

**SECTION 00 91 03**

**ADDENDUM 003**

DATE: November 15, 2024

RE: Public Works – Maintenance and Operations Building  
City of Sherwood  
Sherwood, Arkansas

Architect Engineer Project No. 2023-249\_20

FROM: CROMWELL ARCHITECT ENGINEERS, INC.  
1300 East 6th Street  
Little Rock, Arkansas 72202

TO: BIDDERS OF RECORD

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated September 23, 2024, as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

Each item in Contract Documents complements each of the other Contract Documents. No sheet, section, or document is to be followed without referring to all sheets, sections, and parts of the Contract Documents.

This Addendum consists of the following Documents and Revisions.

**CHANGES TO PROCUREMENT AND CONTRACTING REQUIREMENTS:**

- 1: Replace Section 00 01 10 - Table of Contents with revised Section issued with this Addendum.
- 2: Insert (this) Section 00 91 03 - Addendum 003 issued with this Addendum.

**CHANGES TO SPECIFICATIONS:**

- 3: Replace Section 08 36 13 - Sectional Doors with revised Section issued with this Addendum.
- 4: Replace Section 22 07 19 - Plumbing Piping Insulation with revised Section issued with this Addendum.
- 5: Replace Section 23 07 13 – Duct Insulation with revised Section issued with this Addendum.

**CHANGES TO DRAWINGS:**

- 6: Insert the attached revised and/or new Drawings issued with this Addendum dated with original issue date:

Sheet	Title/Description	Issue Date	Revision No.
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New sections indicated by [\*Addm00X], bold print and underline.

Modified sections indicated by [\*Addm00X] and underline.

Deleted sections indicated by [\*Addm00X] and strikethrough.

**PROCUREMENT AND CONTRACTING REQUIREMENTS**

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**END OF SECTION**

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**SECTION 08 36 13**  
**SECTIONAL DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead sectional doors, electrically and manually operated.
- B. Operating hardware and supports.
- C. Electrical controls.

**1.02 RELATED REQUIREMENTS**

- A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 26 05 83 - Wiring Connections.

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- B. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- C. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- D. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- E. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- F. ITS (DIR) - Directory of Listed Products; current edition.
- G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).
- H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL (DIR) - Online Certifications Directory; Current Edition.
- K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Operation Data: Include normal operation, troubleshooting, and adjusting.
- H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

- I. Specimen warranty.

### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Comply with applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

### 1.06 WARRANTY

- A. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Basis of Design Products: To establish standards of manufacturer, operation, performance and appearance, drawings and specifications are based on products of the manufacturer(s) listed herein. Provided compliance with requirements, products of other manufacturers may also be acceptable.
- B. Basis of Design Sectional Doors:
  - 1. Overhead Door Corporation; 418: [www.overheaddoor.com/#sle](http://www.overheaddoor.com/#sle).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
- B. Air Leakage Rate: Less than 0.40 cfm/sq ft when tested in accordance with ASTM E283/E283M at test pressure difference of 1.57 psf.
- C. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.

### 2.03 STEEL DOORS

- A. Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Door Panels: Steel construction; outer steel sheet of 16 gauge, 0.0598 inch minimum thickness, flush profile; inner steel sheet of 26 gauge, 0.0217 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; expanded polystyrene (EPS) insulation.
  - 2. Door Nominal Thickness: 2 inches thick.
  - 3. Exterior Finish:
    - a. Factory finished with acrylic baked enamel; color as selected by Architect.
  - 4. Interior Finish:
    - a. Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
  - 5. Glazed Lites: Full panel width, one row; set in place with resilient glazing channel.
    - a. Glazing: Annealed float glass; single pane; clear; 1/8 inch nominal overall thickness.
  - 6. Manual Operation: ~~Chain hoist~~ Spring loaded for doors 10'-0" or less in height.
  - 7. Electric Operation: Electric control station for doors over 10'-0" in height.

## 2.04 COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
  - 1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

## 2.05 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Float Glass: Provide float glass glazing, unless noted otherwise.
  - 1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
- C. Insulation: Expanded polystyrene (EPS), bonded to facing.

## 2.06 ELECTRIC OPERATION

- A. Electric Operators:
  - 1. Mounting: Side mounted on cross head shaft.
  - 2. Motor Enclosure:
  - 3. Motor Rating: 1/3 hp; continuous duty.
  - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
  - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  - 6. Controller Enclosure: NEMA 250, Type 1.
  - 7. Opening Speed: 12 inches per second.
  - 8. Brake: Adjustable friction clutch type, activated by motor controller.
  - 9. Manual override in case of power failure.
  - 10. See Section 26 05 83 for electrical connections.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
  - 1. 24 volt circuit.
  - 2. Surface mounted, at interior door jamb.
  - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide ~~electric sensing edge, wireless sensing,~~ NEMA 1 photo eye sensors or NEMA 4X photo eye sensors as required with momentary-contact control device.

- ~~D. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.~~
- ~~E. Safety Edge: Electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.~~

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

#### **3.02 INSTALLATION**

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

#### **3.03 ADJUSTING**

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

#### **3.04 CLEANING**

- A. Clean doors and frames.
- B. Remove temporary labels and visible markings.

#### **3.05 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

**END OF SECTION**

**SECTION 22 07 19**  
**PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SECTION INCLUDES**

- A. Glass fiber insulation.
- B. Jackets and accessories.

**1.03 RELATED REQUIREMENTS**

- A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.04 REFERENCE STANDARDS**

- A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- D. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2021a.
- E. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010 (Reapproved 2016).
- F. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).
- G. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

**1.08 FIELD CONDITIONS**

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

## **PART 2 PRODUCTS**

### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

### **2.02 GLASS FIBER**

- A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum Service Temperature: 850 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
  - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum Service Temperature: 650 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

### **2.03 JACKETS**

- A. PVC Plastic.
  - 1. Manufacturers:
    - a. Johns Manville Corporation: [www.jm.com/#sle](http://www.jm.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
- ~~B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Smooth.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.~~

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
  - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- G. Glass fiber insulated pipes conveying fluids above ambient temperature:
  - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- H. Inserts and Shields:
  - 1. Application: Piping 1-1/2 inches diameter or larger.
  - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  - 3. Insert Location: Between support shield and piping and under the finish jacket.
  - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
- I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 7 feet (2 meters) above finished floor): Finish with ~~aluminum~~-PVC jacket.
- K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- L. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

### 3.03 SCHEDULES

- A. Plumbing Systems:
  - 1. Domestic Hot Water Supply and Recirculation:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: 2 inch and smaller.
        - (a) Thickness: 1 inch.
      - 2) Pipe Size Range: Over 2 inch (50 mm).
        - (a) Thickness: 1.5 inch (40 mm).
  - 2. Domestic Cold Water:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: All Sizes
        - (a) Thickness: 1 inch (25 mm).
  - 3. Roof Drain Bodies:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: All Sizes
        - (a) Thickness: 1 inch (25 mm).
  - 4. Roof Drainage Above Grade:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: All Sizes
        - (a) Thickness: 1 inch (25 mm).

- B. Other Systems:
1. Heat Maintenance Cable:
    - a. Per Manufacturer's instructions.
  2. Piping Exposed to Freezing with Heat Tracing:
    - a. Per Manufacturer's instructions.
  3. Handicap Fixture Traps, Stops and Supplies:
    - a. Manufactured Glass Fiber covering with PVC jacket. (Refer to Fixture Schedules).
  4. Provide aluminum jacket for all piping exposed to weather or damp locations.

**END OF SECTION**

**SECTION 23 07 13**  
**DUCT INSULATION**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SECTION INCLUDES**

- A. Duct insulation.
- B. Duct liner.
- C. Weather barrier coatings.
- D. Insulation jackets.

**1.03 RELATED REQUIREMENTS**

- A. Section 23 05 53 - Identification for HVAC Piping and Equipment.
- B. Section 23 31 00 - HVAC Ducts and Casings.

**1.04 REFERENCE STANDARDS**

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- F. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- G. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- H. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2016 (Reapproved 2021).
- I. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2008.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.
- K. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- L. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015 (Reapproved 2021)e1.
- M. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

- C. Samples: Submit two samples of any representative size illustrating each insulation type.
- D. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

#### **1.08 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

### **PART 2 PRODUCTS**

#### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

#### **2.02 GLASS FIBER, FLEXIBLE**

- A. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
  - 2. Maximum Service Temperature: 250 degrees F.
  - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- B. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
  - 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- D. Outdoor Vapor Barrier Mastic:
  - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

#### **2.03 WEATHER BARRIER COATINGS**

- A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.
  - 1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
  - 2. Water Vapor Permeance: Greater than 1.0 perm in accordance with ASTM E96/E96M.

#### **2.04 JACKETS**

- A. Exterior insulation jackets for outside applications shall be a multi-ply embossed UV-resistant aluminum foil/polymer laminate with a layer of rubberized asphalt specially formulated for use on insulated duct. The jacket will include a metalized polyester film coated with a high quality low temperature acrylic adhesive that allows for a peel and stick functionality.

- B. Aluminum (Indoor) Jacket: ASTM B209 (ASTM B209M).
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Smooth.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
  - 6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

## 2.05 DUCT LINER

- A. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
  - 1. Fungal Resistance: No growth when tested according to ASTM G21.
  - 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
  - 3. Service Temperature: Up to 250 degrees F.
  - 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
  - 5. Minimum Noise Reduction Coefficients:
    - a. 1/2 inch Thickness: 0.30.
    - b. 1 inch Thickness: 0.45.
    - c. 1-1/2 inches Thickness: 0.60.
    - d. 2 inch Thickness: 0.70.
- B. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- C. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that ducts have been sealed and air leak tested per Section 23 31 00 - HVAC Ducts and Casings before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated ducts conveying air above ambient temperature:
  - 1. Provide with or without standard vapor barrier jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.
- F. External Duct Insulation Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Secure insulation without vapor barrier with staples, tape, or wires.
  - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.

4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- G. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
  2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
  3. Seal and smooth joints. Seal and coat transverse joints.
  4. Seal liner surface penetrations with adhesive.
  5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

### 3.03 SCHEDULES

- A. Supply Ducts: 2" Glass Fiber, Flexible
- B. Return Ducts: 2" Glass Fiber, Flexible
- C. Relief Ducts in Mechanical Rooms: 2" Glass Fiber, Flexible
- D. Ducts Exposed to Outdoors: 2" Glass Fiber, Rigid with Exterior Insulation Jacket.
- E. Supply Ducts From Fans to Vertical Ducts in Shafts (Cooling System): 2"
- ~~F. Spiral Supply Duct From Air Handling Units in Vehicle Maintenance Bay: 2" Glass Fiber, Flexible.~~
- F. ~~G.~~ Exhaust Ducts: Not required.

**END OF SECTION**