METROLINX

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Facilities Architecture and Engineering

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Amendment Notice: Refrigerant Updates

This Bulletin applies to and amends the content in the following Documents:

- GO Design Requirements Manual (GO DRM), GO-DRM-STD-2017-Rev5, September 2023 - 5.2.24.8.1 Heating, ventilation, and air conditioning of Electrical Room/Closet, Hub Room, Mini-Hub Room, Elevator Control Room, and Communications Room shall be provided by a dedicated heat pump AC unit with the following features:
    a) Low ambient cooling;
    b) Heating at -25 °C;
    c) ~~R-410A~~ R32 or R454B refrigerant; and
    d) Variable compressor speed.
- Rooftop Air Conditioning Unit Specification, 23 74 17
  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.~~
    Refrigerant: Choice of R32 or R454B.
- Custom Made Air Handling Units Specification, 23 75 00
  2.8.1 Factory tested at 125% of design pressure with compressed air underwater, and dehydrated and capped direct expansion cooling coils in accordance with drawing schedule, designed for use with ~~R410a~~ R32 or R454B refrigerant, arranged for thermal counter-flow, sized so as not to exceed fin density and pressure drops scheduled, full-faced interlaced for coils with 2 refrigerant circuits, and complete with:
    a) Round, 1725 kPa (250 psi) rated seamless copper tubes mechanically expanded into plate-type aluminum fins with full fin collars continuous across entire tube to ensure there is no air bypass.

Amendments to the GO DRM and Specifications are provided in the following attachments:

1) Revisions to GO DRM, GO-DRM-STD-2017-Rev5 – Refrigerant Updates;
2) Revisions to Rooftop Air Conditioning Unit Specification – Refrigerant Updates; and
3) Revisions to Custom Made Air Handling Units Specification – Refrigerant Updates.

The Bulletin is available for internal and external users to download via the Metrolinx public download site www.gosite.ca/engineering_public/GO Design Requirements Manual

For support and inquiries, contact Kyun Chang: Kyun.Chang@metrolinx.com

Madeline Thompson
Director, Facilities, Architecture & Engineering
Asset Management and Maintenance

way for water to exit the room in a manner that does not create any slipping hazards.

5.2.24.4 Doors Design Requirements:

a) The doors shall be at least 915 mm wide x 2135 mm high and shall be hollow metal slab type (no windows) with hollow metal frames;
b) Double or oversized doors shall be provided for rooms that have large equipment shall be installed and maintained;
c) If the door to the Room is in a fire separation, then the door shall have an appropriate fire resistance rating per O.B.C.;
d) When feasible, the rooms shall have exterior access, but doors shall not open onto a public space;
e) The Electrical Room and Communication Room within a parking structure may be exempt from having an exterior door access, providing access to the Room door is unrestricted;
f) Doors shall not open in to the path of vehicle traffic;
g) Access shall be provided through GO Transit uniform master key system and a centrally controlled alarm keypad and proximity access device system, with an access override feature;
h) The door shall be lockable from outside only.

5.2.24.5 Ceiling Design Requirements:

a) No suspended ceiling shall be installed;
b) Finished ceiling minimum height shall be 3050 mm (10’- 0”);
c) Prime and paint the ceiling with a minimum of two coats of non-dust producing paint. White paint is required;
d) Where OWSJ are present, prime and paint all exposed structures to meet flame spread and smoke developed ratings designated by local Code requirements.

5.2.24.6 Flood Prevention Design Requirements

5.2.24.6.1 Locate all Electrical Rooms/Closets and Communications/Hub Rooms and Mini-Hub Rooms at or above grade away from any threat of flooding. Avoid locations that are below grade or adjacent to potential water hazards. Roof drains and pipe penetrations into the room shall be avoided.

5.2.24.7 Fire Protection Design Requirements:

a) Fire-stop all room penetrations (cables, pipes, pathways, trays, conduit slots). Ensure that the fire-resistance rating of installed fire-stopping assembly shall be not less than the fire-resistance rating of surrounding floor and wall assembly to match the corresponding fire rating of fire separation.
b) For fire suppression, install a hand held 10lbs CO2 (10 B:C rated) fire extinguisher, with current certification, meeting NFPA 10 requirements. The extinguisher shall be wall mounted on the latch side of the entry door and installed in accordance with manufacturer’s recommendations. All panels, boxes, and conduit shall be sprinkler proof if required.

