METROLINX

Capital Projects Group

Rooftop Air Conditioning Unit Specification

Specification 23 74 17

Revision 2
Date: March 2021

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an Agency of the Government of Ontario

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Various	Sept. 20, 2018	Revised to coordinate with corresponding specifications.
Various	Mar., 2021	Revised to feedback from project delivery team.

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide rooftop air conditioning equipment as required, scheduled and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. The factory assembled air handler units shall conform to the requirements outlined ASHRAE 90.1.

1.2.2. Unit shall be designed to conform to ASHRAE 15.

1.2.3. Unit shall be designed to conform to CAN/CSA C22.2 No. 236/UL 1995, Heating and Cooling Units.

1.2.4. Unit shall be designed to conform to CSA or ETL certification and labelling for all electrical components.

1.2.5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

1.2.6. Unit casing shall be capable of withstanding 500--hour salt spray exposure per ASTM B117.

1.3. RELATED WORKS

1.3.1. Section 20 05 05 - Mechanical Work General Instructions.

1.3.2. Section 20 05 10 - Basic Mechanical Materials and Methods.

1.3.3. Section 20 05 40 – Mechanical Work Commissioning.

1.4. REFERENCE STANDARDS

1.4.1. Standards and codes to be latest editions adopted by and enforced by local governing authorities.

1.4.2. CAN/CSA C22.2 No. 236/UL, Heating and cooling equipment (Bi-national standard with UL 1995).

1.4.3. ANSI Z21.47 Gas-Fired Central Furnaces.

1.4.4. ASHRAE 15 Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants (ANSI Approved).

1.4.5. ASHRAE Standard 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

1.4.6. ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality (ANSI Approved).

1.4.7. ASHRAE 90.1 Energy Standard for Buildings.

1.4.8. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus.

1.4.9. ASTM-653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.4.10. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4.11. NFPA 225 Model Manufactured Home Installation Standard.

1.4.12. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

1.4.13. NFPA 90A Installation of Air-Conditioning and Ventilating Systems.

1.5. TRAINING

1.5.1. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

1.5.2. Include for 3 training sessions of maximum 7 hours duration per session for 10 Metrolinx people per session.

1.5.3. Refer to Section 20 05 05 for additional general requirements.

1.6. WARRANTY

1.6.1. Products to be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

1.7. DELIVERY, STORAGE AND HANDLING

1.7.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

1.8. SUBMITTALS

1.8.1. Refer to submittal requirements in Section 20 05 05.

1.8.2. Submit shop drawings/product data sheets as follows:

a) to regulatory authority for review and approval prior to submitting to Consultant;

b) for all products specified in this Section except pipe and fittings;

c) copies of all calculations, stamped and signed by same engineer who signs layout drawings, and a listing of all design data used in preparing the calculations, system layout and sizing requirements.

1.8.3. Product Data

a) Submit product data sheets indicating:

1) technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;

3) product transportation, storage, handling, and installation requirements;

4) product identification in accordance with Metrolinx requirements.

1.8.4. Shop Drawings

a) Submit shop drawings indicating:

1) capacity and ratings;

2) mounting details to suit locations shown, indicating methods and hardware to be used;

3) control components and control wiring schematic.

1.8.5. Commissioning Package

a) Submit the following in accordance with Sections 20 05 05 and 20 05 40:

1) Commissioning Plan;

2) Commissioning Procedures;

3) Certificate of Readiness;

4) complete test sheets specified in Section 20 05 40 and attach them to the Certificate of Readiness;

5) Source Quality Control inspection and test results and attach to the Certificate of Readiness.

1.8.6. Commissioning Closeout Package

a) Submit the following in accordance with Section 20 05 05:

1) Deficiency Report;

2) Commissioning Closeout Report;

3) submit the following for each Product for incorporation into the Operation and Maintenance Manuals in accordance with Section 20 05 05:

   i) Identification: manufacturer's name, type, year, serial number, number of units, capacity, and identification to related systems;

   ii) functional description detailing operation and control of components;

   iii) performance criteria and maintenance data;

   iv) safety precautions;

   v) operating instructions and precautions;

   vi) component parts availability, including names and addresses of spare part suppliers;

   vii) maintenance and troubleshooting guidelines/protocol;

   viii) product storage, preparation, handling, and installation requirements;

   ix) Commissioning Report.

1.9. QUALITY ASSURANCE

1.9.1. Site personnel are to be licensed in jurisdiction of the work and under continuous supervision of a foreman who is an experienced HVAC system installer.

1.9.2. Units shall be ULC listed and labelled, and tested and certified in accordance with ANSI Z21.47 Standards as a total package.

1.9.3. Units shall be produced by a recognized manufacturer who maintains a local service agency and parts stock.

1.9.4. The unit shall be the product of a North American owned firm, built in North America, with all components made in North America.

1.9.5. Air handling units and major components shall be products of manufacturing firms regularly engaged in production of such equipment whose products have been in satisfactory use in similar service for not less than 10 years.

1.9.6. Fans shall conform to AMCA bulletins regarding testing and construction.

1.9.7. Coils shall be ARI certified.

1.9.8. Filter media shall be ULC listed.

1.9.9. Units with factory wiring shall be factory UL/ETL/CSA approved and labelled. Failure to comply with this requirement will necessitate the manufacturer, at his expense, to have a certified UL/ETL/CSA representative inspect the equipment prior to affixing a label.

1.9.10. Manufacturers Qualifications

a) Manufacturer shall be ISO 9000, 9001 or 9002 certified. Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement.

b) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer's authorized representative to perform onsite inspection and certificate of approvals.

1.9.11. Installers Qualifications

a) Installers for work to be performed by or work under licensed Mechanical Contractor.

b) Installers of equipment, systems and associated work are to be fully qualified and experienced installers of respective products and work in which they are installing.

c) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.9.12. Regulatory Requirements

a) Products and work to comply with applicable local governing authority regulations, bylaws and directives.

b) Include for required inspections and certificate of approvals of installation work from local governing authorities.

2. PRODUCTS

2.1. UNIT GENERAL CONSTRUCTION

2.1.1. Factory assembled rooftop packaged air conditioning units. Units shall include down flow economizer c/w barometric relied damper, solid state enthalpy, and differential enthalpy control. All specified components installed at the factory. Field fabrication of units and their components will not be accepted. Field assembly of modules is acceptable only when performed and certified by the manufacturer's representatives.

2.1.2. The units will be completely factory pre-wired and tested, requiring a single point power supply at the voltage available at the location where the installation will take place.

2.1.3. The units shall also be equipped with a transformer to provide a separate 115V/1 phase service to ancillary factory pre-wired components such as marine lights, receptacles, controls, etc. The transformer shall be wired to a different circuit from that serving the air handler, so that shutting down the power to the unit will not affect the power supply to the 115V/1phase circuit. Preeminent labelling in this respect will be provided inside and outside the unit.

2.1.4. The units shall be designed to be supported by perimeter roof curb.

2.2. CASING

2.2.1. The unit shall be constructed out of 50 mm (2") thick wall and roof panels.

2.2.2. Cabinet shall be constructed of heavy gauge, minimum 18 gauge galvanized steel panels. Galvanized coating shall conform to ASTM 653.

2.2.3. Insulation shall be 50 mm (2") thick neoprene faced, minimum 32 kg/m^3 (2 lb/ft^3) density insulation meeting 25/50 flame spread/smoke developed ratings when tested to CAN/ULC S102.All insulation and accessories including adhesives and facing shall have a composite fire and smoke hazard rating tested by ASTM E84, NFPA 225, and UL 723 not exceeding; Flame Spread 25, Smoke Developed 50.

2.2.4. All outdoor units shall be finished with Amershield, High Solids two component Aliphatic polyurethane coatings weather resistant topcoat for extra heavy service. The exterior finish for outdoor units shall withstand the Salt Spray Test of minimum 672 hours and per ASTM B117.

2.3. ACCESS DOORS

2.3.1. Units shall be provided with access doors on one side of the unit.

2.3.2. Doors must be the same thickness as the unit casing to maximize thermal and acoustical resistance.

2.3.3. Standard stainless steel hinged access panels, air and water sealed and equipped with ¼ turn latching handles.

2.4. FILTERS

2.4.1. Filter sections shall be provided with adequately sized access doors to allow easy removal of filters.

2.4.2. 50 mm (2") Pleated Panel Disposable Filters: Non-woven cotton fabric media with a metal support grid and heavy duty beverage board enclosing frame. The filter media shall have minimum average efficiency of 65% and MERV 11 as per ASHRAE Standard 62.1 and tested to ASHRAE Standard 52.2.

2.5. INDIRECT GAS FIRED HEATING SECTION

2.5.1. Heating units shall have an indirect natural gas heating section that is C-ETL, approved for both sea level and high altitude areas. The entire assembly shall be approved and labelled by a nationally recognized certification agency.

2.5.2. Efficiency: no less than 82% across the full firing spectrum.

2.5.3. Heat exchanger shall consist of stainless steel tubes and burner.

2.5.4. The burner assembly shall be a blow through positive pressure type with an intermittent pilot ignition system to provide a high seasonal efficiency. Flame surveillance shall be with a solid state programmed flame relay complete with flame rod.

2.5.5. Unit discharge air control shall include 4:1 turndown (HT burner) turndown for all input ranges from 29.3 kW to 410 kW (100MBH to 1400MBH).

2.6. DX COOLING COILS

2.6.1. Coils shall be ARI certified and Underwriter's Laboratories listed. All coils shall be circuited in a counter flow manner with uniform circuits. Coils shall be designed and tested in accordance with ASHRAE 15. Coils shall be fully enclosed within casing and mounted on angle frames manufactured to allow coils to be individually removed.

2.6.2. Drain pans shall be minimum 50 mm (2") deep, constructed of continuously welded 304 stainless steel.

2.7. CONDENSING SECTION

2.7.1. Refrigeration Compressors

a) Compressors shall be fully hermetic scroll type, set on resilient neoprene mounts. Compressors are complete with crankcase heaters, internal line break motor protection and an internal pressure relief. Compressors are high efficiency and matched with liberally sized condenser coils so that the EER ratings meet or exceed ASHRAE 90.1 recommendations. Refrigerant: choice of R-410A or R- 134A.

2.7.2. Each compressor piping circuit shall have a liquid line filter dryer and a moisture indicating sight glass.

2.7.3. Compressors shall incorporate an internal or external pressure-limiting device to protect against high pressure. Compressors shall be provided with means of over-load protection. Scroll compressors shall be equipped with a device to limit noise due to scroll reversal.

2.7.4. Heat Rejection Fans and Motors

a) Heat Rejection fans shall be direct driven propeller type arranged for vertical draw through air flow.

2.7.5. Heat Rejection Coils

a) Heat Rejection coils shall be copper tube type, mechanically expanded into aluminium fins. Fins density shall not exceed 14 units per inch.

2.7.6. Refrigerant Accessories

a) Thermal expansion valve shall be equipped with adjustable superheat and external equalizer as standard feature setting (default value: 66 °C to 93 °C [150 °F to 200 °F]).

b) Hot gas by-pass shall be provided on the lead compressor to maintain adequate suction pressure at low loads. The hot gas by-pass shall be introduced into the evaporator distributor and not directly into the suction line.

c) Five-minute anti-short cycling timer shall be provided on the lead compressor, together with inter-stage time delay relays on subsequent stages.

2.8. FACTORY MOUNTED CONTROLS

2.8.1. Unit control panel shall be compatible with and integrated to BAS.

2.8.2. The manufacturer shall furnish all material required for direct digital control of components specified. Connect indoor components with wiring in EMT conduit with liquid tight fittings. Outdoor conduit shall be rigid galvanized steel with epoxy coating.

2.8.3. Carbon Dioxide Sensor: Units supplying high occupancy rooms, such as meeting rooms shall have the outdoor damper controlled by a carbon dioxide sensor.

2.8.4. The manufacturer shall supply and install 1000 ohm platinum temperature sensors. The mixed air sensor shall be of the averaging type. The supply, return air and outdoor air shall be single point duct mount type.

2.9. SAFETIES

2.9.1. The manufacturer shall supply and install safety controls. Safety control transmitters shall be located at the sensor and output (0-10 V-DC) shall terminate on a numbered terminal strip in the main electrical panel.

3. EXECUTION

3.1. INSTALLATION

3.1.1. Provide required unit on roof.

3.1.2. Provide required rigging and hoisting/moving equipment required to move units to required location. Perform rigging/hoisting/moving in accordance with unit manufacturer's directions and details.

3.1.3. Supply a curb for each unit, assemble curb, and hand curb to roofing trade on roof for installation and flashing into roof construction. Provide continuous gasketing around perimeter of curb between curb and unit mounting frame. Insulate curb with rigid weather-proof board type insulation in accordance with curb manufacturer's details.

3.1.4. Install components shipped loose with units. Install a discharge air temperature sensor in supply ductwork approximately 2 m (6-½') downstream of unit and in accordance with manufacturer's recommendations.

3.1.5. Where applicable, brace and secure unit in accordance with local governing code requirements for seismic control and restraint.

3.1.6. Refer to Section 20 05 10 for equipment/system manufacturer certification requirements.

3.1.7. Refer to Section 20 05 10 for equipment/system start-up requirements.

END OF SECTION