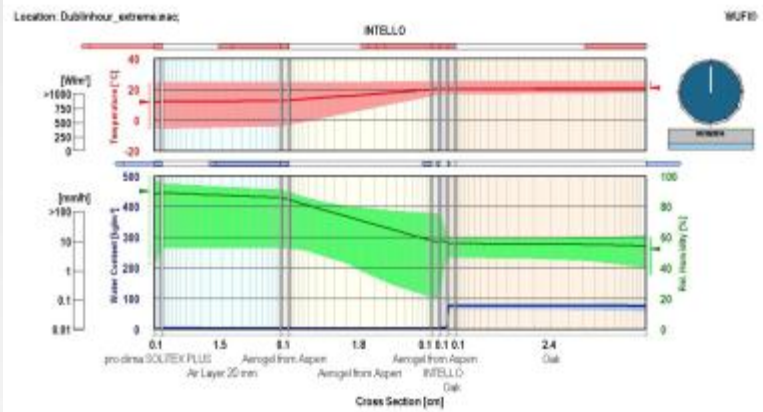
Heritage Projects

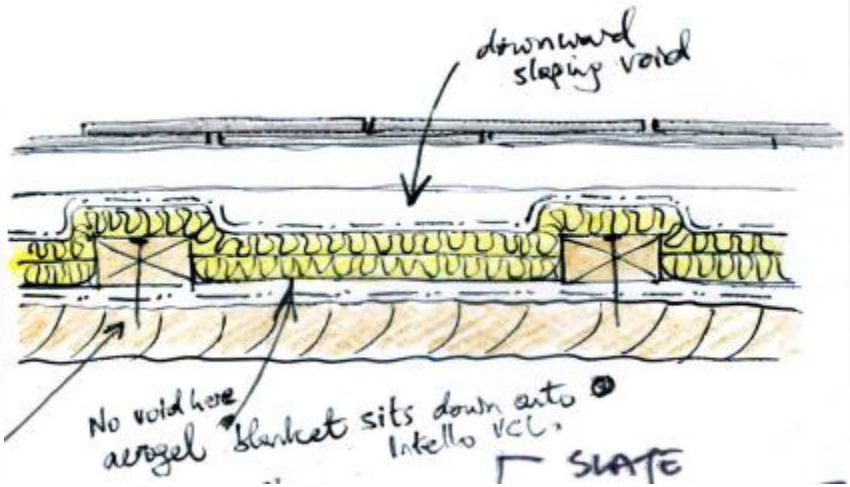
Figure 1 – inside view of existing roof

Request for analysis

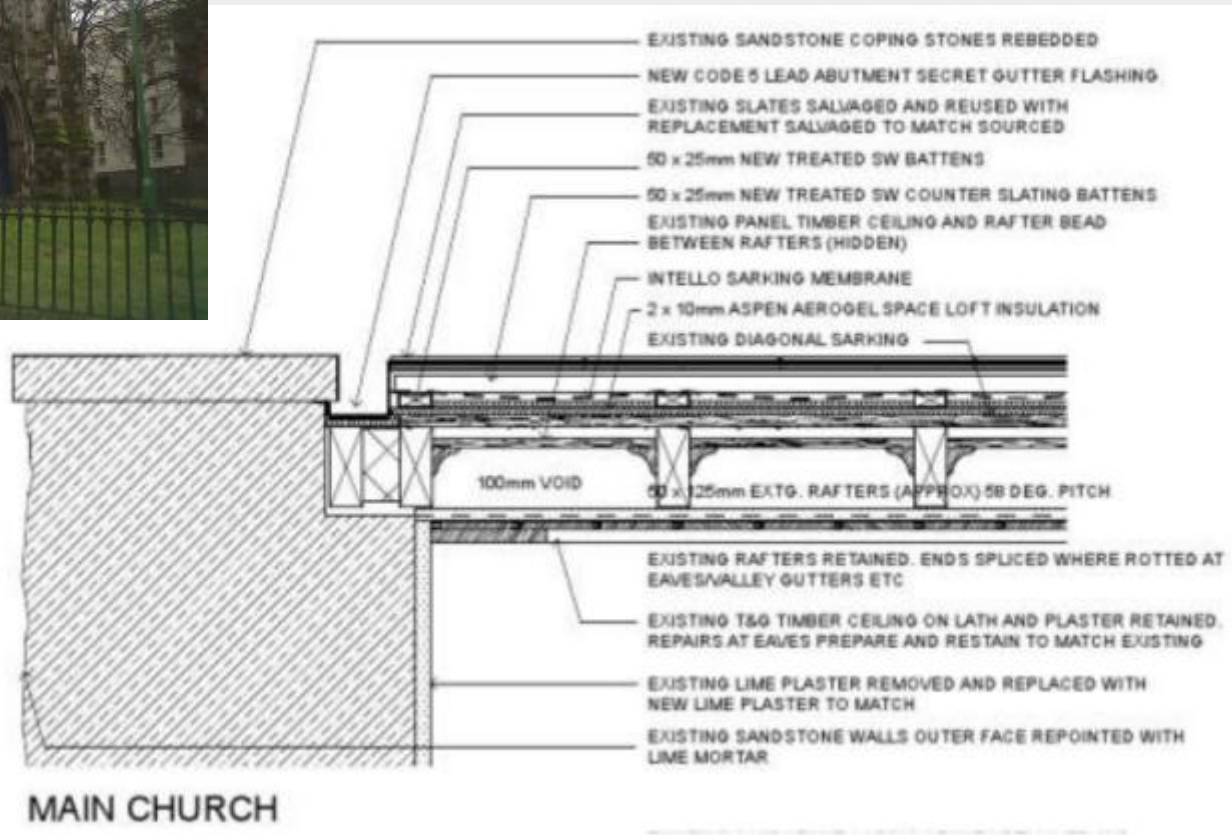
Client wishes to assess performance of Aspen Aerogel as roof insulation in warm-roof buildup between a timber ceiling deck and battens of a vaulted Victorian courthouse building in the south suburbs of Dublin. Roof buildup to be absolutely minimised. Building to be intensely used by small number of people with a lot of electronics.

Figure 10 - Cases 2 & 3 (INTELLO): temperature, RH and water content profiles





Heritage Projects



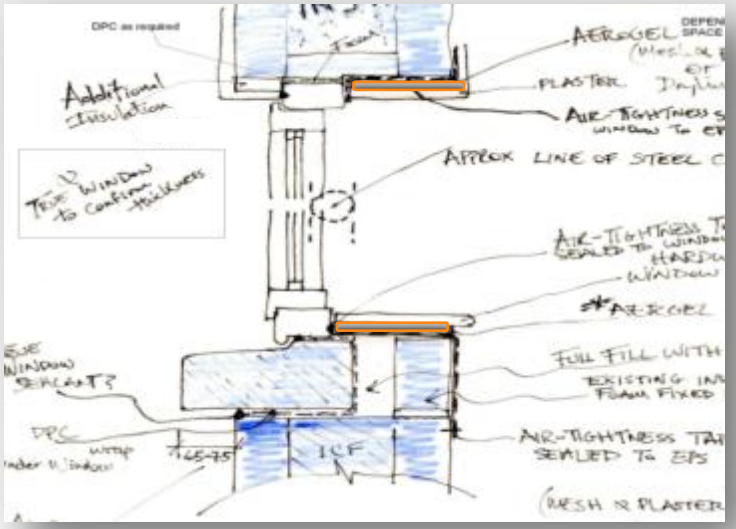
Heritage Projects

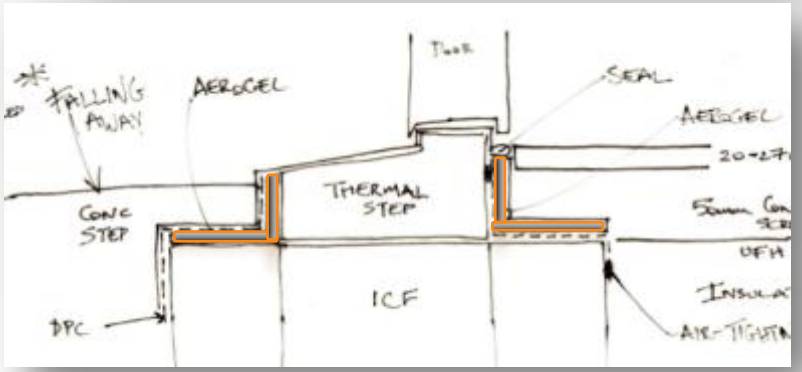
Renovation of Kronborg Castle (Hamlet's Castle) in Denmark
SL 10 used at dormer windows
Project led by renowned Danish architect – Erik Moller

