

SECTION 23 81 46

WATER-SOURCE UNITARY HEAT PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes unitary heat pumps with refrigerant-to-water heat exchangers, refrigeration circuits, and refrigerant compressor(s).

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each water-source unitary heat pump.
 - 2. Include rated capacities, operating characteristics, furnished specialties, and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's warranty.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of water-source unitary heat pumps that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, refrigeration components.
 - 2. Warranty Period: Four years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. ASHRAE Compliance:

1. ASHRAE 15.
- B. Comply with NFPA 70.
- C. Comply with safety requirements in UL 484 for assembly of free-delivery, water-source heat pumps.

2.2 WATER-SOURCE UNITARY HEAT PUMPS, 6 TONS AND SMALLER

- A. Description: Packaged water-source unitary heat pump with temperature controls; factory assembled, piped, wired, tested, and rated according to ASHRAE/ARI/ISO-13256-1.
 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Cabinet and Chassis: Galvanized-steel casing with the following features:
 1. Access panel for access and maintenance of internal components.
 2. Knockouts for electrical and piping connections.
 3. Cabinet Insulation: Glass-fiber liner, minimum , 3/4 inch thick, complying with UL 181, ASTM C 1071, and ASTM G 21.
- C. Water Circuits:
 1. Refrigerant-to-Water Heat Exchangers:
 - a. Source-side coaxial heat exchangers with copper water tube, with enhanced heat-transfer surfaces inside a steel shell; both shell and tube are leak tested to 450 psig on refrigerant side and 400 psig on water side.
- D. Refrigerant Circuit Components:
 1. Sealed Refrigerant Circuit: Charge with R-410A refrigerant.
 2. Charging Connections: Service fittings on suction and liquid for charging and testing on each circuit.
 3. Reversing Valve: Four-way, solenoid-activated valve designed to be fail-safe in heating position with replaceable magnetic coil.
 4. Compressor:
 - a. Scroll.
 - b. Variable speed.
 - c. Installed on vibration isolators and mounted on a structural steel base plate and full-length channel stiffeners.
 - d. Exterior of compressor shall be wrapped with a high-density sound-attenuating blanket and housed in an acoustically treated enclosure.
 - e. Factory-Installed Safeties:
 - 1) High-pressure cutout.
 - 2) Low-pressure cutout or loss of charge switch.
 - 3) Internal thermal-overload protection.

- 4) Freezestat to stop compressor if water-loop temperature in refrigerant-to-water heat exchanger falls below 35 deg F .
- 5) Water-coil, low-temperature switch.
5. Refrigerant Piping Materials: ASTM B 743 copper tube with wrought-copper fittings and brazed joints.
6. Pipe Insulation: Refrigerant minimum 3/8-inch- thick, flexible elastomeric insulation on piping exposed to airflow through the unit. Maximum 25/50 flame-spread/smoke-developed indexes according to ASTM E 84.
7. Refrigerant Metering Device: Thermal-expansion valve.
- E. Controls: Control equipment and sequence of operation are indicated on the drawings, and are specified in Section 23 09 50, "Building Automation System (BAS) General."
- F. Electrical Connection: Single electrical connection.

2.3 ACCESSORIES

- A. Hose Kits: Tag hose kits to equipment designations.
 1. Minimum Working Pressure: 400 psig.
 2. Operating Temperatures: From 33 to 211 deg F.
 3. Hose Length: 24 inches .
 4. Minimum Hose Diameter: Equal to water-source unitary heat-pump piping connection.
 5. Hose Material: Braided stainless steel with adapters for pipe connections.
 6. Isolation Valves: Two-piece, bronze-body ball valves with stainless-steel ball and stem, standard-port threaded connections, and galvanized-steel lever handle. Valves shall be factory installed on supply and return connections of both load-side and source-side heat exchangers. If balancing valve is combination shutoff type with memory stop, the isolation valve may be omitted on the return.
 7. Strainer: Y-pattern with blowdown valve in supply connections of both load and source side of heat exchangers.
 8. Balancing Valves: Mount in return connection. Include meter ports to allow flow measurement with differential pressure gage.
 - a. Manual, calibrated-orifice balancing valve with memory stop.
 - b. Manual, venturi-type balancing valve with memory stop.
 9. Water-Regulating Valve Assemblies: A direct acting valve regulates discharge pressure during the cooling cycle, and a reverse acting valve regulates the suction pressure during the heating cycle. Valves shall close when heat-pump compressor is not running.
 10. Motorized Water Valve: Stop water flow through the unit when compressor is off. Slow-acting, 24-V dc valve with threaded connections is installed between isolation valves and heat exchanger.
- B. Hose Kit Assemblies:
 1. Minimum Working Pressure: 400-psig.
 2. Operating Temperatures: From 33 to 211 deg F.
 3. Hose Length: 24 inches .
 4. Minimum Hose Diameter: Equal to water-source unitary heat-pump piping connection.
 5. Hose Material: Braided stainless steel with adapters for pipe connections.

6. Supply hose having Y-pattern strainer with blowdown valve and ball valve with pressure-temperature port; return hose having automatic flow regulator with pressure-temperature ports and ball valve.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping and electric installations for water-source unitary heat pumps to verify actual locations of piping connections and electrical conduits before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Suspend water-source, unitary heat pumps from structure with all-thread hanger rods and elastomeric hangers. Hanger rods and attachments to structure are specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment." Vibration hangers are specified in Section 23 05 48.13 "Vibration Controls for HVAC."

3.3 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
 1. Connect supply and return hydronic piping to heat pump with hose kits.
- B. Install electrical devices furnished by manufacturer but not specified to be factory mounted.
- C. Install piping adjacent to machine to allow space for service and maintenance.

3.4 STARTUP SERVICE

- A. Perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.
 2. Inspect for visible damage to unit casing.
 3. Inspect for visible damage to compressor and coils.
 4. Inspect internal insulation.
 5. Verify that labels are clearly visible.
 6. Verify that clearances have been provided for servicing.
 7. Verify that controls are connected and operable.

8. Adjust vibration isolators.
9. Start unit according to manufacturer's written instructions.
10. Complete startup sheets and attach copy with Contractor's startup report.
11. Inspect and record performance of interlocks and protective devices; verify sequences.
12. Operate unit for an initial period as recommended or required by manufacturer.
13. Verify thermostat calibration.
14. Inspect controls for correct sequencing of heating, refrigeration, and normal and emergency shutdown.

3.5 ADJUSTING

- A. Adjust initial temperature set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 23 81 46

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