

## PUMPS - STEAM CONDENSATE

### DESIGN GUIDELINES

1. Summary
  - a. Section includes steam condensate pumps.
2. Design
  - a. Steam condensate pumps shall be electric driven. Steam pressure driven pumps shall be approved only by WUSM Project Manager.
  - b. Condensate receivers shall be vented to outside the building. Under no circumstance shall condensate receivers be vented to an interior space. Vents shall be routed separately to the exterior. No other piping or vents are allowed to tie into the receiver vent.
  - c. Building wide condensate return pumps shall be furnished with condensate receivers elevated above condensate pumps to provide for adequate net positive suction head. Condensate shall be configured to gravity drain to the condensate receiver. For the purposes of keeping building heat exchangers at a reasonable height, designers are encouraged to locate building condensate pumps in an open condensate pit or to locate heat exchangers overhead and provide an access platform.
  - d. If condensate pumps are located in a pit, provide a drain in the pit.
  - e. Building wide condensate return pumps shall be provided with a primary and standby pump.
  - f. Provide auxiliary contact for high level alarm to interface with building DDC system.
  - g. Steam powered traps are not allowable.
  - h. Sight glass shall be provided at condensate tanks.
  - i. Pump seals shall be rated for 250°F. Seals rated for maximum of 200°F are not allowable.
  - j. Separate drain shall be routed from condensate tank to floor drain.
  - k. A flush line for pump that is routed from the pump to the tank shall have a ¼ turn ball valve with a union for shutoff and pump isolation. The flush line shall be installed in rigid piping. Flexible piping is not allowed.
  - l. Discharge pressure rating of pumps to be verified. Confirm pressure of tie in location and piping pressure where tying in and verify pumps are rated for tie in pressure plus piping loss, plus vertical rise.
  - m. Include balance valves on discharge of pumps. Plug valves with pressure gauges may be used for balancing purposes. Pressure gauges shall meet standards as listed in separate section.
  - n. Pumps shall be located in a Mechanical room. Do not locate equipment above ceilings or in a room other than a space designed for heat or noise producing mechanical equipment.
  - o. All overflow and drains from receiver tanks shall have tempering valves.
3. Related Sections
  - a. Piping and Valves – Steam
  - b. DDC Controls

EQUIPMENT and PRODUCT REQUIREMENTS

1. Approved Manufacturers
  - a. Domestic pump by Bell and Gossett
  - b. Other manufacturers allowable only by approval through WUSM Facilities.
2. Single-Stage, Centrifugal Pumps With Floor Mounted Receiver
  - a. Description: Factory-fabricated, packaged, electric-driven pumps; with receiver, pumps, controls, and accessories suitable for operation with steam condensate.
    - 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.
    - ASME Compliance: Fabricate and label steam condensate receivers to comply with ASME Boiler and Pressure Vessel Code: Section VIU, Division I.
  - b. Configuration: Duplex floor-mounted pump with receiver and float switches; rated to pump 250 deg F steam condensate.
  - c. Receiver:
    - Floor mounted.
    - Close-grained cast iron or stainless steel.
    - Externally adjustable float switches.
    - Flanges for pump mounting.
    - Water-level gauge
    - Dial thermometer.
    - Pressure gauges at pump discharge. Provide gauges with pigtail, nipple and gauge cock. Include snubbers prior to gauge for protection of gauges and eliminate premature failure.
    - Bronze fitting isolation valve between pump and receiver.
    - Lifting eyebolts.
    - Inlet vent and an overflow.
    - Cast-iron inlet strainer with vertical self-cleaning bronze screen and large dirt pocket.
    - Receiver shall be externally insulated in the field.
    - Drain valves shall be installed in tanks. Piping shall be minimum 1".  $\frac{3}{4}$  " valves not allowed on drain of condensate tanks or systems for when servicing condensate tanks and pumps.
  - d. Pumps:
    - Centrifugal, close-coupled, vertical design.
    - Permanently aligned.

- Bronze fitted.
  - Replaceable bronze case ring.
  - Mechanical seals rated at 250 deg F.
  - Mounted on receiver flange.
- e. Motor:
- Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment." NEMA 4.
  - Enclosure: Open, drip proof.
  - Motor Bearings: Grease-lubricated ball bearings.
  - Efficiency: Premium efficient.
- f. Control Panel:
- Factory wired between pumps and float switches, for single external electrical connection. Unit-mounted so as to be pre-wired with single-point power. Pre-wired is preferred.
  - Provide fused, control-power transformer if voltage exceeds 230 V ac.
  - NEMA 250, Type 3 enclosure with hinged door and grounding lug, mounted on pump.
  - Motor controller for each pump.
  - Electrical pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate on receiver high level. Option: Hand-Off-Auto switch. Mechanical alternator not allowable.
  - Manual lead-lag control to override electrical pump alternator and manually select the lead pump.
  - Momentary-contact "TEST" push button on cover for each pump.
  - Option: Pump pilot light.
  - Numbered terminal strip.
  - Disconnect switch. Option: Fused disconnect switch standard, Option: Circuit breaker with disconnect switch.
3. Single-Stage, Centrifugal Pumps With Elevated Receiver
- a. Description: Factory-fabricated, packaged, electric-driven pumps; with receiver, pumps, controls, and accessories suitable for operation with steam condensate.
- 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.
  - ASME Compliance: Fabricate and label steam condensate receivers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

- b. Configuration: Duplex floor-mounted pump with elevated receiver, float switches, and connecting piping; rated to pump 212 deg F steam condensate.
- c. Receiver:
  - Mounted on fabricated-steel supports.
  - Close-grained cast iron or Welded steel.
  - Externally adjustable float switches.
  - Water-level gauge and dial thermometer.
  - Pressure gauge at pump discharge.
  - Bronze isolation valves between receiver and pumps.
  - Lifting eyebolts.
  - Inlet cascade baffle and convex heads.
  - Cast-iron inlet strainer with self-cleaning bronze screen, dirt pocket, and cleanout plug on receiver inlet.
  - Elevated tanks shall have pump suction valve and flanged union for removal of pumps and addition of a blank off plate.
  - Drain valves shall be installed on tanks. Drain piping shall be minimum 1".  $\frac{3}{4}$ " valves and piping not allowed on drain of condensate tanks or systems due to low flow and too much time to drain and fill if there are shutdowns required for the tank. The valves are required to allow for servicing condensate tanks and pumps.
- d. Pumps:
  - Centrifugal, close-coupled.
  - Permanently aligned.
  - Bronze fitted with enclosed bronze impellers.
  - Replaceable bronze case rings.
  - Stainless-steel shafts.
  - Mechanical seals rated at 250 deg F (120 deg C).
  - Mounted on base below receiver.
  - Rated to operate with a minimum of 2 feet (6 kPa) of NPSH.
- e. Motor:
  - Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
  - Enclosure: Open, drip proof.
  - Motor Bearings: Grease-lubricated ball bearings.
  - Efficiency: Premium efficient.

f. Control Panel:

- Factory wired between pumps and float switches, for single external electrical connection.
- Provide fused, control-power transformer if voltage exceeds 230 V ac. NEMA 250, Type 3 enclosure with hinged door and grounding lug, mounted on pump.
- Motor controller for each pump.
- Electrical pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate on receiver high level.
- Manual lead-lag control to override electrical pump alternator and manually select the lead pump.
- Momentary-contact "TEST" push button on cover for each pump.
- Numbered terminal strip.
- Disconnect switch.

END OF SECTION

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