Part 1 GENERAL

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

1.2 SCOPE OF WORK

.1 Work to include all labour, material and equipment required for installing, testing and commissioning of mechanical utilities systems as detailed in other sections of Divisions 21 & 23.

.2 All mechanical work to be bid as a single complete contract even though work of various mechanical trades maybe subdivided.

.3 It is the responsibility of the Contractor to co-ordinate the work among the various to ensure complete functioning systems.

1.3 EXISTING CONDITIONS

.1 Examine Site, existing adjacent buildings and local conditions affecting work under this Contract. Examine Mechanical and all other Contract drawings to ensure work can be performed without changes to the existing and new conditions as shown on drawings. No allowance will be made later for necessary changes, unless notification of interferences have been brought to the Contract Administrator's attention, in writing, prior to closing of Bid Opportunity.

1.4 SITE SERVICE INFORMATION

.1 Location, routing and height of ceiling clearances shown on drawings are based on field recorded information and are approximate only. Contractor and/or Subcontractors shall verify exact location at jobsite.

.2 Obtain Contract Administrators approval before commissioning systems and putting into service.

1.5 PERMITS AND REGULATIONS

.1 Obtain all permits and pay all fees for performing the work.

.2 Review drawings with authorities having jurisdiction to ensure compliance with all applicable codes and bylaws.

1.6 EXECUTION OF WORK

.1 Install concealed pipes and ducts neatly, close to building structure so furring is minimum size. Pipes, ducts and equipment installed improperly, to be removed and replaced at no additional cost.

.2 Protect and maintain work until work has been completed and accepted. Protect work against damage during installation. Cover with tarpaulins if necessary and use hoarding when/where required. Repair all damage to floor and wall surfaces resulting from carrying out work, with no additional cost.

.3 During welding or soldering ensure new equipment and existing structure is protected against fire by shielding, using fire-rated sheets or galvanized iron sheets. Contractor shall provide trained persons armed with suitable type fire extinguishers, to watch for and extinguish sparks, etc.

.4 Co-ordinate work with other sections to avoid conflict and ensure proper installation of all equipment. Review all Contract drawings.

.5 On completion of work, remove tools, surplus and waste material and leave work in clean, perfect condition.

1.7 WARRANTY

.1 Warranty satisfactory operation of all work and apparatus installed under this Contract. Replace, at no additional cost, all items which fail or prove defective within a period of one year after final acceptance of complete Contract, provided such failure is not due to improper usage. Make good all damage to building incurred as a result of failure or repair of mechanical work.

.2 No certification given, payment made, partial or entire use of equipment, shall be construed as acceptance of defective work or acceptance of improper materials. Make good at once, at no additional cost, all such defective work or materials and consequence resulting there from, within one year of final acceptance date.

.3 This general guarantee shall not act as a waiver for any specified guarantee and/or warranty of greater length of time noted elsewhere in these documents.

1.8 CONTRACT ADMINISTRATOR INSPECTIONS

.1 Contractor’s work will be inspected periodically by Contract Administrator or their representatives, solely for purpose of determining general quality of work, and not for any other purpose. Inspection and directives given to Contractor does not relieve Contractor and his agents and employees of their responsibility to erect and install work in all its parts in a safe and workmanlike manner, and in accordance with plans and specifications, nor impose upon Contract Administrator or their representatives, any responsibility to supervise or oversee erection or installation of any work.

1.9 MECHANICAL SHOP DRAWINGS

.1 Submit for review no more than six sets of detailed shop drawings for all mechanical equipment noted in other sections of Divisions 21 & 23.

.2 Check shop drawings for conformity to plans and specifications before submission.

.3 Each drawing shall bear Divisions 21 & 23 stamp with Firm's name, date of review and shall be initialled by the responsible officer of Divisions 21 & 23. Include name of project, equipment supplier and clause number equipment is specified under.

.4 Clearly show division of responsibility. No item, equipment or description of work shall be indicated to be supplied or work to be done "by other's or by purchaser". Any item, equipment or description of work shown on shop drawings shall form part of the Contract, unless specifically noted to contrary.

