Clark
Patterson
Lee

ADDENDUM NUMBER: 004

COUNTY OF MOORE
NEW RECREATION CENTER
CARTHAGE, NC

OWNER PROJECT NUMBER **IFB-2019-04**
PROJECT NUMBER **14558.00**

April 12, 2019

This Addendum issued prior to receipt of Bid hereby becomes a part of the Construction Documents for the above project.

All information contained in this Addendum supersedes and takes precedence over any conflicting information in the original Bidding Documents dated March 21, 2019.

CHANGES TO PROJECT MANUAL

SPECIFICATION SECTION 00 01 10 – TABLE OF CONTENTS

1. Delete section in its entirety and replace with the enclosed dated April 12, 2019.

SPECIFICATION SECTION 23 74 13 – PACKAGED ROOFTOP UNITS / OUTDOOR AIR HANDLING UNITS

1. Issued section in its entirety (9 pages) dated April 12, 2019.

CHANGES TO DRAWINGS

Not Applicable.

CLARIFICATIONS

Not Applicable.

ENCLOSURES:

SPECIFICATION SECTIONS

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23 74 13 Packaged Rooftop Units / Outdoor Air Handling Units

SHEETS / BULLETIN DRAWINGS

Not Applicable.

MISCELLANEOUS

Not Applicable.

6302 Fairview Road
Suite 102
Charlotte, NC 28210
www.clarkpatterson.com
704.331.9131 TEL
704.331.0402 FAX

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SECTION 23 74 13

PACKAGED ROOFTOP UNITS / OUTDOOR AIR HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 GENERAL DESCRIPTION

A. This section includes the design, controls and installation requirements for packaged rooftop units / outdoor air handling units.

1.3 QUALITY ASSURANCE

A. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.

B. HP-01 HP-04 HP-03 HP-02 Unit and refrigeration system shall comply with ASHRAE 15, Safety Standard for Mechanical Refrigeration.

C. HP-04 Unit Seasonal Energy Efficiency Ratio (SEER) shall be equal to or greater that prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.

D. HP-01 HP-03 HP-02 Unit Energy Efficiency Ratio (EER) shall be equal to or greater that prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.

E. HP-01 HP-04 HP-03 HP-02 Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.

1.4 SUBMITTALS

A. Product Data: Literature shall be provided that indicates dimensions, operating and shipping weights, capacities, ratings, fan performance, filter information, factory supplied accessories, electrical characteristics and connection requirements. Installation, Operation, and Maintenance manual with startup requirements shall be provided.

B. Shop Drawings: Unit drawings shall be provided that indicate assembly, unit dimensions, construction details, clearances and connection details. Computer generated fan curves for each fan shall be submitted with specific design operation point noted. Wiring diagram shall be provided with details for both power and control systems and differentiate between factory installed and field installed wiring.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be shipped with doors screwed shut and outside air hood closed to prevent damage during transport and thereafter while in storage awaiting installation.

B. Follow Installation, Operation, and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.

C. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation, and Maintenance manual.

1.6 WARRANTY

A. HP-01 HP-04 HP-03 HP-02 Manufacturer shall provide a limited "parts only" warranty for a period of 12 months from the date of equipment startup. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer's written instructions for Installation, Operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and filters.

B. Provide an additional five years "parts only" warranty on all compressors.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Products shall be provided by the following manufacturers:
   1. AAON
   2. Substitute equipment may be considered for approval that includes at a minimum:
      a. HP-01 HP-04 HP-03 HP-02 Variable capacity compressor with 10-100% capacity control
      b. Direct drive supply fans
      c. Double wall cabinet construction
      d. Insulation with a minimum R-value of 13
      e. HP-01 HP-04 HP-03 HP-02 Stainless steel drain pans

2.2 ROOFTOP UNITS

A. General Description
   1. HP-01 HP-04 HP-03 HP-02 Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, dampers, air-cooled condenser coils, condenser fans, reheat coil, electric heaters, exhaust fans, energy recovery wheels, and unit controls.
   2. Unit shall be factory assembled and tested including leak testing of the DX coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment's literature pocket.
   3. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
   4. Unit components shall be labeled, including refrigeration system components and electrical and controls components.
   5. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
   6. Installation, Operation, and Maintenance manual shall be supplied within the unit.
   7. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.
   8. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior

of the unit and affixed to the interior of the control compartment's hinged access door.

B. Construction
1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel.
4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
5. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 210/240. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
6. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
7. HP-01 HP-04 HP-03 HP-02 Access to filters, dampers, cooling coils, reheat coil, heaters, energy recovery wheels, compressors, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full-length stainless-steel piano hinges shall be included on the doors.
8. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
9. Units with cooling coils shall include double sloped 304 stainless steel drain pans.
10. HP-04 HP-03 HP-02 Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.
11. HP-01 Unit shall be provided with horizontal discharge and horizontal return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.
12. Unit shall include lifting lugs on the top of the unit.

13. HP-02 Unit base shall be fabricated of 1-inch thick double wall, impact resistant, rigid polyurethane foam panels.

C. Electrical
1. HP-01 HP-04 HP-03 HP-02 Unit shall have a 5kAIC SCCR.
2. HP-01 HP-04 HP-03 HP-02 Unit shall be provided with factory installed and factory wired, non-fused disconnect switch.
3. HP-01 HP-04 HP-03 HP-02 Unit shall be provided with a factory installed and factory wired 115V, 12-amp GFI outlet disconnect switch in the unit control panel.
4. HP-01 HP-04 HP-03 HP-02 Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage or on phase reversal.

D. Supply Fans
1. Unit shall include direct drive, unhoused, backward curved, plenum supply fans.
2. Blowers and motors shall be dynamically balance and mounted on rubber isolators.
3. HP-01 HP-04 HP-03 HP-02 Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
4. HP-04 HP-03 HP-02 Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

E. HP-02 Exhaust Fans
1. Exhaust dampers shall be sized for 100% relief.
2. Fans and motors shall be dynamically balanced.
3. HP-02 Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
4. Access to exhaust fans shall be through double wall, hinged access doors with quarter turn lockable handles.
5. HP-02 Unit shall include belt driven, unhoused, backward curved, plenum exhaust fans.
6. HP-02 Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

F. HP-01 HP-04 HP-03 HP-02 Cooling Coils
1. HP-01 HP-04 HP-03 HP-02 Evaporator Coils
   a. HP-01 HP-04 HP-03 HP-02 Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
   b. HP-04 HP-03 Coils shall be standard capacity.
   c. HP-01 HP-02 Coils shall have interlaced circuitry and shall be standard capacity.
   d. Coils shall be hydrogen or helium leak tested.
   e. Coils shall be furnished with factory installed expansion valves.

G. HP-01 HP-04 HP-03 HP-02 Refrigeration System
1. HP-01 HP-04 HP-03 HP-02 Unit shall be factory charged with R-410A refrigerant.
2. HP-01 HP-04 HP-03 HP-02 Compressors shall be scroll type with thermal overload protection and carry a 5-year non-prorated warranty, from the date of original equipment shipment from the factory.

3. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.
4. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
5. Each refrigeration circuit shall be equipped with expansion valve type refrigerant flow control.
6. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, service fittings on both the high pressure and low-pressure sides and a factory installed replaceable core liquid line filter driers.
7. HP-04 HP-03 Unit shall include a variable capacity scroll compressor on the refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
8. HP-01 Unit shall include a variable capacity scroll compressor on the lead refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
9. HP-02 Unit shall include a variable capacity scroll compressor on all refrigeration circuits which shall be capable of modulation from 10-100% of its capacity.
10. HP-04 HP-03 Refrigeration circuit shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
11. HP-01 Lead refrigeration circuit shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
12. HP-02 Lead refrigeration circuits shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
13. HP-04 HP-03 Unit shall be configured as an air-source heat pump. Refrigeration circuit shall be equipped with a factory installed liquid line filter drier with check valve, reversing valve, accumulator, and expansion valves on both the indoor and outdoor coils. Reversing valve shall energize during the heat pump cooling mode of operation.
14. HP-01 HP-02 Unit shall be configured as an air-source heat pump. Each refrigeration circuit shall be equipped with a factory installed liquid line filter drier with check valve, reversing valve, accumulator, and expansion valves on both the indoor and outdoor coils. Reversing valve shall energize during the heat pump cooling mode of operation.
15. HP-01 Lead refrigeration circuit shall be equipped with flooded condenser low ambient head pressure control to allow operation down to 0°F. Option includes an adjustable compressor lockout.

