

## SECTION 23 22 23 - STEAM CONDENSATE PUMPS

### PART I - GENERAL

#### 1.1 SECTION INCLUDES

- A. Steam Condensate Return Units, Gravity Return Type
  - 1. Receiver
  - 2. Pumps
  - 3. Control Panel
  - 4. Accessories

*Note to PSC: Although treated within F&S as components of Division 33 utility steam systems, PRVs and condensate pump units are specified within Division 23 – HVAC building steam systems given that they are physically located within buildings.]*

#### 1.2 RELATED SECTIONS

- A. *Section 23 22 13 – Steam and Condensate Piping*
- B. *Section 23 22 16 - Steam and Condensate Specialties*
- C. *Section 23 09 13 – Instrumentation and Control Devices for HVAC*
- D. *Section 23 07 19 – HVAC Piping Insulation*
- E. *Section 26 60 00 - Common Motor Requirements*

#### 1.3 REFERENCES

- A. *ASME B31.9 – Building Services Piping*
- B. *Applicable UL Standards*
- C. *Applicable NEMA Standards*
- D. *Illinois Steel Products Procurement Act*
- E. *National Electric Code*
- F. *International Mechanical Code*

#### 1.4 QUALITY ASSURANCE

- A. Products and execution shall be in compliance with applicable codes and standards including those referenced above in paragraph entitled *REFERENCES*.
- B. Installation, start-up and operation shall be in compliance with Manufacturer's recommendations and IOM.

#### 1.5 SUBMITTALS

- A. Full unit description including accessories
- B. Dimensional data, capacities, materials of construction, shipping weight
- C. Detailed pump, motor and control panel componentry
- D. Pump performance curve with design operating point indicated
- E. Motor characteristics as indicated in schedule
  - 1. Phase, voltage, full load amps, efficiency, frequency (Hz.)
- F. Wiring diagram

- G. Piping diagram
- H. Operation and maintenance manual

#### 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Control panel shall be shipped separately from pump unit.
- B. Control panel and pump unit shall be protected from physical damage and weather during transport.
- C. Control panel and pump unit shall be stored indoors protected from physical damage and exposure to dust and debris.
- D. Control panel and pump unit shall be protected from physical damage and exposure to dust and debris during construction.

#### 1.7 WARRANTY

- A. Pump unit and control panel shall be warranted to be free from defects in material and workmanship and to perform as specified for period of one year from date of startup or 18 months from date of delivery, whichever occurs first. Defective product shall be repaired or replaced at no cost to Owner.

### PART 2 - PRODUCTS

#### 2.1 STEAM CONDENSATE RETURN UNIT

##### Design/Performance Requirements:

- A. Separable Unit
  - 1. Control panel shall be separable from unit for remote mounting.
  - 2. Unit, including control panel, shall be factory tested as complete assembly.
- B. Receiver Tank
  - 1. Horizontal configuration
  - 2. Sized as indicated in *PART 3 - EXECUTION*
  - 3. Cast iron construction
  - 4. Lifting eye bolts
  - 5. Connections for pump, vent, drain, overflow, gauge glass and thermometer
    - a. NPT or flanged
- C. Pumps
  - 1. Duplex, vertical centrifugal
  - 2. Tank mounted
  - 3. Direct coupled
  - 4. Rated 210F condensate @ 2' NPSH
    - a. Continuous operation at design conditions
      - 1) No cavitation
      - 2) No damage to seals
  - 5. Design operating parameters
    - a. Discharge pressure and NPSH as scheduled on drawings or otherwise indicated in project documents.
  - 6. Renewable bronze casing wear ring
  - 7. Enclosed bronze impellor with suction inducer

8. Stainless steel shaft
  9. Sealed ball bearings, grease lubricated
  10. Mechanical seals
    - a. Component seal, rotary design
    - b. Carbon/silicon carbide seal faces
    - c. Viton O-rings
    - d. Rated 250F continuous operation
    - e. Discharge flush lines
    - f. RPM as scheduled on drawings or otherwise indicated in project documents
- D. Pump Motors
1. Electrical characteristics as scheduled or otherwise indicated in project documents
  2. ¾ HP and smaller – single phase
  3. 1 HP and larger – three phase
  4. Compliant with requirements of *Section 26 60 00 – Common Motor Requirements*
- E. Control Panel
1. NEMA 1 enclosure with hinged cover
  2. UL listed
  3. NEMA rated components
  4. Factory assembled and wired
  5. Configured for two power sources
    - a. Dedicated power circuit per pump
  6. Combination fused disconnects
    - a. Fuses sized 125-130% motor FLA
  7. Magnetic starters with overload relays
  8. Hand-off-auto switch, each motor
  9. Independent control circuits
  10. Fusible control circuit transformer
  11. Pump alternator
  12. Lead-off-lag selector switch
    - a. Each motor functional when power off to other
  13. Externally adjustable double pole float switches
  14. Pump running pilot light for each motor
  15. High level alarm dry contacts
  16. Stainless steel floats and float rods
- F. Accessories
1. Inlet basket strainer
  2. Pump inlet isolation valves
    - a. No impact on pump performance

- b. Positive shut-off when pump removed
- 3. Gauge glass
- 4. Dial thermometer
- 5. Discharge pressure gauge, each pump
- G. Manufacturers
  - 1. Mepco
  - 2. ITT Domestic
  - 3. Shipco
  - 4. Spirax/Sarco

## PART 3 - EXECUTION

### 3.1 STEAM CONDENSATE RETURN UNIT

- A. Sizing
  - 1. Pump and receiver capacities shall be as scheduled minimum.  
*[Note to PSC: Operational pump capacity shall be 2X design condensate flow rate minimum to accommodate startup load. Net receiver capacity shall provide 10 minute net condensate storage at design flow rate minimum.]*
- B. Equipment Curb
  - 1. Pump receiver shall be firmly affixed to concrete equipment curb.
  - 2. Curb shall be steel reinforced, dowelled into floor.
- C. Control Panel Installation
  - 1. Panel shall be permanently mounted on ridged structure at location indicated on drawings.
  - 2. Panel shall be readily accessible at convenient elevation.
  - 3. Panel and pump unit shall be field wired in accordance with Manufacturer's instructions.
  - 4. Panel installation and wiring shall be in compliance with NEC.
- D. Wiring
  - 1. Interconnecting wiring between the pump controls and control panel shall be enclosed in liquid tight flexible conduit.
- E. Adjustment
  - 1. Floats shall be adjusted per manufacturer's instructions.
  - 2. Condensate bypass piping shall be provided to facilitate float adjustment (see *Drawing 23 22 00-02*). *[Note to PSC: Show on project drawings.]*
- F. Piping
  - 1. See *Drawing # 23 22 00-02 Flow Diagram – Steam PRV and Condensate Return System* for unit piping.
- G. Valves
  - 1. Severe duty check valve shall be provided in each pump discharge line. See specifications.
    - a. Pressure independent balance valve shall be provided in each pump discharge line. See specifications.

- b. Balance valve shall be set to maintain design flow rate under all operating conditions.

H. Vent

1. "Oversized" vent piping shall be provided to minimize receiver pressure.
2. Vent pipe size shall be "engineered" to ensure pressure in receiver tank does not exceed atmospheric pressure.
3. Vent pipe size calculation shall be based upon substantial flash steam and trap blow-through into receiver.
4. Vent pipe shall be extended through roof and terminated open to atmosphere.
5. Vent pipe shall be routed and terminated as indicated on drawings.

END OF SECTION 23 22 23

This section of the *U of I Facilities Standards* establishes minimum requirements only.

It should not be used as a complete specification.

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