5.2.24.8 HVAC Design Requirements:

5.2.24.8.1 Heating, ventilation, and air conditioning of Electrical Room/Closet, Hub Room, Mini-Hub

Room, Elevator Control Room, and Communications Room shall be provided by a dedicated heat pump AC unit with the following features:

a) Low ambient cooling;
b) Heating at -25°C;
c) ~~R410A~~R32 or R454B refrigerant;
d) Variable compressor speed.

5.2.24.8.2 A fan-forced heater shall be provided as a redundancy in case the heat pump does not provide enough heating during the extreme cold days. Because Hub Rooms and Mini-Hub Rooms are smaller than a typical Communications Room and a bunker or kiosk is smaller than an Electrical Room, a heat pump with hyper-heating may not be available on the market. If this is the case, a split A/C unit with ambient cooling would provide cooling and the fan-forced heater will provide heating. Control of both systems shall be central in order to avoid both systems fighting each other. The heat pump and heater shall be fed from the generator backed up power panel located in the Room where available. Temperature and humidity requirements are on a 24 hours, 7 days a week basis, regardless of the heat generated by normally operating electrical and communications equipment.

5.2.24.8.3 The required capacity shall be calculated based on the following:

a) For sensible heat gain from electrical equipment use a minimum 5000 Watts per rack (in the Communications Room);
b) Sensible heat gain from lighting;
c) Include the future growth of systems by 25%;
d) Determine heat gain/loss to the room from the outside (heat transfer through building structures, including solar load) g the following design criteria;
e) Outdoor temperatures.

5.2.24.8.4 Use 1% winter & 2½% summer design temperatures per Ontario Building Code for the geographical location. Indoor temperatures:

a) Winter design: 15°C;
b) Summer design: 22°C D B with a maximum of 50% relative humidity;
c) An infiltration rate from outside of 0.5 air changes per hour;
d) A recirculation rate of 100% for the air conditioning system;
e) A safety factor of 5%.

5.2.24.8.5 The air conditioning system shall be selected to suit the specific capacity by taking into consideration the room's very high sensible load factor. Heat loss calculation shall not include credit for equipment and lighting heat gain.

5.2.24.9 Emergency Cooling

5.2.24.9.1 Provisions for emergency cooling in Hub Room, Mini-Hub Room, Elevator Control Room, Communications Room and Electrical Room:

a) Provide a 150mm diameter vent opening provision, secured from inside, for portable A/C unit in both electrical and communication rooms, venting to the outside;
b) Provide dedicated 120V, 20A, 5-20R and 120V, 30A, 5-30R power receptacles (generator backed-up) from dedicated circuit breakers for portable A/C unit, in Electrical and Communication rooms;

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.~~
Refrigerant: Choice of R32 or R454B.

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. DIRECT EXPANSION COOLING COILS

2.8.1. Factory tested at 125% of design pressure with compressed air under water, and dehydrated and capped direct expansion cooling coils in accordance with drawing schedule, designed for use with ~~R410a~~R32 or R454B refrigerant, arranged for thermal counter-flow, sized so as not to exceed fin density and pressure drops scheduled, full faced interlaced for coils with 2 refrigerant circuits, and complete with:

a) round, 1725 kPa (250 psi) rated seamless copper tubes mechanically expanded into plate type aluminum fins with full fin collars continuous across entire tube to ensure there is no air bypass;

b) flanged #14 gauge type 304 stainless steel casing with stainless steel intermediate tube support sheets;

c) Acme Mfg. Corp or approved equivalent, 25 mm (1") thick "Mistop" type, 304 stainless steel moisture eliminator panel with rigid stainless steel frame.

2.9. COOLING COIL DRAIN PANS

2.9.1. Stainless steel drain pans, each constructed with a cross-break and a double slope pitch to extended 32 mm (1-¼") diameter drain connection located with a centreline a minimum of 75 mm (3") above unit base, and complete with 50 mm (2") of insulation meeting 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102.

2.10. ELECTRIC HEATING COILS

2.10.1. CSA certified insertion type electric heating coils in accordance with drawing schedule consisting of tubular type, Incoloy sheathed, corrosion resistant elements designed to cover entire face area of coil section to prevent stratification when operating at less than full capacity, arranged to slide individually in and out of coil section casing, and complete with:

a) independent, full length galvanized steel supports for each section of coil, secured to casing structural steel supports and incorporating galvanized steel blank-off sheets bolted and fire-proof gasketed to prevent air bypass;

b) sealing collars to prevent air leakage where coil electrical connections penetrate unit casing;

c) removable galvanized steel bolted and gasketed casing access panels to permit withdrawal of coil sections;

d) pre-wired power and control panel secured to exterior of casing wall.