Heat Bridge Treatments

Thermal Bridging Applications

- Internal or External
- Pre-cut or cut to length onsite
- Adhesive or mechanical fix
- Window & Door reveals
- Dormer & Roof Windows
- Partition Wall Returns
- Door & window Components





Internal Insulation - Reveals

Building Life Consultancy

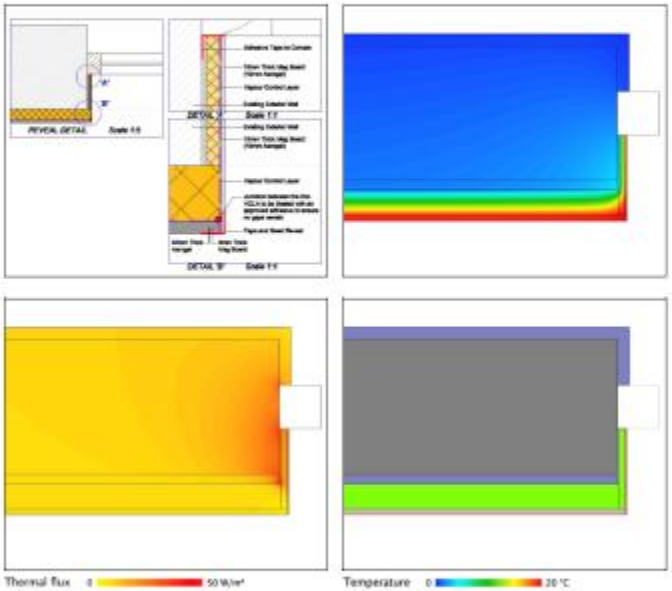
Client	Ref	5013_B_03.1
Aerobord	Date	17.02.2011

Thermal Bridge Assessment of Junction

'SUPERSLIM' DETAIL – WINDOW REVEAL

Description

9mm thick magnesium silicate board on 40mm aerogel insulation on existing wall (retain lime or cement internal plaster but strip off any gypsum). 16mm thick board on reveal (10mm aerogel insulation between 3mm magnesium silicate boards).



Linear thermal transmittance		Temperature factor
Ψ = 0.081 W/mK (reveal (DEAP))	Ψ = 0.086 W/mK (frame (PHPP))	f_{Rsi} = 0.875

This detail has been assessed in accordance with the procedure in BRE IP 1/06 "Assessing the effects of thermal bridging at junctions and around openings" and the guidance in BRE report BR 497 "Conventions for calculating linear thermal transmittance and temperature factors" in accordance with Appendix D of Technical Guidance Document L (2007) of the Irish Building Regulations. The calculations have been carried out analysing a 2D numerical model through conduction heat-transfer analysis based on the finite-element method performing to the standard indicated by IS EN ISO 10211.

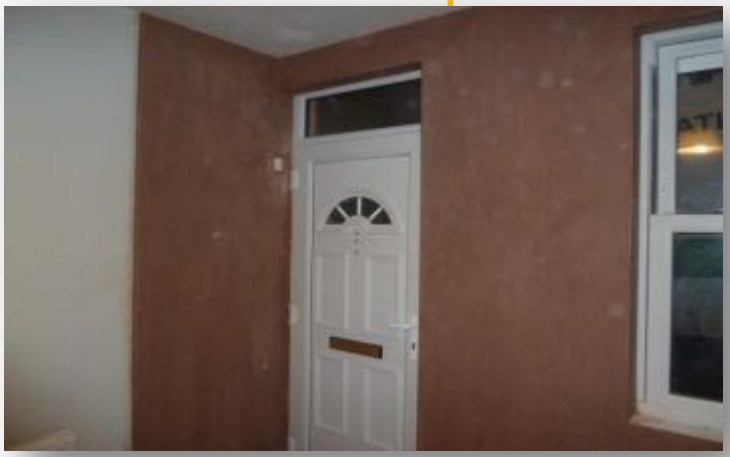
External Insulation - Reveals

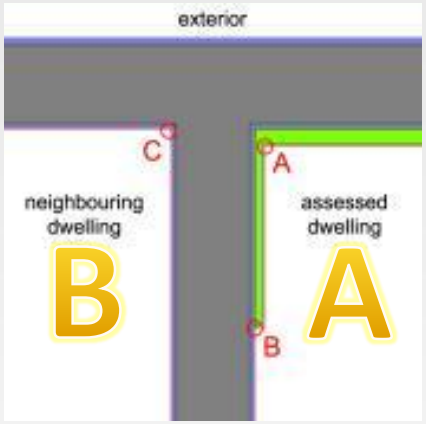
10mm Spaceloft used to treat the heat bridge at the window reveal

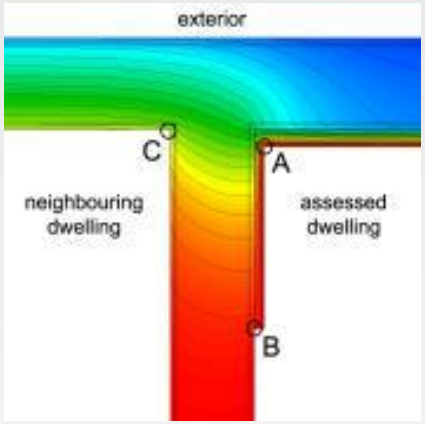
Heat Bridges – Large Scale Projects

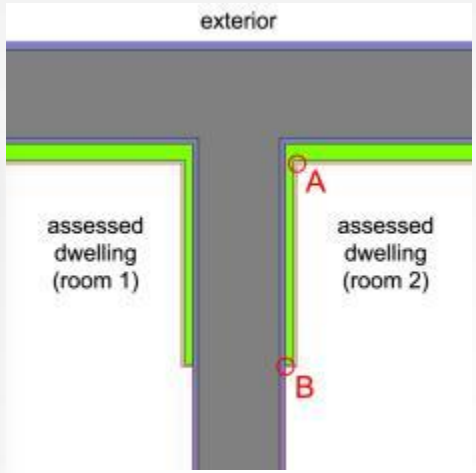
External Window Reveals

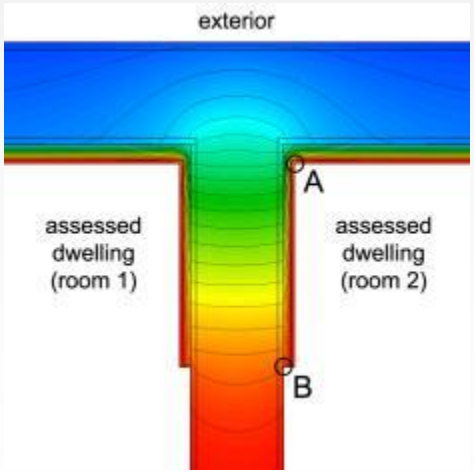
Internal Insulation – Partition Walls











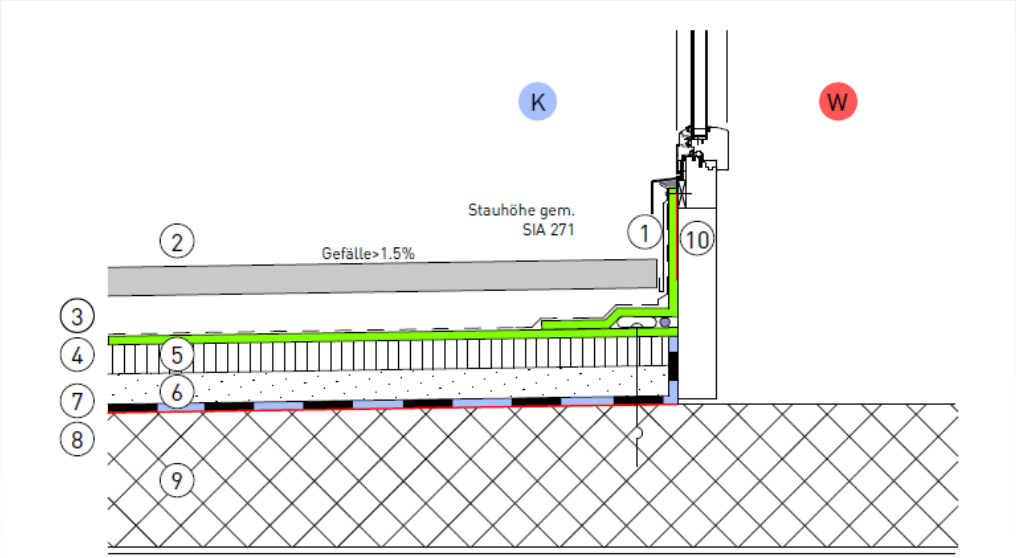
Perimeter Insulation

Project	Perimeter Insulation
Location	Switzerland
Bldg. Type	Concrete
Application	External insulation
Benefit	minimum space disruption to pavement space

Thermal Bridging at balconies

4-5x faster install rates from roll.

