

SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes insulation for heating and ventilating ductwork.
- B. Related Sections:
 - 1. Applicable provisions of Division 01 shall govern all work under this Section.
 - 2. Section 23 05 00 - Basic HVAC Requirements.
 - 3. Section 23 31 00 - HVAC Ducts and Casings.

1.02 REFERENCES

- A. ASTM International
 - 1. ASTM C165 - Test Method for Compressive Properties of Thermal Insulations.
 - 2. ASTM C177 - Test Method for Heat Flux and Thermal Transmission Properties.
 - 3. ASTM C355 - Test Method for Test for Water Vapor Transmission of Thick Materials.
 - 4. ASTM C449 - Specification for Mineral Fiber Hydraulic Setting Thermal Insulation Cement.
 - 5. ASTM C518 - Test Method for Heat Flux and Thermal Transmission Properties.
 - 6. ASTM C916 - Specification for Adhesives for Duct Thermal Insulation.
 - 7. ASTM C921 - Practice for Determining Properties of Jacketing Materials for Thermal Insulation.
 - 8. ASTM C1136 - Specification for Flexible Low Permeance Vapor Retarders for Thermal Insulation.
 - 9. ASTM C1338 - Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - 10. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 11. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- B. Midwest Insulation Contractors Association (MICA)
 - 1. MICA - National Commercial & Industrial Insulation Standards.
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 225 - Surface Burning Characteristics of Building Materials.
- D. Underwriters Laboratories, Inc. (UL)
 - 1. UL 723 - Surface Burning Characteristics of Building Materials.

1.03 QUALITY ASSURANCE

- A. Substitutions: In accordance with Division 01 - General Requirements.

- B. Label insulating products delivered to construction site with manufacturer's name and description of materials.
- C. Insulation systems shall be applied by experienced contractors. Within past five (5) years, contractor shall be able to document successful completion of a minimum of three (3) projects of size and similar scope of work specified in this section.

1.04 DESCRIPTION

- A. Furnish and install insulating materials and accessories as specified or as required for a complete installation. Following types of insulation are specified in this section:
 - 1. Duct insulation.
- B. Install insulation in accordance with latest edition of MICA standard and manufacturer's installation instructions.
- C. Exceptions to these standards will only be accepted where specifically modified in these specifications, or where prior written approval has been obtained from Engineer/ Architect.

1.05 DEFINITIONS

- A. Concealed: Shafts, furred spaces, space above finished ceilings, and crawl spaces. All other areas shall be considered as exposed.
- B. Exposed to Weather: Ducts or pipes located outdoors, either on grade, on wall, or on roof, in location where sun, wind, rain, snow, and other elements will come in contact with ductwork or piping.
- C. Unconditioned Spaces: Unheated or non-cooled attics and crawl spaces where ambient temperatures may rise above 90 degrees F, or drop below 50 degrees F. Ducts or pipes in these instances are considered to be located outside of building thermal envelope.

1.06 SUBMITTALS

- A. Division 01 – Submittal Procedures: Shop drawings, product data and samples.
- B. Submit schedule of all insulating materials to be used on project, including adhesives, fastening methods, fitting materials along with material safety data sheets and intended use of each material.
- C. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.
- D. Duct liner including data on thermal conductivity, air friction correction factor, and limitation on temperature and velocity.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install insulation products that have been exposed to water.
- B. Protect installed work with plastic sheeting to prevent water damage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Manufacturers:
 - 1. Armacell.
 - 2. Certainteed.
 - 3. Manson.
 - 4. Childers.
 - 5. Dow.
 - 6. Extol.
 - 7. Fibrex.
 - 8. Foster.
 - 9. Imcoa.
 - 10. Johns Manville.
 - 11. Knauf.
 - 12. Owens-Corning.
 - 13. Partek.
 - 14. Pittsburgh Corning.
 - 15. Rubatex.
 - 16. Substitutions: In accordance with Division 01 – General Requirements.
- B. Materials or accessories containing asbestos will not be accepted.
- C. Use composite insulation systems, including insulation, jackets, sealants, mastics, and adhesives that have flame spread rating of 25 or less and smoke developed rating of 50 or less, with following exceptions:
 - 1. Pipe insulation not located in an air plenum may have flame spread rating not over 25 and smoke developed rating no higher than 150.

2.02 INSULATION TYPES

- A. Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.
- B. Flexible Fiberglass Insulation: Minimum nominal density of 1.5 lbs. per cu. ft., and thermal conductivity of not more than 0.3 at 75 degrees F, rated for service to 250 degrees F.

2.03 JACKETS

- A. Foil Scrim All Service Jackets (FSJ): Glass fiber reinforced foil kraft laminate, factory applied to insulation. Maximum permeance of .02 perms and minimum beach puncture resistance of 25 units.

2.04 ACCESSORIES

- A. Products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of systems to which they are applied.
- B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.
- C. Tack fasteners to be stainless steel ring grooved shank tacks.
- D. Staples to be clinch style.
- E. Insulating cement to be ASTM C195, hydraulic setting mineral wool.
- F. Finishing cement to be ASTM C449.
- G. Fibrous glass or canvas fabric reinforcing shall have a minimum untreated weight of 6 oz./sq. yd.
- H. Vapor barrier coatings and tapes to have maximum applied water vapor permeance of 0.08 perms.
- I. Fungicidal water base coating, Foster 40-20 or an approved equal, to be compatible with vapor barrier coating.
- J. Insulation Joint Sealant: Used as vapor sealant on below ambient piping with polyisocyanurate and cellular glass insulation.
 - 1. Foster 95-50.
 - 2. Childers CP-76.
 - 3. Or approved equal.
- K. Reinforcing Mesh: Used in conjunction with coatings/mastics to reinforce.
 - 1. Foster Mast A Fab.
 - 2. Childers Chil Glas #10.
 - 3. Or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install insulation, jackets and accessories in accordance with manufacturer's instructions and under ambient temperatures and conditions recommended by manufacturer.
- B. Surfaces to be insulated must be clean and dry.

- C. Do not insulate systems or equipment specified to be pressure tested or inspected, until testing, inspection, and any necessary repairs have been successfully completed.
- D. Install insulation with smooth and even surfaces.
- E. Poorly fitted joints or use of filler in voids will not be accepted.
- F. Provide neatly beveled and coated terminations at nameplates, un-insulated fittings, or at other locations where insulation terminates.
- G. Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.
- H. Use full length material as delivered from manufacturer wherever possible.
- I. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.
- J. Insulation shall be continuous through sleeves and openings except where fire rated penetration materials require interruption of insulation.
- K. Maintain vapor barriers continuous through all penetrations.
- L. Provide a complete vapor barrier for insulation on following systems:
 - 1. Insulated duct.

3.02 DUCT INSULATION

- A. General:
 - 1. Secure flexible duct insulation on sides and bottom of ductwork over 24-inch wide and all rigid duct insulation with weld pins or speed clips.
 - 2. Space fasteners 18-inches on center or less as required to prevent sagging for flexible duct insulation.
 - 3. Space fasteners not less than 3 inches from edge or corner and 12 inches on center or less for rigid duct insulation.
 - 4. Install weld pins without damage to interior galvanized surface of duct.
 - 5. Clip pins back to washer and cover penetrations with tape of same material as jacket.
 - 6. Firmly butt seams and joints and cover with 4-inch tape of same material as jacket.
 - 7. Seal tape with plastic applicator and secure with staples.
 - 8. Joints, seams, edges and penetrations shall be fully vapor sealed.
 - 9. Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation or jacket material.
 - 10. External supply duct insulation is not required where ductwork contains continuous 1-inch acoustical liner.
 - 11. Provide 4-inch overlap of external insulation over ends of acoustically lined sections.
 - 12. Where insulated ductwork is supported by trapeze hangers, insulation shall be installed continuous through the hangers. Drop support channels required to facilitate installation of insulation. Where rigid board or flexible insulation is specified, install high density inserts to prevent weight of ductwork from crushing insulation.
 - 13. Where insulated low temperature (below 45 degrees F) ductwork is supported by steel metal straps or wire ropes that are secured directly to duct, straps or ropes shall be completely covered with insulation and sealed to provide complete vapor barrier.

14. Where insulated duct risers are supported by steel channels secured directly to duct, extend insulation and vapor barrier jacketing to encapsulate support channels.

B. Duct Insulation Schedule:

1. Provide duct insulation on new ductwork in following schedule:

Service	Insulation Type	Jacket	Thickness (Inches)
All Ductwork	Flexible Fiberglass	FSJ	1-1/2

END OF SECTION 23 07 00