From
COLD to HOT
Insulation Needs

We've Got You Covered

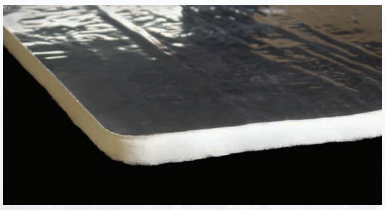
Industrial insulation products spanning the temperature range from –460°F (–270°C) to 1200°F (650°C)

aspen aerogels™

NANOTECHNOLOGY AT WORK™

NEW Production Facility Triples Capacity to Meet Demand

Cryogel Z Flexible Insulation for Cold Work



Description:

Cryogel Z™ has the lowest *k*-value of any cryogenic insulation material in the world, reducing thicknesses by 50% - 75%. Cryogel Z's flexible blanket form, with a factory-applied vapor barrier, is both faster to install and more durable once in service, resulting in lower-cost, higher-performing designs.

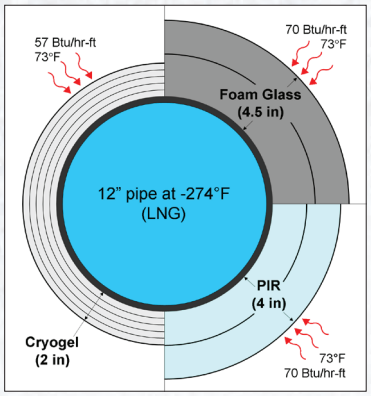
Applications:

Sub-ambient piping and equipment, cryogenic storage and transport, industrial gases, and LNG import/export pipelines and process areas

Properties:

Service Temperature Range: -460°F (-270°C) to 195°F (90°C)

Thermal Performance: Cryogel Z has the lowest thermal conductivity of any material used for cryogenic service. Therefore, its required thickness is extremely small compared to other cold insulation materials. In most cases, condensation control thickness is sufficient to meet the desired heat gain limitation. Cryogel Z's minimal thickness results in a smaller surface area and reduced heat gain compared to other insulation materials. This heat gain "safety factor" maximizes system performance by improving process control, which results in optimized production and energy savings. Cryogel also does not age, so its thermal performance remains constant over time.



All three designs meet the same condensation control criteria

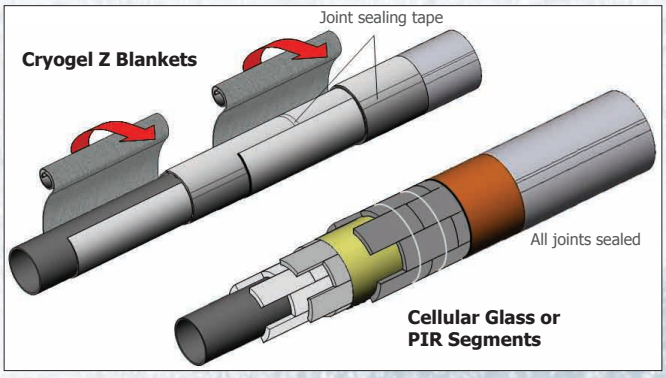
Moisture and Vapor Resistance: Permeability to water and water vapor are critical to any insulation system operating at cryogenic temperatures. Cryogel Z is hydrophobic with excellent resistance to moisture. (Its nanopores form a tortuous network of "dead end" clusters that resist vapor penetration, condensation, and ice.)

Structural Integrity: Cryogel Z is well-suited for below ambient and cryogenic applications. Under these severe conditions, its structure experiences no damage, its performance is unaffected, and it remains totally flexible. This is unlike rigid, cellular insulation materials, which experience contraction, thermal shock, extreme stresses, damaged structure, and degraded insulation performance in the same conditions.

Dimensional Stability: Cryogel Z insulation has a coefficient of thermal expansion similar to that of steel, so there is minimal movement of the insulation system. Its low contraction rate and flexible wrap application eliminate the need for costly and labor intensive expansion/contraction joints required by traditional rigid insulation systems.

Cryogel Z Insulation System Advantages:

- Thinness creates more space in and around pipe racks and equipment.
- Thinness can decrease the overall size of a production facility, resulting in major material reductions and cost savings.
- Thinness results in volume and freight savings, decreased accessory materials, minimal site storage, and simplified logistics.
- Unique flexible form and wrap application makes installation faster, easier, and less costly. Rigid insulation systems require numerous segments that must be effectively sealed.
- Competitive with other insulation systems on an installed basis due to decreased material requirements, logistics improvements, reduced installation time, and shorter construction schedules.



In addition to reducing labor, Cryogel blankets minimize sensitivity to workmanship

Pyrogel XT Flexible Insulation for Hot Work

Description:

Pyrogel® XT is the most effective high-temperature insulation material in the industrial market, typically 2-5 times thinner than competing products. Pyrogel XT is efficient, durable, and more productive to install. Its water resistance offers a level of protection against corrosion under insulation (CUI). It is available with a factory-applied foil vapor/weather barrier (Pyrogel® XTZ) for low- to moderate-temperature applications.

Applications:

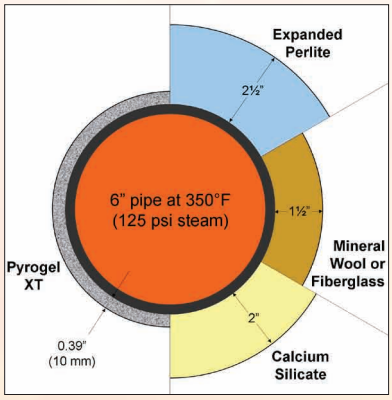
Hot piping and equipment, dual temperature (contact us for limits), towers, tanks, low and high temperature ducts, chilled water systems, and fire protection

Properties:

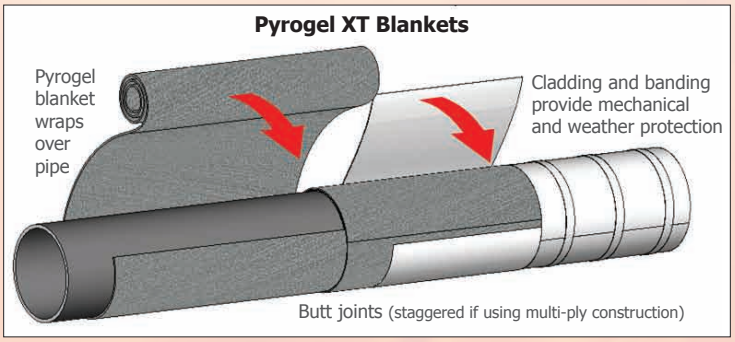
Service Temperature Range: -40°F (-40°C) to 1200°F (650°C)

Thermal Performance: Pyrogel XT has the lowest thermal conductivity value of any material used for hot service. Therefore, its required thickness is 50% - 80% less than other hot insulation materials.

Moisture Resistance: Moisture is a problem in insulation at temperatures up to 200°C. It can form within the insulation and cause corrosion under the insulation (CUI). Pyrogel XT is hydrophobic (resistant to liquid water) through the entire matrix of the material (not just on the surface) and provides excellent resistance to moisture. Other insulations tend to absorb moisture over time, potentially corroding the substrate. Pyrogel XT also is available with an integral vapor barrier (Pyrogel XTZ) that eliminates water vapor penetration. Pyrogel XT also meets all specifications for stress crack corrosion of stainless steel.



All four designs provide the same level of thermal protection (130 Btu/hr-ft)



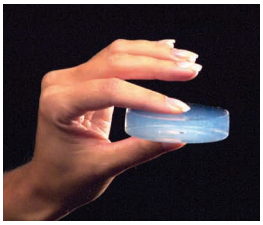
Installation of flexible aerogel blankets is fast and intuitive

Logistics: From procurement through installation, Pyrogel XT simplifies logistics because of its decreased volume requirements. These advantages include freight savings, storage space, and simplified inventory.

Installation: Pyrogel XT is quickly and easily installed by wrapping it onto piping and equipment. In contrast, rigid insulation materials are installed piece by piece in sections, which is very labor intensive. Pyrogel XT also is applied in longer lengths and at a faster rate then other insulation materials, which shortens the project schedule.

Special Applications:

- Overwrap System – Most hot insulation materials used today will eventually become wet, resulting in heat and energy loss, poor process control, and corrosion. This problem can be fixed by wrapping a single layer of 6 mm Pyrogel XT with metal jacket over the existing insulation and jacketing. The Pyrogel XT overwrap drives moisture out of the wet inner layers, resulting in improved thermal performance and reduced operating costs. It also decreases the outer surface temperature, helping to protect your personnel.
- High Temperature Composite System – High temperature applications require higher insulating values. Most high temperature insulation materials (ceramic fiber, mineral wool, etc.) have to be applied in extremely large thicknesses to achieve such values. But for reasons such as space constraints and economics, thick insulation might not work. In these cases, Pyrogel XT can be used in combination with the other materials to substantially reduce the total thickness.
- Economical Combination System – In high temperature applications, rigid insulation materials such as perlite and calcium silicate can crack or break when banded around pipe and over weld seams, or when a pipe expands in service. A single 6 mm layer of Pyrogel XT can be applied to the inner surface of rigid materials to provide a "cushioning" effect, which reduces damage and waste. Adding Pyrogel XT also lessens the amount of rigid insulation needed, reducing the overall thickness by 50% - 80%.




Aerogel - A New Way to Think About Industrial Insulation

Aerogels have been in existence for more than 70 years. They consist of lightweight silica solids derived from a gel in which the liquid component 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 solids. Volume conduction through the solid is therefore very low. The remaining 97% of the volume is composed of air in extremely small nanopores. The air has little room to move, inhibiting both convection and gas phase conduction.

These characteristics make aerogel the world's lowest density solid and most effective thermal insulator. The outstanding thermal properties of aerogels have been studied for decades, but Aspen Aerogels has developed a technically and economically viable form of aerogel for industrial insulation uses. Our unique process integrates aerogel into a carrier to create flexible, resilient, durable aerogel blankets with superior insulating properties.

Environmentally Friendly, Safe, and Durable Products

Environmentally friendly: Strict environmental regulations and increased awareness have led to the requirement for environmentally friendly insulation materials for use in industry. Aerogels pose no chemical threat to the environment. They are silica based, which is essentially sand. Cryogel Z and Pyrogel XT contain no respirable fibers and do not require blowing agents, so they are free of CFC and HCFC. These products can be safely disposed and, since the installed volume is considerably less than competing materials, there is less waste going to landfills.

Fire resistant: Cryogel Z and Pryogel XT offer excellent resistance to flame spread and smoke emission. In actual hydrocarbon fires, they protect piping and equipment longer, which is critical to increasing the reaction time needed to respond to a catastrophic event.

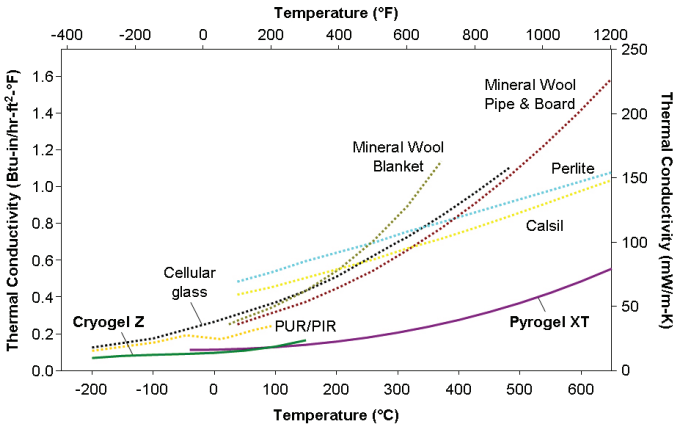
Light weight: Cryogel Z and Pyrogel XT are lighter than other insulation materials on an installed basis. This enables them to be easily and safely handled on the job site. They can be installed in longer lengths than traditional insulations, which improves installation rates. Their light weight also reduces overall loading of the pipe and equipment support structure.

Durable: Cryogel Z and Pyrogel XT are flexible materials that deform under compression. They have excellent bounce-back properties, even when exposed to compression forces of hundreds of psi, and they can resist high impact loads with no damage and no compromise in performance. This is unlike rigid insulation, which handles load with little to no deformation but is friable and susceptible to cracking. This creates thermal short circuits and paths for moisture intrusion. Rigid insulations also are at risk of breakage during shipping and installation, and while in service.

Cryogel Z and Pyrogel XT are super-hydrophobic

Hydrophobic: Cryogel Z and Pyrogel XT are extremely hydrophobic and therefore have outstanding resistance to moisture.

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



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