Insulated balconies , limited height



Thermal Bridging in Zero Carbon Construction

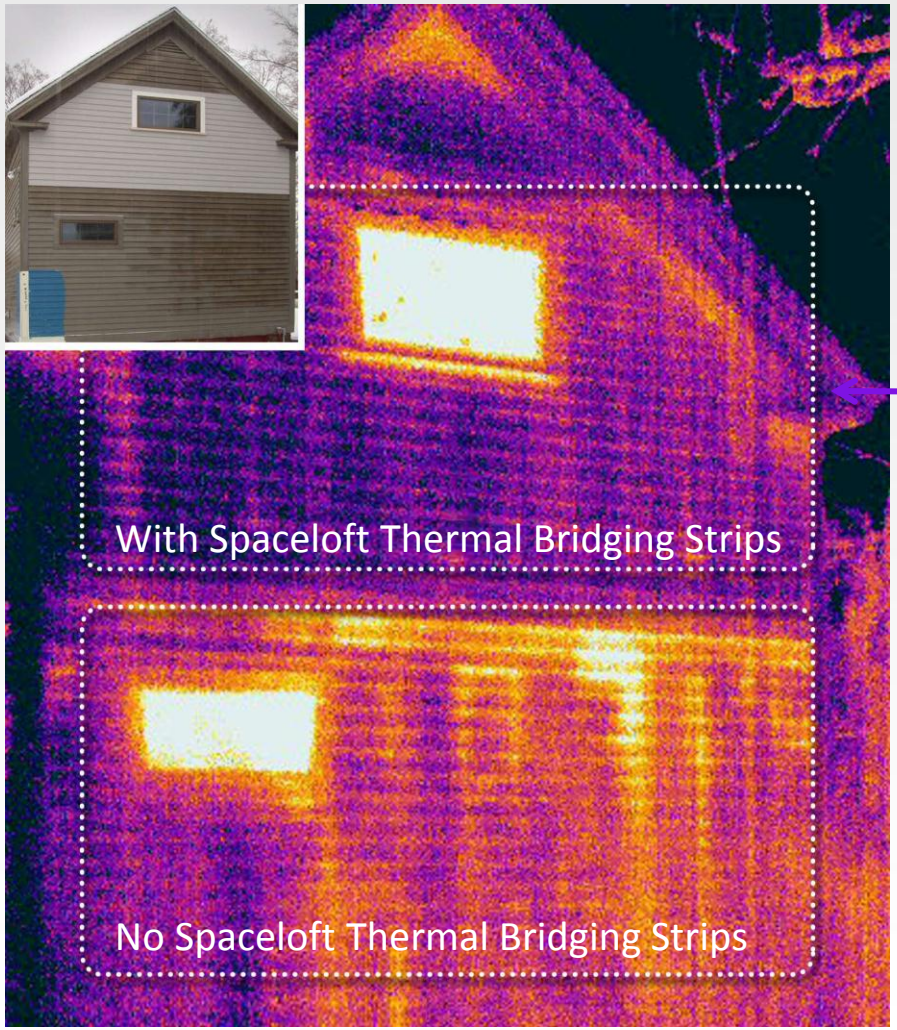
Spaceloft used as a thermal gasket at concrete block gable

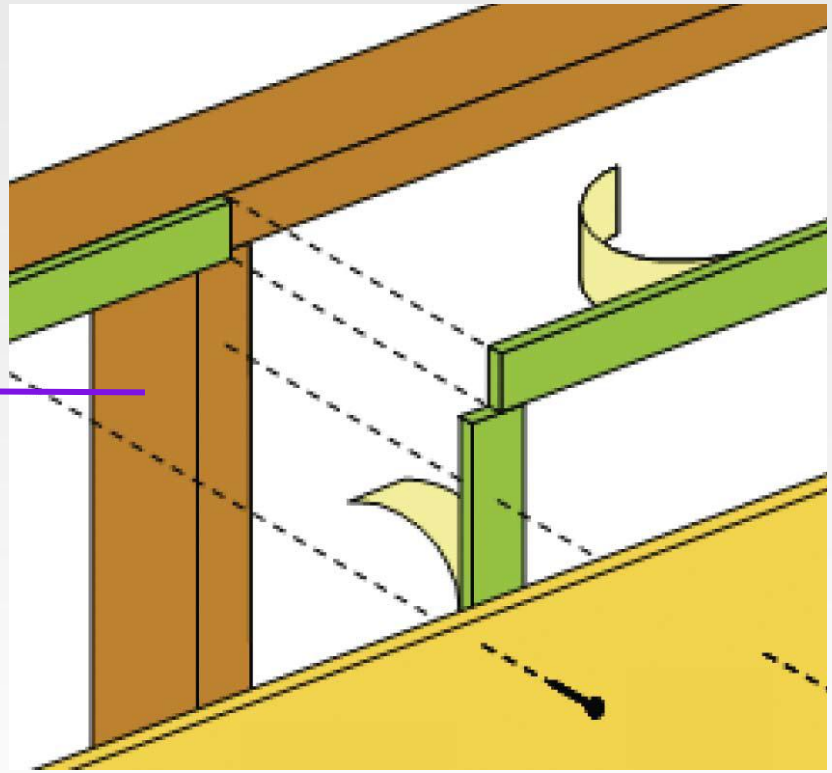
above & left: Spaceloft used to limit thermal bridging through structural steel roof support

Thermal Bridge

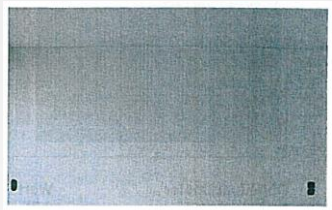
Project	Internal thermal bridge
Location	Switzerland
Bldg. Type	Concrete
Application	Thermal bridge
Benefit	significant thermal leak reduction

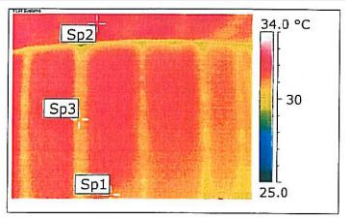
Thermal Bridging : Timber Frame , Spaceloft Insulcap



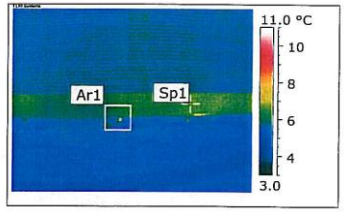


Passive House : lower vertical wall





Timber frame
classic Thermal bridging



Aerogel Cassettes
No Thermal bridging

Spacedome

Thermal Breaks in High Performance Windows

Aluprof (Poland) Industry leading
0.5 W/m²K U_W Value
Using Spaceloft

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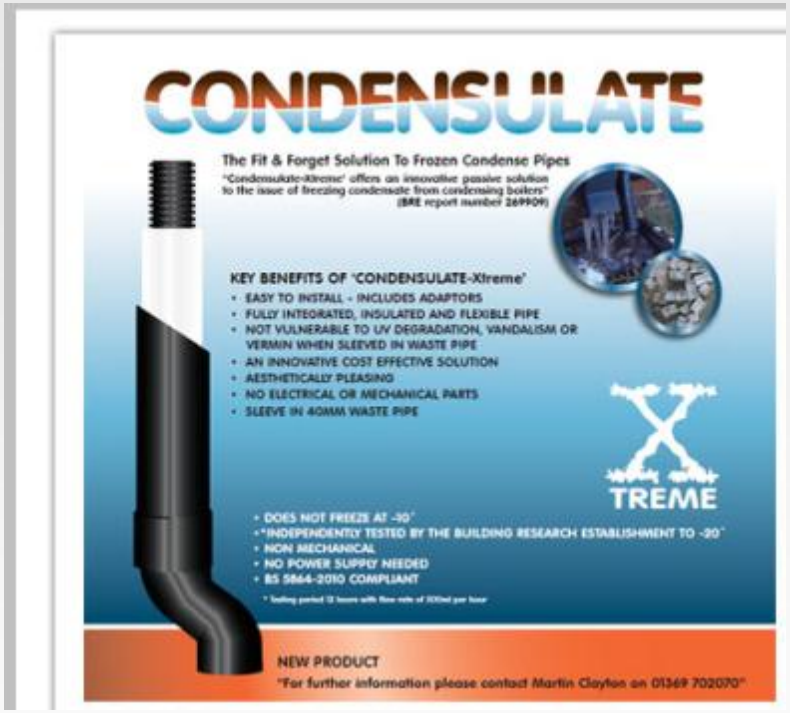
market in Poland

Superior Pipe Insulation



Brian Cahill
bcahill@aerogel.com
+353 86 411 4677

www.aerogel.com

Thank You!