



## **Addendum # 1**

### **Bid Opportunity: 24-7587-RFT - Lexington Public School HVAC Upgrade**

**Closing Date: Wednesday, June 5, 2024 2:00 PM**

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The following issued by the Board shall form part of the Bid / Proposal Solicitation document. The revisions and additions noted herein along with any attachments shall be read in conjunction with all other related documents. This Addendum shall, take precedence over the previously issued documents where differences occur. Receipt of this addendum must be acknowledged in the Bidding System, bids&tenders.

If you have already submitted a Bid / Proposal, it will be automatically withdrawn as a result of this addendum. You must resubmit the Bid / Proposal acknowledging all addenda and revising your Bid / Proposal to comply with all addenda.

#### **Question 1:**

- 1 - Drawings notes 2, 3, 4 & 7 in M-8 Roof Mechanical Renovation Plan instruct to provide roofing to suit for venting, exhaust fan, RTU removal and installation, etc. Will roof specifications be provided?
- 2 - The scope of this project may affect some ceilings. Will an architectural drawings, with Reflected Ceiling Plans be provided?

**Answer 1:**

1 – The roof is currently under warranty and therefore all roofing work is to be completed by Dean Thackeray Roofing Company Ltd. (Patrick Dean, 199 Riverbend Drive, Kitchener, Ontario, N2B 2E8).

2 – Architectural and reflected ceiling plans will not be provided.

**Question 2:**

Is the roof under warranty? If so please provide contact information for the roofing company we would need to use as not to void the warranty.

**Answer 2:**

The roof is currently under warranty and therefore all roofing work is to be completed by Dean Thackeray Roofing Company Ltd. (Patrick Dean, 199 Riverbend Drive, Kitchener, Ontario, N2B 2E8).

**Question 3:**

Is a reflected ceiling plan available?

**Answer 3:**

Reflected ceiling plans are not available and will not be provided.

**END OF ADDENDUM**

**ADDENDUM 01**

<b>To:</b>	WRDSB	<b>Date:</b>	May 30, 2024
		<b>Project:</b>	Lexington PS - HVAC Upgrades 431 Forestlawn Road, Waterloo, ON
<b>cc:</b>	Project Bidders	<b>Project No:</b>	24017

*This addendum forms part of the contract documents and amends the drawings and specifications. Receipt of addenda must be acknowledged on the Bid Form.*

**Mechanical**

1. Add the following to the Division 23 specification:
  - a. Ductless Air Conditioners (Daikin SkyAir)
    - i Refer to attached.
  - b. Ductless Air Conditioners (Daikin VRV)
    - i Refer to attached.

**Electrical**

1. Remove the supply and installation of the new fire alarm control panel (FACP) from the project. The control panel will have been replaced by the Owner prior to the start of this project.
  - a. All other fire alarm work indicated on the drawings including all required verifications, integrated testing, etc. shall remain as part of the project.
  - b. The upgraded FACP will be Edwards EST3X.
2. Reference Electrical Specification – Division 26:
  - a. Delete item 1.1.6.

**End of Addendum**

## **DUCTLESS AIR CONDITIONER (DAIKIN SKYAIR)**

### **1. GENERAL**

#### **1.1 SUBMITTALS**

1.1.1 Indicate the following: complete specifications; piping diagrams with piping lengths; refrigerant charge per system including CSA B52 analysis; wiring diagrams; weight; performance details at specified conditions.

### **2. PRODUCTS**

#### **2.1 GENERAL**

2.1.1 All units shall be listed and rated by ANSI/AHRI Standard 1230-2010 and meet all minimum IEER performance requirements as scheduled.

2.1.2 The units shall be CSA approved, ANSI/UL STD 1995 listed and listed by Electrical Laboratories (ETL) and bear the cETL label.

2.1.3 All wiring shall be in accordance with the National Electric Code (NEC).

2.1.4 The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.

2.1.5 The units and the design shall be in compliance with CSA B52 Mechanical Refrigerant Code including the March 2009 Supplement.

#### **2.2 SYSTEM DESCRIPTION**

2.2.1 The variable capacity air conditioning system shall be an inverter driven cooling only split system as specified. The system shall consist of an indoor evaporator exclusively matched to an outdoor variable speed rotary compressor condensing unit.

2.2.2 The outdoor unit shall be configured for horizontal discharge airflow and complete with a variable speed condenser fan using a single phase power supply.

2.2.3 Typical cooling mode operating range shall be between 23°F DB (0°F DB with wind baffles) and 122°F DB

2.2.3.1 This system shall be designed to operate with a maximum refrigerant pipe length of 164 feet with 98 feet maximum vertical difference (or 230 ft with 164 feet maximum vertical difference for units 2.5 tons and above), and without any oil traps or additional equipment. Refrigerant shall be R-410A.

#### **2.3 REFRIGERANT PIPING**

2.3.1 Refer and comply to the refrigerant piping specifications, including the special considerations for VRF refrigerant piping section.

#### **2.4 FAN COILS**

##### **2.4.1 FAQ - WALL MOUNTED UNIT**

2.4.1.1 Indoor unit shall be a wall mounted fan coil unit for installation onto a wall within a conditioned space. A mildew-proof, polystyrene condensate drain pan and resin net mold resistant filter shall be included as standard equipment.

2.4.1.2 The indoor unit's sound pressure shall range from 37 dB(A) to 41 dB(A) at low speed measured at 3.3 feet below and 3.3 feet away from the unit.

- 2.4.1.3 The unit shall have an auto-swing louver which ensures efficient air distribution, which closes automatically when the unit stops. The remote controller shall be able to set five (5) steps of discharge angle. The front grille shall be easily removed for washing.
- 2.4.1.4 The cabinet shall be affixed to a factory supplied wall mounting template and located in the conditioned space.
- 2.4.1.5 The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- 2.4.1.6 The fan type shall be direct-drive cross-flow with statically and dynamically balanced impeller with high and low fan speeds available.
- 2.4.1.7 Units shall be provided with a loose field installed condensate pump.

## **2.5 CONDENSING UNIT**

- 2.5.1 The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.
- 2.5.2 The fan shall be a direct drive, propeller type fan. The motor shall be inverter driven with permanently lubricated bearings
- 2.5.3 A fan guard shall be provided on the outdoor unit to prevent contact with fan operation.
- 2.5.4 The outdoor coil shall have nonferrous construction with a corrugated fin tube.
- 2.5.5 The compressor shall be a rotary swing inverter-driven compressor. Compressor safeties shall include internal thermal overload protection. Refrigeration specialties shall include an accumulator, refrigerant metering device and a four-way reversing valve.

## **2.6 LOCAL CONTROLS**

- 2.6.1 Fan coil units shall be supplied with Individual Zone Controllers, similar to Daikin model BRC1E73
  - 2.6.1.1 Remote controllers shall be hard wired by installing contractor.
  - 2.6.1.2 Controllers shall be able to function as follows:
    - i. The controller shall have dual or single Cool and Heat setpoints for occupied periods, and independent setback setpoints for unoccupied periods.
    - ii. The controller shall the ability to digitally prohibit individual buttons and functions.
    - iii. The controller shall have a self diagnosis function that constantly monitors the system for malfunctions (total of 80 components).
    - iv. An LCD digital display will allow the temperature to be set in 1°F units.
    - v. The controller shall be equipped with a thermostat sensor.
    - vi. The controller shall have the ability to automatically changeover the mode of operation with dual or single setpoints.
    - vii. Controller shall have built-in 7 day, weekday plus Saturday Sunday (5+1+1), weekday plus weekend (5+2) and everyday (1) scheduler.
    - viii. Controller shall have a simple display mode, displaying only the operation mode, the setpoint(s), and the room temperature.

## **2.7 CENTRAL CONTROLS**

- 2.7.1.1 Fan coil units shall be supplied with DKN Plus Interface AZAI6WSPDKC.

This interface enables the energy-efficient control of VRV, SkyAir, single- and multi-zone systems with third-party thermostats or automation systems through cloud API, Modbus®, BACnet™ MS/TP, or thermostat relay contacts. For P1P2 indoor units, only one DKN Plus Interface can be placed in one remote controller group controlling up to 16 indoor units. For S21 indoor unit, one DKN Plus Interface can control one indoor unit only.

- 2.7.1.2 The interface shall be mounted onto a flat surface either through screws or through double-sided adhesive tape.
- 2.7.1.3 The DKN Plus Interface shall be approximately 3.6 x 3.15 x 1.14 inches in size.
- 2.7.1.4 Power supply:
- i. The DKN Plus Interface shall be supplied with 12-16VDC power, with maximum current of 220mA and max power consumption of 1.08 W.
  - ii. The DKN Plus Interface shall be able to obtain power from the indoor unit with a supplied wire of up to 8.2 ft.
  - iii. If connected to a third-party thermostat, the DKN Plus Interface needs an external 24VAC power supply for the third-party thermostat (if required by the thermostat).
- 2.7.1.5 Operating temperatures:
- i. The DKN Plus Interface shall be stored at a temperature range from -4 °F to 158 °F.
  - ii. The DKN Plus Interface shall be operated at a temperature range from 32 °F to 113 °F.
  - iii. The DKN Plus Interface shall be operated at a humidity range from 5% to 90% (non-condensing).
- 2.7.1.6 Communication:
- i. Wi-Fi Communication
  - ii. Capable of communicating through WiFi-Certificated network 802.11b/g/n
  - iii. Communication frequency of 2.4 or 5GHz
  - iv. Maximum antenna power of 19.5dBm
  - v. Sensitivity of -82dBm
  - vi. Static DHCP IP addressing
  - vii. Shall be able to update the software Over-the-Air
  - viii. Capable of communicating through Bluetooth v5.0 EDR and BLE specification
  - ix. Capable of communication through Modbus RS-485 with baud rate of 19200 bps
  - x. Capable of communication through BACnet MS/TP with baud rate of 9600/19200/38400(Default) bps
- 2.7.1.7 Thermostat Integration
- i. Shall support integration with third-party smart thermostat through Cloud API.
  - ii. Shall support third party thermostat G/Y/W (Fan/Cool/Heat) relay control through thermostat wiring.
    - a) Shall automatically disable thermostat relay logic when cloud API connection detected.
  - iii. Shall have custom control logic to minimize the loss of the indoor unit efficiency when no cloud API, BACnet or Modbus connection detected.
    - a) Shall be able to dynamically increase and decrease the indoor unit internal setpoint by a preset degree based upon the indoor unit status and the G/Y/W request status from the thermostat.

## **2.8 ELECTRICAL**

- 2.8.1 Independent electrical power for fan coils shall be 208/230 volts, 1 phase, 60 hertz. The unit shall be capable of operating within the limits of 187 volts to 253 volts.
- 2.8.2 Unless limited by local electrical codes and standards, multiple fan coils can be connected to the same breaker. Field provided individual disconnect switches for each fan coil are required.
- 2.8.3 Electrical power for condensing units shall be 208/230 volts, 1 phase, 60 hertz. The unit shall be capable of operating within the limits of 187 volts to 253 volts.
- 2.8.4 The control voltage between the indoor and outdoor unit shall be 16VDC. The control wiring shall be communication type stranded non-shielded 18-2 AWG.
- 2.8.5 Control wiring shall be installed in a daisy chain configuration between all VRF components as per Manufacturer.

**2.9 START-UP AND WARRANTY**

- 2.9.1 The system must be installed by an authorized contractor/dealer.
- 2.9.2 The manufacturer shall provide off-site assistance, if required, from a factory trained service technician to installing contractor during start-up for each unit. Untrained contractors who wish to bid this project may contact the Supplier to arrange training prior to bid day. Manufacturer shall provide instruction to the owners' personnel on proper unit operation and maintenance.
- 2.9.3 The warranty period shall commence on the date of initial start-up and shall continue for a period of ten (10) years not to exceed eighteen (18) months from date of shipment.

**3. EXECUTION**

**3.1 INSTALLATION**

- 3.1.1 Install units on a flat surface level within 1/8 inch. Provide intermediate supports as recommended by the equipment manufacturer.
- 3.1.2 Condensing unit shall be installed at least 18 inches above grade/roof level.
- 3.1.3 For ceiling hung installations, provide a reinforced steel framework to adequately support all unit sections.
- 3.1.4 Provide certified wiring schematics to the electrical division for associated equipment and controls.
- 3.1.5 Provide all necessary control wiring as recommended by the manufacturer.
- 3.1.6 High/low pressure gas line, liquid and suction lines must be individually insulated between the outdoor and indoor units.
- 3.1.7 Use refrigeration best practice to allow pipes to expand and contract freely. Review manufacturer installation instructions to ensure expansion joints are properly designed.

**END OF SECTION**

## **DUCTLESS AIR CONDITIONER (DAIKIN VRV)**

### **1. GENERAL**

#### **1.1 SUBMITTALS**

- 1.1.1 Submittals shall include the following: performance and capacity details of all units at specified indoor and outdoor conditions, piping schematics outputted from manufacturer specific software including pipe sizes and estimated piping lengths, refrigerant charge per system including CSA B52 analysis, wiring diagrams, and 10 year parts only warranty information.
- 1.1.2 Submittal shall include a copy of the installing contractor's certification of VRF manufacturer approved training.

### **2. PRODUCTS**

#### **2.1 GENERAL**

- 2.1.1 All units shall be listed and rated by ANSI/AHRI Standard 1230-2010 and meet all minimum IEER performance requirements as scheduled.
- 2.1.2 The units shall be CSA approved, ANSI/UL STD 1995 listed and listed by Electrical Testing Labs (ETL) and bear the cETL label.
- 2.1.3 All wiring shall be in accordance with the National Electric Code (NEC).
- 2.1.4 The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- 2.1.5 The system and the design shall be in compliance with CSA B52 Mechanical Refrigerant Code.

#### **2.2 SYSTEM DESCRIPTION**

- 2.2.1 VRF system shall automatically vary the target evaporating and condensing temperatures based on building load and weather conditions to increase part load efficiency (Variable Refrigerant Temperature). The condensing unit shall also feature customizable operating modes which allows for the manual setting of target evaporating and condensing temperatures.
- 2.2.2 System shall be a two pipe heat pump switchover VRF system. All indoor units on single refrigerant circuits shall operate in the same mode (heating or cooling). The specified system is not a simultaneous heating and cooling heat recovery system. Refer to the controls section of this specification for any central controller and/or mode switchover sequence that may be required.

#### **2.3 START-UP AND WARRANTY**

- 2.3.1 Installing contractor must be certified by VRF manufacturer. The bidders shall be required to submit training certification proof with bid documents and submittal documents. Untrained contractors who wish to bid this project may contact the Supplier to arrange training prior to bid day.
- 2.3.2 The manufacturer shall provide a factory trained service technician to start-up each unit. Manufacturer shall provide instruction to the owners' personnel on proper unit operation and maintenance.
- 2.3.3 The warranty period on all parts and compressors shall commence on the date of initial start-up and shall continue for a period of Ten (10) years not to exceed one hundred and twenty six (126) months from date of shipment. Proper maintenance of the equipment shall be conducted by



certified technicians as per the manufacturer or manufacturer's representative requirements. Maintenance logs shall be supplied by the owner upon request.

- 2.3.4 All manufacturer warranty shall be for parts only. All diagnosis and labour warranty shall be carried out by installing contractor as per the warranty requirements of this project.

## **2.4 REFRIGERANT PIPING**

- 2.4.1 Refer and comply to the refrigerant piping specifications, including the special considerations for VRF refrigerant piping section.
- 2.4.2 Standard T style joints are **not acceptable** for a variable refrigerant volume system. Manufacturer specific Y joints shall be supplied by the VRF manufacturer.

## **2.5 FAN COILS**

- 2.5.1 Fan coils shall monitor and maintain the unit superheat (cooling mode) or subcooling (heating mode) using a computerized PID control. Internal unit components shall be factory wired and piped, and complete with electronic proportional expansion valve, flare connections, condensate drain pan, self-diagnostics, and auto-restart function.