.5 Take full responsibility for securing and verifying field dimensions. In case where fabrication must proceed prior to field dimensions being available, check all shop drawings and approve for dimensions only. In this case guarantee that dimensions will be worked to and ensure that other sub-trades are aware of these dimensions and shall comply with them.

.6 Review by Contract Administrator shall be mutually understood to refer to general design only. If errors in detailed dimensions or interference with work are noticed, attention of Contractor will be called to such error or interferences, but Contract Administrator's review of drawings will not relieve Contractor from responsibility for said error or interferences, or from necessity of furnishing such work, and materials as may be required for completion of work as called for in Contract Documents.

1.10 MECHANICAL SUB-TRADES

.1 State in **Form J**, names of all Subcontractors to be used in mechanical work.

.2 Contractor to have minimum five years' experience in field of mechanical contracting and to have successfully performed work of similar nature and approximate size to that indicated in specifications and on drawings. Sub-trades shall employ, on this project, foremen or supervisory personnel who have had similar experience to that required by the Contractor.

1.11 OPERATING AND MAINTENANCE MANUALS

.1 Provide operation and maintenance data for incorporation into O&M manuals.

.2 Draft operation and maintenance manual to be approved by, and final copies deposited with, Contract Administrator before final inspection.

.3 Operation data to include:

.1 Control schematics for each system.
.2 Description of each system and its controls for control systems not provided by the City's control Contractor.
.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
.4 Operation instruction for each system and each component.
.5 Description of actions to be taken in event of equipment failure.

.4 Maintenance data shall include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
.2 Data to include schedules of tasks, frequency, and tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
.2 Equipment performance verification test results.
.3 Special performance data as specified elsewhere.

.6 Approvals:

.1 Submit (1) copy of draft Operation and Maintenance Manual to Contract Administrator for approval. Submission of individual data will not be accepted unless so directed by Contract Administrator.
.2 Bind data in 3 ring binder with indexed tabs, table of contents, and contact personnel for repair and maintenance. Make changes as required and resubmit (3) final copies and a compact disc including a PDF file of the bound O&M manual.

1.12 DRAWINGS

.1 Drawings are diagrammatic only and do not show all details. Information involving accurate measurements of building to be taken from Architectural Drawings and/or at the building. Make without additional expense, all necessary changes or additions to runs to accommodate structure conditions. Locations of pipes, ducts and other equipment to be altered without charge, provided change is made before installation and does not necessitate additional materials and that Contract Administrator ratifies all such changes and recorded on Record Set of Drawings.

.2 Drawings and specifications to be considered as an integral part of Contract Documents. Neither drawings nor specifications to be used alone. Misinterpretation of requirements of plans or specifications shall not relieve Contractor of responsibility of properly completing work to approval of Contract Administrator.

.3 It is the Contractor's responsibility to ensure that all Subcontractors and suppliers are aware of and conform to all Contract requirements indicated on both the drawings and specifications.

.4 As work progresses, and before installing piping, ductwork, fixtures and equipment interfering with interior treatment and use of building, consult Contract Administrator for comments. This applies to all levels and proper grading of piping. If Contractor fails to perform above checking and fails to inform Contract Administrator of such interference, Contractor to bear all subsequent expense to make good the installation.

.5 Drawings indicate general location and route to be followed by pipes and ducts. Where required piping is not shown on plans or only shown diagrammatically, install in such a way as to conserve headroom and interfere as little as possible with free use or space through which they pass.

1.13 ELECTRIC MOTORS, STARTERS AND WIRING

.1 Provide electric motors for all equipment supplied in Division 21 & 23. Motors to operate at 1800 rpm, unless noted otherwise. Motor design shall comply with Canadian Electrical Code requirements. All electric motors supplied shall be capable of being serviced locally.

.2 All three phase motors shall have a service factor of 1.15 times nominal rated horsepower of the motor.

.3 Motors 0.75 kW (1 hp) and larger shall be high efficiency motors as defined and tested to CSA C390 or IEEE 112B and Manitoba Hydro Power Smart Standards. Motors 0.37 kW (0.5 hp) and over to be 575 V/3Ø/60 Hz unless specified otherwise. Motors under 0.37 kW to be 120V/1Ø/60 Hz.

