

## **PART 1 – GENERAL**

### **1. SUMMARY**

- 1.1. Section includes: The work covered by this specification consists of all labor, equipment, materials, accessories, and all operations required for the correct installation of insulation on all piping, fittings, valves, controls and other necessary items for systems operating from 25°F (-4°C) to 1200°F (650°C).

### **2. DEFINITIONS**

- 2.1. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
- 2.2. ASTM - American Society of Testing and Materials.
- 2.3. Industrial Insulation Group - Industrial Insulation Group, LLC
- 2.4. MICA - Midwest Insulation Contractors Association.
- 2.5. MIL - Military.
- 2.6. NFPA - National Fire Protection Association.
- 2.7. NRC - Nuclear Regulatory Commission.
- 2.8. OPL - Omega Point Laboratories.
- 2.9. OSHA - Occupational Safety and Health Act.
- 2.10. UL - Underwriters' Laboratories, Inc.
- 2.11. CAN/ULC - Underwriters Laboratories of Canada, Inc.

### **3. REFERENCES**

- 3.1. ASHRAE National Voluntary Consensus Standard 90.1 (2004) - "Energy Standards for Buildings Except Low-Rise Residential Buildings"
- 3.2. ASTM C165 - "Test Method for Measuring Compressive Properties of Thermal Insulations"
- 3.3. ASTM C450 - "Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping Vessel Lagging"
- 3.4. ASTM C585 - "Standard Practice for Inner and Outer Diameter of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)"
- 3.5. ASTM C610 - "Specification for Molded Expanded Perlite Block and Pipe Insulation"
- 3.6. ASTM C795 - "Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel"
- 3.7. ASTM C1617 - "Standard Practice for Quantitative Accelerated Laboratory Evaluation of Extraction Solutions Containing Ions Leached from Thermal Insulation on Aqueous Corrosion of Metals"
- 3.8. ASTM E84 - "Test Method for Surface Burning Characteristics of Building Materials"
- 3.9. ASTM E136 - "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C"
- 3.10. MICA - "Commercial and Industrial Insulation Standards"

- 3.11. Mil-I-24244 - "Military Specification for Insulation Material with Special Corrosion, Chloride and Fluoride Requirements"
- 3.12. NRC 1.36 - Regulatory Guide "Nonmetallic Thermal Insulation for Austenitic Stainless Steel"
- 3.13. PIP - Process Industry Practice.
- 3.14. UL 723 - "Test for Surface Burning Characteristics of Building Materials"

### **4. SYSTEM PERFORMANCE**

- 4.1. Insulation material furnished should meet the minimum thickness requirements of the National Voluntary Consensus Standard 90.1 (2004) established by ASHRAE. However if other factors such as condensation control or personal protection are to be considered, the selection of thickness of insulation should satisfy the controlling factor.
- 4.2. Insulation materials furnished and installed hereunder shall meet the fire hazard requirements of applicable building codes per one of the following nominally equivalent test methods:
  - 4.2.1. ASTM E84

### **5. SUBMITTALS**

- 5.1. Product Data
  - 5.1.1. Provide product description, list of materials, and manufacturer's installation instructions and thickness schedules for each service location and piece of equipment.
- 5.2. Shop Drawings
  - 5.2.1. Submit a list of insulation to be used for each service location. Include installation details for valves, fittings, pipe and all other items to be insulated.
- 5.3. Samples
  - 5.3.1. Submit samples of each insulation material to be used.

### **6. QUALITY ASSURANCE**

- 6.1. All work shall conform to accepted industry and trade standards for commercial and industrial insulations and to manufacturer's recommendations. Where available, it is recommended to use a National Insulation Association (NIA) certified (or other similarly certified) mechanical insulation inspector throughout the project to inspect and verify the materials and total insulation system have been installed correctly in accordance with the Johns Manville guide specifications.

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- 6.2. Insulation shall be installed by skilled and experienced applicators who are regularly engaged in commercial or industrial insulation work.
- 6.3. Damaged, wet or contaminated insulation shall not be installed.

## 7. DELIVERY, STORAGE and HANDLING

- 7.1. Deliver all materials to the job site in factory containers with manufacturer's label showing manufacturer, product name and fire hazard information.
- 7.2. Protect the insulation from dirt, water, chemical attack and mechanical damage before, during and after installation.

## 8. PROJECT AND SITE CONDITIONS

- 8.1. Maintain job site temperature and conditions before, during and after installation as required by the manufacturer of the insulation, cement, adhesives and coatings, etc.
- 8.2. Installed Insulation that has not been weatherproofed and is not protected by a roof and walls shall be protected from precipitation by weatherproof sheeting.

## PART 2 – PRODUCTS

### 1. MANUFACTURERS

- 1.1. Johns Manville Industrial
  - 1.1.1. Preformed expanded perlite block and pipe insulation.
    - 1.1.1.1. Johns Manville Sproule WR-1200.
    - 1.1.1.2. Approved alternate.
  - 1.1.2. Adhesive for perlite to perlite joints.
    - 1.1.2.1. Sodium silicate based contact adhesive.
    - 1.1.2.2. Approved alternate.
  - 1.1.3. Weatherproof coating for use over insulation.
    - 1.1.3.1. Water based mastic.
    - 1.1.3.2. Approved alternate.

### 2. MATERIALS

- 2.1. Johns Manville Sproule WR-1200 preformed expanded perlite pipe and block.
  - 2.1.1. Complies with ASTM C610.
  - 2.1.2. Color coded to identify product as asbestos free.
  - 2.1.3. Furnished in standard lengths of 36"(0.92m) with square cut ends.
  - 2.1.4. Conforms to the dimensional requirements of ASTM C585 (pipe).
  - 2.1.5. Rated maximum service temperature of 1200°F (650°C).
  - 2.1.6. Compressive strength of 80 psi minimum when tested in accordance with ASTM C165 (block).
  - 2.1.7. Rated as 0 flame spread and 0 smoke developed when tested in accordance with ASTM E84.

- 2.1.8. Certified to meet the requirements of ASTM C795 for use over stainless steel.
- 2.1.9. Rated as noncombustible when tested in accordance with ASTM E136.

### 3. FIELD APPLIED JACKETS

- 3.1. Aluminum Jacketing
  - 3.1.1. Use a 0.016" (0.045mm) type T-3003 H-14 sheet with a smooth or embossed finish and a factory applied protective inner layer.
- 3.2. Stainless Steel Jacketing
  - 3.2.1. Use 0.010" (0.025mm) type 304 sheet with a smooth finish and with or without a factory applied protective inner layer.

### 4. ACCESSORIES

- 4.1. Tie Wire
  - 4.1.1. 16 gauge (1.6mm) or 18 gauge (1.8mm) type 304 stainless steel.
- 4.2. Bands
  - 4.2.1. 0.5" x 0.020" (13 x 0.5mm) type 304 stainless steel or T-3003 H-14 aluminum.
- 4.3. Screws
  - 4.3.1. Galvanized or Stainless steel sheet metal screws #6, #8 or #10 by 3/8" (10mm) long. Hex or pan head.
- 4.4. Adhesives
  - 4.4.1. Sodium silicate based adhesive.
  - 4.4.2. Approved alternate.
- 4.5. Weatherproofing
  - 4.5.1. Water based mastic.
  - 4.5.2. Approved alternate.
- 4.6. Accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions and in conformance with the current edition of the MICA - "Commercial & Industrial Insulation Standards", PIP, or other recognized standard.

## PART 3 – EXECUTION

### 1. EXAMINATION

- 1.1. Verify that testing of piping has been completed and that the piping is ready for the insulation to be installed.
- 1.2. Verify that all surfaces are clean, dry and free from dirt, scale, moisture, oil and grease prior to installing the insulation.
- 1.3. Verify that it is physically possible to install the insulation in accordance with project drawings, operation performance parameters and the limitations of this specification.

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## 2. INSTALLATION

- 2.1. All work activities shall be conducted in accordance with all applicable codes and laws.
- 2.2. All insulation shall be installed by a skilled and experienced applicator.
- 2.3. All work shall conform to accepted industry and trade standards for commercial and industrial insulations.
- 2.4. All piping shall be supported in such a manner that neither the insulation nor the vapor/weather barrier is compromised by the hanger or the effects of the hanger.
  - 2.4.1. Hanger spacing shall be such that the circumferential joint must be outside the hanger.
- 2.5. Where pipe shoes and roller supports are required, insulation shall be inserted in the pipe shoe to minimize pipe loss.
  - 2.5.1. Where possible the pipe shoe shall be sized to be flush with the outer diameter of the pipe insulation.
- 2.6. On vertical applications, insulation support rings shall be used with no more than 15' (4.6m) spacing between them or as indicated on contract drawings.
  - 2.6.1. Locate insulation and jacket seams out of sight where possible.
- 2.7. For piping and equipment operating at or above 600°F (315°C) or insulation thickness above 3" (75mm), use double layer insulation.
  - 2.7.1. Stagger both longitudinal and circumferential joints to reduce the impact of the thermal expansion and contraction.
- 2.8. For single layer applications, circumferential joints shall be staggered.
  - 2.8.1. Where long unbroken stretches of insulation are encountered, expansion joints may be required as noted on the contract drawings.
- 2.9. Insulation shall be firmly fastened in place with all joints (longitudinal and circumferential) butted tightly and mechanically held in place using one, or a combination of, the following materials:
  - 2.9.1. 16 gauge (1.6mm) stainless steel wire.
    - 2.9.1.1. If the insulation is less than 12" (300mm) in diameter, 18 gauge (1.2mm) wire can be used.
  - 2.9.2. 0.5" x 0.020" (13 x 0.5mm) stainless steel bands and clips.
  - 2.9.3. All wire and bands must be placed on maximum 12" (300mm) centers.
- 2.10. Metal jacketing is required for: piping systems in exterior and corrosive environments, and piping systems up to 10' (3m) above the floor in mechanical equipment rooms or in furnished spaces.
  - 2.10.1. All jacket seams shall be installed with a minimum 2" overlap and seams shall be oriented to shed water and be located on the opposite side of the pipe experiencing prevailing winds, if possible.
  - 2.10.2. All butt joints and longitudinal overlaps shall be a minimum of 2".
- 2.11. If a vapor barrier is required, maintain a vapor barrier in all applications by properly sealing all joints, penetrations and other openings.
- 2.12. All valve stems must be sealed with caulking to allow free movement of the stem but still provide a seal against moisture incursion.
- 2.13. Apply equipment insulation as smooth as possible by grooving, scoring and beveling insulation as necessary.
- 2.14. Bevel and seal the ends of insulation to equipment, flanges and piping.
- 2.15. Fittings and valves shall be covered with insulation fittings fabricated from Johns Manville Industrial Sproule WR-1200 pipe and block insulation glued together with a sodium silicate based contact adhesive and wired in place.
- 2.16. Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section sized to provide the same insulation thickness as the surrounding pipe sections.
  - 2.16.1. Jacketing shall match that used on surrounding pipe.
  - 2.16.2. Rough cut ends shall be coated with a suitable weather or vapor resistant mastic as dictated by the system location and service.
  - 2.16.3. On hot systems where fittings are to be left exposed, insulation ends should be beveled away from bolts for easy access.
- 2.17. Neatly finish insulation at supports, protrusions and interruptions.
- 2.18. Do not insulate over nameplates or ASME stamps. Instead form a tight insulation seal around them.
- 2.19. When equipment with insulation requires periodic opening for maintenance, repair or routine inspection, install the insulation in such a way that it can be easily removed and put back in place without damage.

## 3. FIELD QUALITY CONTROL

- 3.1. Upon completion of the installation of the insulation and before start up, visually inspect and verify that the insulation has been installed correctly.
- 3.2. All work shall conform to accepted industry and trade

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standards for commercial and industrial insulations and to manufacturer's recommendations. Where available, it is recommended to use a National Insulation Association (NIA) certified (or other similarly certified) mechanical insulation inspector throughout the project to inspect and verify the materials and total insulation system has been installed correctly in accordance with the Johns Manville installation specifications.

## 4. INSULATION PROTECTION

- 4.1. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with damage to the vapor barrier and insulation that has been saturated with moisture.
- 4.2. The insulation contractor shall advise the general and/or mechanical contractor as to the requirements for protecting the insulation from damage and deterioration during the duration of the construction period.

## 5. SAFETY PRECAUTIONS

- 5.1. The insulation installers shall be properly protected during installation of the insulation. Protection when handling and applying insulation materials shall include but not be limited to:
  - 5.1.1. Disposable dust respirators.
  - 5.1.2. Gloves.
  - 5.1.3. Hard hats.
  - 5.1.4. Eye protection.
- 5.2. The insulation contractor shall conduct all jobsite operations in compliance with applicable provisions given by OSHA as well as with all state and local safety and health codes and regulations that may apply.

## ADDITIONAL INFORMATION AND SDS

Please visit our website at [www.jm.com/Industrial](http://www.jm.com/Industrial).



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Technical specifications as shown in this literature are intended to be used as general guidelines only. Please refer to the Safety Data Sheet and product label prior to using this product. The physical and chemical properties of the Sproule WR-1200® listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the Regional Sales Office nearest you for current information.

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