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## **PART 1 – GENERAL**

### **1.1 GENERAL**

- .1 All drawings and all sections of the specifications shall apply to and form an integral part of this section.

### **1.2 REFERENCES**

- .1 ASTM A167-89a, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- .2 ASTM C411-82(1989), Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .3 CAN/ULC-S109-M88, Standard for Flame Test of Flame Resistant Fabrics and Films.
- .4 ANSI/NFPA 90A-1990, Air Conditioning and Ventilating Systems, Installation of.
- .5 ANSI/NFPA 90B-1989, Warm Air Heating and Air Conditioning Systems.
- .6 CGSB 51-GP-9M-76, Thermal Insulation, Mineral Fibre, Sleeving for Piping and Round Ducting.
- .7 CGSB 51-GP-11M-76, Thermal Insulation, Mineral Fibre, Blanket for Piping, Ducting, Machinery and Boilers.
- .8 CAN/CGSB-51.12-M86, Cement, Thermal Insulating and Finishing.
- .9 CAN/CGSB-51.40-M80, Thermal Insulation, Flexible, Elastomeric, Unicellular, Sheet and Pipe Covering.
- .10 CGSB 51-GP-52Ma-89, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .11 CGSB 51-GP-53M-77, Jacketing, PolyvinylChloride Sheet for Insulating Pipes, Vessels and Round Ducts.
- .12 CSA HA Series-M1980, CSA Standards for Aluminium and Aluminium Alloys.
- .13 ASTM C335-89, Test Method for Steady-State Heat Transfer Properties of Horizontal Pipe Insulations.
- .14 CGSB 51-GP-10M-76, Thermal Insulation, Mineral Fibre, Block or Board, for Ducting, Machinery and Boilers.

### **1.3 WORK INCLUDED**

- .1 Labour, material, plant, tools, equipment and services necessary and reasonably incidental to completion of external insulation for mechanical equipment, piping and ductwork.

### **1.4 RELATED WORK**

- .1 Mechanical General Provisions: Section 15010
- .2 Plumbing: Section 15430
- .3 Ventilation & Air Conditioning: Section 15800

**1.5 QUALITY ASSURANCE**

- .1 All final pipe and duct installations including insulation, covering, and adhesive shall have a flame spread rating of not greater than 25 and maximum smoke developed rating of 50 in accordance with CAN4-S102. All canvas shall bear ULC label.
- .2 U.L.C. label or satisfactory certified report from approved testing laboratory is required to indicate that fire hazard ratings for material for use do not exceed those specified.
- .3 Flame proofing treatment subject to deterioration due to effects or high humidity are not acceptable.
- .4 Materials to be tested in accordance with ASTM C411.

**PART 2 – PRODUCTS**

**2.1 DESCRIPTION**

- .1 See Part 4 Insulation Schedule at end of this Division.

## **PART 3 – EXECUTION**

### **3.1 WORKMANSHIP**

- .1 Do not apply coverings until hydro-static tests have been completed, surfaces to be covered are clean and dry. Insulation shall be clean and dry when installed and during application of any finish.
- .2 Work shall be performed by licensed journeyman.
- .3 Apply insulation materials, accessories and finished in accordance with manufacturer's recommendations. (Joints to be on top).
- .4 Pack solid around all pipes where they pass through sleeves in walls, floor slabs, etc. for full thickness of floor and/or wall with fibreglass insulation. Where walls or floor slabs are used for rating purposes (See Section 15010 OPENINGS IN FIRE SEPARATIONS). Insulated pipes having vapour barrier jacket to pass through walls, floors, etc. to accommodate full insulation thickness. Protect insulation of exposed pipes passing through floors with 1.2mm (18 ga.) galvanized iron 150mm (6") from finished floor.
- .5 Vapour barriers and insulation to be complete over the full length of pipe or duct surface without penetration for hangers, standing duct seams and without interruption at sleeves, instruct duct installer. (See Section 15010 HANGERS + SUPPORTS).

### **3.2 METHOD OF APPLICATION**

- .1 Fibreglass Piping Insulation:
  - .1 Fasten longitudinal laps with staples and seal with Swift Adhesive #3218.
  - .2 Butt joints wrapped with a 100mm strip of ASJ. Stagger joints multiple layers.
  - .3 Refinish exposed piping with brush coat Flintguard No. 120 white fire retardant lagging adhesive.
  - .4 All fittings 12mm (1/2") to 50mm (2") shall be insulated by wrapping with 25mm (1") thick layers of 13 kg/M3 density flexible fibreglass attached with jute twine, fittings 65mm (2 1/2") and over with preformed fittings. Surface shall be wrapped with Friction Tape and sealed with an asphaltic sealing compound. Over this to be applied a smooth coating of insulating cement. Recover fittings with ASJ vapour seal jacket and brush coat with fire retardant white lagging adhesive.
- .2 Flexible Duct Insulation:
  - .1 Rectangular ductwork (See schedule):
    - .1 On ducts 305mm (12") wide and smaller apply fasteners on bottom surface of duct by impaling on welded pins on 305mm (12") centers.
    - .2 Spot adhesive on 305mm (12") centers on all sides of duct. Apply insulation with edges tightly butted together and secured with 100% coverage of 3-M No.17 or approved alternate. Staple joints and seal with 100mm strips of vapour barrier foil of same quality as duct insulation membrane sealed with BF 85-15.
  - .2 Round Ducts:
    - .1 Adhere to duct surface with adhesive applied in strips 152mm (6") wide, 305mm (12") o.c. Butt all edges of insulation, staple and seal all joints with tape adhered over the joint. Seal all breaks with vapour barrier tape. Recover ducts exposed to view with 170g canvas secured with Flintguard No. 120 white fire retardant lagging adhesive. Finish with brush coat of same adhesive.

- .3 Rigid Duct Insulation:
  - .1 Insulation applied with edges tightly butted and secured by impaling on pins welded to duct. Pins to be staggered, minimum 305mm (12") o.c. in every direction. This applies to all sides. Secure insulation to pins with metal fasteners. Pins shall be long enough to bend after fasteners have been applied. Install two fasteners to all insulation on roof. Dab adhesive over pins and fasteners.
  - .2 Seal all joints, edges and breaks in vapour seal jacket with vapour barrier foil of the same quality as that of duct membrane 100mm wide with BF-85-15 lagging adhesive.
  - .3 On ducts 610mm (24") wide and wider apply fasteners on bottom surface of duct by impaling on welded pins on 305mm (12") centers.
  - .4 Spot adhesive on 305mm (12") centers on all sides of duct. Apply insulation with edges tightly butted together and secured with 100% coverage of 3-M No.17 or approved alternate. Staple joints and seal with 100mm strips of vapour barrier foil of same quality as duct insulation membrane sealed with BF 85-15 lagging adhesive.
  - .5 On ducts 584mm (23") wide or less insulation applied as above but welded pins may be omitted.

**PART 4 - SCHEDULES**

**TABLE 6 - PIPE & DUCTWORK INSULATION**

System	Type	Remarks
Piping – Cooling coil drip	P-1	A, B
Piping – Refrigeration	P-2	A, C
Ductwork – New Supply Fan: Supply/return	D-2 (1½")	A, B
Ductwork – New exhaust/return/relief inlet	D-2 (1")	A
Ductwork – New/existing exhaust/return/relief discharge	D-2 (2")	A
Ductwork – New/existing outside air intake/mixed air	D-2 (2")	A

**Remarks**

- A -** Unless otherwise noted, Insulate completely: (1) all new piping (2) all new ductwork, (3) equipment. Unless otherwise noted all exposed ductwork to be canvas covered. Where required patch existing.
- B -** Repair existing when connecting to new.
- C -** All piping outdoors to be wrapped with weatherproof aluminium jacket. To be installed within a PVC pipe sleeve underground to building.

**Piping Material Legend**

- P-1** Preformed fibreglass heavy density full range with factory applied all service jacket. Cold water insulation to be c/w vapour barrier.  
**Drip**  
 : Piping 12mm (1/2" Ø, 12 mm to 1" Ø, 25 mm) = (1") thick.  
 : Piping 31mm (1¼" Ø, 31mm to 2" Ø, 50mm) = (1 1/2") thick.
- P-2** Armaflex 38mm (1 ½" Ø)

**Ductwork Material Legend**

- D-1** Rectangular/Square: Rigid: heavy density full range fibrous glass insulation with factory applied re-enforced aluminium foil face vapour barrier.
- D-2** Round/Rectangular/Square: Flexible: 12Kg/m3 density fibrous glass insulation with factory applied re-enforced aluminium foil face vapour barrier.

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