

FOAMGLAS[®] INSULATION SYSTEM SPECIFICATION

 **FOAMGLAS[®]**



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**Application of FOAMGLAS[®] Insulation to
Systems Utilizing Heat Transfer Fluids or
Hot Oils**

I-HOT-HTF-PI-EQ 12/2019

A photograph showing a complex industrial system of large, horizontal pipes. The pipes are wrapped in a thick, white, textured insulation material. The background shows a dark, industrial structure with vertical supports and horizontal beams. The lighting is dramatic, highlighting the metallic surfaces of the pipes and the texture of the insulation.

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1. General Notes

- 1.1 This specification covers the application of FOAMGLAS[®] insulation and accessories to piping and equipment utilizing volatile organic heat transfer fluids at high temperatures.
- 1.2 Any deviation from this specification (i.e. alternative accessory materials, design etc.) must be authorized by written approval
- 1.3 The product data sheets referenced in the text are listed at the end of the specification. Product data sheets for Pittsburgh Corning LLC products may be accessed on line at: <http://www.foamglas.com/>.
- 1.4 Technical drawings addressing details as well as supplemental application instructions are provided in Appendix A. Contact Pittsburgh Corning LLC if additional details are needed.
- 1.5 SI and Metric unit conversions have been rounded to nearest United States customary unit equivalent.
- 1.6 This specification is subject to revision without notice. Contact Pittsburgh Corning LLC 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.

2. Training

- 2.1 The performance of insulation systems depends greatly on the quality of the installation work. Pittsburgh Corning LLC recommends the insulation system to be installed by a qualified thermal insulation contractor familiar with FOAMGLAS[®] insulation systems. Training for installation of FOAMGLAS[®] insulation systems is available from Pittsburgh Corning LLC at one of its training facilities (Tessenderlo, Belgium; Fresno, Texas, USA; and Yantai, China). In many cases, training may be offered for no additional cost to the client. In addition, limited on-site training may be available. Contact Pittsburgh Corning LLC for additional information or to request installation training.

3. Codes and Standards

- 3.1 AISI American Iron and Steel Institute
- 3.2 ASTM International Standards
 - 3.2.1 ASTM C552 Standard Specification for Cellular Glass Thermal Insulation
 - 3.2.2 ASTM C1639 Standard Specification for Fabrication of Cellular Glass Pipe and Tubing Insulation
 - 3.2.3 ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation
 - 3.2.4 ASTM C1767 Standard Specification for Stainless Steel Jacketing for Insulation

- 3.3 EN Standards
 - 3.3.1 EN 14305, Thermal insulation products for building equipment and industrial installations. Factory made cellular glass (CG) products. Specification
 - 3.3.2 EN ISO 9229, Thermal insulation — Vocabulary (ISO 9229:2007)
- 3.4 International Organization for Standardization (ISO)
 - 3.4.1 ISO 9001: Quality management systems — Requirements
 - 3.4.2 ISO 9002: Quality systems. Modelled for quality assurance in production, installation, and servicing
- 3.5 British Standards (BS)
 - 3.5.1 BS 4370-1-4 Method of test for rigid cellular materials
- 3.6 Pittsburgh Corning LLC Fabrication Guidelines (FI-322)

4. Preliminary Conditions

- 4.1 FOAMGLAS® insulation is impermeable and the properties of FOAMGLAS® insulation will not be affected by exposure to moisture. Due to the nature of the FOAMGLAS® insulation surface, moisture can be retained in the surface cells of exposed FOAMGLAS® insulation. If installed wet, the surface moisture contained in the outer surface of FOAMGLAS® insulation can potentially cause problems for the system during application. Because of this the following steps are required to ensure the integrity of the finished system.
 - 4.1.1 Insulating materials shall be supplied to the jobsite in the Supplier's clearly identified original packaging Supplier's unique identification, batch number, date of manufacture and shelf life (if applicable) shall be visible.
 - 4.1.2 FOAMGLAS® pipe insulation and fabricated fittings must be transported and stored vertically. Packages must be handled with care and protected from the elements while in storage. FOAMGLAS® insulation packages and must not be allowed to come into direct contact with the ground in to prevent possible damage or contamination prior to application.
 - 4.1.3 Insulation materials shall remain in their original packaging until immediately prior to use. Materials removed from their original packaging and not immediately used shall be re-sealed/packaged to prevent damage or contamination. Material identification shall be maintained.
 - 4.1.4 Materials which become wet, contaminated, or damaged shall not be used.
- 4.2 The surface to be insulated should be clean and free from all traces of grease, rust, dust and any foreign matter. The design engineer should decide whether a protective coating system is necessary, and to also determine if the system is compatible with the service temperature. If the engineer decides to specify an anti-corrosion product, the following rules should be observed:
 - 4.2.1 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.

- 4.2.2 Any surface imperfection must be cleaned with a wire brush and then coated with a new layer of anti-corrosion paint or other suitable product. The surface must be moisture free before the insulation is applied and the product application must follow the anti-corrosion product manufacturer's guidelines.
- 4.2.3 When an adhesive is used, the compatibility between the anticorrosion paint and the adhesive must be verified before applying the insulation.
- 4.3 Insulation and necessary materials shall be protected from moisture during shipment, storage, and installation. Temporary polyethylene sheeting shall be used to protect insulation in wet weather conditions until the final application of the vapor barrier and permanent jacketing. Wet sealants, coatings, and insulation are unacceptable and shall be replaced with dry materials.
- 4.4 Insulation system supports shall consider flexing and vibration during shipping, or equipment installation such that insulation systems, including temporary seals, are not breached.
- 4.5 Vapor stops shall be installed on all supports, all protrusions and all insulation terminations. The vapor stop is applied before the vapor retarder mastic/foil, and covers the metal surface as well as the outer insulation surface. Vapor stop sealant and cryogenic adhesive shall be as specified. For hot service application, all terminations shall be sealed with specified sealant.
- 4.6 The surface and the materials used must be dry before and during application, and must remain dry until start-up of the insulated system.
- 4.7 The application of FOAMGLAS[®] insulation on pipes or equipment is to be done at ambient temperature.
- 4.8 The temperature limits of the accessory products must be respected during both storage and application.
- 4.9 Hydrostatic, radiographic and other tests must be completed before the insulation is applied to assure proper system performance.
- 4.10 Bore Coatings are typically specified if one or more of the following conditions exist:
 - 4.10.1 The surface being insulated cycles, or swings through a given temperature range, more than once a week.
 - 4.10.2 The surface being insulated experiences vibration.
 - 4.10.3 The FOAMGLAS[®] insulation is carrying the load of the pipe such as at a pipe hanger or support.

5. Design Requirements

- 5.1 The heat transfers should be limited to acceptable values with respect to both economic and functional aspects. Design thickness criteria will limit heat losses to acceptable values. The insulation thickness shall be determined through calculations based on particular and unique environmental and operating conditions.
- 5.2 The insulation thickness shall be calculated in accordance to ISO 12241, or ASTM C680, and based upon project requirements for heat loss, environmental conditions, etc. Contact the Pittsburgh Corning LLC Technical

Department for assistance in selecting an insulation thickness based on one or more of the above criteria.

- 5.3 Piping and equipment shall be insulated according to insulation class, operating temperature and insulation thickness defined in the specifications, P&ID, line designation table (list), piping isometrics, equipment drawings, general arrangement drawings, insulation thickness tables.
- 5.4 The entire system shall be fully insulated, including all piping components, instruments and tubing, drains to the extent specified.
- 5.5 All metal parts that protrude through the insulation shall be insulated, over an extent of 3 times the insulation thickness on below ambient systems, and/or two times the insulation thickness on above ambient systems.
- 5.6 The insulation at pipes and equipment shall end in such a distance to adjacent flanges, to allow removal of bolts without damage to the insulation.
- 5.7 FOAMGLAS[®] pipe insulation shall be fabricated to snugly fit the pipe. Oversized pipe insulation or sloppy fitting insulation can lead to premature system degradation.

6. Materials Used

- 6.1 Insulation material - Insulation material shall be FOAMGLAS[®] One cellular glass insulation manufactured in accordance with ASTM C552 "Standard Specification for Cellular Glass Thermal Insulation" (Grade 6) or EN14305, "Thermal insulation products for building equipment and industrial installations – factory made cellular glass (CG) products – Specification". Pittsburgh Corning LLC's quality system for manufacturing, inspecting, and testing of FOAMGLAS[®] insulation is certified to meet the requirements of ISO 9001:2015.
 - 6.1.1 FOAMGLAS[®] pipe insulation shall be fabricated according to the requirements of requirements of Pittsburgh Corning LLC Fabrication Guidelines (FI-322) and ASTM C1639 "Standard Specification for Fabrication of Cellular Glass Pipe and Tubing Insulation".
- 6.2 Anti-abrasive - This coating is only to be applied if the piping will be submitted to frequent and significant thermal movements or to vibrations. The anti-abrasive coating must be applied onto the inner side of the FOAMGLAS[®] elements which will be in contact with the metal pipe or equipment. Anti-abrasive coating shall be chosen from one of the following options depending upon the operating temperature of the system.
 - 6.2.1 PC[®] HTAA supplied by Pittsburgh Corning LLC for operating temperatures $\leq -183^{\circ}\text{C}$ (-297°F) or $\geq 38^{\circ}\text{C}$ (100°F). PC[®] HTAA is an E.U. stock item.
 - 6.2.2 PC[®] 80M Mortar available from Pittsburgh Corning LLC. PC[®] 80M Mortar is a two-component in inorganic, non-combustible bore coating that is acceptable for use with stainless steel. PC[®] 80M Mortar is recommended for operating temperatures $\leq -183^{\circ}\text{C}$ (-297°F) or $\geq 38^{\circ}\text{C}$ (100°F).
 - 6.2.3 Hydrocal[®] B-11 gypsum cement, manufactured by U.S. Gypsum Corporation for operating temperatures $\leq -183^{\circ}\text{C}$ (-297°F) or $\geq 38^{\circ}\text{C}$ (100°F). Hydrocal[®] B 11 is a U.S. stock item.

- 6.3 Protrusion sealant shall be one of the following:
- 6.3.1 PC[®] RTV 450 Silicone Adhesive supplied by Pittsburgh Corning LLC. A one part, neutral cure, silicone adhesive/sealant formulated for use with FOAMGLAS[®] insulation at operating temperatures up to 204°C (400°F). PC[®] RTV 450 Silicone Adhesive is a U.S. stock item.
 - 6.3.2 PC[®] HI-TEMP/RTV Silicone adhesive supplied by Pittsburgh Corning LLC. PC[®] HI-TEMP/RTV Silicone adhesive is a one part, neutral cure, silicone adhesive/sealant formulated for use at operating temperatures up to 260°C (500°F).
 - 6.3.3 Terostat PC[®] FRi as supplied by Pittsburgh Corning. Terostat PC[®] FRi applied polymer coating ensures a highly-flexible, weather-proof finish which gives excellent protection for joints and penetrations and provides a continuous finish to protect against water ingress after impact damage. Terostat PC[®] FRi is an E.U. stock item.
- 6.4 Tape¹ shall be 25 mm (1 in.) wide, high tensile strength fiber reinforced strapping tape. Tape is appropriate for providing temporary insulation securement for piping with insulation O.D.'s 457 mm (18 in.) or smaller as long as it is covered with metal jacket afterwards. Tape is not acceptable as primary means of securement.
- 6.5 Weld Pins shall be of the type which is secured through the insulation after the insulation has been positioned. Pins shall have oversized washers of minimum one and one half (1-1/2) square inches net area. PowerBase[®] stainless steel weld pins by AGM Industries, Inc. or equal.¹
- 6.6 Weld Studs shall be Nelson[®] type stainless steel or approved equal¹
- 6.7 Reinforcing mesh fabric for the vapor retarder coating shall be one of the following:
- 6.7.1 Synthetic fabric, 6.5 x 6 meshes, PC[®] Fabric 79 as supplied by Pittsburgh Corning LLC or approved equal.
 - 6.7.2 Glass reinforcing mesh, PC[®] 150 glass reinforcing mesh as supplied by Pittsburgh Corning LLC or approved equal.
- 6.8 Metal jacket finish for mechanical or fire protection shall be one of the following:
- 6.8.1 Use minimum 0.4mm (0.016 in.) aluminum jacket for insulation O.D.'s of 610mm (24 in.) or less. For larger O.D.'s use 0.6mm (0.024 in.) Aluminum jacket. Aluminum jacketing shall conform to ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation.
 - 6.8.2 Use minimum 0.4 mm (0.016 in.) smooth steel (i.e. stainless galvanized, aluminized, galvalume, etc.) where the FOAMGLAS[®] insulation system is also being used for fire protection. Stainless steel jacketing shall conform to ASTM C1767 Standard Specification for Stainless Steel jacketing for Insulation.
- 6.9 Optional mastic finish shall be:
- 6.9.1 PITTCOTE[®] 404 Coating supplied by Pittsburgh Corning. PITTCOTE[®] 404 is a flexible, acrylic latex coating used with FOAMGLAS[®] insulation. PITTCOTE[®] 404 coating is used with PC[®] Fabric 79. PITTCOTE[®] 404 coating is typically

¹ Product manufacturer information can be found in Appendix B

used for an insulation finish over indoor fitting insulation when all-service-jacketing is used for the straight run insulation finish.

- 6.9.2 Terostat PC® FRI as supplied by Pittsburgh Corning. Terostat PC® FRI applied polymer coating ensures a highly-flexible, weather-proof finish which gives excellent protection for joints and penetrations and provides a continuous finish to protect against water ingress after impact damage. Terostat PC® FRI is an E.U. stock item.

7. Application of Pipe Insulation

- 7.1 This portion of the application procedure is applicable for piping in all areas.
- 7.2 Where specified due to operating conditions, all FOAMGLAS® pipe insulation shall be bore coated with an approved bore coating listed in section 5.2. Bore coating must be chosen to match the operating conditions and system requirements. Bore coating may be shop or field applied.
- 7.3 Before application of the insulation the following procedures should be followed:
- 7.3.1 Mark location of insulation terminations (at flanges, valves, etc.) on the object.
- 7.3.2 The insulation of straight piping, bends, T-pieces, equipment heads will be fully fabricated following applicable standards before installation to fit the piping using the fewest number of pieces as possible, and defined by transport conditions.
- 7.4 The insulation application should include the following procedures:
- 7.4.1 For piping and equipment with operating temperatures $\leq 205^{\circ}\text{C}$ (401°F), the FOAMGLAS® insulation shall be applied in one layer when respective FOAMGLAS® insulation thicknesses are commercially available, and when the operating temperature of the system allows for single layer application.
- 7.4.2 Single layer applications are restricted to design considerations for heat retention or personnel protection. For fire protection, see Multiple Layer Application (section 6.4.7).
- 7.4.3 The insulation shall be applied to piping with all joints dry and tightly fitted to eliminate voids. All ill-fitting or broken insulation shall be refitted or replaced.
- 7.4.4 The insulation shall be secured with fiber reinforced tape applied on 300 mm (12 in.) centers, with a 50% overlap of the tape per wrap, or with metal bands. For pipe insulation on piping, below or equal to 76 mm (3 in.), use of fixation straps is at the discretion of the design engineer.
- 7.4.5 Application of insulation with shop-applied jackets or coatings shall proceed as above, except tape securement of insulation is not required. All joints in the insulation shall be sealed as above with the appropriate sealant.
- 7.4.6 Fittings shall be insulated in a manner similar to that for piping. Where the outer diameter of fitting insulation is larger than that of adjacent piping, a beveled or tapered transition section shall be provided. Where banding is impractical, soft annealed stainless-steel wire may be used.
- 7.4.7 For piping and equipment with operating temperatures $\geq 205^{\circ}\text{C}$ (401°F), or for fire protection design considerations, use of multiple-layer application is required. The inner layer(s) shall be applied to piping with all joints dry and

tightly fitted to eliminate voids. All ill-fitting or broken insulation shall be refitted or replaced.

- 7.4.8 Securement of the inner layer(s) shall be made using fiber reinforced tape, applied at the rate of two strips per insulation section unless the system is intended for fire protection. Tape securement shall overlap a minimum of 50%.
- 7.4.9 For fire protection applications, the securement of the inner layer(s) shall be made using stainless steel bands.
- 7.4.10 The joints of each layer of insulation, both longitudinal and circumferential, shall be staggered from those of the previous layer.
- 7.4.11 The outermost layer of insulation shall be applied with all joints dry and tightly fitted to eliminate voids. All ill-fitting or broken insulation shall be refitted or replaced. Banding shall be stainless steel metal bands as per Section 5.4.
- 7.5 Valve and flange insulation
 - 7.5.1 Valves and flanges are to be insulated applying the same thickness and layering as the adjacent piping. It is recommended to insulate valves and flanges with prefabricated fitting covers custom made to fit.
- 7.6 Miscellaneous
 - 7.6.1 Vertical insulation should be supported in an appropriate manner; the self-supporting height of the insulation is determined by taking the mechanical resistance of FOAMGLAS[®] insulation into account, as well as the movement during contraction. For the purpose of dead load in a vertical support, the insulation will support its own weight on the face of the butt end of the insulation segment for a distance of 15 m (50 ft.). If insulation supports are used, angle iron or metal plates should be welded onto the vessel or piping to support the insulation. The width of the support should be chosen so as to support the insulation layer(s). To prevent a thermal break, an outer layer of insulation should be applied at the support with the mid-point of the insulation section covering the insulation support ring.
 - 7.6.2 Should the ring be wider, a supplementary layer may have to be installed at the insulation support location. Should there be varying thicknesses of insulation on a vessel; a support should be placed at the point where the different thicknesses meet.
 - 7.6.3 Supports, cradles, skirts and legs welded directly onto the equipment should be insulated with the same thickness of insulating material as the equipment itself in order to avoid thermal bridges. This insulation should extend over a distance of at least two times the insulation thickness. The cradle shall be designed to provide a sufficient bearing area to limit the compressive force on the insulation to 1.4 kg/cm² (20 psi) maximum at any point.
 - 7.6.4 Hollow spaces or voids between the substrate and insulation should be filled with pieces of FOAMGLAS[®] insulation.

8. Application of Insulation to Pipe Supports

- 8.1 Several factors govern the pipe span (spacing between supports) and size of the cradle (length, rolled width and thickness). The following are some general recommendations for the use of FOAMGLAS[®] insulation at pipe supports.

Contact Pittsburgh Corning for recommendations on specific situations or systems that are not covered here.

- 8.2 Coat the bore of the FOAMGLAS® pipe insulation to be used in the support area with a recommended bore coating (section 5.2).
- 8.3 Coat the outer surface of the FOAMGLAS® pipe insulation to be used in the support area with bore coating, or the recommended mastic finish (section 5.2 and 5.8).

9. Application of Insulation to Equipment

- 9.1 Equipment shall be insulated in a manner similar to that for piping. The following procedures shall be observed:
 - 9.2 Broken or ill-fitting insulation shall be refitted or replaced.
 - 9.3 Joints shall be staggered between successive layers of insulation.
 - 9.4 Insulation may be secured to equipment using banding or weld pins, depending on the configuration of the particular piece of equipment.
 - 9.5 Banding shall be applied so that each segment or section of insulation is secured by at least one band. Spacing of banding shall be not greater than 457 mm (18 in.) on centers.
 - 9.6 Weld pins shall be installed following the equipment manufacturer's instructions and procedures. There shall be at least one weld pin per every 0.14 m² (1.5 ft²) of insulation and at least one weld pin per insulation block or segment. Pins shall be located no closer than 102 mm (4 in.) from any edge. Pins shall have oversized washers of a minimum 9.8 cm² (1.5 in²).
 - 9.7 Jacketing shall be applied with the surfaces free of irregularities, all joints tightly fitted and positioned to shed water. All joints shall overlap a minimum of 51 mm (2 in.). Banding shall be applied on maximum 457 mm (18 in.) centers.
- Note: This specification is, of necessity, general in nature and does not cover all possible materials or methods of application. Contact Pittsburgh Corning for suitability of methods or materials not covered herein.

10. Insulation Finish

- 10.1 Metal jacketing shall be fitted with tight, smooth joints and all laps positioned to shed water. Follow standard engineering specifications for jacket application.
 - 10.1.1 Jacketing for standard application shall be aluminum. Banding shall be stainless steel.
 - 10.1.2 Jacketing for fire protection applications shall be stainless steel. Banding shall be stainless steel.
 - 10.1.3 Securement of the jacketing shall be with the metal bands at a minimum of two bands per jacket section. Spacing of jacket banding shall be not greater than 457 mm (18 in.) on centers.
- 10.2 Optional Mastic finish

- 10.2.1 Apply mastic according to manufacturer's recommendations over the completed insulation installation. Metal jacketing shall be applied over the mastic coating with the joints positioned to shed water. Follow standard engineering specifications for jacket application.
- 10.2.2 Terostat coating: Terostat PC® FRi is a silicone polymer. It is factory applied on all outer layer FOAMGLAS® elements. For this purpose, Terostat PC® FRi shall be delivered in suitable containers and cartridges. Application includes the use of a bead of Terostat PC® FRi on top of all joints, by cartridge, trowel, or gun. The Terostat PC® FRi bead is then smoothed flush with the factory applied Terostat PC® FRi surface, so that the coverage will be at least as thick as the pre-applied coat, and that there will be a complete closure of the coating system. A flexible spatula (Teflon) covered with a soapy water solution may be used in order to achieve a smooth finish with no drag marks.
- 10.2.3 PITTCOTE® 404 coating: A topcoat of mastic is recommended if the vessel is to be out of service during freezing weather to prevent freeze-thaw damage to the FOAMGLAS® insulation from water that may be trapped under the jacket against the insulation.
- 10.2.4 After specified thickness of equipment insulation has been applied, a tack coat of an approved coating (PITTCOTE® 404 Coating) shall be sprayed, brushed, or troweled onto the insulation at the rate described in the specific product data sheet. While the coat is still tacky, embed PC® Fabric 79 into the coating overlapping all fabric joints 102 mm (4 in.).
- 10.2.5 After tack coat dries, a second coat shall be sprayed, brushed or troweled over the fabric. The PC® Fabric 79 shall be completely covered with mastic and surface must be pin hole free, with no portion of the fabric visible through the finish.

NOTE: When PITTCOTE® 404 Coating is the applied finish, care must be taken to protect the finish from heavy rains a minimum of 24 hours. Finish must be cured before system is put into operation.

11. Inspection

- 11.1 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 responsibility of Pittsburgh Corning LLC. Pittsburgh Corning LLC recommends the use of certified mechanical insulation inspectors who maintain current certification through recognized industry certification agencies such as the National Insulation Association (NIA), the British Columbia Insulation Contractors Association, CINI, or another agency having appropriate jurisdiction throughout the project.
- 11.2 Inspect all insulation and accessory materials to be certain they are applied in conformance with the specification recommendations. Joints must be tight, sealing and flashing must be thorough and water-tight, and finishes must be uniform and free of defects.

12. Quality Assurance

- 12.1 The insulation manufacturer's quality system including its implementation, shall meet the requirements of ISO 9001:2015. The manufacturer will furnish evidence of compliance with the quality system requirements of ISO 9001:2015.

13. Certificates

- 13.1 The manufacturer will furnish evidence of compliance with the quality system requirements of ISO 9001:2015.

14. Product Data Sheets

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

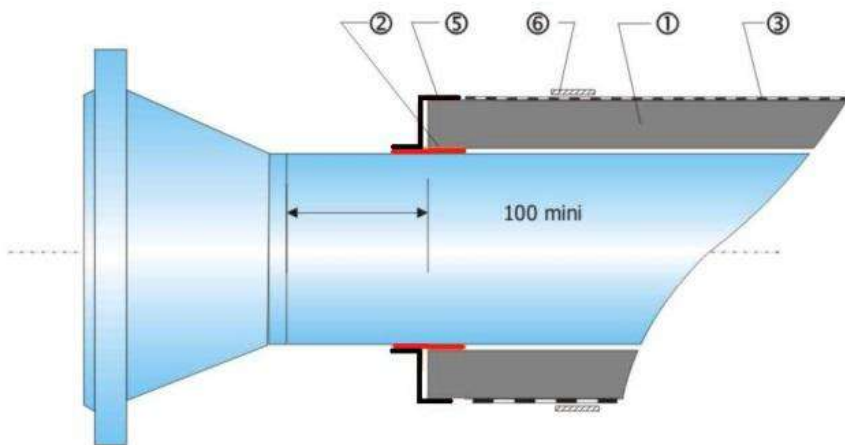
14.1.1	FOAMGLAS® ONE™ Insulation	FI-003
14.2	FOAMGLAS® StrataFab™ system	FI-222
14.2.1	Hydrocal® B-11:	FI-169
14.2.2	PC® 80M Mortar	FI-289
14.3	PC® High Temperature Anti-Abrasive (HTAA)	P-21
14.3.1	PC® Fabric 79:	FI-159
14.3.2	PC® 150 reinforcing mesh	FI-332
14.3.3	PC® RTV 450 Silicone Adhesive	FI-244
14.3.4	PC® HI-TEMP/RTV Silicone Adhesive.	FI-232
14.3.5	PITTCOTE® 404 coating:	FI-138
14.4	Terostat PC® Fri	
14.4.1	PC® 700K	

15. Appendix A Technical Drawings

15.1 Appendix A16: Pipe Insulation (3D)

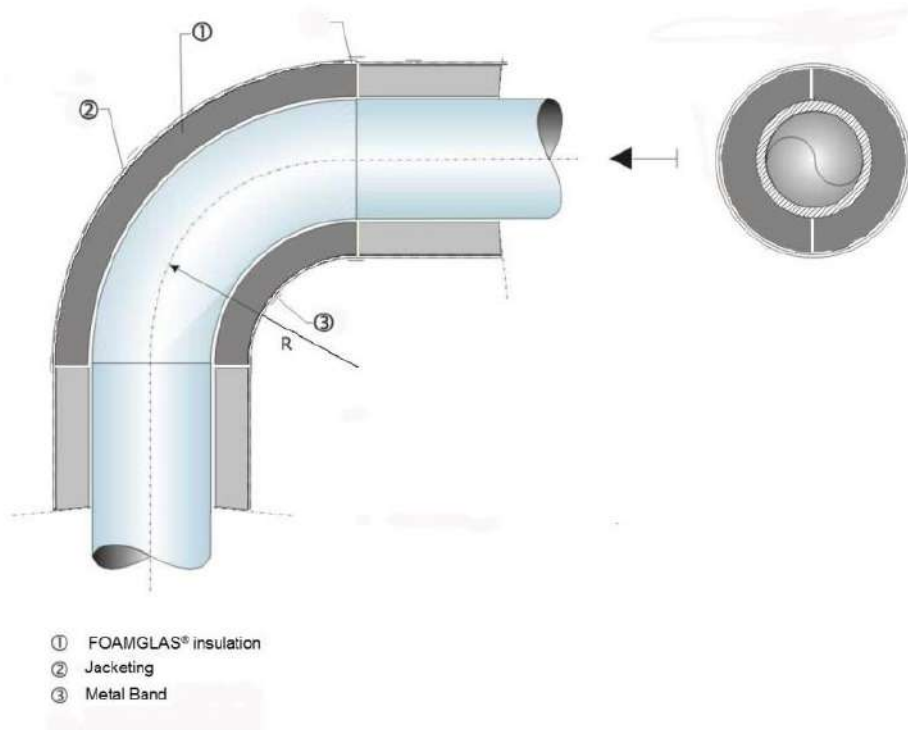


15.2 Appendix A2: Above Ambient Pipe Insulation Termination

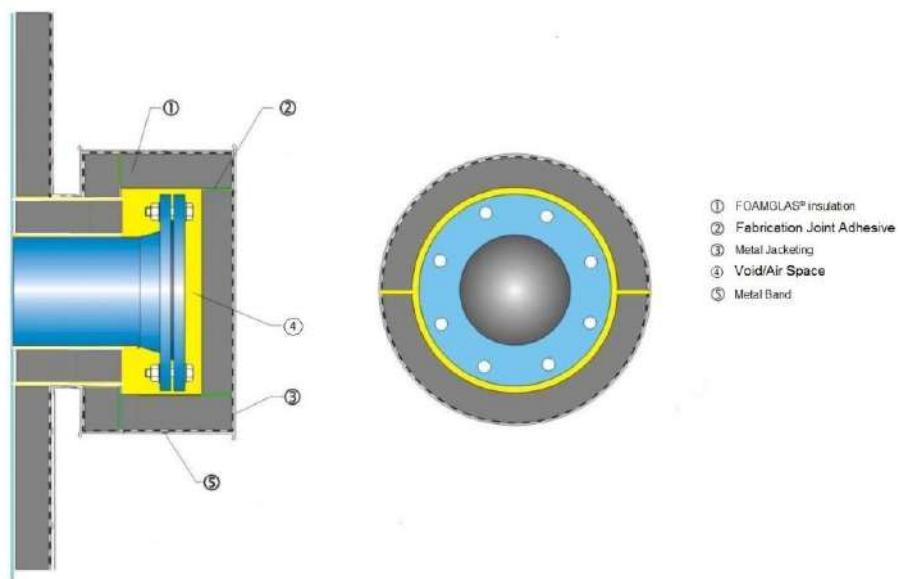


- ① Cellular Glass
- ② High Temperature Sealant
- ③ Metal Jacket
- ⑤ Metal Jacket
- ⑥ Tension Strap

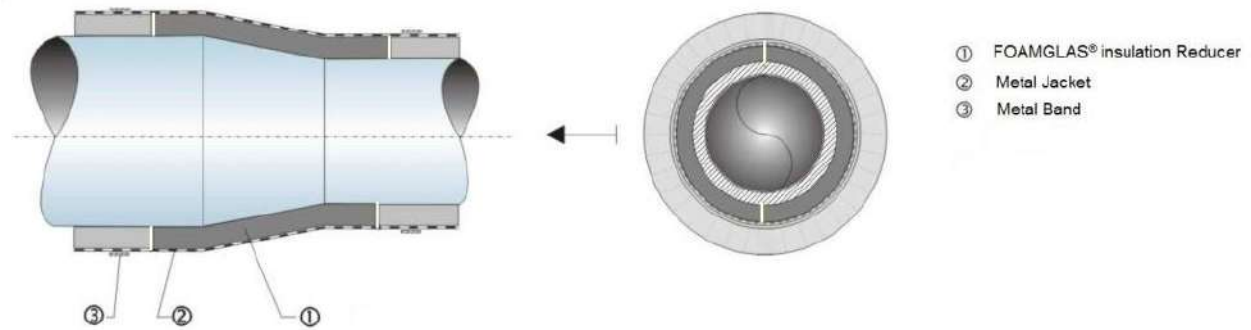
15.3 Appendix A3: Elbow Insulation (single layer)



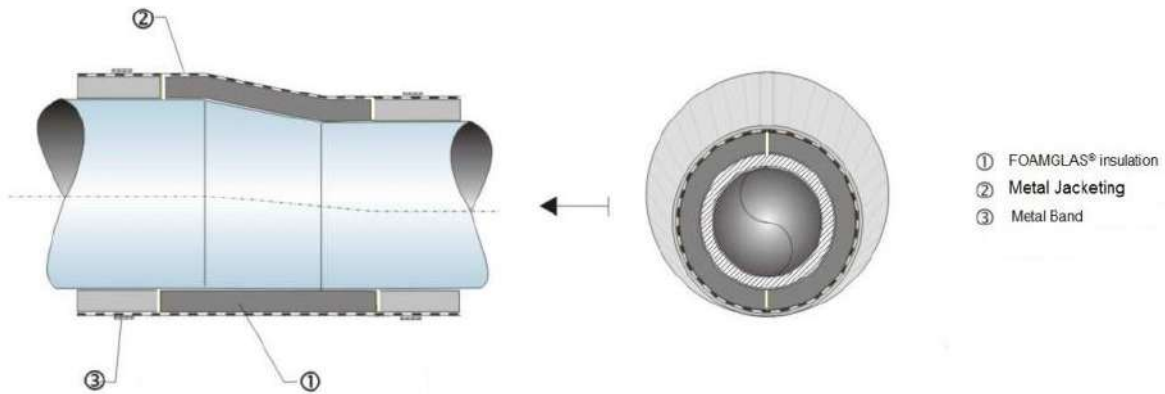
15.4 Appendix A4: Above Ambient Nozzle Insulation



15.5 Appendix A5: Above Ambient Reducer Insulation



15.6 Appendix A6: Above Ambient Reducer-A Insulation

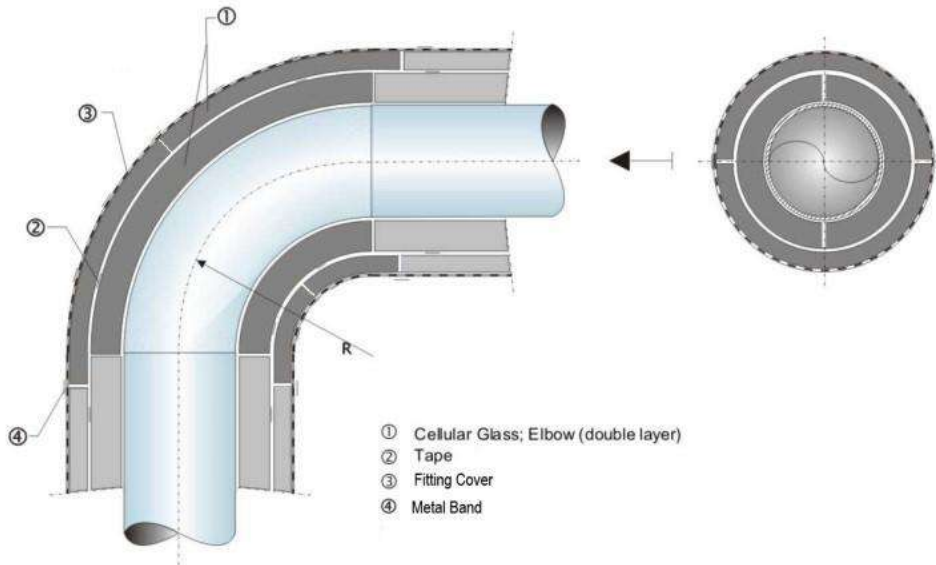


15.7 Appendix A7: Above Ambient Double Layer Insulation



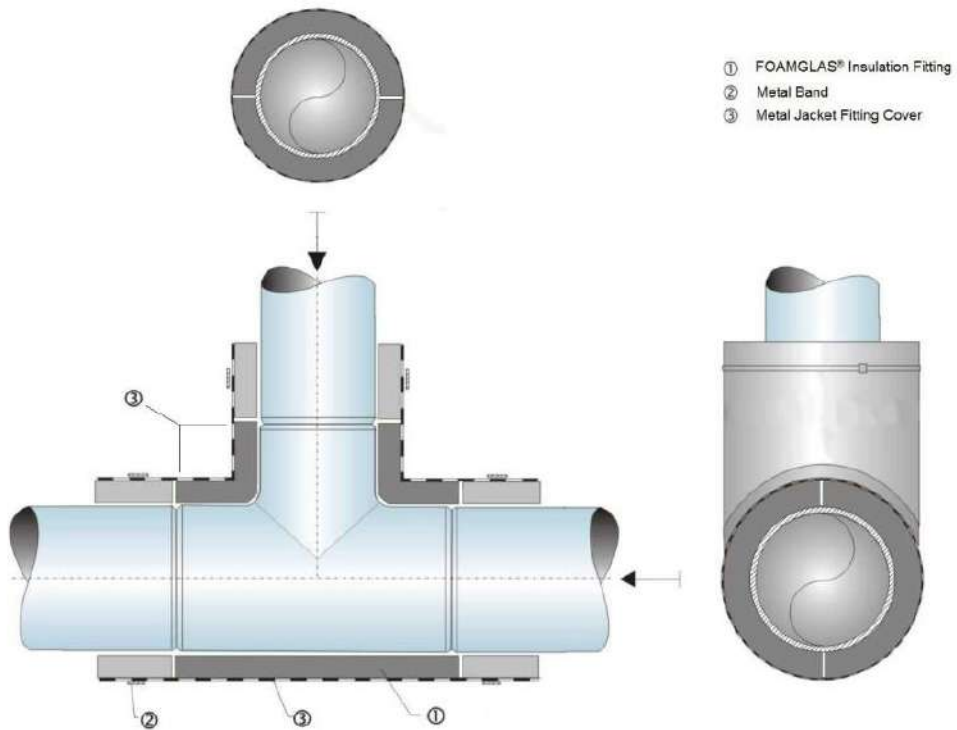
- | | |
|-------------------------------------|-------------------------|
| 1. Pipe | 4. Metal jacketing |
| 2. FOAMGLAS® insulation inner layer | 5. Stainless steel band |
| 3. FOAMGLAS® insulation outer layer | |

15.8 Appendix A8: Above Ambient Double Layer Elbow

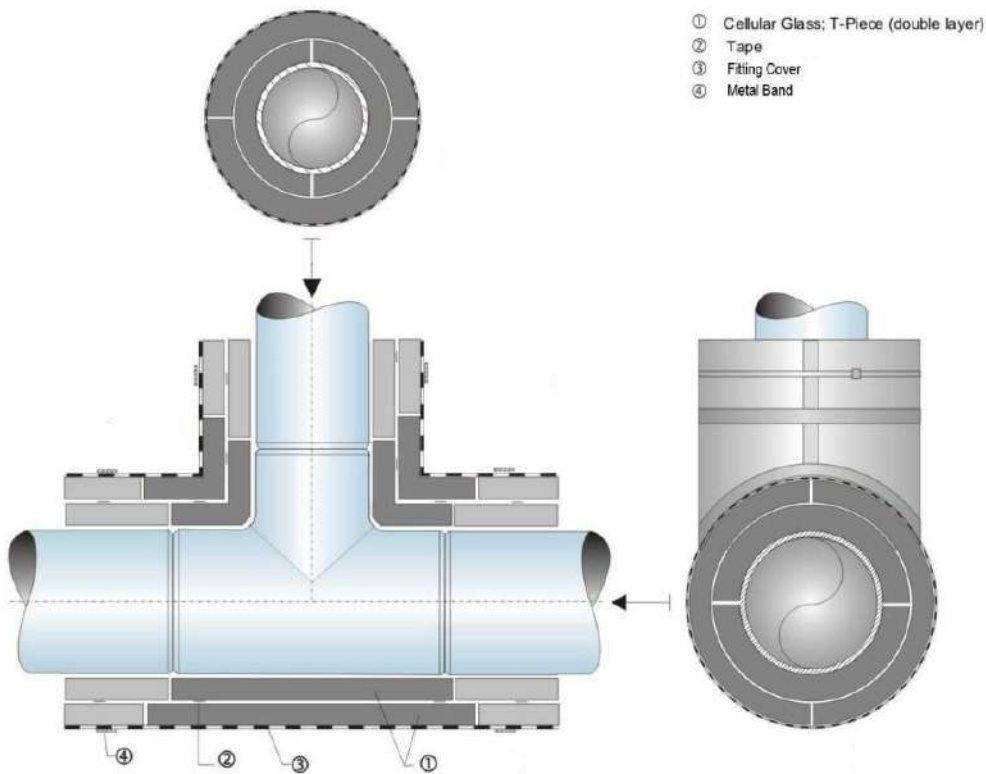


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|--|
| ① Cellular Glass; Elbow (double layer) |
| ② Tape |
| ③ Fitting Cover |
| ④ Metal Band |

15.9 Appendix A9: Above Ambient Tee Insulation



15.10 Appendix A10: Above Ambient Double Layer Tee Insulation



16. Appendix B: Other Product Manufacturers

- 16.1 3M Scotch No. 880 tape, or equivalent
- 16.2 Nelson® Stud Welding, Inc. P.O. Box 4019 7900 West Ridge Road Elyria, OH 44036-2019 Toll Free: 800-635-9353 Fax: 440.329.0521 Email: Nelson.sales@nelsonstud.com, <http://www.nelsonstud.com/Portal/>
- 16.3 AGM Industries, Inc. 16 Jonathan Drive, Brockton, MA 02301 Tel:(508) 587-3900 Fax:(508) 587-3283 Toll Free: 800-225-9990 or approved equal. Pin length shall be appropriate for the thickness of the insulation. <http://www.agmind.com/>

17. Additional Information

Questions regarding this specification should be directed to:

Pittsburgh Corning LLC
One Owens Corning Parkway
Toledo, OH 43659 U.S.A.

For electronic Sales and Technical Service inquiries,
please visit www.foamglas.com



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