

SECTION 23 73 10 INDIRECT EVAPORATIVE COOLER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies air to air heat exchanger/indirect evaporative cooler.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- C. Section 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS
- D. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic requirements for non-structural equipment.
- E. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.
- F. Section 23 05 93, TESTING, ADJUSTING and BALANCING FOR HVAC: Requirements for testing, adjusting and balancing of HVAC system.
- G. Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS: Requirements for commissioning, systems readiness checklists, and training.
- H. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Requirements for controls and instrumentation.
- I. Section 23 21 13, HYDRONIC PIPING.
- J. Section 23 40 00, HVAC AIR CLEANING DEVICES: Requirements for filters used before heat recovery coils.
- K. Section 23 74 17, PACKAGE MODULAR CENTRAL AIR HANDLING UNITS.
- L. Section 23 82 16, AIR COILS: Requirements for run-around system coils.

1.3 QUALITY ASSURANCE

- A. Refer to GENERAL CONDITIONS.
- B. Refer to specification Section 01 00 00, GENERAL REQUIREMENTS for performance tests and instructions to VA personnel.

- C. Refer to paragraph QUALITY ASSURANCE in specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- D. Performance Criteria: Heat exchanging equipment shall be provided by a manufacturer who has been manufacturing such equipment and the equipment has a good track record for at least 3 years.
- E. Performance Test: In accordance with PART 3 of this specification.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Indirect evaporative cooler.
- C. Certificate: Submit, simultaneously with shop drawings, an evidence of satisfactory service of the equipment on three similar installations.
- D. Submit type, size, arrangement and performance details. Present application ratings in the form of tables, charts or curves.
- E. Provide installation, operating and maintenance instructions, in accordance with Article, INSTRUCTIONS, in Section 01 00 00, GENERAL REQUIREMENTS.
- F. Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air Conditioning, Heating, and Refrigeration Institute (AHRI)

AHRI 1060-2005 Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment
- C. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):

15-10 Safety Standard for Refrigeration Systems (ANSI)

52.1-92 Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter

- 52.2-07 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size
- 84-08 Method of Testing Air-to-Air Heat/Energy Exchangers
- D. American Society for Testing and materials (ASTM)
 - D635-10 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
 - E84-10 Standard Test Method for Surface Burning Characteristics of Building Materials
- E. American Society of Civil Engineers (ASCE)
 - ASCE 7-10 Minimum Design Loads for Buildings and Other Structures
- F. Underwriters Laboratories, Inc (UL)
 - 1812-2009 Standard for Ducted Heat Recovery Ventilators
 - 1815-2009 Standard for Nonducted Heat Recovery Ventilators

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Listed manufacturers subject to compliance with requirements.

- A. Manufacturers:
 - 1. Munters
 - 2. Westaire Engineering Inc.
 - 3. Engineered Air
 - 4. Approved Equal

2.2 POLYMER TUBE CROSS FLOW AIR-TO-AIR HEAT EXCHANGER/INDIRECT EVAPORATIVE COOLER

- A. Heat recovery section shall be an updraft air-to-air heat exchanger with the thermal performance characteristics and pressure drops as scheduled. Heat exchanger shall be sized to handle 100% of the supply and exhaust CFM. Heat exchangers sized for less than full flow shall not be approved:
 - 1. Horizontal tubes shall be used as the primary heat exchanger surface. Tubes shall be constructed of a corrosion resistant polymer with internally extruded ribbing for enhanced heat transfer. The polymer material shall be fire and smoke retardant, meeting UL94 V-O standards. The heat exchanger shall be tested and approved to UL 900 Class II. When sprayed for indirect evaporative cooling, water leakage from exhaust/scavenger side to supply side shall be less than 0.001 gallons per hour per 10,000 CFM of primary air.

2. Tubes shall be elastic in design, flexing slightly as exhaust/scavenger fans start/stop to facilitate shedding of dissolved solids buildup (applies to indirect cooling applications). Tube design must have a proven performance record for more than five years operating in hard water, arid conditions.
 3. All heat exchanger surfaces shall be non-metallic, suitable for continuous operation in temperatures up to 160°F. Polymer plate type heat exchangers shall not be approved due to their inability to flex and shed solids build-up. Aluminum or stainless steel plate-type or heat pipe heat exchangers will not be considered or approved as a substitute for the specified tubular heat exchanger.
- B. Heat exchanger shall have an integral spray manifold for indirect evaporative cooling and wash down, such that exhaust filters are not required. Spray manifold shall consist of PVC water distribution header and cooling tower clip-on type spray nozzles (easily removable for cleaning and maintenance). The water distribution system shall supply water equally to all tubes in the system. An all welded 16 ga. stainless steel drain pan shall be installed beneath heat exchanger to collect and route water to the common sump. Piping shall be in accordance with the detailed piping diagram shown on the plans:
1. Indirect spray pumps shall be submersible type, with epoxy coated cast iron motor housing, oil filled for lifetime lubrication and rapid heat dissipation. Pump shall have stainless steel screws, bolts, and handle, integral thermal overload protection, and mechanical shaft seal with stainless steel spring, nitrile parts, carbon and ceramic faces.
 2. Heat exchangers shall be tested in accordance with ASHRAE Standard 84-1991, "Method of Testing Air-to-Air Heat Exchangers", ARI Standard 1060, "Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment", and ANSI/ASHRAE Standard 143-2007 "Method of Test for Rating Indirect Evaporative Coolers. Independent laboratory test data must be supplied by the manufacturer, when requested by the consulting engineer, documenting the thermal effectiveness of the heat exchanger when operating in the heat recovery mode, and the wet bulb depression effectiveness when operating as an indirect evaporative cooler.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Follow the equipment manufacturer's instructions for handling and installation, and setting up of ductwork for makeup and exhaust air steamers for maximum efficiency.
- B. Seal against air modular handling unit casing tightly to avoid air leakage, per Section 23 74 17 PACKAGE MODULAR CENTRAL AIR HANDLING UNITS.
- C. Install units with adequate spacing and access for cleaning and maintenance of heat recovery coils as well as filters.

3.2 FIELD QUALITY CONTROL

- A. Operational Test: Perform tests as per manufacturer's written instructions for proper and safe operation of the heat recovery system.
 - 1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Adjust seals and purge.
 - 3. Test and adjust controls and safeties.
- B. Replace damaged and malfunctioning controls and equipment.
- C. Set initial temperature set points. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- D. Prepare test and inspection reports to the COR in accordance with specification Section 01 00 00, GENERAL REQUIREMENTS.

3.3 INSTRUCTIONS

- A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of heat recovery equipment.

3.4 STARTUP AND TESTING

- A. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the Resident Engineer and Commissioning Agent. Provide a minimum of 7 days prior notice.

3.5 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.6 DEMONSTRATION AND TRAINING

- A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.
- B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00 – COMMISSIONING OF HVAC SYSTEMS.

END OF SECTION 23 73 10