.4 Determine from electrical drawings and specifications, voltage characteristics applying to each individual motor. Where motor voltages are mentioned in this specification confirm voltage with electrical prior to ordering motors.

.5 City of Winnipeg to provide starters for all motors, except as otherwise noted.

.6 City of Winnipeg shall wire from starters to motors.

1.14 PREPARATION FOR AND FIRESTOPPING

.1 All penetrations through fire separations shall be prepared in accordance with UL/ULC rated assembly drawings for the type of penetration and rating integrity required.

.2 Obtain shop drawings of UL/ULC assemblies and submit in accordance with clause 10 Shop Drawings.

1.15 EQUIPMENT INSTALLATION

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provided as recommended by manufacturer or as indicated.

.3 Equipment drains/Relief Valves: pipe to floor drains, minimum drain size NPS 1 complete with tees and cleanouts for easy cleaning.

1.16 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.17 BELT DRIVES

.1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

.3 For motors under 10 hp: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified rpm.

.4 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.5 Motor slide rail adjustment plates to allow for centre line adjustment.

1.18 GUARDS

.1 Provide guards for unprotected drives.

.2 Guards for belt drives:

.1 Expanded metal screen welded to steel frame.
.2 Minimum 1.2 mm thick sheet metal tops and bottoms.
.3 38 mm diameter holes on both shaft centres for insertion of tachometer.

.3 Install belt guards to allow movement of motors for adjusting belt tension.

.4 Guard for flexible coupling:

.1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
.2 Securely fasten in place.
.3 Removable for servicing.

.5 Unprotected fan inlets or outlets:

.1 Wire or expanded metal screen, galvanized, 19 mm mesh.
.2 Net free area of guard: not less than 80% of fan openings.
.3 Securely fasten in place.
.4 Removable for servicing.

1.19 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 23.

.2 Equipment supports not supplied by equipment manufacturer: Fabricate from structural grade steel.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 10 mm high and 100 mm larger than equipment dimensions all around. Form concrete around existing housekeeping pad to meet requirements listed.

.4 Provide any necessary, anchor bolts, anchor sleeves, fire-stop sleeves, etc not supplied by equipment suppliers as necessary for a complete installation.

1.20 TESTS

.1 Give 24 hours written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Contract Administrator.

.3 Conduct tests in presence of Contract Administrator.

.4 Bear costs including retesting and making good.

.5 Piping:

- .1 General: maintain test pressure, to system pressure as stated, without loss for 4 hours unless otherwise specified.
- .2 Test drainage, waste and vent piping to National Building Code and authorities having jurisdiction.
- .3 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests isolate all equipment or other parts, which are not designed to withstand test pressures or test medium.

1.21 DIELECTRIC UNIONS

.1 General:

- .1 To be compatible with and to suit pressure rating of piping system.
- .2 Where pipes of dissimilar metals are joined.
- .3 Pipes NPS 2 and under: isolating unions, no dielectric couplings.
- .4 Pipes NPS 2-1/2 dia. and over: isolating flanges.

1.22 TRIAL USAGE

.1 Contract Administrator reserves the right to use any piece of mechanical equipment, device or material installed under this Contract, for such reasonable lengths of time and at such times as Contract Administrator may require, to make complete and thorough test of same, before final completion and acceptance of any part of Contract. It is agreed and understood, that no claim for damage will be made for any injury or breakage to any parts of the above due to aforementioned tests, whether caused by weakness or inaccuracy of parts, or by defective materials or workmanship of any kind whatsoever. Supply all labour and equipment for such tests.

1.23 SAFETY DEVICE TESTING

.1 Make complete inspection of all safety devices to ensure:

.1 That safety devices are complete in accordance with specifications and manufacturer's recommendations.

.2 That the safety devices are connected and operating according to all local regulations.

1.24 TEMPORARY USE OF EQUIPMENT

.1 Permanent systems and/or equipment is not to be used during construction period without Contract Administrator's written permission.

.2 Equipment used during construction period to be thoroughly cleaned and overhauled. Replace work or damaged parts so equipment is in perfect condition, to entire satisfaction of Contract Administrator.

.3 Provide proper care, attention and maintenance for equipment while it is being used. If in opinion of Contract Administrator, sufficient care and maintenance is not being given to equipment and systems, Contract Administrator reserves the right to forbid further use of said equipment and systems.

.4 Temporary use of equipment shall in no way relieve Contractor of providing one year guarantee period to commence as of date of final acceptance of building by Contract Administrator.

.5 All air filters and pipe strainers are to be replaced prior to turning systems over to the City.

1.25 INSTRUCTIONS TO CITY'S PERSONNEL

.1 Contractor to schedule and co-ordinate start-up supervision and instruction of City's personnel required of individual equipment suppliers as noted in other sections of Division 23. Contractor's construction supervision is also required to instruct City's personnel in operation and maintenance of all equipment and systems to satisfaction of Contract Administrator.

.2 Provide Contract Administrator with three copies of O&M manuals incorporating following:

.1 Service instructions – including lists of spare and replacement parts and names and addresses of suppliers.
.2 Maintenance & Operating instructions.
.3 Revised shop drawings.

.3 Provide Contract Administrator with one set of Record Drawings.

.4 Forward manuals and drawings to Contract Administrator prior to final acceptance. Final payment will not be made until all required manuals have been received.

.5 Review instructions with City's representative to ensure a thorough understanding of equipment and its operation.

1.26 TEMPORARY HEATING

.1 Written permission to be obtained from Contract Administrator to use permanent heating system for temporary heat. Systems to be operated in strict accordance with Contract Administrator's recommendations.

1.27 RECORD DRAWINGS

.1 Provide one set of Record Drawings, (As-Constructed), marked clearly in red pencil, with all changes and deviations from piping and ductwork, etc. shown on Contract Drawings, including all Work Order Changes.

.2 "Record" drawings to be maintained on a weekly basis to ensure they are up-to-date and accurate.

.3 Provide Contract Administrator with one set of drawing prints with all "Record" changes noted. Eradicate piping and/or ductwork, etc. shown on original drawings that has been affected by the changes.

1.28 PAINTING

.1 Apply at least one coat of corrosion resistant primer paint and finish coat to ferrous supports and site fabricated work.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.29 CUTTING AND PATCHING

.1 General.

.1 The equipment and duct installation work specified in this Contract includes the installation by the Contractor of equipment, ducts and materials supplied by the Contractor. Cutting and patching of the existing structure is required to implement this work. Providing the necessary cutting and patching and related architectural and civil works shall be co-ordinated by and provided by the Contractor using trade persons skilled and regularly involved in the work being carried out. These works may be simply detailed/described on the drawings or specifications; it is the responsibility of the Contractor to fully investigate and provide the services and materials necessary to execute these works.

1.30 EQUIPMENT WARRANTIES AND ACCEPTANCE

.1 Quality Warranty

.1 Manufacturer warrants that equipment furnished shall conform to description and specifications contained herein and shall be free from all defective materials and workmanship and all defects due to design. Upon Contract Administrators request, manufacturer shall, at its sole expense, promptly repair or replace, all or any part of said equipment which is defective in any respects, within one year from the date of acceptance by Contract Administrator after all tests have been complete to satisfaction of Contract Administrator. This does not apply to failure of equipment due to improper usage.

1.31 TAKE OVER PROCEDURES

.1 Prior to application for Certificate of Substantial Performance, the Contractor shall carefully inspect the minor construction deficiencies are complete and/or corrected and that the building is clean and in condition for occupancy. Notify the Contract Administrator in writing, of satisfactory completion of inspection and request an inspection.

.2 During the Contract Administrators inspection, a list of deficiencies will be tabulated and signed by the Contract Administrator. Correct all deficiencies.

.3 When the Contract Administrator considers that all deficiencies have been corrected and that it appears the requirements of the Contract have been performed including delivery of operation and maintenance manuals, make application for Certificate of Substantial Performance.

END OF SECTION