



Flexible Aerogel Insulation for Sub-Ambient and Cryogenic Applications

Cryogel[®] Z flexible aerogel blanket insulation is engineered to deliver maximum thermal protection with minimal weight and thickness. Cryogel Z is composed of a flexible aerogel blanket laminated to a vapor retarder. This powerful combination makes Cryogel Z unmatched in sub-ambient, cold cycling, and cryogenic applications.

Cryogel Z's extremely low thermal conductivity minimizes heat gain and liquid boil-off. Cryogel Z remains flexible, even at cryogenic temperatures, eliminating the need for complex and costly contraction joints, thereby resulting in simple and faster installation. It is designed for long term performance while also withstanding incidental mechanical abuse, leading to continued protection through the life of the asset. Cryogel Z is ideal for faster and safer installations for both maintenance work and new builds.

In addition to being the first choice in cold conservation, Cryogel Z based systems offer acoustic attenuation and protections against cryogenic spill, pool fire, and jet fire. The combination of these safeguards make Cryogel Z ideal for onshore, offshore and marine applications¹.

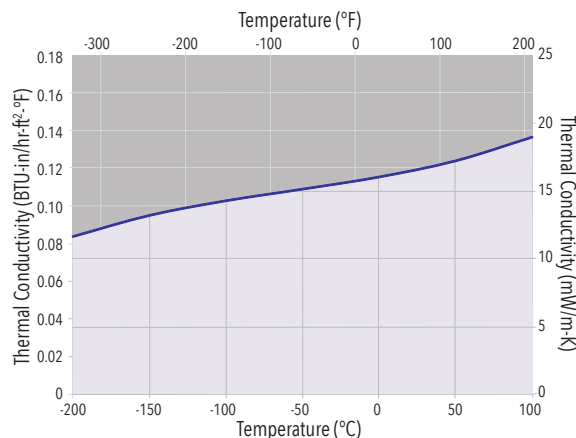
¹ - IMO Compliant Grade is available

THERMAL CONDUCTIVITY †

Tested in accordance with ASTM C177

| Mean Temp. °F / °C | k BTU-in/hr-ft ² -°F / mW/m-K |
|-----------------------|---|
| -200 / -129 | 0.096 / 14 |
| -100 / -73.3 | 0.10 / 15 |
| 0 / -17.8 | 0.11 / 16 |
| 75 / 23.9 | 0.12 / 17 |
| 100 / 37.8 | 0.12 / 17 |
| 200 / 93.3 | 0.13 / 19 |

†Thermal conductivity measured at a compressive load of 2 psi.



ADVANTAGES

- **Extremely low thermal conductivity (k-value) enables thinner designs for improved space efficiency**
- **Integrated vapor retarder provides redundant protection in an easy-to-install package**
- **Eliminates the need for contraction joints reducing cost and complexity**
- **Durable and flexible even at cryogenic temperatures**
- **Robust performance during construction, transport and operations makes it suitable for pre-insulation and modular builds**
- **Increased labor productivity and faster installation rates**
- **Proven in global LNG liquefaction and regasification facilities**
- **Thermal, acoustic, jet-fire, pool fire, and cryogenic spill protection in a single system**

PHYSICAL PROPERTIES OF CRYOGEL® Z

| | | |
|----------------|--|---------------------------------------|
| THICKNESS* | 0.2 in (5 mm) | 0.4 in (10 mm) |
| ROLL SIZE* | Approx. 1250 sqft; 58 in (1450mm) wide | Approx. 700 sqft; 58 in (1450mm) wide |
| MAX. USE TEMP. | 257°F (125°C) | |
| COLOR | White | |
| DENSITY* | 10 lb/ft ³ (0.16 g/cc) | |
| HYDROPHOBIC | Yes | |

*Nominal Values

PERFORMANCE OF FLEXIBLE AEROGEL BLANKET

CRYOGEL Z IS PRODUCED FROM FLEXIBLE AEROGEL BLANKET INSULATION THAT COMPLIES WITH ASTM C1728 TYPE I, GRADE 1B AND MEETS THE FOLLOWING REQUIREMENTS

| TEST PROCEDURE | PROPERTY | RESULTS |
|------------------------|--|---|
| ASTM C165 ¹ | Compressive Resistance | ≥ 5 psi (34.5 kPa) @ 10% deformation |
| ASTM C356 | Linear Shrinkage Under Soaking Heat | < 2% |
| ASTM C795 | Insulation for Use Over Austenitic Stainless Steel | Pass |
| ASTM C1101/1101M | Flexibility of Blanket Insulation | Flexible |
| ASTM C1104/1104M | Water Vapor Sorption | ≤ 5% (by weight) |
| ASTM C1338 | Fungal Resistance of Insulation Materials | No Growth |
| ASTM C1617 | Corrosiveness to Steel | Pass |
| ASTM C1763 | Water Absorption by Immersion | Pass |
| ASTM E84 | Surface Burning Characteristics | Flame Spread Index ≤ 25 Smoke Developed Index ≤ 50 |

[1] Compression resistance measured using a preload of 2 psi.

PERFORMANCE OF VAPOR RETARDER

| TEST PROCEDURE | PROPERTY | RESULTS |
|--------------------|--------------------------|-------------|
| ASTM E96 - DRY CUP | Water Vapor Transmission | ≤0.00 Perms |

PERFORMANCE OF SYSTEMS INCORPORATING CRYOGEL® Z

The performance of Cryogel Z in cold acoustic service and passive fire protection systems has been evaluated according to the test methods described below. Performance levels achieved in these systems are configuration dependent. Contact Aspen Aerogels technical service for configuration and other details.

- UL 1709 - Rapid Rise Fire Test: Up to 150 min of protection
- OTI-95-634 - Jet Fire Protection: Up to 120 min of protection
- ISO 15665 - Acoustic Insulation for Pipes, Valves, and Flanges: Configurations meeting Class A2, B2, C2, and Shell D2 possible
- IMO Part 2 and 5: Effective July 2019, use only Cryogel Z (IMO grade) for applications requiring compliance with IMO Part 2 and 5. Standard grade Cryogel Z is only appropriate for applications that do not require compliance with IMO Part 2 and 5. Contact Aspen Aerogels technical service for additional information.

THE AEROGEL ADVANTAGE

Aerogel is a lightweight solid derived from gel in which the liquid component of the gel is replaced with air. The general process of creating aerogel results in a material with extremely low density and the lowest thermal conductivity of any solid. These remarkable properties make aerogel one of the world's most efficient insulating materials. Our patented process integrates this unique aerogel into a fiber-batting to create flexible, resilient, and durable aerogel blankets with superior insulating performance.

WORKING WITH CRYOGEL® Z

Clean, flush, and accurate cutting of Cryogel Z can be achieved using conventional cutting tools such as scissors, tin snips, razor knives, and hot knives. As with all technical insulation materials, appropriate personal protective equipment (PPE) should be worn when handling, cutting and installing Cryogel Z. See SDS/AIS for complete health and safety information. Cryogel Z is designed for use with a properly installed jacketing system. Refer to the Cryogel Z Installation Guide for details.

TECHNICAL SERVICES

Cryogel Z represents the state of the art in cold service asset and process protection, minimizing total installed costs while facilitating long-term operating cost savings. Our Technical Services team offers comprehensive assistance for your project, from initial design and specification, through training and site start up.

MORE INFO



PRODUCT WEB PAGE

Scan with mobile device or go to aerogel.com/cryogel

This product, produced by Aspen Aerogels, Inc. ("ASPEN") is covered by a series of domestic and international patents and licenses. See www.aerogel.com/pat for further details. The information in this datasheet is provided as a convenience and for informational purposes only and obtained from initial type testing by the manufacturer. Product properties are subject to manufacturing variations. This information may contain inaccuracies, errors or omissions. All the products supplied, including all recommendations or suggestions must be evaluated by the user to determine applicability and suitability for any particular use. No guarantee or warranty as to this information, or any product to which it relates, is given or implied here. ASPEN DISCLAIMS ALL WARRANTIES EXPRESSED OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AS TO (i) SUCH INFORMATION, (ii) ANY PRODUCT. In no event is ASPEN responsible for, and ASPEN does not accept and hereby disclaims liability for, any damages whatsoever in connection with the use of or reliance on this information or any product to which it relates.

aspen | aerogels®