

Part 1 General

1.1 Reference standards

- .1 Air-Conditioning, Heating and Refrigeration Institute (AHRI)
 - .1 AHRI-550/590-03, Performance Rating of Water Chilling Packages Using the Vapor Compression Cycle.
- .2 ASTM International (ASTM)
 - .1 ASTM C547-07e1, Standard Specification for Mineral Fiber Pipe Insulation.
- .3 CSA Group (CSA)
 - .1 CSA B52-05 SMART, Mechanical Refrigeration Code.
- .4 Environment Canada/Environmental Protection Services (EPS)
 - .1 EPS 1/RA/2-1996, Environmental Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems.

1.2 Action and informational submittals

- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for water chillers and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit in accordance with Section 01 33 00 - Submittal Procedures
 - .2 Indicate:
 - .1 Equipment including connections, piping and fittings, valves, strainers, control assemblies and ancillaries, identifying factory and field assembled.
 - .2 Wiring as assembled and schematics.
 - .3 Dimensions, construction details, recommended installation and support, mounting bolt hole sizes and locations and point loads.
 - .4 Space requirements for operation and maintenance.
 - .5 Type of refrigerant used.

1.3 Closeout submittals

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for water chillers for incorporation into manual.
- .3 Data to include:
 - .1 Description of equipment giving manufacturers name, model type and, capacity and serial numbers.
 - .2 Submit part load performance curves.
 - .3 Details on operation servicing and maintenance.
 - .4 Recommended spare parts list.

1.4 Delivery, storage, and handling

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect water chillers from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 General

- .1 Water-cooled chillers, CH-1A,B are to come complete with compressor; evaporator; motor and motor starters; water-cooled condenser; controls; control centre; piping; wiring; refrigeration; floor mounted on concrete pads, ready to connect to system chilled water piping; cooling water ; external control circuitry and electrical power source.
 - .1 Both units are to have a reclaim condenser, cooling tower condenser and an evaporator.
- .2 Both units to fit within: 5000 mm x 1524 mm

2.2 Capacity

- .1 Certified ratings based on AHRI 550:
 - .1 Source Side
 - .1 Source side to heat 25 l/s from 35 C to 41 C
 - .2 Fouling Factor: 0.000044 m²K/W
 - .3 Maximum Pressure Drop: 37.6 kPa
 - .2 System Side
 - .1 System side to cool 14.5 l/s from 14 C to 7 C
 - .2 Fouling Factor: 0.000018 m²K/W
 - .3 Maximum Pressure Drop: 14.5 kPa
 - .3 Heat Recovery
 - .1 Heat recovery to recovery 24 l/s from 35 C to 41 C
 - .2 Fouling Factor: 0.000018 m²K/W
 - .3 Maximum Pressure Drop: 34.1 kPa
 - .4 Cooling Capacity: 461 kW per unit
 - .5 Electrical Requirements: 600 V, 3 ph, 60 hz, maximum breaker size: 250 amps, Input Power: 112 kW
 - .6 Refrigerant: R410A.

2.3 Compressors

- .1 Unit: Direct drive, hermetic, fixed compression, scroll motor-compressor with control panel
- .2 Features: Centrifugal oil pump, sump oil heater, oil level sight glass, oil charging valve, two point lubrication for each motor bearing, flooded lubrication for journal and thrust bearings, check valve on scroll discharge port.
- .3 Motor: Suction gas-cooled, hermetically sealed, squirrel cage induction.
- .4 Automatic Capacity Reduction: Electronic logic controller and air temperature sensor controls unit and hot gas bypass regulator valve.
- .5 Design: Refrigerant circuit data
 - .1 Driver: on-off
 - .2 Compressor type: scroll
 - .3 Minimum number of compressors: 4
 - .4 Minimum number of cooling circuit: 2

2.4 Evaporator and condenser

- .1 Labelling: to CSA B52 and provincial requirements.
- .2 Unit to have reclaim condenser, cooling condenser and evaporator.
- .3 Evaporator condenser and water boxes shall be designed for 1 1/2 times working pressure but not less than 1 MPa on water side.
 - .1 Design refrigerant side for working pressure suitable for refrigerant used and leak tested using refrigerant trace gas.
- .4 Water circuit design
 - .1 Exchanger: Plate
 - .2 Number of exchanger: 1
 - .3 Connection Type: Grooved Joints
 - .4 Water Connections: 76mm or 102 mm

2.5 Refrigerant piping

- .1 Refrigerant piping, valves, fittings and related parts: to CSA B52 include:
 - .1 Thermal expansion valve.
 - .2 Suction and discharge regulators.
 - .3 Combination filter/dryer complete with replaceable core.
 - .4 Solenoid stop valves.
 - .5 Liquid sight glasses complete with moisture indicator.
 - .6 High side pressure relief device.
- .2 Comply with requirements of EPS 1/RA/2.

2.6 Control panel

- .1 To EEMAC standard and include:
 - .1 Safety controls with cutout, indicator lights and manual reset and contacts for an alarm to include:

- .1 High condenser pressure.
- .2 Low oil pressure.
- .3 High oil temperature.
- .4 High hermetic motor temperature.
- .5 High discharge temperature.
- .6 Motor over current.
- .7 Low evaporator temperature.

- .2 Operating controls with in-operation indicator lights to include:
 - .1 Start-stop switch.
 - .2 Anti-recycle 30 minute time delay.
 - .3 Low chilled water temperature cutout and automatic reset.
 - .4 Oil heater signal light; manual reset power failure and signal light.
 - .5 Chilled water flow interruption light meter to indicate number of compressor starts and elapsed running time.
 - .6 Adjustable water temperature set point on controller.
 - .7 Demand limit switch permitting selection of maximum motor load between 40 and 100% of full load.
 - .8 90 mm dial pressure gauges for condenser, evaporator, oil pressure.
 - .9 Interlock terminals.

- .3 Alarm for refrigerant leakage.

2.7 Accessories

- .1 Provide thermometer wells for liquid refrigerant condensing and evaporating temperatures.
- .2 Sight glasses for monitoring refrigerant charge level, and oil charge level.

Part 3 Execution

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for water chiller installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Application

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 Installation

- .1 Provide appropriate protection apparatus.
- .2 Install unit as indicated, to manufacturer's recommendations, and in accordance with EPS1/RA/2.
- .3 Ensure adequate clearances for servicing and maintenance.
- .4 Manufacturer to approve installation, to supervise start up and to instruct operators.
 - .1 Include 3 days minimum per unit.

3.4 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 Protection

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by water chiller installation.

Ω End of Section