PART 1   GENERAL

1.1   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.

1.2   REFERENCE STANDARDS

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

.1   ASHRAE Standard 90.1 (Latest Edition), Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2   ASTM International Inc.

.1   ASTM B 209M (Latest Edition), Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2   ASTM C 335 (Latest Edition), Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3   ASTM C 411 (Latest Edition), Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4   ASTM C 449/C 449M (Latest Edition), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5   ASTM C 547 (Latest Edition), Standard Specification for Mineral Fiber Pipe Insulation.

.6   ASTM C 553 (Latest Edition), Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7   ASTM C 612 (Latest Edition), Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

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

.9   ASTM C 921 (Latest Edition), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

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

.4   Underwriters Laboratories of Canada (ULC)

.1   CAN/ULC-S102 (Latest Edition), Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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

1.3   ACTION AND INFORMATIONAL SUBMITTALS

.1   Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2   Product Data:

      .1   Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.

          .1   Description of equipment giving manufacturer's name, type, model, year and capacity.

          .2   Details of operation, servicing and maintenance.

          .3   Recommended spare parts list.

.3   Samples:

      .1   Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed.

      .2   Mount sample on 12 mm plywood board.

      .3   Affix typewritten label beneath sample indicating service.

.4   Manufacturers' Instructions:

      .1   Provide manufacture's written duct insulation jointing recommendations special handling criteria, installation sequence, and cleaning procedures.

1.4   QUALITY ASSURANCE

.1   Qualifications:

      .1   Installer: specialist in performing work of this section and have at least five (5) years successful experience in this size and type of project, qualified to standards of TIAC.

1.5   DELIVERY, STORAGE AND HANDLING

.1   Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2   Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

PART 2   PRODUCTS

2.1   FIRE AND SMOKE RATING

.1   To CAN/ULC-S102:

      .1   Maximum flame spread rating: 25.

      .2   Maximum smoke developed rating: 50.

2.2 **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 C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).

    .1 Mineral fibre: to ASTM C553.
    .2 Jacket: to CGSB 51-GP-52Ma.
    .3 Maximum "k" factor: to ASTM C553.

2.3 **JACKETS**

.1 Canvas:

    .1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

.3 Aluminum:

    .1 To ASTM B209 with moisture barrier as scheduled in PART 3 of this section.
    .2 Thickness: 0.50 mm sheet.
    .3 Finish: Stucco embossed or corrugated.
    .4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

.4 Stainless steel:

    .1 Type: 304 or 316.
    .2 Thickness: 0.25 mm sheet.
    .3 Finish: Corrugated or stucco embossed.
    .4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

2.4 **ACCESSORIES**

.1 Vapour retarder lap adhesive:

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

.2 Indoor Vapour Retarder Finish:

    .1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 ULC Listed Canvas Jacket:

.1   220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.5   Outdoor Vapour Retarder Mastic:

.1   Vinyl emulsion type acrylic, compatible with insulation.
.2   Reinforcing fabric: Fibrous glass, untreated 305 g/m².

.6   Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.

.7   Contact adhesive: quick-setting

.8   Canvas adhesive: washable.

.9   Tie wire: 1.5 mm stainless steel.

.10   Banding: 12 mm wide, 0.5 mm thick stainless steel.

.11   Facing: 25 mm galvanized steel hexagonal wire mesh stitched on one face of insulation.

.12   Fasteners: 4 mm diameter pins with 35 mm diameter or square clips, length to suit thickness of insulation.

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   Pressure test ductwork systems complete, witness and certify.

.2   Ensure surfaces are clean, dry, 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.

.1   Ensure hangers and supports are outside vapour retarder jacket.
.2   Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

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.5   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:

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts	C-1	Yes	50
Round cold and dual temperature supply air ducts	C-2	Yes	50
Rectangular warm air ducts	C-1	No	25
Round warm air ducts	C-1	No	25
Supply, return and exhaust ducts exposed in space being served			None
Outside air ducts to mixing plenum	C-1	Yes	25
Mixing plenums	C-1	Yes	25
Exhaust duct between dampers and louvers	C-1	No	25

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

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

       .1   Finishes: conform to following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed within mechanical room	CRF/1	CRD/2
Indoor, exposed elsewhere	CRF/2	CRD/3
Outdoor, exposed to precipitation	CRF/3	CRD/4
Outdoor, elsewhere	CRF/4	CRD/5

3.5   CLEANING

.1   Clean in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION