GENERAL:

1. To provide minimum standards for design and installation of mechanical insulation products for ductwork, piping and equipment 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 where ASHRAE 90.1 either doesn't address the condition, or the University prefers to exceed ASHRAE requirements.

SPECIFICATION REQUIREMENTS:

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

DUCT INSULATION APPLICATION

Duct Location and Service	Insulation Type	Jacket	Thickness (inches), or ASHRAE
Exterior exhaust Ductwork used with energy recovery systems before energy recovery coils	Flexible Elastomeric	0.016 aluminum	2
Exterior fresh air ductwork used with energy recovery systems after energy recovery coils			2
Exterior exhaust or outside air duct with no energy recovery	None Required	---	---
Supply Duct in ceiling Return Air Plenum or vertical chase	Fiberglass Wrap Insulation: ASTM C553 Minimum density of 1 (one) lb/cu. Ft.	Foil Skrim	90.1
Supply Duct in Unconditioned Space like attic or non-return air plenum			90.1

Duct Location and Service	Insulation Type	Jacket	Thickness (inches), or ASHRAE
Return Duct in Unconditioned Space		Kraft	1
Return Duct in Return Air Plenum	None Required	---	---
Ductwork Exposed in space to be painted	Rigid Fiberglass ASTM C 612, Class 1, 3 pcf	All service Jacket. See note 2.	90.1
Ductwork Exposed in space	Lined Ductwork or Double wall Spiral Required	---	---
All rectangular Ductwork in Mechanical Rooms. This includes supply air, outside air, return air and duct associated with energy recovery systems	Rigid Fiberglass ASTM C 612, Class 1, 3 PCF	Foil Skrim Kraft	2
All round Ductwork in Mechanical Rooms. This includes supply air, outside air, return air and duct associated with energy recovery systems	Semi-Rigid Fiberglass ASTM C 612, Class 1, 3PCF	Foil Skrim Kraft	2

1. Duct liner is not allowed unless approved by the project manager. Duct liner is typically required only when acoustically sensitive spaces are considered and duct silencers (air velocity reduction, etc.) aren't sufficient to achieve these goals. Transfer ducts with boots are allowed to use duct liner to reduce noise transmission.

2. 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.

3. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapped joints and excessive voids resulting from poor workmanship.

4. Take adequate pre-cautions to assure that the duct insulation does not get wet if installed before the building is enclosed.

5. Provide All Service Jacket on duct insulation to be painted.

6. Re-insulate any duct in mechanical room where insulation was removed to attach new duct.

7. Duct wrap on horizontal ducts shall be pinned on the bottom and sides of the duct at 18" intervals to prevent sagging.

8. Duct wrap shall be pinned on vertical ducts to prevent the insulation from sagging.

9. Do not insulate until duct leakage test is complete and acceptable.

10. At connections to equipment such as VAV boxes, all collars, reheat coils, coil return bends shall be insulated as the adjacent duct. All components in contact with 55F supply air shall be insulated and a vapor barrier installed.

11. Provide neatly beveled edge at interruptions of insulation. Coat bare edges of insulation with mastic or sealant to prevent delamination.

12. Do not stretch duct wrap insulation around ductwork.

13. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.

14. Extend ductwork insulation without interruption through walls, floors and ceilings, except where fire dampers are installed in fire rated partitions.

15. Insulation thickness may be reduced on a one-to-one basis where internal insulation or sound absorbing linings have been installed and the table calls for insulating wrap. Where the table calls for rigid duct insulation the rigid insulation may be reduced by ½" for every 1" of liner.

16. Install corner angles on external corners of insulation on ductwork in exposed mechanical or finished spaces before covering with jacketing.

17. All exterior exposed ductwork shall have an aluminum jacket installed to protect the insulation. The jacket shall be weather-resistant, water-proof, smooth surfaced aluminum, sloped to aid in drainage of rain water. Jacket shall fit neatly over round duct and fittings. Seams shall overlap so they do not catch water. Secure jackets with aluminum sheet metal screws. Seal all joints and seams on the top and sides but leave the bottom unsealed.

18. Contractor shall be responsible for re-insulating existing equipment, duct work and piping where insulation has been removed for new piping connections, duct connections or where asbestos insulation has been abated.

19. Repair damaged sections of existing mechanical insulation, damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

20. Do not cover the damper shafts and handles with insulation.