**MECHANICAL SPECIFICATIONS**

PART 1 - MECHANICAL GENERAL REQUIREMENTS

1.1 GENERAL

.1 Supply all labour, equipment, and materials necessary to install a complete and operational mechanical system described herein and shown on the drawings. The requirements of this section are in addition to those contained in the General Conditions and other portions of the Tender and Contract Documents.

.2 Guarantee all work for one year, following final acceptance. This guarantee shall include all problems caused by improper installation or equipment failure.

1.2 DRAWINGS AND SPECIFICATIONS

.1 It is the intent of these drawings and specifications to provide for a mechanical installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.

1.3 GENERAL REQUIREMENTS

.1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown in both.

.2 The project engineer shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.

.3 The mechanical system shall comply with the requirements of the current edition of the B.C. Building Code, revisions thereto, the B.C. Plumbing Code, local ordinances, and the Fire Protection Act.

.4 All material used shall be new and installed in accordance with manufacturer's instructions.

.5 The mechanical contractor shall familiarize himself with the building plans and shall co-operate with other contractors doing work in this building so that their work will not conflict with his.

.6 Obtain all permits and pay all fees required for the HVAC, fire protection, and plumbing installation.

.7 The mechanical contractor shall be responsible for all trenching, backfilling and concrete work associated with the mechanical installation.

.8 The mechanical contractor shall be responsible for his own cleanup and garbage removal, including sweeping floors of all debris caused by each portion of his work.

.9 Demonstrate satisfactory operation of all new systems to the RCMP, and provide instructions for usage and maintenance.

.10 Prior to ordering of products or delivery of any products to job site and sufficiently in advance of construction requirements to allow ample time for checking, submit one (1) set of electronic shop drawings for review. Shop drawings shall be submitted for the following: all equipment identified in the equipment schedules, fire stopping materials, insulation, and controls.

.11 Maintain accurate as-built drawings on an on-going basis during construction. At the conclusion of the job, obtain the services of project engineer to transfer all of the above changes including Site Instructions, Addenda, Change Orders and revisions, to the CAD files.

.12 Provide an independent balancing agency to balance the air systems in accordance with industry standards. Measurements at individual outlets are not required. Mech. Contractor is to record the existing supply & return air flow rates at the existing air handling units AHU-1 & AHU-2 prior to start of construction. The new supply & return air flow rates shall match the existing after installation of the new units. Provide to the project engineer, one (1) copy of the balance report for review. Upon written approval of the review set, include in each of the "Mechanical Operation & Maintenance" manuals, one (1) copy of the Balance Report. Approved agencies are Inland Technical Services Ltd., BCTech Engineering Services Inc., R.A. Bruce & Associates Inc. and Vesta Dynamics

.13 Provide the RCMP with one (1) indexed, hard cover and one (1) bookmarked, PDF format "Mechanical Operation & Maintenance" manuals from an independent balancing agency to local air balance industry standards. Each manual shall contain a description of systems, shop drawings, balance report, maintenance requirements, warranty and test certificates and one (1) copy of "as-built" drawings. Submit PDF copy to the Engineer for review.

1.4 FIELD REVIEWS & SUBSTANTIAL PERFORMANCE REQUIREMENTS

.1 The contractor shall call the Project Engineer for inspections at the following stages of construction:

.1 Rough-in work in progress (all items must be visible).

.2 Pre-Substantial Completion (all items in place and functional).

.3 Substantial Completion, including correction of ALL deficiencies.

.2 Provide three (3) working days' notice for all inspections.

.3 Failure to inform the Project Engineer of construction progress as described above may result in the Engineer being unable to issue an Assurance of Professional Field Review and Compliance (Schedule 'C') to the Building Authority, which is required per B.C. Building Code prior to occupancy.

.4 Should the work not be Substantially Performed the Engineer's costs of re-inspection will be paid by the RCMP and subtracted from the contract amount.

1.5 INSTALLATIONS IN EXISTING BUILDINGS

.1 The work shall include the relocation or connection onto existing equipment, piping and ductwork as indicated. Make good equipment, insulation, piping and ductwork damaged or disturbed during the work.

.2 Protect all existing services encountered. Arrange work to avoid shutdowns of existing services. Where interruptions are unavoidable, obtain the Project Engineer's approval of timing of shutdowns.

.3 Ensure that existing equipment is carefully dismantled and not damaged or lost. Do not reuse existing materials and equipment unless specifically indicated. Remove off site all existing removed materials and equipment not reused.

.4 Where new building control systems connect into existing systems, allow for proper calibration of work affected.

.5 No extra compensation shall be allowed for rerouting, resizing or work required to miss existing work and structures. Check work before fabrication and make necessary cost allowances for additional elbows and joints.

PART 2 - HEATING VENTILATION AND AIR-CONDITIONING

2.1 All ductwork shall be constructed and installed in accordance with SMACNA and ASHRAE standards. Coordinate duct size and routing with structural and other trades prior to fabrication.

2.2 Balancing dampers shall be locking quadrant type. Multi-blade dampers shall be used for duct dimension exceeding 12" (300 mm)

2.3 Lamacoid labels shall be provided on major items of mechanical equipment. Lettering shall be 2" (50 mm) high, black on a white background.

2.4 CLEANING AIR SYSTEMS

.1 Contractor is to keep duct openings sealed throughout construction and ensure no construction debris enters ductwork.

PART 3 - INSULATION

3.1 Insulation to be installed by experienced insulation applicators in accordance with BCICA Standards.

3.2 Insulation shop drawings shall be provided and approved prior to installation.

3.3 Pipe insulation shall be pre-formed mineral fibre with all-service integral jacket. Cold piping to have integral vapour barrier. Provide oversized hangers to permit the installation of insulation through hangers.

3.4 Exposed piping in public areas to have PF-5 PVC jacket.

3.5 Duct insulation shall be flexible mineral fibre with foil jacket.

3.6 Acoustic insulation shall be flexible mineral fibre applied to inside ducts where shown.

3.7 Secure all insulation with pins, staples, adhesive tape and twine binding as required in BCICA Standards.

3.8 Exposed ductwork to have RF-3 premium finish.

3.9 PIPING INSULATION

| Nominal Pipe Diameter - | All | Up to 1" | Over 1” |
|---|---|---|---|
| Domestic cold water | -- | 1/2" | 1" |
| Humidifier steam | -- | 1/2" | 1" |

3.10 DUCT INSULATION

| | |
|---|---|
| Acoustic (shown cross-hatched) | 1" |
| Supply Duct in heated spaces | 1" |
| Outside air ductwork in heated spaces | 1" |

PART 4 - PLUMBING

4.1 PIPING AND FITTINGS

.1 Grade all domestic water piping to fixtures. Provide drain valves at low points of piping.

.2 Domestic water pipe above grade for hot and cold water shall be:

All sizes: TYPE "L" hard drawn copper tubing with cast brass or wrought copper streamline fittings with 95/5 Sn/Sb solder joints.

.3 Condensate drain piping to be Type M or DWV hard drawn copper tubing with cast brass or wrought copper streamline fittings with 95/5 Sn/Sb solder joints.

.4 Coordinate all installations and piping locations with other trades to avoid conflicts with other services and to preserve structural integrity.

.5 Gas piping shall be black steel schedule 40, complete with screwed or welded fittings and valves.
.6 Gas piping to have one of the following identification systems:
  .1 Entire piping system painted yellow.
  .2 Piping shall be provided with yellow banding at intervals of 20 ft or less.
  .3 Piping to be labelled, "GAS", at intervals of 20 ft or less.

PART 5 - REFRIGERATION

5.1 Provide complete refrigeration systems to meet with the applicable code requirements and as outline in the contract documents.
5.2 Work to include but not be limited to the installation of the following systems:
  .1 Supply air unit with coil.
  .2 Air cooled condensing unit.
  .3 Complete refrigerant piping and refrigerant charge.
  .4 All related automatic controls.
  .5 Full year maintenance service including call backs.
5.3 Follow ASHRAE Standards for pipe, fittings, balancing and adjustments.
5.4 All refrigeration work shall be in accordance with BC Regulations, CSA and ASME Codes. Workers shall be qualified tradesmen holding valid BC (T.Q.) certificate. Permit shall be affixed to all equipment prior to the refrigeration equipment being energized.

5.5 At completion of installation; pressurize the system and test for leaks. Dehydrate system via triple evacuation with suitable vacuum pump (maximum 500 microns holding) and charge with refrigerant; start-up system and check operation. Provide complete operating instructions to the RCMP representative and Project Engineer.

5.6 Refrigerant piping arrangement shall ensure:

.1 Compressor oil and refrigerant return to the compressor under varying loads without harm to compressor. Provide adequately suction accumulators, as required, to prevent "slugging".

.2 Minimum pressure drops.

.3 Restrict refrigerant migration during the inoperative cycle.

.4 Accessories and piping to prevent excessive compressor cycling.

.5 Pipe routing and isolation to avoid line breakage, excessive vibration and sound transmission to conditioned space.

.6 Maintenance of clean and dry system.

PART 6 - CONTROLS

6.1 Division 15 shall provide the equipment, installation, supervision and commissioning for a control system to achieve the performance specified.

6.2 Prior to construction, complete schematic control wiring diagrams shall be submitted to the Engineer. The wiring diagrams shall clearly indicate the following:

.1 All low voltage and line voltage thermostats, all low voltage and line voltage relays and all contactors.

.2 Control wiring diagrams for each item of equipment listed in the Equipment Schedules. This shall include equipment controlled by devices and wiring provided by Division 16, and to equipment provided by Division 16.

.3 Line voltage wiring and equipment provided by Division 16 associated with the control system, including speed controllers, relays and electric heaters.

.4 Labels for all mechanical and electrical equipment, identical to those shown on the Mechanical and Electrical Drawings.

6.3 Shop drawings shall be submitted for all equipment provided by Division 15.

6.4 Division 15 shall provide all of the low voltage relays, line voltage relays, contactors, low voltage control wiring and conduits for control wiring required for the control system.

6.5 Division 15 shall provide low voltage control wiring between programmable thermostats and the low voltage relays, line voltage relays and contactors.

6.6 All of the control wiring between programmable thermostats and the mechanical equipment shall be 9-wire cable.

6.7 All low voltage control wiring shall be FT-6 plenum rated cable.

6.8 The control component (thermostat, speed controller, manual switch, etc.) for each item of mechanical equipment shall be provided with a lamacoid label indicating the equipment being controlled. Labels shall be provided for all control components, including components provided by other Divisions. The lettering shall be 6mm (1/4") high and the labels shall be mounted on, or immediately adjacent to, the component.