

## PART 1- GENERAL

### 1.1 SCOPE

The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required for the correct installation of flexible closed cell Polyolefin Insulation for applications on domestic hot and cold water piping. **The installation guidelines outlined in this document are Nomaco Insulation recommendations and are intended to ensure a successful installation. Any variations other than what is supported by this document may cause unwanted side effects and compromise the purpose and design of the insulation.**

### 1.2 REFERENCES

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| A. ASTM C177  | Thermal Conductivity (k) by Guarded Hot Plate Apparatus                            |
| B. ASTM C335  | Thermal Conductivity (k) for Pipe Insulation                                       |
| C. ASTM C411  | Upper Temperature Limit  |
| D. ASTM C518  | Thermal Conductivity (k) by Heat Flow Meter Apparatus                              |
| E. ASTM C1427 | Standard Specifications for Preformed Flexible Cellular Polyolefin Foam Insulation |
| F. ASTM D1622 | Density  |
| G. ASTM D3575 | Density  |
| H. ASTM E84   | Surface Burning Characteristics  |
| I. ASTM E96   | Water Vapor Permeability   |

### 1.3 QUALITY ASSURANCE

- A. Insulation materials shall be manufactured under a strict quality control program assuring quality product delivered to the job site. Insulation material that has become damaged shall not be installed.
- B. Workmanship: all insulation to be installed by a qualified applicator and applied in accordance with the manufacturer's recommendations.
  - 1. All work shall comply with all applicable federal, state and local codes and laws. This shall include, but shall not be limited to, the Occupational Safety and Health Act.
  - 2. All work shall conform to accepted industry and trade standards for commercial and industrial insulation.
  - 3. Surfaces to be insulated shall be cleaned free of dirt, scale, moisture, oil and grease.

### 1.4 DELIVERY AND STORAGE OF MATERIALS

- A. Deliver all materials to the job site and protect the insulation from dirt, water, chemical and mechanical damage before, during and after installation. Damaged insulation shall not be installed and it shall be removed from the project site.
- B. Deliver insulation, and where applicable, coverings, cements, adhesives, coatings, etc. to the site in factory supplied containers with the manufacturer's stamp or label affixed showing warning statement, name of manufacturer and brand.
- C. Storage and transport of materials should utilize the manufacturer's carton, original shipment packaging, or approved white reflective packaging. Damage to the insulation may result from improper packaging.

## **PART 2- PRODUCTS**

### 2.1 NOMACO INSULATION POLYOLEFIN INSULATION

- A. Products must be manufactured by Nomaco Insulation and identified by their container with one of the following trade names: ARCTICFLEX, THERMA-CEL.
- B. Pipe (tubular) insulation must display the ASTM E84 (25/50) flame spread and smoke developed ratings. Any material submitted claiming to be a similar, like, or equal must demonstrate (meet or exceed) the same physical characteristics as Nomaco Insulation manufactured insulation (i.e., pre-slit/pre-glued products, non-porous, and non-fibrous). In addition, materials must meet the following criteria:
  - 1. Material shall have a density ranging from 1.5 to 1.8 lb/ft<sup>3</sup> (ASTM D1622).
  - 2. Material must have a maximum thermal conductivity (k) of 0.25 Btu-in/hr-ft<sup>2</sup>-°F @ 75°F mean temperature (ASTM C518, ASTM C177 or ASTM C335).
  - 3. Material must have a maximum Water Vapor Transmission rate of 0.00 Perm-in (ASTM E96, Desiccant Method).
  - 4. Material up to 1" thick, when tested in accordance with ASTM E84, shall have a flame spread rating not greater than 25 and a smoke developed rating not greater than 50.

### 2.2 PIPE INSULATION

- A. THERMA-CEL (tubular): black-pigmented, longitudinally pre-slit tubular pipe insulation with closure system consisting of pressure sensitive adhesive and protective release tape applied at the factory. Allows precision-cut angles and pre-cut pieces to be joined by the application of industry standard contact adhesives. See appropriate price list for available tube and pipe sizes, standard wall thicknesses, and lengths.
- B. ARCTICFLEX (tubular): same as above, but white pigmented.

### 2.3 ACCESSORIES

- A. **R-320 and R-620** Contact Adhesive: standard air-drying contact adhesive (brush or roller applied) formulated for adhering mitered and circumferential (butt) joints of polyolefin insulation. R-320 is tan / beige colored. R-620 is black colored.
- B. **720 LVOC** Contact Adhesive: air drying contact adhesive complies with the requirements of SCAQMD Regulation 1168 for VOC content.
- C. **Insulation Tape** Rolls: pre-glued 1/8" thick Insulation Tape with release backing designed for use with polyolefin insulation and is used for applications where insulation integrity needs to be maintained and pipe insulation cannot be readily installed.

### 2.4 JACKETING

- A. A jacket is NOT required for INDOOR applications (installations NOT exposed to direct sunlight or weather elements), unless otherwise indicated by the specifying engineer, owner, or other agency having appropriate or legal jurisdiction. A coating (see section 2.6) is required (jacket material is optional) for OUTDOOR applications exposed either to direct sunlight or weather elements.

### 2.5 ADHESIVES

- A. **Field applied Contact Adhesives.** Because of the unacceptable performance of some adhesive systems, please refer to Technical Information Bulletin for a list of recommended adhesives to be used with polyolefin insulation.

#### ENGINEERING NOTES:

1. The recommended contact adhesives are all subject to specific service temperature ranges. The contact adhesive manufacturer should be contacted to verify correct application for service temperatures anticipated. (The contact adhesive, when applied on joints or when applied between layers of insulation is not exposed to the extreme temperatures experienced by the reactor or piping. Therefore, the design temperature of the adhesive will be much less demanding and must be estimated)
2. It is very important that contact adhesive be allowed to flash fully prior to joining two impermeable substrates such as polyolefin insulation. Contact adhesive will not continue to flash under an impermeable substrate and therefore, will not set up properly.
3. The flash time of a contact adhesive is dependent upon relative humidity and temperature. Relatively speaking, the lower the temperature or the higher the relative humidity, the longer the time required for the contact adhesive to fully flash.
4. A contact adhesive will be slightly tacky, yet dry to the touch when fully flashed.

## 2.6 COATINGS

- A. Insulation **MUST** be coated (jacket is optional) in **OUTDOOR** applications exposed either to direct sunlight or weather elements. Coatings will provide the necessary protection from direct sunlight or weather elements when applied per the coating manufacturer's installation guidelines. The surface of the insulation must be clean and free of any dust, dirt, scale, moisture, oil and grease. Because of the unacceptable performance of some coating systems, please refer to Technical Information Bulletin for a list of recommended coatings to be used in conjunction with polyolefin insulation.

#### ENGINEERING NOTE:

1. After long term outdoor exposure, the above coatings may weather to a light tan or yellow color. This surface appearance will not affect any other physical properties of the coating.
2. The flexibility, impermeance, and chemical inertness of polyolefin insulation prevent strong adherence of water based latex paints. Therefore, water based latex paints are **NOT** recommended for coating polyolefin insulation where physical abuse is possible.
3. The recommended coatings are all subject to specific application and service temperatures. The manufacturer should be contacted to verify correct utilization for anticipated temperatures.
4. In some indoor applications a particular color is desired. Consult the coating manufacturer about available pigment additives. **OUTDOOR** applications should **NOT** be pigmented.

## 2.7 PIPING SYSTEMS

- A. Domestic hot and cold piping

#### ENGINEERING NOTE:

Insulation can only inhibit (it **CANNOT** prevent) the freezing of water in pipes exposed to freezing conditions. If freeze protection/prevention is desired, it is recommended that an appropriate heat trace be used. The insulation/heat trace system should **NEVER** exceed 210°F. To properly accommodate the trace, it may be necessary to upsize the inside diameter of the insulation.

## **PART 3- EXECUTION**

### 3.1 WORKMANSHIP

- A. Installation shall be performed by a qualified insulation contractor who specializes in industrial and/or commercial mechanical systems.

### 3.2 PREPARATION FOR INSTALLATION

- A. Apply insulation to approved and pressure tested piping systems (if applicable).
- B. Ensure that insulation and all mechanical piping surfaces to be insulated are clean and dry prior to installation.
- C. Do not apply insulation to wet or frosted surfaces.

### 3.3 INSTALLATION DETAILS

#### 3.3.1 INSULATION OF STRAIGHT RUNS OF PIPE

- A. Snap pre-slit insulation on existing pipe or slip over new pipe PRIOR to removal of release liners. Firmly grasp both release liners and pull away and back, exposing factory glued seams.
- B. When using THERMA-CEL, ARCTICTFLEX, apply firm and even pressure along the entire longitudinal seam to properly engage the pressure sensitive adhesive.

#### ENGINEERING NOTES:

- 1. Pressure sensitive adhesives (PSA's) require greater pressure for proper adhesion as the temperature at time of install declines. As a rule of thumb, beginning at 70°F, every 10°F drop in temperature requires twice as much pressure (i.e. applications at 40°F require 8 times as much pressure as applications at 70°F). Installation is NOT recommended when the PSA seam is below 35°F. PSA must be warmed to a temperature above 35°F before the install step.
- 2. All insulation installed outdoors must be coated (see section 2.6). All seam locations must be placed away from exposure to direct sunlight or weather elements, located on the lower half of the pipe.
  - C. Seal all circumferential (butt) joints using recommended adhesives (see section 2.5) and joining methods (see section 3.3.5).
  - D. Compression fit insulation on continuous runs. Install an additional 2 inches (2") of insulation for every 6 feet (6') of measured pipe, or 3-1/2 inches (3-1/2") for every 10 feet (10') of measured pipe to allow for any contraction.

