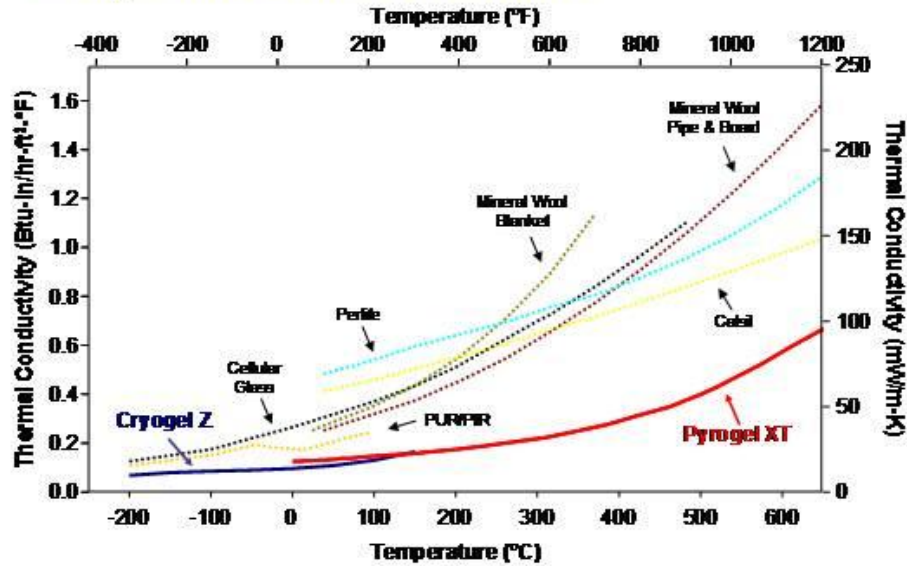


Aspen Aerogels

Industrial Insulation Value Proposition

Aerogel Industrial Insulation Advantages

Exceptional Thermal Performance



Flexible / Durable Blanket Form

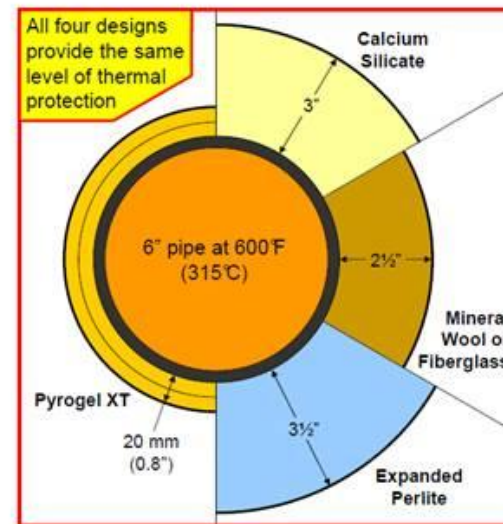


Physical Properties



Aerogel Thermal Performance Advantage

- 50% to 80% decrease in thickness
- Reduced volume
- Lightweight



10mm Pyrogel XT



2" Perlite

Aerogel Flexible/Durable Blanket Form Advantage

- Flexible Blanket Material
- Supplied in Roll Form
- 5 and 10mm Thickness



Pyrogel XT equivalent thickness to preformed insulation.



Aerogel Industrial Insulation: Superior Value Proposition

Benefits for:

Contractors



Owners



Engineers



Owner Concerns: **Safety**

Aerogel Benefits

- **Reduced Exposure to Injuries**
 - Less labor intensive
 - Lighter loads
 - Improved access around pipe / equipment
 - Less waste on site (No boxes, broken pieces)
 - Less personnel and vehicle traffic



Insulation R requirement:		Pyrogel XT 10mm	Perlite 2"
Pipe Size	LF		
12"	260	1 Roll	44 Boxes

Contractor analysis of Petrologistics Project (USA)

Factor	Pyrogel XT 10mm	Perlite 2"
Insulation Ft ²	203,450	203,450
Cartons	313 Rolls	7,535 Boxes
Trips Carrying 50 lbs.	1,492	8,816



Broken pieces of traditional insulation. Minimal access.

Owner Concerns: Plant Operation and Safety

- **Fire Protection Goals**

- Prevention of loss of life / injury
- Minimize plant damage

- **Aerogel Advantage**

- Protects piping and equipment for longer period of time with less thickness

- **Corrosion Under Insulation (CUI) Prevention Goals**

- Avoid accidents resulting from CUI
- Prevent CUI related plant shut downs
- Decrease CUI maintenance costs

- **Aerogel Advantage**

- Extreme hydrophobicity (non-absorptive)
- Inert / No binders (non-acidic)



Corrosion Under Insulation

- Costs industry up to \$300 billion/year
- Use of water absorptive insulation materials is primary contributor.
- Secondary causes: use of insulation materials that cause pH values to <7.
- Maximum corrosion rates occur from -4 °C (25 F) to 149 C (300 F).



