

## SECTION 23 84 13

### HUMIDIFIERS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Self-contained adiabatic humidifier.

##### 1.3 SUBMITTALS

- A. Compliance Review: In addition to the submittal requirements of this section, preorder bidders shall provide a Compliance Review of the Specifications and Addenda. The Compliance Review shall be a paragraph-by-paragraph review of the Specifications with the following information, "C", "D," or "E" marked in the margin of the original Specifications and any subsequent Addenda.
  - 1. "C": Comply with no exceptions.
  - 2. "D": Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
  - 3. "E": Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives.
  - 4. The notes associated with "D" and "E" responses shall be typewritten and submitted alongside the compliance review for review by the Design Professional.
  - 5. Unless a deviation or exception is specifically noted in the Compliance Review, it is assumed that the Bidder is in complete compliance with the plans and Specifications. Deviations or exceptions taken in cover letters, subsidiary documents, by omission or by contradiction do not release the Bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review submitted with the Bid.
- B. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections and the provisions of Division 23.
- C. Product data including rated capacities of selected models, operating characteristics, weights (shipping, installed and operating), furnished specialties and accessories.

- D. Shop drawings detailing fabrication and installation of humidifiers, including plans, elevations, sections, details of components, piping diagram, and attachments to other units of Work. Detail connections to water piping.
- E. Coordination drawings drawn accurately to scale and showing humidifiers and adjacent equipment. Submit with shop drawings. Show support locations, type of support and weight on each support.
- F. Wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring.
- G. Maintenance data for humidifiers to include in the operation and maintenance manual specified in Division 1. Include detailed manufacturer's instructions on startup, shutdown, troubleshooting, preventive maintenance and servicing. Include parts list and list of accessories.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm experienced in manufacturing humidifiers similar to those indicated for this Project and that has a record of successful in-service performance.
- B. Installed unit shall be CSA certified and / or UL listed.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with ARI 640, "Commercial and Industrial Humidifiers." Coordinate layout and installation of humidifiers with all other trades prior to installation.
  - 1. Revise locations and elevations as required to suit field conditions and to assure proper humidifier operation, and as approved by the Owner.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle humidifiers according to manufacturer's recommendations.
- B. Store humidifiers on elevated platforms in a dry location and protect from damage, dirt, and water.

### PART 2 - PRODUCTS

#### 2.1 SELF-CONTAINED HUMIDIFIERS

- A. Manufacturers: Subject to compliance with requirements, provide products by Munters the basis of design manufacturer:
  - 1. Munters.
  - 2. Air<sub>2</sub>O, an ICT Company.

3. Neptronic.

## 2.2 EVAPORATIVE MEDIA PAD HUMIDIFICATION SYSTEM

- A. General: Furnish and install complete, ready-to-operate, factory assembled Adiabatic Humidifier. The units must be certified according to U.L. standard 507. Listed and labeled by an independent testing lab such as U.L., ETL, or C.S.A.
- B. Cabinet Coatings and Construction:
  1. The unit cabinet shall be constructed of minimum 16 gauge corrosion resistant alloy.
  2. Water reservoir seams shall be continuously welded water tight as one complete assembly having double thickness at corners. In addition to a mechanically sealed reservoir, seams shall also be coated with a baked on 375 degrees F enamel or stainless steel.
  3. Unit top shall be mechanically sealed, rain tight with a 1/4" per foot pitch in order to prevent leaks into the conditioned space. The sealing of the top shall be accomplished without caulking or foam tape gaskets which are prone to deterioration. Any galvanized components shall be coated inside and out with electro-statically applied, at a minimum of 3 mil. Thickness, epoxy powder base paint, baked on at 375 degrees F.
  4. Provide the unit with a Hinged Access Door or Dedicated Removable Panel for access to major internal components for service.
- C. Fans and Motors:
  1. Blower Fan Type (Where Applicable): Adiabatic Humidifier units shall contain a forward curved or axial blower wheel rigidly constructed of galvanized steel or die-cast aluminum. Blower wheel shall be balanced for quiet operation and extended life. Blower Housing shall be Epoxy Powder Coated at a minimum 3 mils thick. Pulley shall be cast iron and shall have a split taper bushing.
  2. The fan shaft shall be solid galvanized steel and shall be seated to the blower pulley with a key and keyway. Bearings shall be greasable pillow block with an L50 life of 200,000 hours or extended life lubricated ball bearings.
  3. Motor design shall meet the requirements of the available electric service. Motors shall be copper wound, with ball bearings and a steel or cast iron frame. Motors larger than one horsepower shall be a rigid mount type for longevity in a vertical mount installation. Motors one horsepower or less shall have overload protection integral to the motor. Motors larger than one horsepower shall be factory provided with a remote overload protection device. Mounting plate for the motor must be 14 gauge, hot dip, G-90 galvanized steel or heavier.
  4. Direct drive motor.
- D. The fan of the unit shall be provided with a wire mesh screen, louver or other means of protecting internal components from damage as well as preventing inadvertent injury.
- E. The evaporative media shall be GLASdek U.L. 900 listed (or equivalent). The cross fluted design of the media should induce a highly turbulent mixing of air and water

