

FOAMGLAS[®] INSULATION SYSTEM SPECIFICATION



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FOAMGLAS[®]

Pittsburgh Corning

Application of FOAMGLAS[®] Insulation to
Ethylene Oxide Piping and Equipment

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1. General Notes

- 1.1 This specification covers the application of FOAMGLAS[®] insulation and accessories to piping and equipment associated with ethylene oxide service to control heat flow. It should not be used if the insulation is expected to provide fire protection in addition to reducing heat flow. If fire protection is intended, refer to specification I P-EO-322.
- 1.2 The product data sheets referenced in the text are listed at the end of the specification. Product data sheets for Pittsburgh Corning products may be accessed on line at: <http://www.foamglas.com/>.
- 1.3 SI unit conversions have been rounded to nearest English unit equivalent.

2. Codes and Standards

- 2.1 AISI American Iron and Steel Institute
- 2.2 ASTM International Standards
 - 2.2.1 ASTM C240 Standard Test Methods of Testing Cellular Glass Insulation Block
 - 2.2.2 ASTM C552 Standard Specification for Cellular Glass Thermal Insulation
 - 2.2.3 ASTM C 1338 Determining Fungi Resistance of Insulation Materials and Facings
 - 2.2.4 ASTM C1639 Standard Specification for Fabrication of Cellular Glass Pipe and Tubing Insulation
 - 2.2.5 ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation
 - 2.2.6 ASTM C1767 Standard Specification for Stainless Steel Jacketing for Insulation
 - 2.2.7 ASTM E136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
- 2.3 EN Standards
 - 2.3.1 EN 14305, Thermal insulation products for building equipment and industrial installations. Factory made cellular glass (CG) products. Specification
 - 2.3.2 EN ISO 9229, Thermal insulation — Vocabulary (ISO 9229:2007)
- 2.4 International Organization for Standardization (ISO)
 - 2.4.1 ISO 9001: Quality management systems — Requirements
 - 2.4.2 ISO 9002: Quality systems. Modelled for quality assurance in production, installation, and servicing.
- 2.5 British Standards (BS)
 - 2.5.1 BS 4370-1-4 Method of test for rigid cellular materials

3. Preliminary Conditions

- 3.1 This specification is subject to revision without notice. Contact Pittsburgh Corning for current revision data before using. This specification is offered as a guide for the purpose described herein and should be employed at the discretion of the user. No warranty of procedures, either expressed or implied, is intended.
- 3.2 All piping shall be cleaned of foreign substances and free of surface moisture prior to the application of insulation.
- 3.3 All insulation materials shall be stored in an area protected from the weather and kept dry before and during application.
- 3.4 Testing of the piping system shall be completed prior to application of insulation.
- 3.5 On outdoor lines and equipment, no more insulation shall be applied than can be completely sealed by the end of each workday.
- 3.6 Protrusions from piping and equipment such as vents, relief valves, thermocouple walls, etc. shall be considered as part of this specification, and shall be insulated a distance of 1-1/2 times the specified insulation thickness.
- 3.7 All fabricated sections of FOAMGLAS[®] insulation shall be adhered with Hydrocal[®] B-11 through the entire thickness of the insulation.

4. Design Requirements

- 4.1 The insulation thickness shall be computed from design criteria for the system being insulated. The Energy Analysis Group at Pittsburgh Corning at the owner or designer's request can perform these calculations. Consideration should be given to process control, energy conservation, personnel and fire protection and other criteria as required. For fire protection thickness calculations contact the Energy Analysis Group at Pittsburgh Corning.

5. Materials Used

- 5.1 Insulation shall be FOAMGLAS[®] cellular glass insulation manufactured in accordance with ASTM C552, "Standard Specification for Cellular Glass Thermal Insulation," by Pittsburgh Corning whose quality system for manufacturing, inspecting, and testing of FOAMGLAS[®] insulation is certified to meet the requirements of ISO 9001:2008.
 - 5.1.1 FOAMGLAS[®] pipe insulation shall be fabricated according to the requirements of ASTM C1639 "Standard Specification for Fabrication of Cellular Glass Pipe and Tubing Insulation".
- 5.2 Bore Coating shall be one of following:
 - 5.2.1 Hydrocal[®] B 11 gypsum cement, manufactured by U.S. Gypsum Corporation
 - 5.2.2 PC[®] 80M Mortar, available from Pittsburgh Corning. PC[®] 80M Mortar is a two-component in inorganic, non-combustible bore coating that is acceptable for use with stainless steel.
- 5.3 Joint sealant shall be heat-resistant silicone such as:
 - 5.3.1 PC[®] RTV 450 Silicone Adhesive, as supplied by Pittsburgh Corning.
 - 5.3.2 PC[®] HI-TEMP/RTV Silicone Adhesive, as supplied by Pittsburgh Corning.
- 5.4 Metal jacketing materials are available from RPR Products, Inc. 407 Delz Houston, TX 77018 PH: (713) 697-7003 <http://www.rprhouston.com/>. Pre-Metco, 3420 C Street NE #401 Auburn, WA 98002 PH: (800)734-0474 <http://premetco.com/> or other manufacturers - options are:
 - 5.4.1 Aluminum jacketing - 0.4 mm (0.016 in) aluminum jacketing with 13 x 0.38 mm (0.5 in x 0.015 in) bands with matching seals. Aluminum jacket shall comply with ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation.
 - 5.4.2 Stainless steel jacketing - 0.4 mm (0.016 in.) smooth stainless steel jacket.
 - 5.4.3 Metal Bands shall be 13mm x 0.4mm (0.5 in. x 0.015 in.) stainless steel bands with matching seals.
- 5.5 Tape shall be fiber reinforced strapping tape, 25 mm (1 in.) wide, Scotch Brand Filament Tape, or equal.

6. Application Procedure - Straight Piping

- 6.1 All insulation shall be applied with all joints closed tightly. The insulation shall be secured with stainless steel bands as specified. Bands shall be spaced 30.5 cm (12 in.) on center for 610mm (24 in.) pipe insulation. Care must be taken not to over-tighten bands which may cause the insulation to crack. Cracked or broken FOAMGLAS[®] insulation shall be replaced. Voids shall be filled with pieces of FOAMGLAS[®] insulation.
- 6.2 On cyclic or vibrating pipe, the bore surface of the inner layer of FOAMGLAS[®] insulation shall receive a coating of Hydrocal[®] B 11 gypsum cement or PC[®] 80M Mortar bore coating. The bore coating shall be sufficient to fill the surface cells of the insulation. Allow the bore coating time to dry before applying the insulation to the pipe.
- 6.3 If necessary for process design considerations, the joints of the insulation may be sealed with the specified neutral cure silicone sealant.
- 6.4 No more insulation shall be applied to the piping and equipment than can be finished the same day. At the end of each day, the exposed end and joints of the last section of insulation shall be sealed using the specified RTV sealant. This section shall also be completely sealed to the pipe or piece of equipment. This is to prevent possible water intrusion due to the elements.

7. Application Procedure - Fittings and Valves, etc.

- 7.1 All fitting and valve insulation shall be banded on with all fabricated sections to nest, with no voids or gaps.
- 7.2 The fitting and valve insulation thickness shall be sized to match adjacent straight run pipe insulation.

8. Application Procedure - Equipment

- 8.1 Equipment shall be insulated in a manner similar to that for piping. The following procedures shall be observed:
 - 8.1.1 All joints shall be tightly fitted, and if necessary as sealed with the specified sealant.
 - 8.1.2 Broken or ill-fitting insulation shall be refitted or replaced.
 - 8.1.3 When applicable, joints shall be staggered between successive layers of insulation.
 - 8.1.4 All equipment insulation securement shall be with stainless steel bands as specified.
 - 8.1.5 Securement band spacing shall be a minimum of two (2) bands per course of block.

9. Application Procedure - Protrusions

- 9.1 All protrusions shall be insulated a distance of 1-1/2 times the specified insulation thickness. All mating surfaces of insulation on protrusions, as well as surfaces in contact with the protrusion, shall be sealed with a full bed of RTV sealant as specified.

10. Insulation Finish

- 10.1 Apply metal jacketing as specified according to the jacketing manufacturer's recommendations. All laps shall be positioned to shed water and shall be sealed with PC[®] RTV 450 Silicone Adhesive or PC[®] HI-TEMP/RTV Silicone Adhesive.
- 10.2 Band the jacket in place using the stainless steel bands and seals as specified. Use two (2) bands per section of insulation or per course of block.
- 10.3 Jacketing terminations shall be sealed using the specified silicone sealant.

11. Hangers and Cradles for Piping

- 11.1 All hangers shall be located on the outside of the final layer of insulation and finish.
- 11.2 The cradle should be designed to provide a sufficient bearing area to limit the compressive force on the insulation to 138 kPa (20 psi). Further details are available in Pittsburgh Corning specification I S-83-07-01 "GUIDELINES FOR USING FOAMGLAS[®] INSULATION AT PIPE HANGERS AND SUPPORTS".
- 11.3 The bore and outer surface of the insulation in the load bearing area must be coated with Hydrocal[®] B 11 gypsum cement or PC[®] 80M Mortar as specified.

12. Inspection

- 12.1 Inspection of the insulation and finish application procedures before, during and after the application is the responsibility of the owner.

13. Quality Assurance

- 13.1 The insulation manufacturer's quality system, including its implementation, shall meet the requirements of ISO 9001:2008.

14. Certificates

- 14.1 The manufacturer will furnish evidence of compliance with the quality system requirements of ISO 9001:2008.

15. Product Data Sheets

Product data sheets for Pittsburgh Corning products may be accessed on line at: <http://www.foamglas.com/>

- 15.1 The following are Pittsburgh Corning products referenced in this specification:

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| 15.1.1 | FOAMGLAS® ONE™ Insulation | FI-003 |
| 15.1.2 | Hydrocal® B-11 | FI-169 |
| 15.1.3 | PC® 80M Mortar | FI-289 |
| 15.1.4 | PC® HI-TEMP/RTV Silicone Adhesive | FI-232 |
| 15.1.5 | PC® RTV 450 Silicone Adhesive | FI-244 |

16. Additional Information

Questions regarding this report should be directed to:

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