#### ENGINEERING NOTE:

The use of tape on butt joints and fittings is NOT recommended. Tapes do not act as an effective vapor barrier.

#### 3.3.2 INSULATION OF FITTINGS, VALVES & FLANGES

- A. All fittings must be insulated at the same insulation thickness as the adjoining pipe.
- B. Screwed fittings must be sleeved and adhered with a one inch (minimum) overlap of the adjoining insulation.

##### 3.3.2.1 TEES

- A. Using a very sharp knife cut a length of insulation 2 times the run length of the tee to be insulated and a second length of insulation 2 times the branch length of the tee to be insulated.
- B. Using the length of insulation cut to cover the run of the tee, locate the pre-glued seam at the top center, carefully cut out a half moon opening to accommodate the branch of the tee.
- C. Using the length of insulation cut to cover the branch length of the tee, miter the end making a concave cut to mate with the half moon opening in the run length piece.
- D. Pre-fit mitered pieces to insure tight fit of surfaces to be joined. Position pieces on tee body and seal miter joints as outlined in section 3.3.5.

##### 3.3.2.2 ELBOWS

- A. Using a very sharp knife cut 2 pieces of insulation of equal length (approximately 2 times the length of the elbow to be covered).
- B. Using a miter guide carefully miter cut one end of each piece of insulation to accommodate the angle of the elbow to be insulated.
- C. Position pre-cut pieces on elbow and pre-fit mitered ends to insure complete mating of surfaces to be joined. Seal mitered joints as outlined in section 3.3.5.

### 3.3.2.3 VALVES & FLANGES

- A. Valves, flanges, strainers, and Victaulic-type fittings are to be insulated using donuts and then covered with sheet or appropriate tubular insulation.

### 3.3.3 JOINING MITERED ENDS

#### 3.3.3.1 CONTACT ADHESIVE JOINING METHOD

- A. Coat both surfaces to be bonded with an adequate, even coat of **approved** adhesive (for acceptable adhesives refer to section 2.5, paragraph A).
- B. Follow the instructions on the contact adhesive container label and product data sheets for open times required prior to positioning and joining pieces.

### 3.3.4 INSULATING AT HANGERS

#### 3.3.4.1 STANDARD & SPLIT HANGERS

- A. Size hangers to accommodate pipe support. Install hangers in accordance with manufacturer's guidelines.
- B. Ring hangers may be sleeved with oversized tubular insulation and are to be insulated at the same insulation thickness as the adjoining pipe.
- C. On cold piping, when hangers are sleeved, the insulation must extend up the hanger rod at a distance equal to four times the insulation thickness. Alternatively, Insulation Tape insulation (see section 3.3.6) can be used at the hanger rod. Wrap tape to the same insulation thickness as the adjoining pipe.

#### 3.3.4.2 CLEVIS HANGERS & OTHER PIPE SUPPORTS

- A. Supporting devices must be used where load compression of the insulation is anticipated. Hanger shields/saddles must be installed under all insulated piping at unistrut clamps, clevis hangers or where load compression of the insulation is anticipated.
- B. For piping up to 1-1/2" nominal size, wooden or plastic (polyethylene) dowels or blocks, whose length is equal to the insulation thickness, must be inserted into the insulation as support between the pipe and hanger shield/saddles. To install dowels, cut undersized holes into the insulation such that the dowels will fit tightly. Wooden or plastic dowels should be coated with **an approved** adhesive prior to their installation (for acceptable adhesives refer to section 2.5, paragraph A).
- C. For piping larger than 1-1/2" nominal size, wooden blocks, approximately 1" wide by 3" long, are required. Block thickness should be the same as that of the insulation.
- D. For best fit and long-term performance, it is best to carve out the support blocks to the contour of the pipe and hanger shield.

#### 3.3.5 INSULATION TAPE FOR HARD TO INSULATE AREAS (1/8" THICK)

- A. For use in areas where it is impractical or impossible to install pipe insulation. Convenient for wrapping valves, fittings, short runs of pipes, and hard-to-access areas.

- B. Surface to be covered must be cleaned free of dirt, scale, moisture, oil and grease. Pull release liner and spiral wrap area in multiple layers with 50% overlap per layer until desired thickness is obtained.

ENGINEERING NOTE:

It is recommended that **Insulation Tape** material be used only on indoor applications, protected from external environment conditions.