### **FXAQ - WALL MOUNTED UNIT**

- 2.5.1.1 Indoor unit shall be a wall mounted fan coil unit for installation onto a wall within a conditioned space. A mildew-proof, polystyrene condensate drain pan and resin net mold resistant filter shall be included as standard equipment.
- 2.5.1.2 The indoor unit's sound pressure shall range from 31 dB(A) to 41 dB(A) at low speed measured at 3.3 feet below and 3.3 feet away from the unit.
- 2.5.1.3 The unit shall have an auto-swing louver which ensures efficient air distribution, which closes automatically when the unit stops. The remote controller shall be able to set five (5) steps of discharge angle. The front grille shall be easily removed for washing.
- 2.5.1.4 The cabinet shall be affixed to a factory supplied wall mounting template and located in the conditioned space.
- 2.5.1.5 The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- 2.5.1.6 The fan type shall be direct-drive cross-flow with statically and dynamically balanced impeller with high and low fan speeds available.
- 2.5.1.7 Units shall be provided with a loose field installed condensate pump.

## **2.1 CONDENSING UNIT**

- 2.1.1 The outdoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of a Daikin swing compressor, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separator, service ports and suction line accumulator.
- 2.1.2 The outdoor system shall be able to support the connection of up to 10 indoor unit's dependant on the model of the outdoor unit.
- 2.1.3 The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
- 2.1.4 The following safety devices shall be included on the condensing unit; high pressure switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.

- 2.1.5 To ensure the liquid refrigerant does not flash when supplying to the various indoor unit units, the circuit shall be provided with a sub-cooling feature.
- 2.1.6 Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation.
- 2.1.7 The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-protected mild steel panels coated with a baked enamel finish.
- 2.1.8 The condensing units shall have a SEER2 rating as high as 18.6 and a HSPF2 of 9.
- 2.1.9 The condensing unit fan(s) shall consist of propeller type, direct-drive fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
- 2.1.10 The fan motor shall have inherent protection and permanently lubricated bearings and shall be provided with a fan guard to prevent contact with moving parts.
- 2.1.11 The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design manufactured from Hi-X seamless copper tube. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film type E1.
- 2.1.12 The outdoor unit shall be capable of heating operation at -4°F ambient temperature. Tested factory data on heating capacity and efficiency shall be available.
- 2.1.12.1 The outdoor unit shall be capable of cooling operation down to +23°F without any additional low ambient controls.

## **2.2 LOCAL CONTROLS**

- 2.2.1 Fan coil units shall be supplied with individual zone controllers, similar to Daikin model BRC1E73
  - 2.2.1.1 Zone controllers shall be hard wired by installing contractor.
  - 2.2.1.2 Controllers shall be able to function as follows:
    - i. The controller shall have single and dual setpoints for occupied periods, and independent setback setpoints for unoccupied periods.
    - ii. The controller shall have the ability to digitally prohibit individual buttons and functions, including custom mode selection.
    - iii. The controller shall have a self diagnosis function that constantly monitors the system for malfunctions.
    - iv. An LCD digital display will allow the temperature to be set in 1°F units.
    - v. The controller shall be equipped with a thermostat sensor.
    - vi. The controller shall have the ability to automatically changeover the mode of operation with dual or single setpoints.
    - vii. Controller shall have built-in 7 day, weekday plus Saturday Sunday (5+1+1), weekday plus weekend (5+2) and everyday (1) scheduler.
    - viii. Controller shall have a simple display mode, displaying only the operation mode, the setpoint(s), and the room temperature.

## **2.3 CENTRAL CONTROLS**

- 2.3.1.1 Fan coil units shall be supplied with DKN Plus Interface AZAI6WSPDKC.

This interface enables the energy-efficient control of VRV, SkyAir, single- and multi-zone systems with third-party thermostats or automation systems through cloud API, Modbus®, BACnet™ MS/TP, or thermostat relay contacts. For P1P2 indoor units, only one DKN Plus Interface can be placed in one remote controller group controlling up to 16 indoor units. For S21 indoor unit, one DKN Plus Interface can control one indoor unit only.
- 2.3.1.2 The interface shall be mounted onto a flat surface either through screws or through double-sided adhesive tape.

- 2.3.1.3 The DKN Plus Interface shall be approximately 3.6 x 3.15 x 1.14 inches in size.
- 2.3.1.4 Power supply:
- i. The DKN Plus Interface shall be supplied with 12-16VDC power, with maximum current of 220mA and max power consumption of 1.08 W.
  - ii. The DKN Plus Interface shall be able to obtain power from the indoor unit with a supplied wire of up to 8.2 ft.
  - iii. If connected to a third-party thermostat, the DKN Plus Interface needs an external 24VAC power supply for the third-party thermostat (if required by the thermostat).
- 2.3.1.5 Operating temperatures:
- i. The DKN Plus Interface shall be stored at a temperature range from -4 °F to 158 °F.
  - ii. The DKN Plus Interface shall be operated at a temperature range from 32 °F to 113 °F.
  - iii. The DKN Plus Interface shall be operated at a humidity range from 5% to 90% (non-condensing).
- 2.3.1.6 Communication:
- i. Wi-Fi Communication
  - ii. Capable of communicating through WiFi-Certificated network 802.11b/g/n
  - iii. Communication frequency of 2.4 or 5GHz
  - iv. Maximum antenna power of 19.5dBm
  - v. Sensitivity of -82dBm
  - vi. Static DHCP IP addressing
  - vii. Shall be able to update the software Over-the-Air
  - viii. Capable of communicating through Bluetooth v5.0 EDR and BLE specification
  - ix. Capable of communication through Modbus RS-485 with baud rate of 19200 bps
  - x. Capable of communication through BACnet MS/TP with baud rate of 9600/19200/38400(Default) bps
- 2.3.1.7 Thermostat Integration
- i. Shall support integration with third-party smart thermostat through Cloud API.
  - ii. Shall support third party thermostat G/Y/W (Fan/Cool/Heat) relay control through thermostat wiring.
    - a) Shall automatically disable thermostat relay logic when cloud API connection detected.
  - iii. Shall have custom control logic to minimize the loss of the indoor unit efficiency when no cloud API, BACnet or Modbus connection detected.
    - a) Shall be able to dynamically increase and decrease the indoor unit internal setpoint by a preset degree based upon the indoor unit status and the G/Y/W request status from the thermostat.

## **2.4 ELECTRICAL**

- 2.4.1 Independent electrical power for fan coils shall be 208/230 volts, 1 phase, 60 hertz. The unit shall be capable of operating within the limits of 187 volts to 253 volts.
- 2.4.2 Unless limited by local electrical codes and standards, multiple fan coils can be connected to the same breaker. Field provided individual disconnect switches for each fan coil are required.
- 2.4.3 Electrical power for condensing units shall be 208/230 volts, 1 phase, 60 hertz. The unit shall be capable of operating within the limits of 187 volts to 253 volts.
- 2.4.4 The control voltage between the indoor and outdoor unit shall be 16VDC. The control wiring shall be communication type stranded non-shielded 18-2 AWG.
- 2.4.5 Control wiring shall be installed in a daisy chain configuration between all VRF components as per Manufacturer.

## **2.5 START-UP AND WARRANTY**

- 2.5.1 The system must be installed by an authorized contractor/dealer.

2.5.2 The manufacturer shall provide off-site assistance, if required, from a factory trained service technician to installing contractor during start-up for each unit. Untrained contractors who wish to bid this project may contact the Supplier to arrange training prior to bid day. Manufacturer shall provide instruction to the owners' personnel on proper unit operation and maintenance.

2.5.3 The warranty period shall commence on the date of initial start-up and shall continue for a period of ten (10) years not to exceed eighteen (18) months from date of shipment.

### **3. EXECUTION**

#### **3.1 INSTALLATION**

3.1.1 Install condensing units on a flat surface level within 1/8 inch, and elevated a minimum of 18" from ground or roof surface. Provide intermediate supports as recommended by the equipment manufacturer.

3.1.2 Provide all necessary control wiring as recommended by the manufacturer.

3.1.3 High/low pressure gas line, liquid, and suction lines must be individually insulated between the outdoor and indoor units.

3.1.4 Contact the Supplier prior to installation to review and confirm piping layout and lengths.

3.1.5 Use refrigeration best practice to allow pipes to expand and contract freely. Review manufacturer installation instructions to ensure expansion joints are properly designed.

3.1.6 Pressure test ALL systems to 550 PSI after system was vacuumed and held to below 500 microns for at least one hour. Review manufacturer installation instructions for proper pressure test procedures.

3.1.7 Design and install all piping as per TSSA and CSA B52 regulations, and apply and obtain TSSA certification for all systems.

**END OF SECTION**