SECTION 230719 – DIRECT EXPANSION PIPING SYSTEM INSULATIONS

Part 1 - GENERAL

* 1. RELATED DOCUMENTS
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
	1. SUMMARY
2. Section includes insulating the following HVAC piping systems.
3. Refrigerant suction (low pressure gas) piping.
4. Refrigerant hot gas (discharge or high pressure gas) piping.
5. Refrigerant liquid piping, for VRF/VRV and Heat Pump systems.
	1. ACTION SUBMITTALS
6. Product Data: For each type of product indicated, include thermal conductivity, water vapor permeance, thickness, and jackets (both factory and field applied if any).
7. LEED Submittals - Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
8. Shop Drawing: Include plans, elevation, section, details, and attachments to other work.
9. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
10. Detail insulation application at elbows, fittings, flanges, valves and specialties for each type of insulation.
11. Detail application of field applied jackets.

Retain paragraph below to verify product with Samples.

1. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use.
2. Tubular Preformed Pipe Insulation Materials: 12 inches long by 7/8” pipe size.
3. Jacket Materials for Pipe: 12 inches long by 7/8” pipe size coordinated with insulation wall thickness.
	1. INFORMATIONAL SUBMITTALS
4. Field quality-control reports.
	1. QUALITY ASSURANCE
5. Comply with Latest Edition of California BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS, TITLE 24, PART 6.
6. Installer Qualification: Only trained installers that are familiar with the products should be used.
	1. DELIVERY STORAGE AND HANDLING
7. Material to be delivered in new condition, free of defects and stored in a clean, dry space that provides protection against damage and contamination.
	1. COORDINATION
8. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 “Hangers and Supports for HVAC Piping and Equipment”.
9. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and space required for maintenance.
	1. SCHEDULING
10. Schedule insulation application after pressure testing and leak testing of systems. Insulation application may begin on segments that have satisfactory test results.

Part 2 – PRODUCTS

2.1 INSULATION MATERIALS

A. Flexible Elastomeric Foam: EPDM - Closed cell expanded rubber. Comply with ASTM C 534, Type I for tubular materials for refrigeration pipe sizes 1/4" and greater.

1. Outdoor Use, Basis of Design Product: Provide Reftekk AC-SSPT (EPDM pre-split with lap seal and field applied Aeroflex Aerocoat) or comparable product by one of the following.
	1. Aeroflex, EPDM SSPT with field applied Aerocel Aerocoat
	2. Armacell, LLC, EPDM UT Solaflex, Pre-split with lap seal and with field applied Black PVC jacket
2. Indoor Use, Basis of Design Product: Provide Reftekk AC-SSPT (EPDM pre-split with lap seal) or comparable product by one of the following.
	1. Aeroflex, EPDM SSPT
	2. Armacell, LLC, EPDM UT Solaflex, Pre-split with lap seal
3. Applied to Annealed Coiled Tubing (Line Sets), Basis of Design Product: EPDM continuous tube.

B. Elastomeric insulation shall not use CFC’s or HFC’s in the manufacturing process.

C. Elastomeric insulation shall have a flame spread-index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 for all products through 2” thickness.

D. Elastomeric insulation and elastomeric joining system shall be suitable of use from -70°F to 257°F continuous service temperature, per ASTM C 411.

E. Elastomeric insulation shall have a maximum thermal conductivity of 0.235 Btu-in/h-ft2-°F at a mean temperature of 75°F when tested in accordance with ASTM C 177 or ASTM C 518.

F. Elastomeric insulation shall have a maximum water vapor transmission of ≤0.03 perm-inch when tested in accordance with ASTM E 96, Procedure A, latest revision.

G. Elastomeric insulation must exhibit long-term UV resistance in outdoor installation per ASTM G 7 and ASTM G 90.

H. Elastomeric insulation must not contribute to external stress corrosion cracking when tested per ASTM C 692.

2.2 ADHESIVES, AND TAPES

A. Flexible Elastomeric Adhesive for Indoor and Outdoor Application:

1. Basis of Design Product: Provide Aeroflex AeroSeal contact adhesive or comparable product by one of the following.

a. Armacell, LLC HT 625 contact adhesive

B. Flexible Elastomeric for LEED low VOC Application:

1. Basis of Design Product: Provide Aeroflex AeroSeal LVOC

C. Seaming tape to be 15-mil EPDM rubber with acrylic adhesive.

2.3 INSULATING PIPE HANGER SUPPORTS

A. Support the piping system using high density rigid foam insulating pipe hanger supports with an inner lining of EPDM rubber insulating tape and 15-mil exterior EPDM rubber jacket. Insulation density to be a minimum of 10 lb. / cu. ft. with a compressive strength of 284 PSI or greater, and a k-value of 0.312 or lower. Continuous use temperature range to be -70°F to 257°F with water absorption of 5% or less.

1. Basis of Design Product: Provide Reftekk “Cush-A-Therm”, model UX insulated pipe support complete with steel channel insulation OD clamp or comparable product by one of the following.

a. Aeroflex USA, Aerofix-U with matching steel channel insulation OD clamp.

b. Armaflex LLC, Armafix IPH with matching steel channel insulation OD clamp.

Part 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and free of leaks and defects

2. Verify that surfaces to be insulated are clean, dry and free of dirt, dust, grease, frost, and moisture.

3. Work shall be performed at the installation temperatures recommended by the product manufacturer.

4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Tape seams and lap seam tape overlaps shall be clean dry, fan free of dirt, dust, grease, frost and moisture.

3.3 GENERAL INSTALLATION REQUIREMENTS

1. All piping, valves and fittings scheduled to be insulated to have all insulation applied in strict accordance with the insulation manufacturers installation instructions and practices described in the National Commercial and Industrial Insulation Standards Manual. In case of conflict, the manufacturers installation guidelines and instruction will be used.
2. Install insulation materials, accessories and finishes with smooth, straight, and even surfaces; free of voids, throughout the length of the piping including supports, fittings, valves and specialties.
3. Install insulation materials, vapor barriers, vapor dams, jackets, and thicknesses required for each item of the pipe system as required.
4. Install insulation with longitudinal seams oriented per the insulation manufacturers installation instructions for all horizontal runs.
5. Keep insulation dry and clean during application and finishing. Do not apply insulation to operating systems.
6. Install insulation with the least number of joints practical.
7. Piping to be insulated with tubular preformed pipe insulation.
8. Install insulation continuously through roof penetrations, wall penetrations and floor penetrations.
9. Install insulation continuously through fire rated wall and fire rated floor penetrations complying with Penetration Fire-stopping details.
10. Insulating Pipe Hanger Supports are to be installed at all pipe support and clamp locations. Insulating Pipe Hanger Supports are to be installed at the time of piping installation such that the pipe insulation system is installed in a continuous manner through the pipe support system.
11. All insulation terminations, butt joints, longitudinal joints, and access points to be properly glued or sealed with the insulation manufacturers sealant system.
12. Vapor dams to be installed every 12’ to 18’ per insulation manufacturers installation instructions, high point of piping run and at all insulation terminations (supports, valves, flanges and end of pipe runs)
13. Provide sufficient clearance between insulated pipes to allow air circulation.
14. Provide mitered insulation fittings at elbows to prevent compression of the insulation at the throat of the elbow and stretching on the outside of the bend.
15. Do not compress the insulation at penetrations or structural members, such as joists or studs. Do not allow the insulation to be compressed by ceiling hanger wires.
16. Do not allow attachment of anything to the insulated piping that will reduce the effective thickness of the insulation, such as control wiring, cabling, telephone wiring, etc. When using insulation manufacturers recommended tape on joints, do not compress the insulation.
17. Insulation should be installed such that butt joints are in slight compression. This prevents separation of the insulation joints over time or due to changes in temperature. Do NOT apply the insulation in a stretched condition.
18. Insulation thickness to be the most restrictive of the following options.
19. Liquid, suction, and discharge lines per state energy codes.
20. In accordance with the thickness tables for piping insulation in the latest version of ASHRAE 90.1.
21. In accordance with local building code requirements and Authority Having Jurisdiction.
22. In accordance with the requirements of the manufacturers of the equipment being served by the insulated refrigerant piping system.
23. Sufficient thickness to prevent condensation on the surface of the insulation under all operating conditions.

END OF SECTION 230719