Absorbent Insulation



Pyrogel XT

Owner Concerns: Economics / Productivity

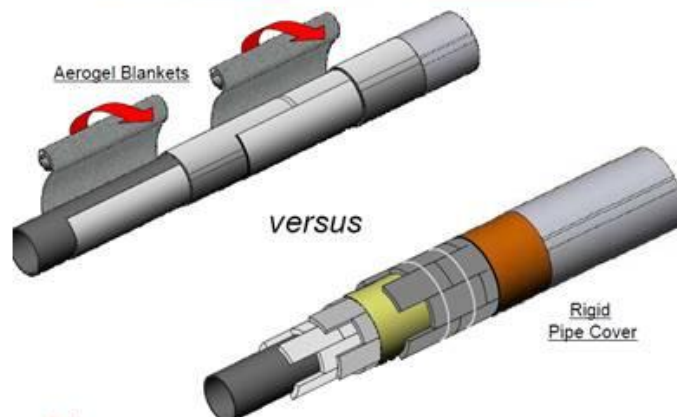
Aerogel Benefits

- Less metal cladding required
- Simplified application procedure
 - Reduced training & skill
- Faster install time
 - Significant labor savings
- Accelerated construction schedule
 - Less delays



Perlite with cladding. 10mm Pyrogel XT (less cladding required)

Flexible Insulation: Exceptional Installation Productivity



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Cost/ productivity example

Cal Sil (10 linear ft, 1-90 ell, 1-flanged valve)	
Labor Hours	82.26
Labor Cost	\$2,467.80
Material Cost	<u>\$2,281.85</u>
Total Labor & Material	<u>\$4,749.65</u>
Pyrogel XT (10 linear ft, 1-90 ell, 1-flanged valve)	
Labor Hours	39.04
Labor Cost	\$1,171.20
Material Cost	<u>\$2,571.92</u>
Total Labor & Material	<u>\$3,743.12</u>

Engineering Firm Concerns: Construction

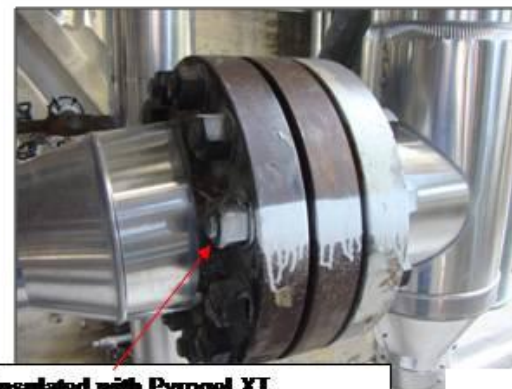
Aerogel Benefits

- Reduced loads
- Access to flange bolts
- Increased space in pipe racks
- Decreased equipment/plant size



Load consideration example

Factor	Cryogel	Cellular Glass 1.5"
Volume	72 Rolls	651 Boxes
Weight	8.5 Tons	14.6 Tons
Weight per Section	2.83 Tons	4.86 Tons



**Insulated with Pyrogel XT.
Flange nuts/bolts accessible.**

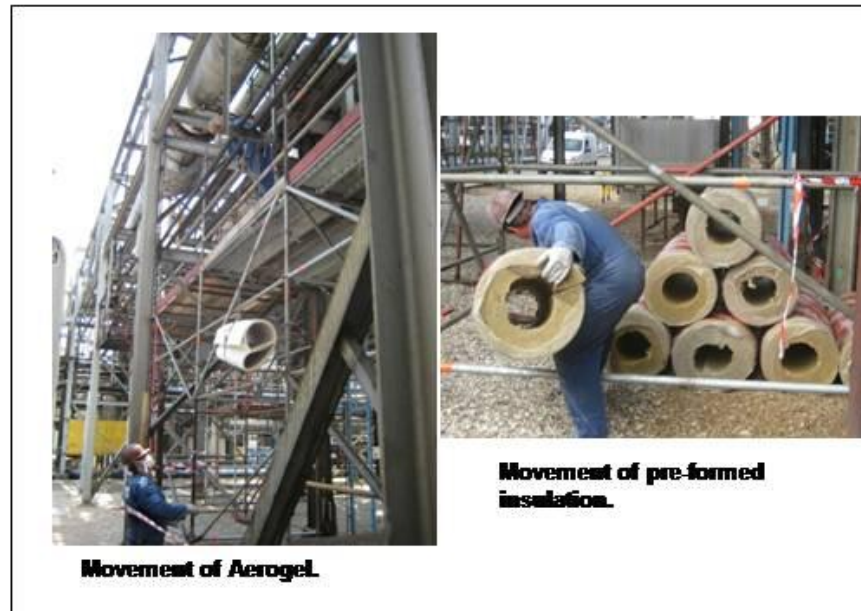
Contractor Concerns: **Material Handling**

- Less Freight
- Less Breakage
- Less Storage Space Required
- Simplified Stock Management
- Better Housekeeping
- Fewer Personnel Trips
- Less Vehicle Traffic

Contractor Analysis of Petrologistics Project (USA)

Factor	Aerogel 10mm	Perlite 2"
Insulation SF	203,450	203,450
Cartons	313 rolls	7,535 boxes
Storage Footprint	1,956 s.f.	11,303 s.f.
Weight	37 tons	220 tons
Trips Carrying 50#	1,492	8,816
SF per Trip	136 sf	23 sf

On site truck delivery trips



Movement of Aerogel.

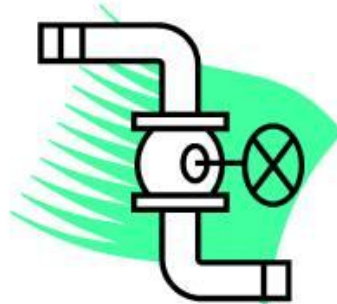
Movement of pre-formed insulation.

Factor	Pyrocel XT 10mm	Perlite 2"
Quantity per Load	70 Rolls	194 Boxes
Number of Trips	1	6

Aspen Aerogels



Improved Safety



Operational Efficiency



Optimized Productivity / Scheduling



Improved Engineering Practices



Streamlined Material Handling