

FOAMGLAS[®] INSULATION SYSTEM SPECIFICATION



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FOAMGLAS[®]

Pittsburgh Corning

Application of FOAMGLAS[®] Insulation to
Above Ground Steam Piping

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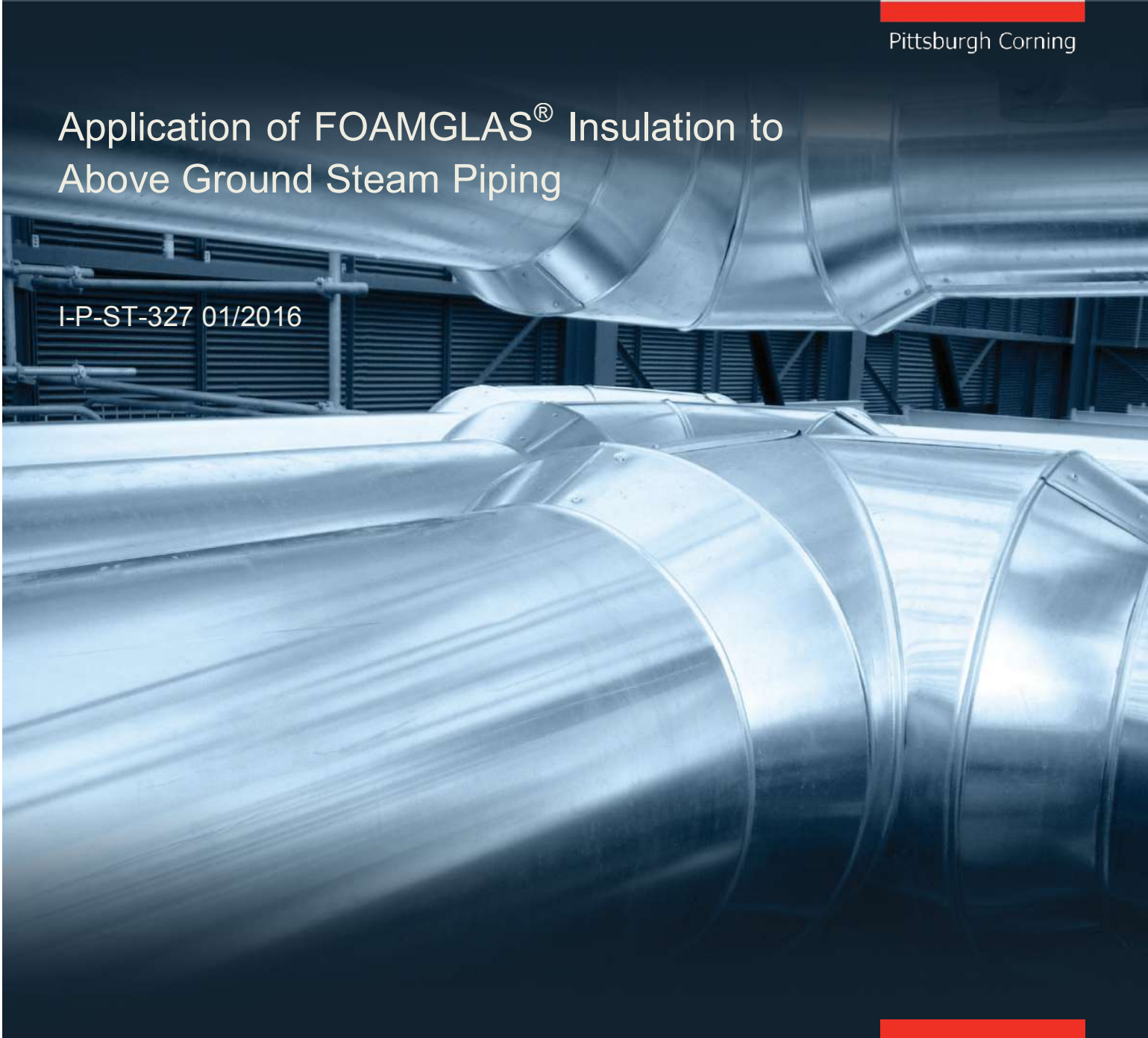


