

March 27, 2017
BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA
ADDENDUM NO. 4 / IFB NO. Y17-740-CC
CORRECTIONS HORIZONS AHU HOT WATER REPLACEMENT

BID OPENING DATE: April 4, 2017

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to, and shall take precedence over, the original documents. Underlining indicates additions, deletions are indicated by ~~strikethrough~~.

A. The bid opening date remains April 4, 2017 at 2:00 p.m.

B. Questions and Answers:

1. **Question:** The pumps specified on the project are rated for 250# pressure with stuffing box seals. From what we have been able to find in the bid documents, we don't believe the AHU coils are rated for 250# pressure. Therefore, do the pumps need to be rated for high pressure with stuffing box seals or can they be rated for regular pressure with standard seals?

Answer: All pumps provided shall be rated for 250 psi as noted in specifications.

2. **Question:** VFDs? I cannot find anything on the schedule or in the specifications that clarifies if there are (6) of them to be replaced.

Answer: Please see attached VFD specification section 15030.

3. **Question:** Will we be replacing existing equipment for the water heater pumps or will they be relocated?

Answer: Heating hot water pumps serving the domestic boiler loop and heat exchanger as shown on MD201 will be replaced as part of this project.

C. ACKNOWLEDGEMENT OF ADDENDA

- a. The Bidder shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the bid.
- b. All other terms and conditions of the IFB remain the same.

c. Receipt acknowledged by:

Authorized Signature

Date Signed

Title

Name of Firm

SECTION 15030 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Basic Requirements: Provisions of Section 15010, BASIC MECHANICAL REQUIREMENTS are part of this Section.

1.2 SUMMARY

- A. General: Provide electric motors and related electric material and equipment required for all mechanical work.

1.3 SUBMITTALS

- A. Include the following material and performance data:
 - 1. Manufacturers Literature:
 - a. Complete technical information on the Variable Frequency Drive and all specified options, indicating all cabinet dimensions and space requirements for the VFD, including bypass contactors and line reactors.
 - b. Wiring diagram with all control and power wiring for the Variable Frequency Drive Unit.
 - 2. Performance Data: Complete efficiency versus load and speed data for all VFD ratings showing that the VFD with line reactors is capable of providing full motor nameplate rated horsepower.
 - 3. Installation Instructions:
 - a. Manufacturer's printed installation instructions including copies shipped with the equipment.
 - b. Manufacturer's instructions for the installation and checkout procedure for the variable frequency drive unit.
 - 4. Maintenance Instructions: Manufacturer's printed instructions for the maintenance of the variable frequency drive unit.
 - 5. Manufacturer's Start-Up, Checkout and Instructions: Start-up and checkout of the variable frequency drive unit.

1.4 APPLICABLE STANDARDS

- A. Requirements: The electrical equipment, components and installation shall comply with the requirements of the following regulations:
 - 1. NEC: National Electrical Code (NFPA 70).
 - 2. NEMA: National Electric Manufacturer's Association Standard MG-2.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY DRIVE

- A. Manufacturer: Refer to Section 15010.
 - 2. ABB
 - 3. Danfoss
 - 4. Cutler-Hammer, Eaton Corporation
 - 5. York International
 - 6. Allen-Bradley
- B. Variable Frequency Drive: Provide and install variable torque Variable Frequency Drives (VFD) variable speed operation where indicated, suitable for controlling NEMA Design B motors on continuous duty in variable speed applications. The VFD shall be listed by Underwriter's Laboratories and shall comply with the latest standards of ANSI, IEEE and the NEC.
- C. Minimum Interruption Capacity: The entire Variable Frequency Drive assembly shall be capable of a minimum interruption capacity of 50,000 amperes (A.I.C.). The VFD assembly nameplate shall indicate the UL-listing at this minimum interruption capacity.
- D. General: The Variable Frequency Drive shall be capable of converting the input voltage from plus 10 to minus 5 percent, three phase, 60 Hz plus 2 Hz to variable frequency, three phase AC power for variable torque motor control continuously from 10 percent to 100 percent of base speed. A transformer shall not be used to adjust the input or output voltage. All general options and modifications shall mount within the VFD enclosure. A constant voltage-to-frequency ratio shall be maintained throughout the operating range of the VFD.
- E. Power Factor: The VFD output power factor shall be maintained at a minimum of 0.95 throughout the speed range of the drive.
- F. Control Cabinet: The VFD shall be totally enclosed in a free-standing NEMA 1 enclosure for floor mounting, and shall dissipate any heat generated by the VFD circuitry. All unit-mounted controls shall be flush mounted on the face of the VFD enclosure. VFD shall be capable of operating in an ambient temperature of 40-105 degrees F.

1. The VFD shall incorporate a molded case circuit breaker sized to provide short circuit interrupting capacity of 50,000 A.I.C. The circuit breaker shall be mechanically interlocked with the power unit enclosure door.
- G. Control Requirements: The following control interfaces shall be provided at a terminal strip in the VFD as a minimum to assure control system integrity:
1. Speed Control Input: A 4-20mA or 0-5 VDC signal proportional to speed shall be input for directly controlling the speed of the VFD when in automatic mode.
 2. Start/Stop Control: The VFD shall be capable of being started and stopped remotely by a maintained-contact start/stop relay.
 3. Control Interlock: The VFD shall provide an auxiliary control interlock output of 115 VAC whenever the VFD is enabled, to provide interlocking with the control system. The VFD shall be furnished with two sets of N.O. contacts for control interlocking. The VFD shall be provided with a 115 VAC control transformer so that no external 115 VAC power source is required.
 4. Speed Signal Reference: The VFD shall furnish a 0-5 VDC or 4-20mA signal directly proportional to the output frequency of the VFD, for remote monitoring of the VFD speed.
 5. Hand-Off-Auto Switch: The VFD shall be furnished with a door-mounted Hand-Off-Auto switch to allow switching of the speed control signal from the "Automatic" signal to a manually adjustable speed potentiometer on the VFD when in the "Hand" position. The VFD shall be disabled when in the "Off" position.
 6. VFD Trip Contacts: The VFD shall be furnished with a set of Form C (NO/NC) contacts for remote annunciation to the building automation system under Section 15950.
 7. Speed Potentiometer: A manually adjustable speed potentiometer shall be door-mounted to select the speed when the H-O-A switch is in "Hand" position.
 8. Speed Meter: The VFD shall be furnished with a digital door-mounted speed meter (0-100 percent) to indicate the rpm of the motor or the percent of full-load frequency of the VFD.
- H. Manual Bypass with Magnetic Contactors:
1. A door-mounted manual bypass switch shall be provided to bypass the VFD circuitry for emergency operation. In "normal" mode, the motor is controlled by the VFD. In "bypass" mode the motor is directly connected to the building power. Motor protection thermal overload shall be provided in "bypass" and "normal" mode.

2. Manual bypass shall provide all the circuitry necessary to safely transfer the motor from the VFD to the power line, or from the line to the controller, while the motor is at zero speed. The bypass shall not be located in the VFD section of the cabinet. The bypass section of the cabinet shall house all devices which must be energized at either line or control voltage while operating in the bypass mode.
 3. Two motor contactors, electrically interlocked, shall be utilized. One contactor is to be between the VFD output and the motor, controlled by the VFD regulator; and the other one is to be between the bypass power line and the motor, providing across-the-line starting. The 115 VAC relay control logic, allowing common start-stop commands in the "controller" mode and the "bypass" mode shall also be included within the bypass enclosure.
 4. The bypass section door shall include a "VFD-Off-Bypass" selector switch, a "VFD Mode" indicator light and a "Bypass Mode" indicator light. Terminals shall be provided for remote indication of mode selection.
 5. The bypass option shall include a door interlocked, main power input disconnect, providing positive shutdown of all input power to both the bypass circuitry and the VFD.
 6. Manual bypass with magnetic contactors shall be factory installed.
- I. Variable Frequency Drive Controller: The VFD controller shall be completely solid state variable voltage source design. The VFD shall provide the following standard features:
1. Minimum and Maximum Speed Potentiometers shall be furnished to select a minimum (10-50%) and maximum (50-100%) output frequency.
 2. Adjustable linear acceleration and deceleration functions shall be furnished.
 3. Safety features shall be provided to protect the VFD internal circuitry and motor, including but not limited to the following:
 - a. Current limit feature to limit output current from 50-100 percent of that of the inverter rating. The current limit shall be designed to function automatically to prevent over-current trip due to momentary overload conditions, without shutdown.
 - b. Instantaneous over-current trip to safely limit the output current in under 50 micro seconds due to phase to phase short circuits or severe overload conditions, without damage to input fuses or circuitry.
 - c. Under and over voltage trip for non-momentary power or phase loss. Automatic restart shall occur on under-voltage condition.

- d. Drive diagnostic fault indicator for continuous indication of drive status.
 - e. Isolated current and voltage signals from logic circuitry.
 - f. Fast-acting current limiting input fuses.
 - g. In the event of a momentary or sustained power loss, the controller shall shut down safely without component failure. Upon return of power, the system shall automatically return to normal operation.
 - h. Over-temperature safety shall be provided to shut down the VFD if the internal temperature becomes excessively high. The VFD panel shall provide visual indication when conditions are within 10 degrees F. of over-temperature shutdown, and upon shutdown.
 - i. Solid-state ground-fault protection and indication shall be provided with the VFD.
 - j. Motor Thermal Overload Protection shall be provided with door mounted reset button for the exact motor full load amps. Motor thermal overload relay shall be mounted inside the VFD cabinet.
- J. Line Noise: The Variable Frequency Drive shall be furnished with Class H dry type isolation transformers, Class H insulation line reactors and other line noise filtering devices as required to prevent line noise from being transmitted into the AC power system. The line noise shall be no greater than 3 percent harmonic distortion and no more than a 16,400 volt-microsecond commutation notch area, in accordance with IEEE Standard 519-1981 for Special Applications. Line reactors or filters should be considered in sizing the VFD units to ensure that the overall power conversion efficiency does not reduce the fan or pump capacity below that indicated.
- K. Efficiency Rating: Complete efficiency versus load and speed data for all VFD ratings shall be submitted and shall be no less than 95 percent at 100 percent speed and 87 percent at 60 percent speed.
- L. Factory Testing and Warranty: Each VFD shall be factory tested to insure reliability. Testing shall include component thermal cycling, logic system simulation tests and full load operation tests. The VFD shall be heat tested with power on for 50 hours at 120 degree F. The VFD shall be furnished with manufacturer's written certification of tests conducted.
- M. Diagnostic Features: The VFD shall contain diagnostics to allow on-site troubleshooting of fault conditions through built-in diagnostic indicators.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install material and equipment in accordance with details shown on the drawings, SUBMITTALS drawings and manufacturer's instructions.

3.2 VARIABLE FREQUENCY DRIVE

- A. Start-up Service: Provide the services of a factory-trained service technician during startup to ensure that the VFD units have been installed, programmed and wired correctly and that the factory recommended startup procedures are followed for each of the VFD units installed.
- B. Mounting: Floor mounted variable frequency drive units and isolation transformers shall be installed on housekeeping pads. Refer Section 15050.

3.3 WEATHER PROTECTION

- A. Wiring: All electrical wiring exposed to the weather or in damp locations shall be enclosed in weatherproof fittings as required in Division 16, ELECTRICAL.
- B. Enclosures: Enclosures for electrical equipment shall be NEMA 3R unless indicated otherwise.
- C. Pitch Pockets: Refer to paragraph entitled "PITCH POCKETS" in Section 15050.

END OF SECTION 15030