

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)/Air Conditioning and Refrigeration Institute (ARI).
 - .1 ANSI/ARI 210/240-03, Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
 - .2 ARI 270-95, Sound Rating of Outdoor Unitary Equipment.
 - .2 ANSI/UL 1995 B-1998, Standard for Heating and Cooling Equipment.
 - .3 AMCA 99, Standard Handbook.
 - .4 AMCA 210, Laboratory Methods of Testing Fans for Rating Purposes.
 - .5 AMCA 300, Test Code for Sound Rating Air Moving Devices.
 - .6 AMCA 301, Method of Publishing Sound Ratings for Air Moving Devices.
 - .7 AMCA 500, Test Methods for Louvers, Dampers, and Shutters.
 - .8 ANSI/AFBMA 9, Load Ratings and Fatigue Life for Ball Bearings.
 - .9 ANSI/UL 900, Test Performance of Air Filter Units.
 - .10 ARI 410, Forced-Circulation Air Cooling and Air Heating Coils.
 - .11 ARI 430, Standard for Application of Central-Station Air Handling Units.
 - .12 SMACNA, Low Pressure Duct Construction Standards.
 - .13 AMCA 611-95, Methods of Testing Airflow Measurement Stations for Rating.
 - .14 ASHRAE 52.1/52.2, Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size.
 - .15 ASHRAE 62, Ventilation for Acceptable Indoor Air Quality.
 - .16 ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.
 - .17 Canadian Standards Association (CSA) / CSA International.
 - .1 CSA B52-F99, Mechanical Refrigeration Code.
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- .2 CSA C22.1 HB-02, Canadian Electrical Code Handbook.
- .18 Health Canada - Information System Hazardous Materials (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .19 National Fire Protection Association.
 - .1 NFPA 90A-02, Standard for the Installation of Air Conditioning and Ventilating Systems.
- .20 National Roofing Contractors Association (NRCA).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals Data.
 - .1 Submit product data in and specifications and the manufacturer's documentation for packaged outdoor HVAC unit.
 - .2 Shop Drawings:
 - .1 Drawings to indicate project layout and dimensions; indicate:
 - .1 Equipment, piping, and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware, and recommended ancillaries which are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections.
 - .2 Piping, valves, fitting shipped loose showing final location in assembly.
 - .3 Control equipment shipped loose, showing final location in assembly.
 - .4 Complete internal panel and wiring and external wiring, both as schematics and as actually assembled.
 - .5 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, mounting curb details, sizes and location of mounting bolt holes; include mass distribution drawings showing point loads.
 - .6 Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices of ancillaries, accessories, controllers.
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- .7 Pump and fan performance curves.
- .8 Details of vibration isolation.
- .9 Estimate of sound levels to be expected across individual octave bands in dB referred to A rating.
- .10 Type of refrigerant used.
- .3 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .5 Manufacturer's Field Reports: Submit manufacturer's field reports specified.
- .6 Submit copies of reports of inspections carried out on site by the manufacturer.
- .7 Closeout submittal: Submit maintenance data and technical data below:
 - .1 Summary description of proposed devices, with identification marks of the various components elements and details concerning the function, operation, command / control and verification of the latter.
 - .2 Manufacturer's name, number of equipment, type, year, and power of the latter.

1.3 WARRANTY

- .1 18-month warranty period for all work covered by this section.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 Single zone rooftop unit provided with a DX cooling coil.
 - .2 Unit including a casing, a frame, a supply fan, an exhaust fan, an air filter, a DX cooling coil, a fresh air damper, and a motorized exhaust damper.
 - .3 At least 450 mm height roof curb, according to the requirements of the NRCA (National Roofing Contractors Association).
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2.2 ROOFTOP UNIT

- .1 General.
 - .1 Manufacturers shall be approved and shall meet all the characteristics listed in this specification.
 - .1 Acceptable Products: Aaon; Valent Air or approved equivalents.
- .2 Construction.
 - .1 The unit shall be built for outdoor use on a prefabricated roof curb at least 450 mm (18 in) height.
 - .2 Connections.
 - .1 Supply air opening shall be located under the unit.
 - .2 Return air opening shall be located under the unit.
 - .3 Fresh air opening shall be on the side of the unit.
 - .3 Base.
 - .1 The unit base shall be constructed in at least 10 gauge galvanized steel with 16 gauge condensate pan integrated to floor.
 - .2 The unit base shall extend at least 4 inches above the roof curb to prevent water infiltration.
 - .3 All floor joints shall have joined cleats.
 - .4 There shall be no penetration through the floor of the unit, except for duct penetrations.
 - .5 The condensate pan shall be insulated with ½ inch neoprene.
 - .4 Panel.
 - .1 The construction of the cabinet shall be 2 inches double wall with injected foam insulation with R-6 value per linear inch.
 - .2 Individual panels shall be constructed with thermal breaks (there should be no metal to metal contact between the inside and the outside of each panel).
 - .3 The interior walls should be in 22 gauge galvanized steel.

- .4 The outside of the panels shall be in 22 gauge painted steel. The paint should be approved for 500 hours according to ASTM B117 and prepared according to the ASTM D1654 Standard.
 - .5 Insulation.
 - .1 The insulation shall be injected with 2 lb/ft³ foam with R-6 value per inch.
 - .2 The water absorption of the insulation must not exceed 0.038 lb/ft, according to ASTM D 2842 Standard.
 - .3 No insulation shall be exposed to air.
 - .4 Fiberglass insulation is not acceptable given the opportunity of flaring and moisture retention.
 - .5 Access Doors.
 - .1 Access doors shall provide access to all components requiring maintenance or regular inspection.
 - .2 The construction of the access doors shall be identical to the rest of the unit.
 - .3 The inner wall of the doors must be in 22 gauge galvanized steel.
 - .4 The outer wall of the doors must be in 22 gauge painted steel. The paint should be approved for 500 hours according to ASTM B117 and prepared according to the ASTM D1654 Standard.
 - .5 The access doors shall be sealed with a full perimeter seal built in foam "Mylar-Encased Low-Density".
 - .6 Isolation.
 - .1 The insulation shall be injected with 2 lb/ft³ foam with R-6 value per inch.
 - .2 The water absorption of the insulation must not exceed 0.038 lb/ft, according to ASTM D 2842 Standard.
 - .3 No insulation shall be exposed to air.
 - .4 Fiberglass insulation is not acceptable given the opportunity of flaring and moisture retention.
 - .6 The unit shall be provided with hood and screen bird on the air inlet.
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- .7 The unit shall be built with an inclined roof exceeding at least ½ inch the unit perimeter.
 - .3 Fans / Motors.
 - .1 Fans.
 - .1 The fan should be a belt drive type with adjustable pulleys.
 - .2 The fan blades should be a backward curved type and built with reinforced polyamide fiber and resistant to corrosion.
 - .3 The fan impeller should be tested to AMCA Standard 210.
 - .2 Motors.
 - .1 Fan motors shall be with premium efficiency.
 - .2 The fan sections shall be accessible through an access door with 2 in double wall with injected foam insulation.
 - .3 Fan motors shall be with variable speed drive.
 - .4 Damper.
 - .1 Motorized damper.
 - .1 Damper frame shall be built in 16 gauge galvanized steel.
 - .2 The damper blades shall be built in 16 gauge galvanized steel and should be reinforced by three “V” grooves of 1 in deep crossing the full length of each blade. Each blade shall be symmetrical with the pivot axis.
 - .3 Shaft bearing shall be synthetic sliding type and shall rotate within extruded holes in the damper frame.
 - .4 The sealing blades shall be in extruded vinyl, permanently attached to the appropriate side.
 - .5 The damper frame shall be a flexible compressor seals type in stainless steel.
 - .6 Dampers shall be provided with modulating actuators installed and wired at the factory.
 - .7 The assembly of the components shall be approved for a maximum leak rate of 5 cfm/ft² at 1 water inch of static pressure.
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- .5 Filters.
 - .1 Fresh air hood.
 - .1 The filter media shall accommodate a 1 inch filters thickness.
 - .2 The manufacturer shall provide one aluminum filters set.
 - .3 Filter sections shall be accessible from the outside of the unit and be located in the fresh air hood.
 - .2 Exhaust filters.
 - .1 The filter support shall accommodate a 2 inches filters thickness.
 - .2 The manufacturer shall provide one aluminum MERV 8 filters set.
 - .3 Filter sections shall be accessible by a 2 inches insulated double wall access door with foam injected.
 - .6 Direct Expansion Cooling - Air Cooled.
 - .1 The unit shall be provided with an air cooled direct expansion system fully installed, wired, tested and pre-loaded at the factory.
 - .2 The refrigeration system shall be provided with a thermal expansion valve (TXV) with incorporated overheating.
 - .3 All 10 tons or more refrigeration systems rated shall be equipped with two capacity control stages, each on a separate cooling circuit. One of two cooling stages must allow modulation by a digital compressor.
 - .4 Evaporator.
 - .1 The coils shall be tested according to the ARI Standard and tested for a 250 lb/in² operating pressure.
 - .2 Coils shall have a minimum of six rows.
 - .3 Refrigeration systems with more than one circuit shall include evaporator coils with interlaced circuits.
 - .4 Coil cabinet shall be constructed in 16 gauge stainless steel.
 - .5 Tube coils shall be in copper and shall have a ½ inch diameter and 0.016 inch thick.
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- .6 Finned coils shall be constructed in 0.0060 inch aluminum thick.
 - .5 Drain pan.
 - .1 The drain pan shall be constructed in 18 gauge 304 stainless steel.
 - .2 Drain pan shall be double-slope type to ensure the condensate removal from the unit.
 - .3 Drain pan shall be extends a minimum of 8 inches downstream of the coil to ensure the condensate retention.
 - .6 Compressors.
 - .1 Compressors shall be a hermetic scroll type and shall include the following features:
 - .1 Service valves on suction and discharge;
 - .2 Protection against reverse rotation;
 - .3 Oil level adjustment;
 - .4 Oil filter;
 - .5 Dirt rotational trip;
 - .6 Short-cut operation control;
 - .7 High and low pressure limit;
 - .8 Housing heater.
 - .2 The compressors shall be installed in a separate cabinet of the supply air flow, the return air flow, the microprocessor controller, the non-fuse switch, the relays and other electrical component of the unit.
 - .3 Compressors shall be installed with vibration isolators recommended by the manufacturer.
 - .7 Condenser coils.
 - .1 Provide condenser coils with a galvanized steel casing, copper tubing and aluminum fins.
 - .2 Coil frames shall be in 16 gauge galvanized steel.
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- .3 Tube coils shall be in copper and shall have a $\frac{3}{8}$ inch diameter, 0.016 inches thick.
 - .4 Finned coils shall be constructed in 0.0060 inch thick aluminum.
 - .8 Condenser fans.
 - .1 Condenser section shall be equipped with 1140 RPM direct drive fans.
 - .2 Fan assembly shall be statically and dynamically balanced according to AMCA 204-05 Standards.
 - .3 The fan assembly include an aluminum blades wheel, a base "Formed-Channel", venturi and a coated steel guard on discharge.
 - .9 Options.
 - .1 The main cooling system shall use a Digital Scroll™ compressor with 10:1 modulation.
 - .2 Condensing section shall include condenser coils guards supplied and installed at the factory.
 - .3 Evaporator coil, the reheat coil and the drain pan shall be accessible by a 2-in double wall door with foam insulated.
 - .7 Electrical.
 - .1 The units shall be factory wired to a single connection point.
 - .2 The units shall be wired according to NEC and ETL listed.
 - .3 ETL certification shall cover all components of the fan and not be limited to the control panel.
 - .4 All major electrical components must be UL listed.
 - .5 Units shall be built with integral control center and isolated to supply air flow, exhaust air flow, compressors and heating elements.
 - .6 The following shall be provided and factory pre-wired in control center.
 - .1 Non-fuse disconnect;
 - .2 Subcircuits fuse;
 - .3 Low voltage transformer;
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- .4 Control circuit fuse.
- .8 Controls.
 - .1 The unit must not include control. The controls will be supplied by other.
- .9 Factory Verification Tests.
 - .1 The equipment shall pass an operation test at the factory prior to delivery.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 General.
 - .1 The installation contractor shall install the system, component and control, as recommended by written manufacturer's instructions.

END OF SECTION
