
Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 23 05 00 - Common Work Results for HVAC

1.2 DEFINITIONS

- .1 Definitions:
 - .1 The following apply for the purposes of this section:
 - .1 "CONCEALED" elements – insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" elements – means "not concealed" as previously defined.
 - .3 Insulation systems – assemblies made of insulation materials, fasteners, jackets, and other accessories.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
 - .1 Samples must include:
 - .1 Complete assembly of each type of insulation system proposed including insulation materials, coating, and adhesive. Mount sample on a 12 mm thick plywood board. Affix typewritten label beneath sample indicating service.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

- .1 The Thermal Insulation Association of Canada's (TIAC) Mechanical Insulation Best Practices Guide must be used as the standard reference and is part of the project specifications.
- .2 The contractor responsible for installing mechanical insulation must keep a copy of the guide as a reference.

1.6 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 MATÉRIAUX/MATÉRIEL DE REMPLACEMENT

- .1 Where materials or products are specified by their trademark, consult the Instructions to Bidders document for the procedures to follow regarding the request for approval for materials or product replacement.

1.8 WASTE MANAGEMENT

- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Recuperate and sort paper, plastic, polystyrene and corrugated board packaging and dispose of in appropriate recycling bins as per waster management Plan.
- .3 Dispose of unused adhesives at an approved hazardous waste collection site.
- .4 It is not permitted to dump adhesive products in sewers, water streams, lakes, on the ground or at any other location that could risk harming our health or the environment.

Part 2 Products

2.1 FIRE AND SMOKE RATING

- .1 Fire and smoke ratings to CAN/ULC-S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION MATERIALS

- .1 Insulation Type **D-1**: Flexible Fiberglass with Vapor Barrier, Round Ducts, between -40 °C and 100 °C (-40 °F to 210 °F)
 - .1 Use: insulation type D-1 for round or oval air ducts.
 - .2 Materials
 - .1 Fiberglass blanket for air ducts according to ASTM C1290 and ASTM C553, (type I), factor k (maximum = 0.04 W/m. (0.3 BTU in./hr sq.ft. °F) at 24 °C (75 °F), with a protective cover, such as a vapor barrier FSK according to ASTM C1136.
 - .2 Acceptable products:
 - .1 Certainteed, Soft Touch FSK;
 - .2 Johns Manville, Microlite Standard duct wrap FSK;
 - .3 Knauf, Duct Wrap FSK;
 - .4 Manson, Alley-Wrap FSK;
 - .5 Owens Corning, SoftR Duct Wrap FSK.
 - .3 Insulation thickness

Nominal insulation thickness	Service temperature
2 x 25 mm (2 x 1") overlapped joints	-40 to -18 °C (-40 to 0 °F)
38 mm (1.5")	-17°C to 67 °C (1°F to 150 °F)
50 mm (2")	68 °C and over (151 °F and over)
100 mm (4"), overlapped joints	Outside

.2 Insulation Type **D-2**: Rigid Fiberglass with Vapor Barrier, Rectangular Ducts

- .1 Used on rectangular air ducts.
- .2 Materials
 - .1 Rigid fiberglass panel for air ducts, density 48 kg/m³ (3 lbs/cu.ft.) according to ASTM C612, and FSK vapor barrier according to ASTM C1136, maximum K factor: 0.034 W/m °C (0.24 BTU in/hr sq.ft. °F) at 24°C (75 °F).
- .3 Acceptable products:
 - .1 Certainteed, CertaPro CB300 FSK;
 - .2 Johns Manville, Spin-Glas serie 1000 FSK;
 - .3 Knauf, Insulation board FSK;
 - .4 Manson, AK Board FSK;
 - .5 Owens Corning, Isolant Fiberglas serie 700 FSK.
- .4 Insulation thickness

Nominal insulation thickness	Service temperature
2 x 25 mm (2 x 1") overlapped joints	-40 °C to -22 °C (-40 °F to -8 °F)
25 mm (1")	-22 °C à 58 °C (-8 °F to 129 °F)
38 mm (1½")	59 °C to 67 °C (130 °F to 150 °F)
50 mm (2")	68 °C and over (151 °F and over)
100 mm (4"), overlapped joints	Outside

2.3 JACKETS

- .1 Polyvinyl Chloride (PVC):
 - .1 One-piece moulded type and sheet to CAN/CGSB 51.53 with pre-formed shapes as required.
 - .2 Colours: selected by Departmental Representative.
 - .3 Minimum service temperatures: -20 degrees C.
 - .4 Maximum service temperature: 65 degrees C.
 - .5 Moisture vapour transmission: 0.02 perm.
 - .6 Thickness: 0.5 mm.

- .7 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Tacks.
 - .3 Pressure sensitive vinyl tape of matching colour.
- .8 Special requirements:
 - .1 Outdoor: UV rated material at least 0.8 mm thick.
- .9 Acceptable product: Zeston.
- .2 Canvas:
 - .1 Fire resistant cotton plain weave canvas, ULC listed, 220 gm/m² for exposed elements and 120 g/m² for concealed elements, coated with heat insulating and fire retardant adhesive, diluted, in accordance with ASTM C921.
 - .2 Heat insulating adhesive: compatible with insulation.
 - .3 Acceptable product: Fattal Thermocanvas.
- .3 Aluminum:
 - .1 To ASTM B209.
 - .2 Thickness: 0.50 mm sheet.
 - .3 Finish: smooth.
 - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.
- .4 Stainless steel:
 - .1 Type: 304.
 - .2 Thickness: 0.25 mm.
 - .3 Finish: smooth.
 - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

2.4 ADHESIVES, TAPES AND FASTENERS

- .1 For ductwork
 - .1 Tape: self adhesive, 100 mm (4"), wide rated lower than 25 for flame spread and lower than 50 for smoke development.
 - .1 Acceptable products: FSK Venture Tape.
 - .2 Contact adhesive: quick-setting, non-flammable fire resistant adhesive to bond fiberglass to ducts. Flame spread 15, smoke development 0.

- .1 Acceptable products: Duro Dyne "WSA"; Foster 85-60.
- .3 Use weld pins on bottom of duct if duct is over 635 mm (25") wide.
- .2 For vapor barrier
 - .1 Lap seal adhesive: Quick-setting adhesive for joints and lap sealing of vapor barriers. Flame spread 10, smoke development 0.
 - .2 Acceptable products: Foster 85-75.
- .3 For canvas
 - .1 Fire resistant adhesive for cementing canvas cloth to duct insulation.
 - .2 Acceptable products: Foster 30-36.
- .4 Pins
 - .1 Weld pins 4 mm (0.15") diameter, with 35 mm (1.4") diameter head for installation through the insulation. Length to suit thickness of insulation.
 - .2 Acceptable products: Duro Dyne, Clip-Pin.
 - .3 Weld pins 2 mm (0.08") for installation prior to applying insulation. Length to suit thickness of insulation. Nylon retain clips 32 mm (1.25") square.
 - .4 Acceptable products: Duro Dyne spotter pins with spotter clips or stop clips as required.

2.5 CEMENT

- .1 Thermal insulating and finish
 - .1 Hydraulic setting or air drying on mineral wool, to ASTM C449.

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PRE-INSTALLATION REQUIREMENTS

- .1 Install insulation only when network tests are complete and results are certified by the relevant authority present during testing.
- .2 Ensure surfaces to cover with insulation or to be coated are clean, dry and free from foreign materials.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and as indicated.
- .3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.

- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Ensure hangers, and supports are outside vapour retarder jacket.
- .5 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
 - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- .6 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 DUCTWORK INSULATION TABLE

- .1 Works for this section include but are not limited to the thermal insulation of the following elements:

Ductwork	Insulation type	
• From fresh air intake to mixing box	D-2	
• From fresh air intake to heating coil	D-2	
• Air supply	D-1	D-2
• Exterior	D-2	
• Exhaust in roof space and on a distance of 3 m (10') in heated space	D-1	D-2
• Exhaust on a 3 m (10') distance starting from an exterior wall	D-1	D-2
• Exhaust between the fan and exhaust louver	D-2	
• Exhaust between the fan register and exhaust louver	D-2	
• Fresh air plenum	D-2	
• Foul air plenum	D-2	

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION