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.

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 2.1.1.
7.1. Deliver all materials to the job site in factory containers with manufacturer's label showing manufacturer, product name and re 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 1200ºF (650ºC).
2.1.6. Compressive strength of 80 psi minimum when tested in accordance with ASTM C165 (block).
2.1.7. Rated as 0 ame spread and 0 smoke developed when tested in accordance with ASTM E84.
2.1.8. Certi ed to meet the requirements of ASTM C795 for use over stainless steel.
2.1.9. Rated as noncombustible when tested in
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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 600ºF (315ºC) 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

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