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1. General Notes

- 1.1 This specification covers the application of FOAMGLAS[®] insulation and accessory materials on above ground steam piping operating in the range of 100°C (212°F) to 482°C (900°F).
- 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 C623 Standard Test Method for Young's Modulus, Shear Modulus, and Poisson's Ratio for Glass and Glass-Ceramic by Resonance
 - 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
- 2.3 ASTM C1767 Standard Specification for Stainless Steel Jacketing for Insulation
- 2.4 EN Standards
 - 2.4.1 EN 14305, Thermal insulation products for building equipment and industrial installations. Factory made cellular glass (CG) products. Specification
 - 2.4.2 EN ISO 9229, Thermal insulation — Vocabulary (ISO 9229:2007)
- 2.5 International Organization for Standardization (ISO)
 - 2.5.1 ISO 9001: Quality management systems — Requirements
 - 2.5.2 ISO 9002: Quality systems. Modelled for quality assurance in production, installation, and servicing.
- 2.6 British Standards (BS)
 - 2.6.1 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 The specifying engineer or owner shall, at their option, designate a rust inhibitor or corrosion resistant paint to be applied before the application of any insulation. The application of such paint or coating is not a requirement of this specification.
- 3.4 All insulation materials shall be stored in an area protected from the weather and kept dry before and during application.
- 3.5 Testing of the piping system shall be completed prior to application of insulation.
- 3.6 When working on outdoor lines or equipment, no more insulation shall be applied than can be completely sealed by the end of each workday.
- 3.7 Any protrusions from piping and equipment such as vents, relief valves, thermocouple wells, etc., shall be considered as part of this specification and shall be insulated accordingly.
- 3.8 The general contractor, insulation contractor and owner shall provide sufficient inspection during the insulation and finish application. Continuous inspection of the application is not to be considered a requirement of Pittsburgh Corning.

4. Design Requirements

- 4.1 The insulation thickness shall be computed from design criteria for the system being insulated. Such computations can be performed by Pittsburgh Corning Corporation at the owner's or designer's request. Consideration should be given to process control, energy conservation, personnel and fire protection, and other criteria as required.

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".
 - 5.1.2 The FOAMGLAS[®] pipe insulation may be fabricated in half, curved sidewall, segmented, or StrataFab[®] System, depending on the operating conditions. Fabrication adhesive for standard FOAMGLAS[®] pipe insulation shall be Hydrocal[®] B-11. For systems operating above 205°C (401°F), StrataFab[®] System, PC[®] 700K System, segmented insulation, or HT Reinforced System is preferred.

- 5.2 Bore Coating and External Reinforcement:
- 5.2.1 Bore coating for carbon steel pipe shall be Hydrocal[®] B 11 gypsum cement, manufactured by U.S. Gypsum Corporation. Hydrocal[®] B 11 may also be used as part of the HT Reinforced System if specified.
- 5.2.2 Bore coating for stainless steel pipe shall be PC[®] 80M Mortar available from Pittsburgh Corning. PC[®] 80M Mortar is a two-component inorganic, non-combustible bore coating that is acceptable for use with stainless steel. PC[®] 80M Mortar may also be used as part of the PC[®] 700K external reinforced System if specified.
- 5.2.3 Glass reinforcing mesh used for PC[®] 700K System and HT Reinforced System shall be PC[®] 150 glass reinforcing mesh as supplied by Pittsburgh Corning or approved equal.
- 5.3 Insulation jacketing shall be one of the following:
- 5.3.1 Aluminum jacketing - 0.4 mm (0.016 in) aluminum jacketing with 13 x 0.38 mm (0.5 in x 0.015 in) stainless steel bands and matching seals. Aluminum jacket shall comply with ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation.
- 5.3.2 Stainless steel jacketing - 0.4 mm (0.016 in.) smooth stainless steel jacket for caustic service or where the FOAMGLAS[®] insulation is being used for fire protection applications.
- 5.3.3 Metal Bands shall be 13mm x 0.4mm (0.5 in. x 0.015 in.) stainless steel bands with matching seals.
- 5.3.4 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.
- 5.3.5 PITTWRAP[®] CF jacketing, a cellulose free fiberglass reinforced vapor retarder insulation jacketing used for protecting above ground indoor FOAMGLAS[®] insulation systems.
- 5.3.6 One of any non-cellulose multi-ply laminated fiberglass-reinforced polypropylene, PVC, or vinyl faced/metalized film backed jacket for above ground indoor systems. Jacket must not contain known mold or mildew nutrients, and exhibit no mold growth when tested according to ASTM C1338 "Determining Fungi Resistance of Insulation Materials and Facings".
- 5.4 Tape shall be 19 mm (0.75 in.) wide fiber reinforced tape such as Scotch #880 or equal.
- 5.5 PITTSEAL[®] 444Ns sealant or PITTSEAL[®] 444N sealant supplied by Pittsburgh Corning. PITTSEAL[®] 444Ns sealant and PITTSEAL[®] 444N sealant are specially formulated butyl sealant used for sealing joints in FOAMGLAS[®] insulation systems. The maximum continuous service temperature that PITTSEAL[®] 444Ns and 444N sealants may be exposed to is 82°C (180°F).

6. Application for Systems Operating From 83°C (181°F) to 204°C (400°F)

- 6.1 The FOAMGLAS[®] insulation shall be fabricated in half sections or curved sidewall segments where possible.
- 6.2 Apply a single layer of FOAMGLAS[®] insulation to the pipe with joints tightly butted. The insulation shall be applied to piping with all joints dry and tightly fitted to eliminate voids. One piece of the first section of insulation shall be cut in half so that the butt joints of successive pieces will be offset 50% from the mating half-section. This will eliminate four way joint intersections on straight runs. The insulation shall be applied so that the longitudinal joints between insulation half sections will be oriented at the 12 o'clock and 6 o'clock position on horizontal piping. All ill-fitting or broken insulation shall be refitted or replaced. Pieces of FOAMGLAS[®] insulation shall be used to fill voids or gaps.
- 6.3 Depending on the outer diameter of the insulation, the FOAMGLAS[®] insulation may be taped or banded in place. Securement shall be a minimum of 100mm (4 in.) from the end of any insulation section, and shall be installed on equal spacing such that bands or rounds of tape are spaced 305mm (12 in.) on center. Care shall be taken not to damage the insulation during banding. Tape securement insulation securement may be used for piping with insulation O.D.'s 457 mm (18 in.) or smaller. Tape is not acceptable as primary means of securement. Tape shall be applied to overlap a minimum of 50%.
- 6.4 All damaged FOAMGLAS[®] insulation shall be replaced before jacketing or finish is applied.
- 6.5 Fittings shall be insulated in a manner similar to piping. Where the outer diameter of fitting insulation is larger than that of adjacent piping, a beveled or tapered transition section shall be provided.

