DUCT INSULATION

1. GENERAL

1.1 Description

.1 For additional information, refer to Section 21 05 01 - Common Work Results for Mechanical and Division 1 - General Conditions of the Construction Contract.

.2 For a list of applicable codes and standards, refer to Section 21 05 01 - Common Work Results for Mechanical.

.3 The Construction Contractor shall be responsible for coordinating all aspects of this Work.

.4 Locations of equipment, ductwork, pipework, and all associated appurtenances indicated on the Drawings are approximate only. The Construction Contractor is responsible for checking and coordinating the locations of equipment, ductwork, pipework, and all associated appurtenances and shall make any necessary adjustments in positions to conform with the architectural features, other services, symmetry, clearances, and lighting arrangements.

1.2 Scope of Work

.1 The Scope of Work for this Section includes, but is not limited to, the following:

.1 Materials and procedures for the provision and installation of thermal insulation for HVAC ductwork systems.

1.3 Related Work

.1 This Section may not contain all materials, equipment and requirements required for the completion of this project. This Section is to be read in conjunction with the remaining Sections of Division 21, 22 and 23 and all related works.

.2 Division 1 forms an integral part of Division 21, 22 and 23.

1.4 References

.1 Except as specified herein, the latest edition of the standards listed below form a part of this Specification to the extent referenced in this Section. Where earlier editions of standards are adopted as referenced in applicable codes, those shall govern. The publications are referred to within the text by the basic designation only.

.2 In each of the standards referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.

.3 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):

.1 ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.4 ASTM International Inc.:

.1 ASTM B209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335, Standard Test Method for Steady-State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M, Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547, Standard Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C 795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.5 Canadian General Standards Board (CGSB):

.1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.6 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.7 Underwriters Laboratories of Canada (ULC).

.1 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.5 Action and Informational Submittals

.1 Refer to Section 21 05 01 - Common Work Results for Mechanical and Section 01 33 00 - Submittal Procedures for submission requirements.

.2 Product Data: Provide manufacturer's printed product literature and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit copies of WHMIS SDS - Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

1.6 Closeout Submittals

.1 Refer to Section 21 05 01 - Common Work Results for Mechanical, Section 01 33 00 - Submittal Procedures, and Section 01 78 00 - Closeout Submittals for submission requirements.

1.7 Delivery, Storage and Handling

.1 Shipping:

.1 All equipment, material and spare parts shall be shipped, stored, handled, and installed in such a manner as not to degrade quality, serviceability, or appearance. Equipment and material warranties shall not be voided by actions of the Construction Contractor.

.2 Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

.3 Pack spare parts in containers bearing labels clearly designated contents and pieces of equipment for which intended.

.4 Deliver spare parts at same time as pertaining equipment. Deliver to the City after completion of Work.

.2 Receiving:

.1 All equipment, material and spare parts shall be delivered to the Site in original packages or containers bearing the manufacturer's labels and product identification.

.2 Inspect for damage and correctness, and inventory items, upon delivery to Site.

.3 Store equipment, material and spare parts protected for the weather, humidity and temperature variations, dirt and dust or other contaminants. Store and safeguard in accordance with Manufacturer's recommendations.

1.8 Quality Assurance

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

2. PRODUCTS

2.1 Definitions

.1 For purposes of this Section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - means "not concealed" as previously defined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork.

.2 CRF: Code Rectangular Finish.

2.2 Fire and Smoke Rating

.1 To CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.3 Insulation

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C 335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C 612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C 553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.1 Mineral fibre: to ASTM C 553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C 553.

2.4 Jacketing

.1 Aluminum:

.1 To ASTM B 209 with moisture barrier as scheduled in PART 3 of this Section.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Stucco embossed.

.4 Jacket banding and mechanical seals: 19 mm wide, 0.5 mm thick Type 316 stainless steel.

2.5 Accessories

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.2 Tie wire: 1.5 mm stainless steel.

.3 Banding: 19 mm wide, 0.5 mm thick Type 316 stainless steel.

.4 Fasteners: 4 mm diameter pins with 35 mm square self-adhesive pads, length to suit thickness of insulation.

3. EXECUTION

3.1 Manufacturer's Instructions

.1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 Pre-Installation Requirements

.1 Pressure test ductwork systems in accordance with SMACNA requirements complete, witness and certify.

.2 Ensure surfaces are clean, dry, and free from foreign material.

3.3 Installation

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturer’s instructions and as indicated.

.3 Use two (2) layers with staggered joints when required nominal thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.5 Ensure hangers, and supports are outside vapour retarder jacket.

.6 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for Piping and Equipment.

.7 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.8 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum two (2) rows each side.

3.4 Ductwork Insulation Schedule

.1 Insulation types and thicknesses: conform to following table:

Duct/Service	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular supply air ducts	C-1	Yes	50
Round supply air ducts	C-2	Yes	50

Supply, return and exhaust ducts exposed in space being served	C-1	No	25
Outside air ducts to mixing plenums or equipment	C-1	Yes	50
Mixing plenums	C-1	Yes	25
Exhaust duct between dampers and louvers, and from exterior wall insulation to minimum 1.5 m past dampers	C-1	No	25

.2 Exposed round ducts 600 mm or larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.3 Finishes to conform to the following table:

Duct/Service	**TIAC Code**	
	Rectangular	**Round**
Indoor concealed	None	None
Indoor, exposed within mechanical room	CRF/1	CRD/1
Indoor exposed elsewhere	CRF/1	CRD/1

3.5 Cleaning

.1 Remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION