METROLINX

Capital Projects Group

Air Terminal Units Specification

Specification 23 36 00

Revision 0
Date: August 2018

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Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide air terminal units as required, scheduled and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Schedule terminal boxes on drawings. Ensure that required box sizing, maximum sound level and static pressures are listed. Identify decibels of octave range two to seven.

1.2.2. Select controls to suit specific applications whether supplied integral with terminal boxes or supplied by controls contractor and/or integrated to building automation systems.

1.2.3. Coordinate control requirements with Controls Contractor.

1.2.4. Design requirements are based on Part 2 specified requirements of products.

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. ANSI/AHRI Standard 880, Performance Rating of Air Terminals.

1.4.3. ANSI/AMCA Standard 210, Laboratory Method of Testing Fans for Certified Aerodynamic Performance Rating.

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

1.4.5. International Organization of Standardization (ISO) Standard 3741, Acoustics-Determination of Sound Power Levels of Noise Sources Using Sound Pressure-Precision Methods for Reverberation Rooms.

1.4.6. NFPA 90A, Standard for the 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. Product Data

a) Submit manufacturer's Product data 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.

1.8.3. Shop Drawings

a) Submit shop drawings for products including following where applicable:

1) capacity and ratings;

2) sound power data to verify conformance with specified sound power levels;

3) leakage and dimensions;

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

5) control components and control wiring schematic.

b) Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this Section.

1.8.4. 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.

1.8.5. 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. 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) Manufacturers are to be current members of Air-Conditioning, Heating and Refrigeration Institute (AHRI), and products are to be in accordance with requirements of standards listed previously.

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

1.9.2. 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.

1.9.3. 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. VARIABLE AIR VOLUME (VAV) TERMINAL BOXES

2.1.1. Single duct, controller type, pressure independent variable air volume boxes in accordance with drawing schedule, each individually field adjustable to minimum and maximum air volumes, and complete with:

a) #22 gauge galvanized steel housing, sealed and gasketed, and complete with:

1) where scheduled, internally lined with 25 mm (1") thick fibre-free foam lining material meeting NFPA 90A and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102;

2) where scheduled, internally lined with 25 mm (1") thick aluminium foil faced glass fibre lining material meeting NFPA 90A and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102;

3) exposed cut edges of the liner material factory coated with NFPA 90A and CAN/ULC S102 approved sealant;

4) 50 mm (2") long, round inlet duct connection;

5) rectangular discharge opening with slip and drive cleat duct connection facilities;

6) protective galvanized steel shroud for controller and damper actuator.

b) air valve damper, normally open, galvanized steel blade with peripheral gasket, pivoting in self-lubricating bearings and with air leakage past a closed damper of 2% or less of rated capacity at 750 Pa (3" wc) inlet static pressure;

c) air flow sensor located at box inlet, complete with gauge taps, multiple pressure sensing ports, and an averaging chamber designed to accurately average the flow across the inlet of box with an accuracy of within 5% with a 90° sheet metal elbow located directly at inlet, and amplify the sensed air flow signal;

d) following controller type with terminal units as scheduled:

1) controller/actuator supplied as part of controls work specified with BAS, shipped to box manufacturer’s plant by controls supplier, and factory installed and connected by box manufacturer;

2) pneumatic controller/actuator factory installed and connected, field adjustable controller, and a suitable pneumatic actuator for damper, both factory calibrated and set for minimum and maximum air flow rates scheduled, and equipped with gauge taps for balancing with a standard pressure gauge;

3) electronic controller/actuator factory installed, connected and tested control package including an electronic controller, electronic flow transducer, and an electronic actuator for damper, all calibrated and factory set for maximum and minimum air flow, field adjustable, and equipped with gauge taps for balancing with a standard pressure gauge;

4) digital controller/actuator factory installed, connected and tested control package including a microprocessor based stand-alone digital controller capable of networking with a building automation system, personal computer, or a portable operator interface device, an electronic flow transducer, and an electronic actuator for damper, all calibrated and factory set for maximum and minimum air flow, field adjustable and equipped with gauge taps for balancing with a standard pressure gauge.

e) for boxes as scheduled, AHRI performance rated and certified, CSA certified electric reheat coils in accordance with drawing schedule, each factory mounted, wired and tested and complete with:

1) galvanized steel coil frame and cabinet with 20 mm (¾") thick neoprene coated glass fibre insulation meeting NFPA 90A and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102;

2) hinged access door for electrical enclosure;

3) low watt density coil consisting of minimum Grade 80/20 nickel-chromium wire elements insulated from frame by floating ceramic bushings;

4) pre-wired safety devices and controls including:

i) automatic reset primary thermal cut-out and a manual reset secondary thermal cut-out;

ii) differential pressure switch to shut-down coil upon sensing a no air flow condition;

iii) electronic modulating controller compatible with building controls for proportioned pulsed AC or DC control of heater;

iv) door interlock disconnect switch;

v) contactors.

f) wall mounting thermostat with thermometer and guard, supplied with boxes by box manufacturer, suitable in all respects for box it controls and control sequence, and complete with all required installation and connection accessories.

2.1.2. Terminal box to be complete with attenuator or lined discharge duct in place. Maximum sound power levels in decibels and specific static pressure are scheduled on drawings for each size of box.

2.1.3. Equip boxes with factory secured seismic restraint connection hardware, to suit local building code requirements.

2.1.4. Standard of quality assurance manufacturers are:

a) Price Industries Inc.;

b) Titus;

c) Nailor Industries Inc;

d) or approved equivalent.

2.2. CONSTANT VOLUME TERMINAL BOXES

2.2.1. Single duct constant volume by-pass boxes in accordance with drawing schedule, each complete with:

a) #22 gauge galvanized steel housing, sealed and gasketed, and complete with:

1) following insulation type with terminal units as scheduled:

i) internally lined with 25 mm (1") thick fibre-free foam lining material meeting NFPA 90A and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102;

ii) internally lined with 25 mm (1") thick aluminium foil faced glass fibre lining material meeting NFPA 90A and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102.

2) exposed cut edges of the liner material factory coated with NFPA 90A and CAN/ULC S102 approved sealant;

3) round inlet collar and a rectangular by-pass discharge collar for connection to return air ductwork;

4) integral inlet and by-pass balancing dampers;

5) field adjustable minimum air volume stop;

6) protective galvanized steel shroud for controller and damper actuator.

b) sliding gate type supply/by-pass air valve equipped with polyethylene linear bearings which slide in stainless steel tracks, and adjustable end stops;

c) air valve actuator, factory installed, electronic, 24 volt, direct connected, tri-state, reversible floating actuator suitable in all respects for the application;

d) galvanized steel attenuators, lined as per box housings, each factory supplied loose and with a length in accordance with drawing schedule;

e) actuator supplied as part of controls work specified with BAS, shipped to box manufacturer's plant by controls supplier, and factory installed and connected by box manufacturer.

2.2.2. Standard of quality assurance manufacturers are:

a) Price Industries Inc.;

b) Titus;

c) Nailor Industries Inc;

d) or approved equivalent.

3. EXECUTION

3.1. INSTALLATION OF TERMINAL BOXES

3.1.1. Provide ceiling mounted terminal boxes.

3.1.2. Secure each box in place from structure by means of galvanized steel angles and hanger rods, independent of connecting ductwork.

3.1.3. Coordinate provision of transformers, actuators and controllers with Controls Contractor if applicable.

3.1.4. Connect each box with ductwork as indicated. Provide straight inlet duct same size as box inlet and of a length equal to a minimum of 4 duct diameters. Coordinate final box adjustments and settings with personnel doing system testing and balancing work.

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

END OF SECTION