SECTION 23 22 30 – STEAM AND STEAM CONDENSATE SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install the following steam specialties indicated by the Contract Documents with supplementary items necessary for their proper installation.

1. Steam traps.
2. Flash tanks.
3. Condensate return pumping units.
4. Steam pressure-reducing valves.
5. Steam relief valves.
6. Steam safety valve discharge elbows.
7. Steam muffler attachments.
8. Steam pipe anchors.
9. Steam pipe guides.
10. Drip traps.
11. Sediment strainers.
12. Automatic air vents.
13. Gauges and gauge connections.
14. Thermometer and thermometer wells.
15. Steam orifice meters.
16. Steam integrating (condensate) meters.
17. Steam vortex meters

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ASTM A105 - Forgings, Carbon Steel, for Piping Components.

2. ASTM A216 - Steel Casings, Carbon, Suitable for Fusion Welding, for High Temperature Service.

3. ASTM A395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

4. ASME B31.9 - Building Services Piping.

1.04 QUALITY ASSURANCE

A. All specialties of the same type shall be provided from the same manufacturer.

B. Manufacturer's name and pressure rating marked on body of each device.

1.05 SUBMITTALS

A. Product Data:

1. Submit Shop Drawings, wiring diagrams and product data on all steam specialties.

B. Record Documents:

1. Shop Drawing submittal of traps shall contain an itemized list with a tabulation of the load, trap type and trap size.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Steam Traps:

1. Armstrong.

2. Spirax Sarco.

3. Spence.

B. Flash Tanks:

1. Penn Separator.

2. Wendland.

3. Wilson.

C. Condensate Pumping Units:

1. Skidmore.

2. Aurora.
3. Mepco.
4. Spirax Sarco

D. Pressure Powered Condensate Pumps:
1. Armstrong.
2. Spriax Sarco.
3. Spence

E. Steam Pressure Reducing Valves:
1. Leslie.
2. Spence.
3. Spirax Sarco.
4. Fisher.

F. Steam Relief Valves:
1. Consolidated Type 1511.
2. Spirax Sarco 211S or SV Series.
3. Spence Engineering 41.
4. Crane 2501.

G. Steam Discharge Pan Elbows:
1. Grinnell Fig. No. 1538F.
2. Spirax Sarco DPE.
3. Spence Engineering DPE.

H. Steam Muffler Attachment:
1. Consolidated Type 1441.
2. Wright Austin 40EHC.

I. Automatic Air Vents:
1. Spirax Sarco 13W
2. Spence Engineering.

J. Sediment Strainers:
1. Muller Steam Specialty.
2. Keckley.

3. Spirax Sarco

K. Gauges:

1. Ashcroft No. 1279-R Duragauge.

L. Thermometer and Wells:

1. Weksler Industrial Thermometers.

2. Ashcroft 1279-R.

3. Conbraco 20-150.

M. Steam Orifice Meters

1. [No selections]

N. Steam Condensate Integrating Meters:

1. Daniel Model CRA turbine meter.

2. Winters.

O. Steam Vortex Flow Meters

1. Onicon F-2000/2500 Series Vortex Flow Meter (Basis of Design) or approved equal.

P. Vacuum Breakers:

1. Spirax Sarco VB

2. Kadent Johnson VB

2.03 INVERTED BUCKET TRAPS

A. Cast iron or semi-steel body and bolted cover for 250 psig working steam pressure (WSP); provide access to internal parts without disturbing piping; with top test plug and bottom drain plugs, brass or stainless steel bucket, stainless steel seats and plungers, and stainless steel lever mechanism with knife edge operating surfaces.

2.04 FLOAT AND THERMOSTATIC TRAPS

A. ASTM A126, cast iron or semi-steel body and bolted cover for 125 psig WSP; provide access to internal parts without disturbing piping; with bottom drain plug, stainless steel or bronze bellows type air vent, stainless steel or copper float, stainless steel lever and valve assembly.

B. Float and thermostatic traps for clean steam service shall have Type 316L stainless steel bodies, covers, and all internal components.

2.05 THERMOSTATIC TRAPS

A. Pressure balanced type with ASTM A216 WCB cast steel body and bolted or screwed cover and integral ball joint union, for 300 psig WSP; monel or stainless steel bellows, stainless steel valve and seat; integral stainless steel strainer.

B. Freeze-proof type with cast iron body for 300 psig WSP, bronze bellows, stainless steel valve and seat, external adjustment.

C. Bi-metallic type with ASTM A105 forged steel body and cover, for 300 psig WSP, bi-metal element with stainless steel components, integral Type 304 stainless steel strainer screen, and ¼ inch blow down valve.

D. Clean steam thermostatic traps for non-critical process areas shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from Type 316L stainless steel. Traps shall be maintainable, of sealed construction, and shall be completely self-draining when installed in vertical pipeline.

2.06 FLASH TANKS

A. Closed type, welded steel construction, tested and stamped in accordance with Section 8D of ANSI/ASME Boilers and Pressure Vessels Code for 125 psig working pressure; cleaned, prime coated and supplied with steel support legs. Construct with nozzles and tappings for installation of accessories and piping connections.

2.07 CONDENSATE PUMPING UNITS

A. Condensate pumping units shall be duplex horizontal type to include receiver, interstrainer, duplex pumps, float switches, control panel and accessories. Pumps shall be single-stage centrifugal type with head capabilities and flow rates as scheduled. Pumps shall be capable of pumping 212 degrees F condensate at the controlled water level.

B. Unit shall be complete with 3/16 inch thick steel receiver with rust resistant coating and shall have magnesium anode protection.

C. Each motor shall be provided with safety switch and a magnetic starter with current overload relays providing overload and undervoltage protection. These magnetic starters shall be provided with three-pole overload protection.

D. Pumps shall be bronze fitted throughout. Bearings shall be such as to protect them from dust and corrosion.

E. Each unit shall have fully automatic control by a float and float switch. An alternator switch shall be provided as a part of the unit to automatically alternate pumps at the end of each pump operation.

F. All accessories and auxiliaries, such as pressure gauges, water gauge glasses, etc., shall be installed complete.

G. Electrical wiring and controls shall be complete so that no wiring beyond that required by the driving motor need be supplied in the field. Such units shall be tested at the factory and adjusted prior to shipment. Alternator shall be mechanical type. If electrical alternator is used, it shall be Allen Bradley.

H. Each pump shall have stainless steel shafts. Furnish an extra set of Viton seals. Each duplex pump shall have two-point power connections (not a single point) and integral shut-off valves upstream and downstream of each pump.

I. Capacities and electrical characteristics shall be as scheduled on Drawings.

J. Provide high level alarm switch complete with transformer, bell and one set of 120 volt AC rated, normally open contacts for connection to the building automation system (BAS).

K. Control Cabinet: NEMA II enclosure, UL listed, with piano hinged door, grounding lug, combination magnetic starters with overload relays, circuit breakers and cover interlock, electric alternator, AUTO-OFF switch, test button, terminal strip, high level alarm light, acknowledge button, alarm horn and fusible control circuit transformer. Provide a normally open auxiliary alarm contact for connection to the BAS.

2.08 PRESSURE POWERED CONDENSATE PUMPS (PUMPING TRAP)

A. Pressure powered condensate pump (pumping trap) operated by steam, compressed air, or other pressurized gas, which does not require any electrical energy, and is safe for use in explosive atmospheres. Spring assisted float mechanism with no external seals or packing.

B. Stainless steel float and operating mechanism, inconel or stainless steel springs, and stainless steel trim.

C. Cast iron or fabricated steel bodies shall be S150 psi ASME rated and steel bodies shall be stamped.

D. Provide with factory-attached stainless steel swing type check valves on inlet. and stainless steel spring type check, Durable type SCV, on discharge.

2.09 STEAM PRESSURE REDUCING VALVES

A. All pressure reducing valves shall be capable of maintaining the set pressure from zero to the maximum steam flow within reasonable limits when subjected to steam pressure fluctuations.

B. Valve bodies shall be cast steel for high-pressure service and cast iron for medium and low-pressure service. Stations having a total steam capacity less than 3000 pounds per hour shall consist of one PRV with a minimum rangeability of 20:1. Discharge pressure shall be adjustable to any value between 10 percent and 75 percent of the supply pressure. Stations having a total steam capacity greater than 3000 pounds per hour shall consist of two PRV’s sized with a 1/3, 2/3 or 50 – 50 percent capacity split as indicated by the Drawings, and each capable of a minimum control ranageability of 20:1.

C. High-pressure PRV's shall be pneumatically actuated rotary control valves. The valve bodies shall be cast carbon steel with integral 300-pound ANSI flanged ends. Valve plug design shall be eccentric rotary action offset to the shaft centerline. Seat ring shall be available in full port as well as 60 percent, 40 percent and 20 percent reduced port. Plug and seat ring shall be 316 stainless steel with satellite overlay. Stem packing shall be carbon graphite. Valve actuators shall be suitable for 60 psi control air and shall be selected to provide tight shut-off without air assist. Each actuator shall be provided with an electro-pneumatic valve positioner with gauges, control air regulator and 3-way 120VAC solenoid valve. The positioner, air regulator and 3-way solenoid valve shall be factory installed and connected with 3/8 inch outside diameter (OD) stainless steel tubing. The 3-way solenoid valve shall be rated for continuous duty and shall be connected to vent on loss of power.

D. When necessary to achieve required noise attenuation, high-pressure PRV's shall be provided with silencing orifice plates for noise attenuation. The high-pressure valves and orifice plates shall be sized and selected so as to minimize noise generation, including pipe insulation, to 85 dBA or less at three (3) feet from the valve. The silencing orifice shall be of 300 series stainless steel and shall be designed to install between two 300-pound ANSI flanges in the expanded section of pipe downstream of the PRV.

E. Each high-pressure PRV station shall be supplied with an electronic pressure controller and pressure transducer. The pressure transducer shall be mounted with a block valve and coil siphon in the common downstream header of the PRV station, and shall be wired by the BAS Provider back to the electronic pressure controller with shielded cable. The electronic controller shall be mounted in a NEMA 4X fiberglass enclosure. The enclosure shall include a 120 VAC circuit breaker, 24 VDC power supply and all other control relays necessary to provide the control requirements. The electronic controller shall provide a 4-20mA signal to the electro-pneumatic valve positioner(s) to modulate the control valves to maintain the system pressure. The controller shall be configured to accept a 4-20mA input for remote set point. The controller enclosure shall provide 120VAC to the 3-way solenoid valve(s). The controller shall have a high pressure limit that will interrupt the control signal to the valve(s) and de-energize the 3–way solenoid valve(s). Provide a normally open auxiliary high pressure alarm contact for connection to the BAS. Provide terminal points for all connections.

F. Medium and low-pressure PRVs shall be single-seated, pilot-operated valves with 250-pound cast iron bodies, stainless steel trim with renewable valve plugs and seats.

G. All pressure regulators 2-½ inches and larger shall have flanged connections. Pressure regulators 2 inches and smaller may have screwed connections. Unions shall be installed on each side of any screwed pattern regulators installed.

H. Each reducing valve shall be preceded by a sediment strainer complete with a full-sized blowoff valve with threaded end for hose connection.

2.10 STEAM RELIEF VALVES

A. Relief valves 2 inches and smaller shall have brass bodies and arranged for screwed connections. Such relief valves shall be Spence Type 41 or Spirax Sarco 211 Series safety valves for steam. Bushings shall not be used.

B. Relief valves 2-1/2 inches and larger for all medium and low pressure steam piping systems be arranged for flanged inlet and screwed outlet connections. Such relief valves shall be Spence Type 41 or Spirax Sarco SV Series, ASME Standard Cast Iron Safety Valves.

C. The pressure at which each relief valve shall open is designated on the Drawings. Specify the pressure at which each relief valve must be set. Each valve shall have a metal tag attached stamped with the valve identification plus the pressure setting. Each valve shall be sized at full steam flow through the PRV and discharge piping must be equal or greater than the steam relief valve outlet size.

D. Safety relief valve shall comply with ASME Section 1 or 8 as applicable. Provide Certificate of Conformance per ASME standard.

2.11 DRIP TRAPS

A. Traps shall be 3/4 inch traps unless specifically shown to the contrary, i.e., they shall have 3/4 inch inlet and outlet connections.

B. High-pressure drip traps shall have steel or semi-steel bodies and the internal operating mechanisms shall be made of heat-treated chrome steel. The caps shall be bolted to the bodies by the use of alloy steel heat-treated machine bolts, No. 300 Armstrong Traps, manufactured by Armstrong Machine Works. Capacity for discharging at least 3,500 pounds of condensate per hour when operating at a pressure of 250 pounds per square inch.

C. All drip traps used in medium pressure steam piping systems shall be 3/4 inch Armstrong No. 811 inverted bucket traps, with cast iron bodies and stainless steel trim.

D. Low-pressure traps shall be equal to Armstrong “A” or “B” series sized to handle 200 percent of the load with an operating differential pressure equal to 50 percent of the inlet steam pressure.

2.12 SEDIMENT STRAINERS

A. Sediment strainers in high pressure steam piping shall be cast steel and shall be suitable for working steam pressures as high as 300 pounds per square inch and temperatures not in excess of 750 degrees F.

B. For pipe sizes 2-1/2 inches and larger, flanged pattern sediment strainers shall be used. For pipe smaller than 2-1/2 inches, screwed pattern shall be used.

C. The flanges of flanged strainers shall be dimensioned, faced, drilled and spot faced to conform to the 300-pound American Standard for Steel Pipe Flanges and Flanged Fittings (B16E-1939).

D. Strainers in low and medium pressure steam piping systems 2-1/2 inches and larger shall be flanged iron body strainers having bolted covers. These strainers shall be suitable for operating pressures as high as 125 psig.

E. Sediment strainers in low and medium pressure steam piping systems 2 inches and smaller shall be arranged for screwed pipe connections.

2.13 GAUGES AND GAUGE CONNECTIONS

A. Pressure gauges for interior steam systems shall be 4-1/2 inches with back connection when used on a panel; otherwise they shall have bottom connections. Each gauge shall be provided with Ashcroft carbon steel needle valve and a siphon rated for the steam pressure and temperature. The arrangement of the mechanisms shall conform to pressure ranges and details shown on the Drawings.

B. The dial graduation shall be 1.5 times the highest working pressure of the steam that the gauge is serving.

2.14 THERMOMETER AND THERMOMETER WELLS

A. Furnish and install thermometers of not less than 9 inch scale complete with brass separable sockets with extension neck to allow for insulation of piping. These thermometers shall be mercury red reading type in one piece glass tubes extending from top of scale to sensor, and shall be located so that they may be easily read. Field adjustable angle thermometers are acceptable.

B. Thermometers shall be provided with range of 0 to 220 degrees F at hot water heat exchangers. The sensing element of the thermometer shall be at least one inch into the pipe.

C. Thermometer test wells shall be ¾ inch Weksler thermal wells, brass with stem of minimum length to extend beyond the mid-diameter of the pipe, 2-½ inch extension neck and brass screw plug. Wells shall be suitable for use of industrial type thermometers.

D. Indicating thermometers shall be Weksler industrial thermometers having stainless steel separable sockets and scales of the range suitable for steam pressures indicated on flow sheets.

2.15 STEAM CONDENSATE INTEGRATING METERS

A. Furnish and install turbine meter in the condensate return system as indicated on Drawings. Turbine meter to be installed to read GPM from all pumps.

B. Meter shall be constructed of stainless steel with stainless steel internal parts and tungsten carbide bearings:

1. Maximum Operating Range: 210 degrees F.

2. Pressure Range: 0 to 100 psig.

3. Maximum pressure drop: 4 psig.

4. Condensate Flow Rate: Engineer shall complete.

5. Output: 12 VDC.

6. Maximum Accuracy ± 0.05 percent over linear flow range.

7. Power Available: 12 VDC.

2.16 FINNED TUBE RADIATION

A. General: Supply and install finned tube radiation of the type, length and dimensions as shown on the Contract Documents. Finned tube radiation shall be the product of Engineered Air. All finned tube radiation components shall be cleaned and phosphatized to prevent corrosion. They shall be finished with a baked cactus gray enamel primer.

B. Copper-Aluminum Element: Tubing shall be 1-¼ inch nominal ID (1-3/8 inch OD) seamless copper. Fins shall be aluminum, 4-¼ inch x 4 inch, 0.015-inch thick with a stamped pattern for strength and rigidity. Fins shall have integral collars to provide even spacing and maximum heat transfer. Fins shall be firmly bonded to the tube by mechanical expansion. All copper-aluminum elements shall have 50 fins/foot. Tube ends shall be suitable for connecting with sweat fittings.

C. Element Brackets: Element brackets shall consist of a steel cradle mounted on a roller bearing, which will allow free and quiet element expansion. Element brackets shall be securely fastened to wall brackets or wall, on not more than 4-foot centers.

D. Dampers: Dampers shall be knob operated and have a screw-type control with a channel-type damper blade located behind the outlet grille. Damper mechanism shall provide complete adjustment between fully opened and fully closed positions.

E. Access Doors: Provide access doors where shown on Drawings. They shall consist of a surface-mounted 7 inch x 7 inch frame with a 6 inch x 6 inch continuous hinged door fitted with a slot operated cam lock. Flush-mounted factory-installed access doors are also acceptable.

F. Protective Covers: ½-inch diamond mesh, 18-gage expanded steel cover (Type WF-7) shall be provided. Covers should not contact element and shall be supported by combination bracket.

2.17 VACUUM BREAKERS

A. Vacuum breakers shall be used on all modulating or on/off heat exchangers and coils, except in vacuum return systems.

B. Vacuum breakers shall be of hardened ball check valve design with all working parts manufactured from stainless steel.

C. Bodies shall be made of brass or stainless steel and shall be suitable for operating conditions of 300 psig saturated steam.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. Install specialties in accordance with manufacturer's instructions.

C. Install float and thermostatic traps to drain condensate from unit heaters, converters, heating coils, steam separators, flash tanks, steam jacketed equipment and direct steam injected equipment.

D. Install inverted bucket steam traps to drain condensate from steam main headers and branch lines at an operating differential pressure equal to 50 percent of the inlet steam pressure unless noted otherwise.

E. Install thermostatic steam traps to drain condensate from steam radiation units, converters, and other similar terminal heating units.

F. Size steam traps to handle minimum of two times maximum condensate load of apparatus served.

G. Traps used on steam mains and branches shall be minimum 3/4-inch (20 mm) size.

H. Install steam traps with union or flanged connections at both ends.

I. Provide gate valve and strainer at inlet and gate valve at discharge of steam traps.

J. Provide minimum 10-inch (250 mm) long dirt pocket of same pipe sizes as apparatus return connection between apparatus and steam trap.

K. Remove thermostatic elements from steam traps or valve out during temporary and trial usage and until system has been operated and dirt pockets cleaned of sediment and scale.

L. Provide pressure-reducing stations with pressure reducing valve, valved bypass, strainer and pressure gauge on upstream side, relief valve and pressure gauge on downstream side of pressure reducing valve.

M. Pressure reducing station shall be [one] [two] stage to produce flat reduced pressure curve over range of capacity.

N. Rate relief valves for pressure upstream of pressure reducing station, for full operating capacity. Set relief at maximum 20 percent above reduced pressure.

O. Terminate relief valves to outdoors. Provide drip pan elbow with drain connection to nearest floor drain.

P. When several relief valve vents are connected to a common header, header cross sectional area shall equal sum of individual vent outlet areas.

Q. Steam Safety Valve Discharge Elbows:

1. All vent lines from safety valves shall be provided with safety valve discharge elbows at the point at which such lines rise to an elevation higher than that of the safety valve. The nature and design of the piping systems involved shall effectively drain all condensate from the discharge side of all relief valves. No force shall be exerted on the safety valve by the discharge piping.

R. Steam Muffler Attachments:

1. At the point at which vent lines from safety valve discharge elbows terminate, a muffler attachment of the proper size shall be installed.

2. These muffler attachments shall be screwed pattern members.

S. Steam Pipe Anchors:

1. All steam lines shall be securely anchored at points designated on the Drawings and/or at such points as may be needed to assure proper control of the expansion and contraction of such systems.

T. Steam Pipe Guides:

1. All steam piping systems shall be properly guided.

U. Drip Traps:

1. High-pressure drip trap assemblies shall be provided per the Contract Documents and where required to keep piping systems completely drained of condensate.

2. Where drip taps are installed in conjunction with 3 inch and larger steam lines, a drip pocket of the nature detailed on the Drawings shall be provided where a natural pocket does not exist. The piping and valves in trap assemblies shall be arranged as detailed on the Drawings; extra strong pipes shall be used on both sides of the trap. The diameter of the drip pocket shall be the same size as the distribution line up to 4 inches in diameter. The diameter shall be half the size of the distribution line over 4 inches but never less than 4 inches.

3. All drip traps used in medium pressure steam piping systems where automatic steam control valves are not employed shall be arranged as shown on the Drawings. Each trap shall be provided with a valved test line and shall be preceded by a sediment strainer.

4. Condensate traps from coils, convertors, hot water generators, and all other devices where modulating steam valves are employed shall be of the float and thermostatic type. Installed traps with less than 12 inch of height between equipment outlet and trap inlet shall be sized for not less than 300 percent of the load. Each trap shall be provide with a ½ inch valve test line and shall be preceded by a sediment strainer. A vacuum breaker shall be supplied for these applications and it can be integral to the trap. Under no circumstances shall a float and thermostatic trap be installed in a manner to lift condensate up in a return line.

V. Sediment Strainers:

1. Each drip trap assembly, each control valve, for steam and each pressure reducing valve assembly regardless of its size shall be preceded by a sediment strainer. The arrangement of these sediment strainers shall be such that the screens may be removed for cleaning with ease through a gasketed plug.

2. Sediment strainers shall be placed in steam piping systems wherever shown on the Drawings and at such other points as may be required for the removal of foreign material from the piping systems.

3. Full sized blow off valves shall be installed on all strainers in steam, condensate, chilled and hot water lines and a drain shall be installed from each valve to the nearest floor drain.

W. Automatic Air Vents:

1. Provide auto air vents with a pressure rating that is equal to system classification but not less than 125 psig. Provide shut-off valve to facilitate maintenance of air vent.

2. Locate all air vents and their discharge lines in accessible locations, preferably clustered.

X. Thermometer and Thermometer Wells:

1. Thermometers shall in all cases be installed upright or at the proper angle to be read while standing on the floor. The wells for thermometers shall be located in vertical pipes where possible. When installed in horizontal pipes, thermometers shall be installed in the side and not on top of the pipe.

2. Thermometer wells and thermometers shall be located where noted on the Drawings and where called for in other Specification Sections. Thermometer test wells shall only be installed in a vertical position in horizontal lines and at 45 degrees in vertical lines to hold a fluid in the well.

Y. Condensate Integrating Meters:

1. Meters shall be mounted in a horizontal position at the pump discharge with required upstream and downstream straight runs of pipe.

2. Furnish and install a line size spool piece in the main until all piping has been cleaned and flushed.

Z. Condensate Pumping:

1. Install condensate pumping units on a housekeeping pad.

2. Install vent and overflow piping as detailed in the Drawings. Route the overflow pipe to a floor drain. Provide and pipe a receiver drain valve and pipe to the nearest floor drain.

3. Install spring assisted check valves in the discharge of each pump. Install globe valves for pump balancing in the discharge of each pump. Install gate valves downstream of the globe valves.

4. Pump discharge lines 1-1/2 inches and larger shall be piped to the condensate return piping with stainless steel flex connectors.

AA. Pressure Powered Condensate Pumps (Pumping Trap):

1. Do not install pumping traps on housekeeping pads (housekeeping pads reduce the filling head to the pump). Install the pump at the lowest possible point below the equipment that is being drained.

2. Where specified, provide an inlet condensate receiver. The receiver shall be an ASME vessel as shown on the Drawings. Install and support the receiver above the pumping trap unit. Route all condensate to be drain to the top on the receiver. The receiver shall be vented to atmosphere and shall also be supplied with a drain connection and drain valve.

3. The pumping trap body shall be provided with a gauge glass assembly.

4. When motive gas pressure is greater than 20 psig over the required discharge head, provide a PRV assembly to regulate motive gas pressure. The PRV assembly shall include an inlet block valve, y-strainer, PRV and pressure gauge assembly. When motive gas is steam, install a drip trap assembly upstream of the PRV. When motive gas is air or nitrogen, provide a spring loaded check valve downstream of the PRV.

5. Route the exhaust vent pipe of the pumping trap, and the receiver vent (when receiver is installed), to an atmospheric vent line, or, it may be routed 8 to 10 feet up and piped back down a minimum of 6 inches. Install a drain valve and drain line off the pumping trap unit and route to the nearest floor drain.

BB. Vacuum Breakers:

1. Vacuum breakers shall be installed in the supply side between the control valve and equipment.

2. Install in a vertical position with cap at top.

3. Mount the vacuum breaker on the highest point of the circuit.

4. Large coils or equipment may require more than one vacuum breaker to be fitted.

END OF SECTION 23 22 30