H. HP-01 HP-04 HP-03 HP-02 Condensers
1. HP-01 HP-04 HP-03 HP-02 Air-Cooled Condenser
   a. Condenser fans shall be a vertical discharge, axial flow, direct drive fans.
   b. HP-01 HP-04 HP-03 HP-02 Heat pump outdoor coil shall be constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
   c. Coils shall be designed for a minimum of 10°F of refrigerant sub-cooling.
   d. Coils shall be hydrogen or helium leak tested.
   e. HP-01 HP-04 Condenser fans shall be high efficiency electrically commutated motor driven with factory installed head pressure control module. Condenser airflow shall continuously modulate based on head pressure and cooling operation shall be allowed down to 35°F with adjustable compressor lockout.
   f. HP-01 HP-03 HP-02 Condenser fans shall be VFD driven variable speed for condenser head pressure control. Factory provided and factory programmed VFDs shall continuously modulate the fan air flow to maintain head pressure at acceptable levels. Cooling operation shall be allowed down to 35°F with adjustable compressor lockout.

I. HP-01 HP-04 HP-03 HP-02 Electric Heating
1. Unit shall include an electric heater consisting of electric heating coils, fuses and a high temperature limit switch, with capacities as shown on the plans.
2. Electric heating coils shall be located in the reheat position downstream of the cooling coil.
3. HP-01 Electric heater shall have full modulation capacity controlled by an SCR (Silicon Controlled Rectifier). Supply air temperature sensor shall be factory provided and field installed in the supply air ductwork. A 0-10 VDC terminal block shall be factory provided for external control.
4. HP-01 HP-04 HP-03 HP-02 Electric heater shall have full modulation capacity controlled by an SCR (Silicon Controlled Rectifier). A 0-10 VDC heating control signal shall be field provided to control the amount of heating.
5. HP-01 HP-04 HP-03 HP-02 Auxiliary electric heating capacity shall be sized to meet heating leaving air temperature setpoint when heat pump heating is in operation. Auxiliary heating capacity shall be available for operation when heat pump heating is in operation. Unit shall include 1 stage of auxiliary electric heating capacity. Heat Pump - Auxiliary Heat Sizing
6. HP-01 HP-04 HP-03 HP-02 Emergency electric heating capacity shall be sized by determining the maximum electric heating capacity not to exceed the amp draw of all compressors and adding that electric heating capacity to the auxiliary electric heating capacity. Auxiliary electric heating capacity shall be sized to meet heating leaving air temperature setpoint when heat pump heating is in operation. Unit shall include 1 stage of auxiliary electric heating capacity. Heat Pump - MCA Limited Heat Sizing
7. HP-01 HP-04 HP-03 HP-02 Emergency electric heating capacity shall be sized to meet heating leaving air temperature setpoint when heat pump heating is not in operation. Auxiliary electric heating capacity shall be sized to meet heating leaving air temperature setpoint when heat pump heating is in operation. Unit shall include 1 stage of auxiliary electric heating capacity. Heat Pump - Emergency Heat Sizing
8. HP-02 Outdoor Airflow Monitoring

a. Unit shall include outside airflow measuring station and airflow signal processor that communicates directly with the factory provided control systems or can also be used with customer provided controls with a 0-10 VDC output signal. LonTalk and BACnet may also be available for some applications. Monitoring size is dependent on the cfm.

J. Filters
1. HP-01 HP-04 HP-03 Unit shall include 2-inch-thick, pleated panel filters with an ASHRAE MERV rating of 8, upstream of the cooling coil.
2. HP-01 Unit shall include 2-inch-thick, pleated panel filters with an ASHRAE MERV rating of 8, upstream of the cooling coil.
3. HP-02 Unit shall include 4-inch-thick, pleated panel filters with an ASHRAE MERV rating of 13, upstream of the cooling coil. Unit shall also include 2-inch-thick, pleated panel pre filters with an ASHRAE MERV rating of 8, upstream of the 4-inch standard filters.

K. HP-01 HP-04 HP-03 HP-02 Outside Air/Economizer
1. HP-01 HP-04 HP-03 HP-02 Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 20 cfm of leakage per sq ft. at 4 in. w.g. air pressure differential across the damper. Low leakage dampers shall be Class 2 AMCA certified, in accordance with AMCA Standard 511. Damper assembly shall be controlled by spring return enthalpy activated fully modulating actuator. Unit shall include outside air opening bird screen, outside air hood, and barometric relief dampers.

L. HP-02 Energy Recovery
1. HP-02 Unit shall contain a factory mounted and tested energy recovery wheels. The energy recovery wheels shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. Frame shall slide out for service and removal from the cabinet.
2. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belt.
3. HP-02 Wheels shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop-to-efficiency ratios. The layers shall be effectively captured in stainless steel wheel frames or aluminum and stainless-steel segment frames that provide a rigid and self-supporting matrix.
4. HP-02 Wheels shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.
5. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.
6. The energy recovery cassette shall be an Underwriters Laboratories Recognized Component for electrical and fire safety. The wheel drive motor shall be an

Underwriters Laboratory Recognized Component and shall be mounted in the cassette frame and supplied with a service connector or junction box. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and AHRI Standard 1060, Rating Air-to-Air Energy Recovery Ventilation Equipment. Cassettes shall be listed in the AHRI Certified Products.

7. Energy recovery wheel cassette shall carry a 5-year non-prorated warranty, from the date of original equipment shipment from the factory. The first 12 months from the date of equipment startup, or 18 months from the date of original equipment shipment from the factory, whichever is less, shall be covered under the standard AAON limited parts warranty. The remaining period of the warranty shall be covered by Airxchange. The 5-year warranty applies to all parts and components of the cassette, with the exception of the motor, which shall carry an 18-month warranty. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided the Airxchange written instructions for Installation, Operation, and Maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts. Refer to the Airxchange Energy Recovery Cassette Limited Warranty Certificate.
8. HP-02 Unit shall include 2-inch-thick, pleated panel outside air filters with an ASHRAE MERV rating of 8, upstream of the wheels.
9. HP-02 Hinged service access doors shall allow access to the wheels.
10. HP-02 Total energy recovery wheels shall be coated with silica gel desiccant permanently bonded by a process without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.

M. Controls
1. HP-01 HP-04 HP-03 HP-02 Factory Installed and Factory Provided Controller
   a. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Controller shall be capable of standalone operation with unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling available without dependence on a building management system.
   b. Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
   c. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
   d. HP-01 HP-04 HP-03 HP-02 Variable Air Volume Controller
2. HP-01 HP-04 HP-03 HP-02 Unit shall utilize a variable capacity compressor system and a variable speed supply fan system to modulate cooling and airflow as required to meet space temperature cooling loads and to save operating energy. Supply fan speed shall modulate based on supply air duct static pressure. Cooling capacity shall modulate based on supply air temperature.
3. HP-01 HP-04 HP-03 HP-02 With modulating hot gas reheat, unit shall modulate cooling and hot gas reheat as efficiently as possible, to meet space humidity loads and prevent supply air temperature swings and overcooling of the space.

4. HP-01 HP-04 HP-03 HP-02 Unit shall modulate heating with constant airflow to meet space temperature heating loads. Modulating heating capacity shall modulate based on supply air temperature.
   a. HP-02 Unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling shall be accomplished with connection to interface module with LCD screen and input keypad, interface module with touch screen, or with connection to PC with free configuration software. Controller shall be capable of connection with other factory installed and factory provided unit controllers with individual unit configuration, setpoint adjustment, sensor status viewing, and occupancy scheduling available from a single unit. Connection between unit controllers shall be with a modular cable. Controller shall be capable of communicating and integrating with a LonWorks or BACnet network.
   b. HP-04 HP-03 Unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling shall be accomplished with a touchscreen controller interface. Controller shall be capable of communicating and integrating with a BACnet MS/TP or Modbus RTU network. AAON Touchscreen Controller

N. HP-01 Accessories
1. HP-01 Unit shall be provided with a safety shutdown terminal block for field installation of a smoke detector which shuts off the unit's control circuit.
2. HP-01 HP-04 HP-03 HP-02 Unit shall be provided with a high condensate level switch that shuts down the unit when a high-water level is detected in the drain pan.

PART 3 - EXECUTION

3.1 INSTALLATION, OPERATION, AND MAINTENANCE

A. Installation, Operation, and Maintenance manual shall be supplied with the unit.

B. Installing contractor shall install unit, including field installed components, in accordance with Installation, Operation, and Maintenance manual instructions.

C. Start up and maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

END OF SECTION 23 74 13