

## CHILLERS

### DESIGN GUIDELINES

1. General: This section is for packaged water cooled chillers.
2. Location and Layout Requirements
  - a. Chillers shall be located at grade or basement level on an exterior wall for easy replacement without disassembling the chiller or without removing ductwork or piping.
    - Chillers located at grade shall have an overhead door, removable louver, or removable panel.
    - Chillers located below grade shall have an area way.
    - Chillers installed at slab on grade shall be installed on a neoprene pad.
    - Chiller pad shall be reinforced and doweled to the floor to withstand seismic forces.
    - Chiller attachment to the pad shall withstand seismic forces.
    - The drawings shall indicate the specific requirements, including snubber size, anchor bolt size, embedment depths, edge distance requirements, anchor spacing requirements.
  - b. Chiller layout shall be arranged to facilitate chiller maintenance.
  - c. Piping shall be arranged so that the service valves can be closed and the piping and specialties between the service valves and chiller can be removed for servicing and to allow clear access to the water boxes for removal as required.
  - d. Flanges or Victaulic couplings shall be located to allow removal of a minimal amount of piping to clean the chiller tubes. Where chiller connection sizes are smaller/larger than the line sizes associated with the system piping, a reducer/increaser shall be installed immediately at the chiller flanges to adapt to the indicated line size.
  - e. All specialties and service valves associated with the chiller shall be line size, and not chiller connection size.
  - f. Head room and piping layout shall allow removal of the chiller compressor and motor with an A frame hoist.
3. Loop Chillers
  - a. Life cycle bidding is the preferred method of purchasing Loop chillers. Life cycle cost should be based on 7 years of expected energy consumption for the chiller and auxiliaries.
  - b. Selections shall meet the following criteria:
    - Centrifugal compressor.
    - High Efficiency, complies with ASHRAE 90.1
    - HCFC-123 or HFC-134a refrigerant.
    - 44°F leaving water temperature, fouling factor 0.00025.
    - 85°F entering condenser water, fouling factor 0.0005.

- Evaporator flow based on a 12°F  $\Delta T$ .
  - c. Pipe refrigerant rupture disk and refrigerant relief valve in series to minimize charge loss on an over pressure condition.
  - d. A pressure switch shall be located between the two devices to indicate a ruptured disk.
4. Process Chiller
- a. Selections shall meet the following criteria:
    - Scroll or screw compressor.
    - HFC-134a, HFC-407c refrigerant.
    - Evaporator fouling factor 0.00025.
    - Air cooled condensers selected at 105°F ambient for summer operation.
    - Air cooled condensers selected at 0°F ambient for winter operation.
    - 85°F entering condenser water, fouling factor 0.0005.
5. Refrigerant relief piping shall be copper or steel with a braided flexible connector at the chiller connection.
6. Provide an electric kW meter with each chiller. In general the chiller should be metered at the S kV load switch in lieu of the chiller starter.
7. Specifications
- a. Specify that chiller manufacturer controls be Johnson Controls N2 compatible or the manufacturer shall provide a gateway to the Johnson Controls system. The manufacturer shall include the cost of field programming and mapping the gateway points.
  - b. Include temperature control point to monitor the pressure switch between the refrigerant rupture disk and relief valve.
  - c. Specify that the chiller condenser water tubes be Eddy Current tested, at the job site after installation, and that the test data be submitted to the Owner.
  - d. Specify that the chiller warranty be five (5) years from Substantial Completion.
  - e. Specify Contractor to adjust set point for electronic flow switches.
8. Refrigerant Sensors
- a. Provide a refrigerant sensor on each side of the chiller.
  - b. Chillers next to each other may share a common sensor if the refrigerants are the same.
9. Exhaust
- a. Shall be ducted down to 12 inches above the mechanical room floor.
  - b. Exhaust duct and makeup air inlet shall be located to "sweep" the room across the chiller.
10. DDC Controls
- a. Provide an interposing relay on the high alarm contact to:
    - Start the exhaust fan, output to the DOC

- Shut down any boilers in the same equipment room.
- These functions shall be hardwired and shall be shown on the electrical drawings.
- b. Shall monitor the following:
  - low alarm level contact
  - high alarm level contact.

#### EQUIPMENT and PRODUCT REQUIREMENTS

##### 1. Chiller Manufacturers

###### a. Centrifugal Loop Chillers

- Trane
- York
- Carrier.

###### b. Process Chillers

- Trane
- York
- Carrier
- Diakin.

###### c. Electronic Flow Switches

- Ameritrol, Inc. model FM-0750-voltage-02-S.

##### 2. Refrigerant Monitoring Systems

- a. Genesis International, Sherlock 2-series, no substitutions allowed.
- b. Infrared (IR) sensor technology. It shall accurately provide sensing down to 1 part per million (ppm).
- c. Alarm Levels:
  - First level of alarm shall be set at 100 ppm.
  - Second level of alarm shall be set at the TLATWA level of 1000 pm.
- d. R-123 Alarm Levels:
  - First level of alarm shall be set at 20 ppm.
  - Second level of alarm shall be set at the TLATWA level of 30 pm.

END OF SECTION

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