7. Application for Systems Operating From 205°C (401°F) to 482°C (900°F)

- 7.1 The primary fabrication recommendation for this temperature range is FOAMGLAS[®] insulation StrataFab[®] System.
- 7.2 Apply a single layer of FOAMGLAS[®] insulation StrataFab[®] System using the same application methods described in Sections 6.2 through 6.5.
- 7.3 An alternative to the StrataFab[®] System is double layer application.
 - 7.3.1 For double layer application, the FOAMGLAS[®] insulation shall be fabricated in half sections or curved sidewall segments where possible.
 - 7.3.2 Apply the first layer of FOAMGLAS[®] insulation as described in sections 6.2 through 6.5. The first layer of insulation may be secured using tape provided that the outer diameter of the first layer is within the previously specified limits.
 - 7.3.3 The second layer of FOAMGLAS[®] insulation is applied over the first layer with joints tightly closed and offset from the joints of the inner layer. All ill-fitting or broken insulation shall be refitted or replaced. Pieces of FOAMGLAS[®] insulation shall be used to fill voids or gaps. The second layer of insulation shall be secured using metal bands spaced 305mm (12 in.) on center.
 - 7.3.4 Fittings with offset or ship-lapped joints are available from some fabricators and are recommended when available. Check with your local fabricator to determine availability.
- 7.4 A second alternative to FOAMGLAS[®] StrataFab[™] system is the use of external reinforcement. The PC[®] 700K System or the HT Reinforced System. These systems are typically applied in the fabrication shop, not in the field.
 - 7.4.1 The PC[®] 700K System is comprised of two coats of PC[®] 80M Mortar reinforced with PC[®] 150 glass reinforcing mesh applied to the outer surface of the pipe insulation. A single coat of PC[®] 80M Mortar is applied to the pipe insulation surface and the PC[®] 150 glass reinforcing mesh is embedded into the uncured mortar. A second layer of PC[®] 80M Mortar is applied over the mesh and the system is allowed to cure.
 - 7.4.2 Similar to the PC[®] 700K System, the HT Reinforced System is comprised of two coats of Hydrocal[®] B-11 reinforced with PC[®] 150 glass reinforcing mesh applied to the outer surface of the pipe insulation. A single coat of Hydrocal[®] B-11 is applied to the pipe insulation surface and the PC[®] 150 glass reinforcing mesh is embedded into the uncured mortar. A second layer of PC[®] Hydrocal[®] B-11 is applied over the mesh and the system is allowed to cure.
- 7.5 The third alternative is the use of a composite system using either a high density fibrous glass blanket or a mineral wool inner layer and FOAMGLAS[®] insulation outer layer. The composite system is not for use on systems containing combustible fluids or where systems are subject to wash-down. For additional application information for composite system, refer to specification I-P-ST-329.

Note: Pittsburgh Corning recommends that composite systems only be used on lines operating at 232°C (450°F) or higher. In addition, the system should be designed so that the FOAMGLAS[®] insulation/inner layer material interface is

a minimum temperature of 121°C (250°F). Contact Pittsburgh Corning for further details.

8. Finish Application

- 8.1 Apply metal jacket according to the jacket manufacturer's recommendations.
- 8.1.1 Metal jacketing shall be fitted with tight, smooth joints and all laps positioned to shed water. Securement of the jacketing shall be with metal bands at a minimum of two bands per jacket section. Spacing of jacket banding shall be not greater than 18" on centers.
- 8.1.2 If the system is subject to wash-down or moisture intrusion into the metal jacket lap is a reasonable expectation, all laps and seams in the metal jacket should be sealed using a bead of PITTSEAL[®] 444N^s or 444N sealant. The sealant should be applied as with the jacket so that the sealant is placed between the overlapping surfaces of the jacket. Running a bead of sealant along the edge of a seam will not be sufficient.
- 8.2 As an alternate to metal jacket on indoor lines not subject to wash-down or moisture intrusion, a laminated jacket may be used as the insulation finish. The laminated jacket should be applied in accordance with manufacturer's recommendations.

9. Inspection

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

10. Quality Assurance

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

11. Certificates

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

12. Product Data Sheets

- 12.1 Product data sheets for Pittsburgh Corning products may be accessed on line at: <http://www.foamglas.com/>. The following are Pittsburgh Corning products referenced in this specification:

12.2	FOAMGLAS [®] ONE [™] Insulation	FI-003
12.3	Hydrocal [®] B-11	FI-169
12.4	PC [®] 150 glass reinforcing mesh	
12.5	PC [®] 80M Mortar	FI-289
12.6	PITTSEAL [®] 444N ^s sealant	FI-164s
12.7	PITTSEAL [®] 444N sealant	FI-164
12.8	StrataFab [®] Insulation System	FI-222

13. Additional Information

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