GENERAL:

1. This section provides minimum standards for design and installation of mechanical insulation products for piping that will be durable, functional and reduce failures for the life of the facility.

DESIGN GUIDELINES:

A. Design General

1. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
    a. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.
2. Insulation thickness shall comply with ASHRAE 90.1 or the table below whichever is greater. Please note ASHRAE 90.1 and this table applies to building systems and not buried utility piping or piping within a concrete chase or manhole. Consult Division 33 guidelines.

SPECIFICATION REQUIREMENTS:

A. The following Table and statements shall be included in the contract specifications.

System Type	Insulation Material	Jacket*	Branches, Mains, and Loops				
			Pipe Diameter (inches)				
			<1	1-1¼	1½-3	4-6	8>
			Insulation Thickness (inches)				
Chilled water	Flexible Elastomeric	Not Required	1†	1†	1	1	1
AC condensate	Flexible Elastomeric	Not required	1	1	1	1	1
Refrigerant suction, interior	Flexible Elastomeric	Not required	1†	1	1	1	1.5
Refrigerant suction, exterior	Flexible Elastomeric	Aluminum jacket to protect from sun.	1.5	1.5	1.5	1.5	2
Heating Hot water supply and return	Fiberglass	All Service Jacket	1.5	1.5	2.0	2.0	2.0

High Pressure Steam, Above 15 psig	Fiberglass	All Service Jacket	3	4	4.5	4.5	4.5
High pressure steam condensate	Fiberglass	All Service Jacket	2.5	2.5	2.5	3	3
Low pressure Steam, <15 psig	Fiberglass	All Service Jacket	2.5	2.5	2.5	3	3
Low pressure steam condensate	Fiberglass	All Service Jacket	2.5	2.5	2.5	3	3

*See jacket requirements below for outdoor installation or exposed piping within specified distances from floors.
†Exceeds ASHRAE 90.1

With the exception of refrigerant suction and AC condensate, 2" of insulation shall be added to the tabular values above when the piping is to be installed outdoors.

1. All exterior, exposed piping shall have an aluminum jacket installed to protect the insulation. The jacket shall be weather-resistant, water-proof, smooth surfaced aluminum.
2. All new interior piping, exposed to view in occupied areas, shall be painted to match the surrounding background.
3. All new interior piping, exposed to view in occupied areas, and within 6'-0" of the finished floor, shall have a PVC jacket installed.
4. All new interior piping that is exposed in mechanical rooms, and within 6'-0" of the finished floor, shall have an aluminum jacket installed.
5. **DO NOT INSULATE**
   - 5.1 Hot piping within radiation enclosures or unit cabinets.
   - 5.2 Cold piping within unit cabinets provided piping is located over drain pan.
   - 5.3 Hot piping beyond control valve, located within heated space.
   - 5.4 Condensate piping between the steam trap and the unions.
6. In Mechanical Rooms, insulate all heat piping and accessories. All accessories shall be insulated with removable covers.
7. Balance valves on chilled water need to have ports extended beyond the insulation. Sleeves are not desirable. Provide shaft extensions on all chilled water valve handles.
8. Provide removable covers and insulation on strainers and manual or automatic flow control valves.
9. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
10. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance of tests.
11. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
12. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together and seal to ensure a complete and tight fit over surfaces to be covered.

13. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
14. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
15. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
16. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.
17. Where piping passes through firewalls indicated on the contract drawings, contractor shall install firestopping per firestop manufacturer’s instructions.
18. Replace insulation damaged during construction which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
19. Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.
20. No wood inserts for pipe hangers. Use only inert materials.