

FOAMGLAS® INSULATION SPECIFICATION

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APPLICATION AND FINISH OF CELLULAR GLASS INSULATION ON COLD PROCESS PIPING SYSTEMS

1. SCOPE

- 1.1 This guideline offers application suggestions for the finish of FOAMGLAS® insulation on below ambient systems at temperatures down to -268°C (-450°F). Other application options not listed in these guidelines may be appropriate. Contact Pittsburgh Corning Corporation for recommendations.
- 1.2 The product data sheets referenced in the text are listed at the end of the specification. Product data sheets for Pittsburgh Corning Corporation products may be accessed on line at: <http://www.foamglasinsulation.com/productsheets.html>.
- 1.3 Metric conversions have been rounded to nearest inch-pound equivalent.

2. GENERAL

- 2.1 This specification is subject to revision without notice. Contact Pittsburgh Corning Corporation 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.
- 2.2 All piping shall be cleaned of foreign substances and free of surface moisture prior to the application of insulation.
- 2.3 All insulation materials shall be stored in an area protected from the weather and kept dry before and during application.
- 2.4 Testing of the piping system shall be completed prior to application of insulation.
- 2.5 Cleaning such as, sandblasting and priming of surfaces to be insulated, while recommended, is not part of this specification. If priming is specified, the primer must be thoroughly dry prior to the application of any insulation materials. The

primer should also be compatible with any accessory materials recommended in this guide specification with which it may come in contact.

- 2.6 All un-insulated protrusions, such as stairs and railings, shall be cleaned, primed and painted prior to the application of any insulation materials
- 2.7 All un-insulated penetrations through the insulation system shall be insulated a distance of four times the insulation thickness. To prevent moisture migration behind the insulation, these penetrations should be sealed with the sealant found in Section 3.2 or Section 3.8, and flashed to shed water. Flanged connections, valves, or other obstructions on the penetration should be designed to accommodate this insulation.
- 2.8 Insulation thickness for cold process applications should be based on one or more of the following criteria and it is the specifying engineer's responsibility to determine which is most important.
 - 2.8.1 Limiting heat gain to a predetermined acceptable value based on process control, energy conservation, and limiting product boil-off, this value is frequently in the range of 25.26 - 37.88 W/m² (8 - 12 Btu/hr ft²).
 - 2.8.2 To limit or control condensation on the surface of the insulation. This can be used as design criteria if desired. However, in many outdoor applications this is impractical
 - 2.8.3 The insulation thickness can be designed for economic optimization by considering the installed cost of the insulation system and energy costs and then calculating system payback values
 - 2.8.4 Cellular glass insulation thickness' can be designed to provide fire protection for piping and equipment for specified amounts of time under given fire conditions. Credit may be taken for the insulation in sizing pressure relief valves, protecting the steel from over stressing, or protecting the contents of the vessel from overheating.

Note: Contact Pittsburgh Corning Corporation's Energy Analysis Group for assistance in selecting an insulation thickness based on one of the above criteria.

- 2.9 Prior to finish application, inspect insulation system to ensure proper installation. Make sure that all insulation joints and protrusions are sealed. Make any necessary repairs. Remove excess dust if mastic finish is to be applied

3. MATERIALS

- 3.1 Insulation shall be FOAMGLAS® cellular glass insulation manufactured in accordance with ASTM C552, "Standard Specification for Cellular Glass Thermal Insulation," by Pittsburgh Corning Corporation whose quality system for manufacturing, inspecting, and testing of FOAMGLAS® insulation is certified to meet the requirements of ISO 9001:2000.
- 3.2 Joint sealant - PITTSEAL® 444N Sealant, a butyl based sealant as supplied by Pittsburgh Corning Corporation.
- 3.3 Vapor Retarder Mastic - shall be PITTCOTE® 300 Finish, an asphalt cutback mastic, as supplied by Pittsburgh Corning Corporation
- 3.4 Weather Barrier Mastic - shall be PITTCOTE® 404 coating, an acrylic latex mastic, as supplied by Pittsburgh Corning Corporation
- 3.5 Reinforcing Fabric - shall be PC® Fabric 79, a polyester fabric mesh, as supplied by Pittsburgh Corning Corporation
- 3.6 Hot asphalt, ASTM D 312, Type III
- 3.7 PITTWRAP® CW30 jacketing - a 0.76mm (30 mil) thick, self-sealing, non-metallic modified bituminous vapor retarder membrane.
- 3.8 PITTWRAP® IW50 jacketing – a 1.27mm (50 mil) thick self-sealing, non-metallic modified bituminous vapor retarder membrane.
- 3.9 Tape - shall be 25.4mm (1") wide high tensile strength fiber reinforced strapping tape. Scotch Brand Filament Tape or approved equal. Tape is appropriate for providing temporary securement to insulation with O.D.'s 46cm (18") or smaller as long as it is covered with metal jacket afterwards. Tape is not acceptable if the insulation system is being designed to provide fire protection.
- 3.10 Metal Jacket - shall be either:
- 3.10.1 0.41mm (0.016") smooth aluminum jacket for insulation O.D.'s of 61cm (24") or less. For larger O.D.'s use 0.020" embossed aluminum jacket, or:
- 3.10.2 0.38mm (0.015") smooth stainless steel jacket where the cellular glass insulation is being used for fire protection applications.
- 3.11 Metal Bands - shall be either:

- 3.11.1 13mm x 0.51mm, (0.5" x 0.020") aluminum bands with matching seals for piping with O.D.'s of 122cm (48") or less. For larger O.D.'s, use 19mm x 0.51mm (0.75" x 0.020") aluminum bands, or:
- 3.11.2 13mm x 38mm (0.5" x 0.015") stainless steel bands with matching seals for where the cellular glass insulation is being used for fire protection applications.

4. INSULATION APPLICATION -268°C (-450°F) to -179°C (-290°F)

- 4.1 All insulation shall be fabricated with Hydrocal B-11 gypsum cement such that fabrication through-joints are minimized. Fabrication shall be such that insulation joints are also minimized by using half sections wherever possible and curved sidewall segments when half sections are not feasible
- 4.2 Insulation thickness' 16.5cm (6.5") or less shall be applied in a double layer application. For insulation thickness' greater than 16.5 (6.5"), a triple layer application shall be employed.
- 4.3 In multi-layer applications, the first layer or layers of insulation shall be installed dry (using no joint sealant) and the outer or final layer shall be installed with all joints tightly butted and sealed with a full bed of joint sealant as found in Section 3.2. Any broken or poorly fitting insulation shall be replaced or re-cut to fit. Joints of succeeding layers shall be offset from those of the preceding layer.
- 4.4 The inner layers in multi-layer applications may be applied with tape as specified in Section 3.9, wrapping the tape 1-1/2 times around the insulation such that the tape secures to itself. This procedure is acceptable as long as the O.D. of the insulation section being taped in place does not exceed 46cm (18"). Two wrappings of tape per insulation section are required.
 - 4.4.1 For insulation with larger O.D.'s than 46cm (18"), metal bands as specified in Section 3.11 shall be used. Use two bands per insulation section.
 - 4.4.2 Regardless of the O.D., the outermost layer of insulation shall be installed using metal bands in order to make certain that the sealed joints are drawn tight. Secure the insulation with two bands per section.
- 4.5 Finish insulation using appropriate option described in section 7.

5. INSULATION APPLICATION -178°C (-289°F) to -52°C (-61°F)

- 5.1 All insulation shall be applied in a double layer application. Insulation shall be fabricated in half sections or curved sidewall segments with a minimum number of fabrication through-joints.

- 5.2 The first layer shall be installed dry (using no joint sealant) and may be either taped in place or banded in place in accordance with the limitations specified in section 4.4 above for securement
- 5.3 The second layer shall be installed with all joints tightly butted and sealed with a full bed of joint sealant as found in Section 3.2. The second layer shall be installed using metal bands as in 4.4.2, to ensure that the sealed joints are drawn up tight.
- 5.4 Finish insulation using appropriate option described in section 7.

6 INSULATION APPLICATION -51°C (-60°F) to Ambient

- 6.1 Insulation may be applied in a single layer application. Insulation shall be fabricated in half sections or curved sidewall segments with a minimum number of fabrication through-joints.
- 6.2 For surfaces with diameters up to approximately 91cm (3.0') O.D., the insulation shall be taped or banded with all joints tightly butted and sealed with joint sealant as found in Section 3.2. Poorly fitting or broken insulation shall be replaced or re-cut to form a completely vapor sealed insulation system. The insulation shall be secured as described in section 4.4.

NOTE: The use of joint sealant is recommended on all systems that operate below ambient temperature for any length of time, and is required on systems that operate at or below 36 °F. In cases where the below ambient system is operating at a temperature higher than 36°F, and the outdoor relative humidity is not routinely expected to exceed 50%, the use of a joint sealant is at the discretion of the design engineer.

- 6.3 For piping with diameters larger than 91cm (3.0'), the Pittsburgh Corning Corporation PC^(R)88 Adhered Insulation System is the preferred method of application. Contact Pittsburgh Corning Corporation for more details on this system.
- 6.4 Insulation for piping with diameters larger than 91cm (3.0') may be banded with metal bands as in 4.4.2.
- 6.5 Finish insulation using appropriate option described in section 7.

7 FINISH ALTERNATIVES

- 7.1 Vapor retarder mastic with metal jacket:
- 7.1.1 Apply vapor retarder mastic as found in Section 3.3, in two coats at a rate of 1.25 l/m² (3 gal/ 100 ft²) 1.25 l/m² for each coat. The fabric found in Section 3.5,

reinforces the first coat of mastic. See Pittsburgh Corning Corporation data sheets on these products for more detailed information.

- 7.1.2 After 24 hours, apply metal jacket with all laps positioned to shed water and sealed with a full bed of joint sealant as found in Section 3.2. Firmly secure metal jacket in place with bands in accordance with manufacturers recommendations. Do not use screws.

7.2 Vapor retarder jacket with metal jacket:

- 7.2.1 Apply jacket specified in section 3.7 or 3.8 according to the application instructions detailed in the product data sheet for the jacket.
- 7.2.2 Apply metal jacket with all laps positioned to shed water and sealed with a full bed of joint sealant as found in Section 3.2. Firmly secure metal jacket in place with bands in accordance with manufacturers recommendations. Do not use screws. Care must be taken during the metal application to avoid punctures in the vapor retarder jacket. If a puncture occurs, seal the puncture with a small piece of the vapor retarder jacket.

Note: The finishes in section 7.1 and 7.2 provide the greatest protection and are recommended for severe cold process service.

7.3 Glove coat of vapor retarder mastic with metal jacket:

- 7.3.1 Prior to applying the metal jacket, cover the entire insulation surface with a "glove coat" of mastic, as specified in section 3.3, at a coverage rate of approximately 1.25 l/m^2 (3 gal/ 100 ft²).
- 7.3.2 After 24 hours, cover the insulated surface with metal jacket in accordance with Section 7.1.2

7.4 Metal jacket finish with roller coat of asphalt (factory applied):

- 7.4.1 The insulation may be pre-coated at the fabrication shop with a roller coat of ASTM D 312 - Type III asphalt. Apply metal jacket as described in section 7.1.2.

Note: The finishes described in sections 7.3 and 7.4 are for mild to moderate cold process service. For extremely low temperatures, and/or where the humidity is consistently high, use one of the alternatives in sections 7.1 or 7.2.

7.5 Metal jacket finish:

- 7.5.1 Apply metal jacket with all laps positioned to shed water and sealed with manufacturers recommended lap sealant. Firmly secure metal jacket in place with bands in accordance with manufacturers recommendations. Do not use screws.

7.6 Weather barrier mastic finish:

- 7.6.1 Apply weather barrier mastic as found in Section 3.4, in two layers at a coverage rate of 1.25 l/m² (3 gal/ 100 ft²) for each layer. The fabric found in Section 3.5 above reinforces the first layer of mastic. See Pittsburgh Corning Corporation data sheets for more detailed information.

Note: The finishes in sections 7.5 and 7.6 are recommended for mild below ambient services only.

8. INSPECTION

Inspect finish to be certain it is applied in conformance with the specification recommendations. Sealing and flashing should be thorough and watertight, and finish should be uniform and free of defects.

9. QUALITY ASSURANCE

The insulation manufacturer's quality system, including its implementation, shall meet the requirements of ISO 9001:2000.

10. CERTIFICATES

The manufacturer will furnish evidence of compliance with the quality system requirements of ISO 9001:2000.

Product Data Sheets

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| 1. PITTSEAL® 444N sealant: FI-164 | 4. PC® Fabric 79: FI-159 |
| 2. PITTCOTE® 300 finish: FI-120 | 5. PITTWRAP® CW30 jacketing: FI-235 |
| 3. PITTCOTE® 404 coating: FI-138 | 6. PITTWRAP® IW50 jacketing: FI-258 |

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