

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 23 21 13.02 - Refrigerant Piping.

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute/Air-Conditioning and Refrigeration Institute (ANSI/ARI)
 - .1 ANSI/ARI 210/240 (Latest Edition), Unitary Air Conditioning and Air-Source Heat Pump Equipment.
- .2 American National Standards Institute/American Society of Heating, Refrigeration and Air-Conditioning Engineers (ANSI/ASHRAE)
 - .1 ANSI/ASHRAE Standard 15 (Latest Edition), Safety Standard for Refrigeration Systems.
- .3 CSA International
 - .1 CAN/CSA-C656 (Latest Edition), Performance Standard for Split-System and Single Package Central Air Conditioners and Heat Pumps.
- .4 Environment Canada, (EC) / Environmental Protection Services (EPS)
 - .1 EPS 1/RA/2 (Latest Edition), Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems.
 - .2 Environment Canada, Ozone-Depleting Substances Alternatives and Suppliers List (Latest Edition).
- .5 National Fire Protection Association (NFPA)
 - .1 NFPA 90A (Latest Edition), Standard for Installation of Air Conditioning and Ventilating Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for heat pumps and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings:
 - .1 Rated capacity
 - .2 Ratings
 - .3 Components

- .4 Installation/Wiring diagrams
- .5 Certifications

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for heat pumps for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect heat pumps from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- .1 Heat pumps: to EPS 1/RA/2, CSA approved and with ARI or CSA certification seal.

2.2 REFRIGERANTS

- .1 Type of Refrigerant: R-410A.

2.3 AIR-SOURCE HEAT PUMP

- .1 General:
 - .1 To consist of air-to-air outdoor unit, BC controller, and ductless wall-mounted indoor units, for use with R-410A.
 - .2 All components to be of the same manufacturer.
- .2 Outdoor units:
 - .1 Electrical: 208/230 V, 3 ph, 60 Hz.
 - .1 Each individual unit requires a separate electrical connection.
 - .2 Minimum circuit ampacity: 60-54 A.
 - .3 Maximum overcurrent protection 104-94 A.
 - .2 Cooling:

- .1 Capacity: 28.1 kW (nominal), 27.0 kW (rated)
- .2 Input power: 7.66 kW (nominal), 6.84 kW (rated)
- .3 Temperature range:
 - .1 Indoor: 15°C to 24°C W.B.
 - .2 Outdoor: -5°C to 46°C D.B.
- .3 Heating:
 - .1 Capacity: 31.7 kW (nominal), 30.2 kW (rated)
 - .2 Input power: 8.88 kW (nominal), 8.33 kW (rated)
 - .3 Temperature range:
 - .1 Indoor: 15°C to 27°C D.B.
 - .2 Outdoor: -25°C to 15.5°C W.B.
- .4 Connectable to up to 24 indoor units at 50% to 150% of outdoor unit capacity.
- .5 Fan: Single propeller type, inverter-control, brushless DC motor
 - .1 Airflow rate: 2,920 L/s
 - .2 Motor output: 0.92 kW
- .6 Compressor: Inverter scroll hermetic type, 6.8 kW motor output.
- .7 External finish: pre-coated galvanized steel sheet, Munsell 5Y 8/1.
- .8 Protection devices:
 - .1 High pressure: Sensor and switch at 4.15 MPa
 - .2 Inverter circuit: Over-current protection
 - .3 Fan motor: Thermal switch
- .3 Indoor units:
 - .1 Electrical: 208/230 V, 1 ph, 60 Hz.
 - .1 Each individual unit requires a separate electrical connection.
 - .2 External finish: Plastic, Munsell 1.0Y 9.2/0.2
 - .3 Heat exchanger: Cross fin, aluminum fin and copper tube.
 - .4 Air filter: Polypropylene honeycomb.
 - .5 EV-3, EV-4, EV-6, EV-7, EV-9, EV-10, EV-11, EV-12, EV-13, EV-19, EV-20:
 - .1 Cooling (nominal):
 - .1 Capacity: 1.8 kW
 - .2 Power input: 0.008 kW
 - .2 Heating (nominal):
 - .1 Capacity: 2.0 kW
 - .2 Power input: 0.03 kW
 - .3 Fan: Line flow type direct driven by single phase induction motor.
 - .1 Airflow rate: 82 to 98 L/s
 - .2 Motor output: 0.008 kW
 - .4 Piping connections: 6.35 mm (liquid), 12.7 mm (vapour), 16 mm (drain).
 - .6 EV-2, EV-8, EV-18:
 - .1 Cooling (nominal):

- .1 Capacity: 2.3 kW
 - .2 Power input: 0.03 kW
- .2 Heating (nominal):
 - .1 Capacity: 2.6 kW
 - .2 Power input: 0.03 kW
- .3 Fan: Line flow type direct driven by DC motor.
 - .1 Airflow rate: 150 to 195 L/s
 - .2 Motor output: 0.030 kW
- .4 Piping connections: 6.35 mm (liquid), 12.7 mm (vapour), 16 mm (drain).
- .7 EV-5, EV-14:
 - .1 Cooling (nominal):
 - .1 Capacity: 3.5 kW
 - .2 Power input: 0.03 kW
 - .2 Heating (nominal):
 - .1 Capacity: 4.0 kW
 - .2 Power input: 0.03 kW
 - .3 Fan: Line flow type direct driven by DC motor.
 - .1 Airflow rate: 150 to 195 L/s
 - .2 Motor output: 0.030 kW
 - .4 Piping connections: 6.35 mm (liquid), 12.7 mm (vapour), 16 mm (drain).
- .8 EV-15, EV-17:
 - .1 Cooling (nominal):
 - .1 Capacity: 4.4 kW
 - .2 Power input: 0.03 kW
 - .2 Heating (nominal):
 - .1 Capacity: 5.0 kW
 - .2 Power input: 0.03 kW
 - .3 Fan: Line flow type direct driven by DC motor.
 - .1 Airflow rate: 150 to 195 L/s
 - .2 Motor output: 0.030 kW
 - .4 Piping connections: 6.35 mm (liquid), 12.7 mm (vapour), 16 mm (drain).
- .9 EV-16:
 - .1 Cooling (nominal):
 - .1 Capacity: 5.3 kW
 - .2 Power input: 0.03 kW
 - .2 Heating (nominal):
 - .1 Capacity: 5.9 kW
 - .2 Power input: 0.03 kW
 - .3 Fan: Line flow type direct driven by DC motor.
 - .1 Airflow rate: 150 to 200 L/s

- .2 Motor output: 0.030 kW
 - .4 Piping connections: 6.35 mm (liquid), 12.7 mm (vapour), 16 mm (drain).
 - .10 EV-1, EV-21:
 - .1 Cooling (nominal):
 - .1 Capacity: 7.0 kW
 - .2 Power input: 0.07 kW
 - .2 Heating (nominal):
 - .1 Capacity: 7.9 kW
 - .2 Power input: 0.07 kW
 - .3 Fan: Line flow type direct driven by DC motor.
 - .1 Airflow rate: 267 to 433 L/s
 - .2 Motor output: 0.056 kW
 - .4 Piping connections: 9.5 mm (liquid), 16 mm (vapour), 16 mm (drain).
- .4 BC Controllers:
 - .1 Electrical: 208/230 V, 1 ph, 60 Hz.
 - .1 Each individual unit requires a separate electrical connection.
 - .2 Indoor unit capacity connectable to one branch: 15.8 kW.
 - .3 External finish: Galvanized steel plate.
 - .4 BC-1:
 - .1 Number of branches: 13
 - .2 Minimum circuit ampacity: 1.08/0.97 A.
 - .3 Power input: 0.178 kW (cooling), 0.086 kW (heating).
 - .5 BC-2:
 - .1 Number of branches: 10
 - .2 Minimum circuit ampacity: 0.83/0.75 A.
 - .3 Power input: 0.138 kW (cooling), 0.066 kW (heating).
- .5 Controls:
 - .1 Each unit shall have a wireless remote controller to perform input functions necessary to operate the system.
 - .2 Remote shall consist of the following:
 - .1 Operational display
 - .2 On-Off switch
 - .3 Temperature buttons
 - .4 Operation select button
 - .5 Fan speed control button
 - .6 Louver direction control button
 - .7 Timer Start/Stop buttons
 - .8 External heater adapter
 - .3 The microprocessor located in the indoor units shall have the capability to monitor return air temperature and indoor coil temperature, receiving and

- processing commands from the wireless controllers, providing emergency operation and controlling the outdoor unit.
- .4 The control signal between the outdoor and indoor units shall be pulse signal 24 volts DC. The system shall be capable of automatic restart when power is restored after power interruption.
- .6 Refrigeration piping:
 - .1 Between outdoor unit and indoor units, complete with refrigerant metering devices and valves.
 - .2 Refer to Section 23 23 00 - Refrigerant Piping.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for heat pumps installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install where indicated and in accordance with manufacturer's instructions.
- .2 Install outdoor units at ground level on fabricated stand and housekeeping pad.
- .3 Secure with hold-down bolts in accordance with manufacturer's recommendations.
- .4 Level unit with fans running. Align flexible connections. Misalignment with fan stopped not to strain or damage flexible connection.
- .5 Make piping connections.
- .6 Nothing to obstruct ready access to components or to prevent removal of components for servicing.

3.3 START-UP AND COMMISSIONING

- .1 Have manufacturer certify installation.
- .2 Have manufacturer present during tests and start up of units and certify performance.
- .3 Submit written start-up and commissioning reports to Departmental Representative.

3.4 CLOSEOUT ACTIVITIES

- .1 Manufacturer to deliver verbal, video, and written instructions to operating personnel.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by heat pumps installation.

END OF SECTION