

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- .2 Section 23 21 23 - Hydronic Pumps.

1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- .1 Anchor bolts: size anchor bolts to withstand seismic acceleration and velocity forces as defined in Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A48/A48M-03(2012), Standard Specification for Gray Iron Castings.
 - .2 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A153/A153M-09, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .4 ASTM B117-11, Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - .5 ASTM C67-14, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - .6 ASTM D520-00(2011) Standard Specification for Zinc Dust Pigment.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA B52-13, Mechanical Refrigeration Code.
- .3 Cooling Technology Institute (CTI)
 - .1 CTI-ATC-105-ATC (00), CIT Code Tower Standard Specifications for Acceptance Test Code for Water Cooling Towers.
 - .2 CTI-STD-201-11, Standard for the Certification of Commercial Water Cooling Tower Thermal Performance.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Underwriters Laboratories' of Canada (ULC)
 - .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .6 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA MG 1-2011, Motors and Generators.

1.4 PERFORMANCE REQUIREMENTS

- .1 Performance certified in accordance with CTI-STD-201.
- .2 Fluid cooler:
 - .1 Capacity: as indicated.

- .2 Pressure drop and operating characteristics: as indicated.

1.5 DIMENSIONAL CONSTRAINTS

- .1 Fluid cooler (FC-01 and FC-02):
 - .1 Width: 2350 mm max. including electrical and controls enclosure.
 - .2 Length: 5652 mm max.
 - .3 Electrical and controls enclosure: as indicated or on same end as piping connections.
 - .4 Weight: 1272 kg (dry) max.
 - .5 Height: as indicated.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 10 – General Instructions. Include product characteristics, performance criteria, and limitations.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 00 10 – General Instructions.
 - .2 Indicate:
 - .1 Connections, piping, fittings, valves, strainers, control assemblies and ancillaries, identifying factory and field assembled.
 - .2 Wiring as assembled and schematically.
 - .3 Dimensions, construction details, recommended installation and support, mounting bolt hole sizes and locations and point loads.
 - .4 Vibration and seismic control measures.
 - .5 Manufacturers recommended clearances.
- .3 Quality assurance submittals: submit following in accordance with Section 01 00 10 – General Instructions.
 - .1 Test reports:
 - .1 Submit certified test reports for closed circuit coolers from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.
 - .4 Manufacturer's Field Reports: manufacturer's field reports specified.
- .4 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 00 10 – General Instructions.
 - .2 Include:
 - .1 Description of equipment giving manufacturers name, type, model year, capacity.

- .2 Start-up and commissioning procedures.
- .3 Details of operation, servicing and maintenance.
- .4 Recommended spare parts list.
- .5 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 00 10 – General Instructions.
- .2 Storage and Protection:
 - .1 Store materials in dry location.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .3 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

1.8 MAINTENANCE

- .1 Extra Materials:
 - .1 Include with data complete list of parts and supplies, source of supply, recommended spare parts list for 1 year of operation, and list of parts recommended by manufacturer to be replaced on routine basis.

Part 2 Products

2.1 GENERAL

- .1 Factory assembled forced draft vertical discharge closed circuit cooler.
- .2 Ensure major fans, and motors have manufacturer's name, address, style, model, serial number, catalog number on plate secured to item of equipment.
- .3 Plates: durable and legible throughout equipment life and made of stainless steel.
- .4 Fix plates in prominent locations with nonferrous screws or bolts.

2.2 SIZE AND WEIGHT

- .1 Fluid cooler (FC-01 and FC-02):
 - .1 Width: 2350 mm max. including electrical and controls enclosure.
 - .2 Length: 5652 mm max.
 - .3 Electrical and controls enclosure: as indicated or on same end as piping connections.
 - .4 Weight: 1272 kg (dry) max.
 - .5 Height: as indicated.

2.3 MATERIALS

- .1 Steel: components fabricated of zinc-coated steel not lighter than 1.5 mm thick steel, protected against corrosion by zinc coating.
 - .1 Zinc coating: to ASTM A153/A153M and ASTM A123/A123M, with extra heavy coating of not less than 0.76 kg per square meter of surface.
 - .2 Coat galvanized surfaces damaged due to welding with zinc rich coating conforming to ASTM D520, Type 1.
- .2 Fibre glass reinforced plastic, (FRP) components: inert, corrosion resistant, and fire-retardant with thickness of 3.66 kg/square meter.
- .3 Polyvinyl chloride, (PVC) with flame spread rating of 10, smoke developed of 25, to CAN/ULC-S102.
- .4 Stainless steel: type 304.
- .5 Plastic: polypropylene.
- .6 Hardware: zinc-coated steel.
 - .1 Bolts: provided with cadmium-plated steel washers under heads.
 - .2 Hardware: meet salt-spray fog test as defined by ASTM B117.

2.4 CASING AND FRAMEWORK

- .1 Materials: galvanized steel sheet, angles and channels.
- .2 Structure: designed for wind loads of 1.45 kN/m² on projected area and transmission of loads to anchorage.
 - .1 Include 15 % increased loading for ice or snow load.
- .3 Access panels: on one end wall or side as indicated for servicing and maintenance.
- .4 Provide straight-rung ladders of standard design, starting at platform level and extending as high as required to gain access to fan decks.
 - .1 Stairways and ladders: hot-dip, zinc-coated steel.

2.5 COIL SECTION

- .1 Tube bundle: copper, type M, isolated from steel support with poly propylene spacers or steel tubing and supporting steel framework, hot-dip galvanized after fabrication.
- .2 Factory test to 2.4 MPa under water.
- .3 Coil pressure drop: as indicated.

2.6 FAN

- .1 Direct drive axial fan with swept wing.
- .2 850 RPM quiet low speed fan motors with male electrical plug, moisture slinger, and rainshield.

2.7 ACCESSORIES

- .1 Factory installed motor contactors, with 24V coils.

2.8 VIBRATION ISOLATORS

- .1 To Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

Part 3 Execution**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 GENERAL

- .1 Coordinate electrician and controls contractor as one conductor of the main feeder to each fluid cooler must be wired through a current sensor. This will be provided by Division 25 and installed by Division 26.
- .2 Mount on structural supports as indicated and to manufacturer's recommendations.
- .3 Manufacturers field service representative to approve installation, to supervise start up and to instruct operators.

3.3 ADJUSTING

- .1 Lubricate bearings with oil or grease as recommended by manufacturer.
- .2 Tighten belts to manufacturer's specified tension.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 00 10 – General Instructions.
- .2 Wipe equipment clean, and remove traces of oil, dust, dirt, or paint spots.
- .3 Maintain system in clean condition until final acceptance.
- .4 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION