DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING
SECTION 23 XX XX
CHILLED WATER COMPUTER ROOM AIR-CONDITIONER

This guide specification is written in accordance with the Construction Specifications Institute (CSI) MasterFormat. This section must be carefully reviewed and edited by the architect or the engineer to meet the requirements of the project. Coordinate this section with other specification sections in the project manual and with the drawings. where reference is made throughout this section to "provide", "install", "submit", etc., it shall mean that the contractor, subcontractor, or contractor shall "provide", "install", submit", etc., unless otherwise indicated.

NOTE: User may edit, revise and remove text from this document as required to meet the project specifications.

PART 1 - GENERAL

1.1 SUMMARY

A. These specifications describe requirements for a mission critical environmental control system. The Data Cool™ system shall be designed to control temperature and humidity conditions in rooms containing electronic equipment, with good insulation and vapor barrier. The manufacturer shall design and furnish all equipment to be fully compatible with the heat dissipation requirements of the room.

B. This section addresses environmental control chilled water (CW) Computer Room Air Handling (CRAH) cooling equipment used to provide cooling for electronic equipment.

1.2 RELATED DOCUMENTS

A. Project plans, schedules, drawings and general provisions of the Contract as they apply to this Section.

B. ASHRAE Std. 52.2-1999, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particulate Size

1.3 DEFINITION

BMS: Building Management System

CRAH: Computer Room Air Handling

CW: Chilled Water

1.4 SUBMITTALS

A. Pre Delivery Submittals shall be provided with the proposal and shall include:
1. Product Data: For each type of product indicated include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories
2. Shop Drawings: Single-line diagrams; dimensional, capacity data; and piping.
3. Wiring Diagrams: For power, signal, and control wiring.
4. Specification Compliance with "C" Comply, "D" Deviation, or "N" Non-Compliant indicated for each paragraph, with appropriate notes and comments.

B. Post Delivery Submittal for record purposes shall include:
1. Operation and Maintenance Data: To include operation, and maintenance.
2. Warranty: Warranty statement for equipment provided.

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1.5 DESIGN REQUIREMENTS

A. The Data Cool™ chilled water CRAH based cooling equipment shall be a self-contained factory assembled, piped, wired and factory run tested prior to shipment.
   3. The unit shall be floor or wall mounted.
   4. The units shall have horizontal airflow delivery
   5. The total cooling capacity (total and sensible), entering air conditions, air flow and electrical power requirements shall be as detailed on the project plans and schedule.
   6. Net capacities shall include losses due to fan motor heat.
   7. Quantities and configurations as shown on the project drawings.
   8. Safety Certification: Units shall be ETL or UL listed.

1.6 PERFORMANCE REQUIREMENTS

A. The following specification describes the performance requirements for the chilled water Computer Room Air Handling (CRAH) based cooling equipment following the formal acceptance and throughout the life of the product.
   1. During the warranty and contract periods, the equipment must remain fully operational and available for use and meet the design requirements.
   2. The equipment provided should meet the capacity expectations stated in the project plans and schedule and continue to meet functional, reliability, and performance requirements of this contract after final acceptance
   3. In the event that the equipment fails to meet any requirements of this specification and the project plans and schedule after acceptance and during the warranty period, the manufacturer must take appropriate steps to correct the problem and bring the equipment back into compliance with the performance and reliability requirements at no cost to the buyer.

1.7 QUALITY ASSURANCE

A. The manufacturer shall define and manage a process necessary to ensure that product and/or service conforms to customer requirements. As a means of implementing and demonstrating the defined processes, establish a quality management system in accordance with ISO 9001International Standard.

B. Product Safety: Product shall comply with North American safety standards. Tested by one of the following and bearing label indicating conditions of use:
   1. Intertek (ETL Listed Mark)
   2. Underwriters Laboratories, Inc. (UL)

1.8 COORDINATION

A. Installing Contractor to coordinate installation of equipment with computer-room access flooring Installer.

B. Installing Contractor to coordinate installation of equipment with server and network cabinet Installer.

1.9 WARRANTY

A. Parts that fail during this period shall be repaired or a new part supplied by the manufacturer at no cost to the owner. Seller warrants its equipment to Buyer to be free from defects in material and workmanship for a period

of eighteen (18) months from date of shipment, as long as equipment is utilized under normal conditions and service and is properly installed.

B. Manufacturer's warranty shall be for parts only. Labor is not included

1.10 EXTRA MATERIALS ***(Consulting Engineer – Select Item as appropriate)***

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Filters: One (1) set of filters for each unit.

PART 2 – PRODUCT

2.1 CHILLED WATER COMPUTER ROOM AIR HANDLING UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers offering products that may be incorporated into the Work.

B. Basis-of-Design Product: Subject to compliance with requirements, provided product indicated on drawings or comparable product by one of the following:
   1. Data Aire, Inc.

C. DESCRIPTION: The Data Cool™ is an environmental control, chilled water (CW) Computer Room Air Handling (CRAH) unit designed specifically for use in small-computer or electronic equipment areas. It is a packaged system designed to utilize an existing chilled water loop. The unit shall provide a high sensible cooling system, self-contained, and shall be capable of humidifying, dehumidifying, and filtering air. Units shall be factory assembled, piped, wired and factory run tested prior to shipment. Provide quantities and configurations as shown on the project drawings.

D. CABINET AND FRAME
   1. Frame: Welded, braced for rigidity, and supporting other mechanical equipment and fittings. Constructed of 16 gauge welded tubular steel.
   2. Front: Removable fabricated steel panel with two (2) manually actuated via a hand tool door latches
   3. Side panels: Removable fabricated steel panel with 18-gauge steel sheet metal for superior sound attenuation.
   4. Insulation: Thermally and acoustically insulate cabinet interior lined with 1/4 inch thick, insulation.
   5. Finish of Exterior Surfaces: Powder coated with a heavy corrosion inhibiting finish for long life. The unit shall be coated the color selected from the manufacturers standard color selection chart.
   6. The electrical panel shall be hinged and swing out for servicing.
   7. A stainless steel drain pan shall be provided integral to the unit.

E. FILTER SECTION
   1. The filter chamber shall be an integral part of the system, designed within the front portion of the unit for easy accessibility.
   2. Filters shall be 2-inch deep, disposable, pleated design, extended-surface, nonwoven, reinforced synthetic fibers; supported and bonded to welded-wire grid; enclosed in cardboard frame design.
   3. An initial set of filters shall be factory installed in the unit.
   4. Rated not less than MERV 8 per ASHRAE Std. 52.2.

F. FAN SECTION

1. The supply fans shall be two (2) direct driven centrifugal type, double width, double inlet blowers and shall be statically and dynamically balanced at the factory as a complete assembly. The blower motor shall have dual shafts that drive the blowers on each end of the motor. The blower wheel shall be supported on a heavy steel shaft having self-aligning ball bearings.

G. HYDRONIC EVAPORATOR COOLING COIL
1. Arrangement: The chilled water cooling coil shall be vertically mounted to allow maximum coil surface in a small cabinet.
2. Coil: Shall be constructed of seamless copper tubes expanded into enhanced style aluminum fins for maximum heat transfer.
3. Face Velocity: Shall be less than 500 feet per minute (2.54 m/sec).
4. Maximum Working Pressure: Shall be 300 PSI (2068 kPa).
5. Drain Pan: Coil shall sit in a stainless steel drain pan sloped for drainage. A properly sized condensate drain trap shall be furnished by manufacturer and externally piped by the installing contractor.

H. ON/OFF CONTROL VALVE
1. Cooling Medium: Chilled Water.
2. Chilled water flow shall be controlled by a 2-way (3-way) ON/OFF control valve for temperature control and dehumidification. The programmable thermostat shall open and close the valve in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil.
3. The valve shall be designed for up to 20 PSI (138 kPa) water pressure.
4. Maximum pressure drop shall be as detailed on the project plans and schedule at design flow rate.

I. ELECTRICAL
1. All electrical components, including capacitors, contactors, relays and control transformers shall be pre-wired and contained in a hinged electrical box that shall swing out for easy access and servicing.
2. The control circuit voltage shall be 24 volts AC.
3. The input electrical power shall be single phase (1PH) and detailed on the project plans and schedule.
4. A factory installed micro-switch will disable the unit prior to condensate pan overflow should the drain become plugged with debris.
5. Units with the optional Mini-dap4 have a condensate pan high water level alarm standard.

J. CONTROLS
1. Precise temperature regulation shall be provided by a low profile programmable thermostat which provides 5/2 day temperature programming for cooling only (no reheat).
2. The easy to read full function LCD provides 12 or 24 hour clock display.

2.2 CAPACITIES AND CHARACTERISTICS

A. The quantity, capacity, and performance shall be as shown on the project plans and schedule.

2.3 ADDITIONAL REQUIREMENTS (Consulting Engineer – Select Items as appropriate)

A. Mini-dap4
1. The Mini-dap4™ offers the definite answer for precision environmental control with the fast and most advance controller with 50MHz, 32 bit microprocessor.

2. The controller system shall be comprised of three components – a wall mount display module, a combination remote wall mount temperature and humidity sensor and a unit mounted control module.
3. The wall mount display module shall include a backlit liquid crystal display (LCD) with six keys (buttons) for easy programming.
4. All settings and alarm conditions shall be displayed on the display module in easy read verbiage.
5. The control module shall be mounted on the unit and connected to the display module via a special "telephone like" cable which is included with the system.
6. A remote mounted temperature and humidity sensor is a separate wall mounted device which is to be mounted at the client's selected location in the controlled space. The combination temperature and humidity sensor is connected to the control module via separate wiring which is also included with the system.
7. The wall-mount display module will allow recall and display of the high and low temperature and high and low humidity for the last 24 hours; current percent of capacity and average percent of capacity for the last hour of operation for cool 1, reheat, humidification, dehumidification, component runtimes for fan motor, cooling stage, reheat, humidification, dehumidification.
8. Programming will have multi-level password and accomplished entirely from the front of the wall mount display module. Programmable functions shall be entered on flash memory to ensure program retention should power fail.
9. The historical database shall be maintained by rechargeable battery backup.
10. Multiple messages shall be displayed by automatically by scrolling from each message to the next. Alarm conditions shall be displayed by automatically scrolling from each message to the next. Alarm conditions, in addition to being displayed, shall enunciate an audible alarm.
11. A programmable summary contact shall be available for remote alarm monitoring.
12. Additional test or service terminal shall not be required for any functions.
13. The control shall include temperature anticipation, moisture level humidity control.
14. In addition, the Mini-dap4™ control panel shall support the following network protocols for integration with a Building Management System (BMS) for system monitoring and control: Modbus RTU, Modbus TCP/IP, SNMPv1/v2, BACnet IP or BACnet MS/TP and LonTalks. Unit(s) shall be furnished with an optional interface card to communicate directly with the BMS through a RS-485, Ethernet or LonTalks port.
15. All alarms, set points, and operating parameters that are accessible from the control panel shall also be made available through the BMS.

B. HIGH PRESSURE ON/OFF CONTROL VALVE
1. Cooling Medium: Chilled Water.
2. Chilled water flow shall be controlled by a 2-way ON/OFF control valve for temperature control and dehumidification. The programmable thermostat shall open and close the valve in response to room conditions.
3. The valve shall be designed for up to 75 PSI (517 kPa) water pressure.

C. MODULATING CONTROL VALVE
1. Cooling Medium: Chilled Water.
2. Chilled water flow shall be controlled by a 3-way (2-way) modulating control valve with characterized flow disk for accurate temperature control and dehumidification. The microprocessor shall positions the valve in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil.
3. The valve shall be designed for up to 400 PSI (2758 kPa) water pressure.
4. Maximum pressure drop shall be as detailed on the project plans and schedule at design flow rate.

D. STEAM GENERATOR HUMIDIFIER

1. The unit shall be provided with a self-contained, microprocessor-controlled steam generator type humidifier. The steam generating humidifier shall use disposable cylinder type with electronic controls.
2. The capacity shall be 5 pounds per hour. Power consumption shall be 1.7 kW or less.
3. The humidifier shall discharge pure steam with no material dust carry-over and have a self-regulating automatic flush cycle. Cylinders shall be disposable not requiring cleaning or maintenance. The humidifier fill level, water conductivity and flush rate shall automatically adapt, both in frequency and duration, to variations in the incoming water.
4. Fully modulating to provide gradual 0 to 100 percent capacity with field-adjustable maximum capacity; with high-water probe.
5. Drain duration and drain interval shall be field-adjustable.
6. Humidifiers using an open reservoir in the air stream are not acceptable.
7. Units with steam generator humidifier shall require the Mini-dap4 controller.

E. ELECTRIC REHEAT
1. The reheat shall be of the finned enclosed, sheath type, fabricated of stainless steel core sheath with plated fins to withstand moist conditions.
2. The reheat shall be installed on the air discharge side of the cooling coil, shall have a single stage and provide 2kW or 4kW of capacity.
3. The reheat shall be capable of maintaining room dry bulb conditions when the system is calling for dehumidification.
4. The reheat section shall include safety switches to protect the system from overheating.

F. DISCONNECT SWITCH:
1. The unit shall include a non-automatic disconnect switch mounted in the high voltage section of the electrical panel.
2. The operating mechanism shall prevent access to the high voltage electrical components until switched to the "OFF" position.
3. The operating mechanism shall protrude through the electrical panel and be lockable in the off position.

G. CONDENSATE PUMP
1. Units shall be provided with dual float external condensate pump. If condensate pump fails control panel shall enunciate an alarm and display "High Condensate Water Level".
2. The pump shall be rated for 25 gallons/hour at 15 feet of head.
3. Pumps shall include sump, motor, and automatic control.
4. The condensate pump will be shipped loose.
5. A factory installed high condensate water level alarm switch will disable the unit prior to condensate pan overflow should the drain become plugged with debris.
6. The audio alarm is activated and a “HIGH CONDENSATE WATER LEVEL” message shall be displayed on the display module.

H. CABLE TYPE WATER DETECTION SENSOR
1. Units shall be provided with cable type water detection system designed to detect the presence of water anywhere along the cable.
2. Cable shall be mounted on the floor under the unit. Sufficient length of cable shall be supplied to completely surround the perimeter of the unit so that water coming from anywhere within the unit will not escape detection.
3. When an alarm is detected, the controller shall display "WATER UNDER FLOOR".
4. Additionally, three adjustable action settings shall be available when an alarm is detected: Alarm only, shutdown unit or lockout compressor.

I. DIRTY FILTER ALARM
   1. A filter differential switch for alarm activation shall be included.

J. SMOKE DETECTOR
   1. Unit shall be provided with a smoke detector.
   2. The smoke detector shall be mounted with the sensing element in the return air stream.
   3. When the smoke detector is activated, it shall immediately shut down the unit.

K. EXTENDED COMPRESSOR WARRANTY
   1. Provide an additional two-year or four-year extended compressor warranty.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor to examine the areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for hydronic piping systems to verify actual locations of piping connections before equipment installation.

C. Examine walls, floors, and roofs for suitable conditions where equipment will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install precision cooling units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

B. Install in conjunction with server cabinets for integrated line up of equipment.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Piping Connections: Connect equipment furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor. Install piping to allow proper service and maintenance.

C. Electrical Wiring: Install and connect electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's electrical connection diagram submittal to electrical contractor.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Inspect for and remove shipping bolts, blocks, and tie-down straps.
   2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
   3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   5. The equipment shall be considered defective if they do not pass tests and inspections.
   6. Prepare test and inspection reports.
   7. After startup service and performance test, change filters and flush humidifier (if applicable).

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the equipment. Training shall be conducted concurrent with startup of the equipment.

--- END OF SECTION ---