for optimum heat and moisture transfer. The built-in angle in the media will continually direct the water into the entering air. Cooling efficiency shall be at minimum 80% in the 400-500 FPM velocity range in a typical 8" depth of GLASdek. Media shall be removable for servicing or replacement from the side of the unit through a factory provided access panel.

- F. Water shall be distributed to pads via large (min ¾" @ .113" wall thickness) diameter polyvinylchloride plastic conduit providing total saturation of media and durability during servicing. For minimal maintenance units shall utilize only one thermally protected re-circulating type pump with a centrifugal impeller. Make-up water shall be provided through one water level switch. Removable caps or cleanouts shall be provided at the end of each distribution header for maintenance access by the servicing personnel. Distribution caps shall be easily accessible without any cabinet disassembly.
- G. Drain: The drain shall be operated by a full port motorized valve based on user input, which will permit solid mineral particles to pass through the drain without being obstructed. Hot water skimming during fill cycle is not acceptable.
- H. Feed water: The supply water to the unit shall be controlled by a quiet solenoid valve. To conserve energy, any hot water skimming during normal FILL cycle is not acceptable. The humidifier shall have an air gap in the fill water line to prevent backflow of contaminated water into water supply system.

## 2.3 CONTROLS

- A. Provide factory wired, unit mounted, integral single point power connection including Supply Fan EC motor, fused disconnect, 24v low voltage control transformer, necessary fuses and control relays. Motor overload protection and short circuit protection must be sized unit specific and comply with NEC standards. Unit mounted integral control panel shall be tested and labeled in accordance with UL Standard 508.
- B. Provide factory installed electronic programmable microprocessor based controller, compatible with Modbus TCP/IP or RS485 and include optional BACnet interface for BACnet MS/TP or IP communication.
- C. Provide remote wall mounted high resolution HMI interface.
- D. Control sequence includes a batch drain cycle with user selectable interval based on site water quality.
- E. Provide leak detection for each unit to be installed within the drain pan (provided and installed by mechanical contractor) which will discontinue the respective unit fill and pump. Leak detection shall also be wired and programmed to sound an alarm at the front end of the BMS.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Label fans according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment." Install humidifiers as indicated, according to manufacturer's written instructions and ARI 640.
- B. Install piping adjacent to humidifiers to allow service and maintenance.
- C. Install shutoff valve, strainer, backflow preventer, and union in humidifier makeup line.
- D. Allow clearance for maintenance and service.
- E. Connect humidifier and components as indicated and instructed by manufacturer.
- F. Install piping from safety relief valves to nearest floor drain.
- G. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer.
- H. Ground electrically operated humidifiers and components.

### 3.2 CONNECTIONS

- A. Coordinate duct installations and specialty arrangements with schematics on Drawings and with requirements specified in duct systems. If Drawings are explicit enough, these requirements may be reduced or omitted.
- B. Install electrical devices and piping specialties furnished by manufacturer but not factory mounted.
- C. Install piping from safety relief valves to nearest floor drain.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductor and Cables."

### 3.3 FIELD QUALITY CONTROL

- A. Field Services: Mechanical Contractor to inspect components, assemblies and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
  3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.
- 3.4 DEMONSTRATION
- A. Mechanical Contractor to train owner's maintenance personnel to adjust, operate, and maintain centrifugal fans. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION