comparable products as manufactured by Hoffman, TACO, or Armstrong.

2. Non-ferrous automatic air vent; stainless steel, brass and EPDM internal parts; 150 psig working pressure, 240°F operating temperature; mount on ½" nipple or 3/4" MPT connection.
3. Utilize ¾" minimum connection for air separators.

N. Expansion Tanks:

1. Provide ASME full bladder type expansion tanks of sizes, capacities and arrangement as indicated on the contract drawings and as manufactured by Taco; Model No. CA, comparable products as manufactured by ITT Bell and Gossett, or Amtrol may be submitted for review as comparable products.
2. Construction: Welded steel, designed, tested and stamped in accordance with ASME (BPV code sec VIII, div 1); supplied with National Board Form U-1, rated for working pressure of 150 psi, with flexible heavy duty butyl rubber bladder. Bladder shall be able to accept the full volume of the expansion tank and shall be removable and replaceable. Bladder shall be NSF 61 rated for low temperature potable water service and shall be manufactured with FDA approved materials.
3. Provide with the following accessories: Pressure gauge (field installed in adjacent piping by others) and air-charging fitting.
4. Support horizontal tanks with steel saddles.
5. Support vertical tanks with steel legs or base on a 4" high concrete housekeeping pad.

O. Air Separators:

1. Manufacturers:
   a. Provide air separator as manufactured by Taco, Inc.; Model ACF, of size and capacity as indicated on the contract drawings or comparable products as manufactured by Armstrong, Spirotherm or Flamco.
2. Air removal device shall be constructed of steel. It shall be designed, fabricated and stamped per ASME Section VIII Division 1 with a maximum working pressure of 150 psi at 270°F. Manufacturer shall be holder of ASME U stamp. Manufacturer shall have optional 250 psi and 125 psi ASME units available. Units 3 inch and larger shall be provided with flanged system connections as standard. 2 inch and 2 ½ inch models shall be provided with NPT connections. These connections shall be inline with the mechanical room piping.
3. The unit shall have a top NPT connection to allow for the tie in of automatic air vent, make up water, and compression tank (air control system). This fitting shall be at the upper most point on the chamber. There shall be a bottom connection for blowdown cleaning.
4. The unit shall be provided with a removable stainless steel strainer with 3/16" perforations and a free area of not less than five times the cross sectional area of the connecting pipe. The unit shall come with an inline connection that will allow for strainer removal. This additional fitting shall allow the installing contractor the option of installing the unit with inlet and outlet on the same side of the unit or on opposite sides.

1. Manufacturers:
   a. Taco, Inc.; 4900 (size and capacity as indicated on the contract drawings).
2. Air and dirt removal device shall be constructed of steel. It shall be designed,

fabricated and stamped per ASME Section VIII Division 1 with a maximum working pressure of 125 psi at 270°F.

3. Units up to 2½-inch in size shall be provided with threaded connections as standard. Inlet and outlet connections shall be inline with piping system. Both inlet and outlet shall be in the same horizontal and vertical planes.
4. Each air and dirt removal device shall be equipped with a brass conical shaped air venting chamber designed to minimize system fluid from fouling the venting assembly. The air vent shall be able to be closed to allow flushing and purging of dirt via side port without dirt passing through vent on initial system fill.
5. A brass flushing cock shall be located on the side of each separator to facilitate system fast-fill and removal of the floating impurities from the air system interface within the separator.
6. A blow down valve shall be provided by the unit manufacturer on the bottom of each unit to allow blow down and cleaning. On units 2 ½" and smaller the valve and all of its fittings shall be 1".
7. The air and dirt removal device shall remove air down to 18 microns and shall remove dirt/debris down to 35 microns. The unit shall be 100% efficient at removing dirt down to 90 microns in 100 passes or less.
8. The unit manufacturer shall provide the owner and design engineer third party independent test data certifying that their unit performs to the above standards. Suppliers not providing these independent performance test results will not be acceptable.
9. The air and dirt separator shall employ the use of high surface area pall rings to achieve optimal separation of air and dirt with minimal pressure drop. The pall rings shall be made of stainless steel. Stainless steel will be the only acceptable material used for suppressing turbulence and increasing surface area for high efficiency air and dirt removal. Inferior materials of construction such as copper for the straining medium will not be acceptable.
10. Manufacturer shall have at least 15 years of experience with microbubble coalescing and dirt removal technology.
11. The unit shall be manufactured with a removal cover to facilitate removal, inspection, and cleaning of the pall ring basket. The entire pall ring basket shall be constructed of stainless steel. For safety and ease of service the unit shall be accessed from the top and the pall ring basket shall be accessed as one complete assembly housed in a stainless steel cage.

P. Pump Suction Diffusers:

1. Provide as manufactured by Armstrong, Bell and Gossett, or Hoffman.
2. Cast-iron body, with threaded connections for 2 inch and smaller, flanged connections for 2 1/2 inch and larger; 175 psig working pressure, 300°F maximum operating temperature; and complete with the following features:
   a. Inlet vanes with length 2 1/2 times pump suction diameter or greater.
   b. Cylinder strainer with 3/16 inch diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head.
   c. Disposable fine start-up mesh strainer to fit over cylinder strainer.
   d. Permanent magnet, located in flow stream, removable for cleaning.
   e. Adjustable foot support, designed to carry weight of suction piping.
   f. Blowdown tapping in bottom; gage tapping in side.
3. Provide grooved connection as manufactured by Victaulic Series 731 / W731, or Grinnell Model S810.
   a. Grooved inlet and straight, single, or double reduction flanged outlet, ASTM A395 ductile iron body, Type 304 stainless steel frame and

perforated sheet diffuser with 5/32” diameter holes, Type 304 stainless steel 20-mesh startup pre-filter, pipe plug for system drainage, and bosses for support. Rated to the working pressure of the mating flange up to a maximum of 300 psi.

Q. Factory-Assembled Header and Pump Drops

1. Factory-fabricated grooved end header [manifold] all-in-one assembly for fluid distribution. Header shall consist of an ASTM A53, Grade B, standard weight pipe spool with required outlet connections. Grooved ends roll grooved to Victaulic [OGS] [AGS] dimensions, with enamel coating or galvanized to project requirements. Standard of Acceptance: Victaulic Vic-Header.

2. Factory Assembled Grooved End Vibration Pump Drops: 3” through 12” (DN80 though DN300). Orange enamel coated installation-ready assembly with flexible couplings to accommodate vibration attenuation and stress relief. Rated for working pressure to 300-psig (2068-kPa).

   a. Discharge Drop: Class 150 flange for pump connection, [base elbow for horizontal pump connection] [straight line with concentric reducer for vertical pump connections], tri-service valve assembly consisting of a spring-actuated check [Venturi-Check] valve and butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool with thermometer and pressure ports. Standard of Acceptance: Victaulic Series 380.

   b. Suction Drop: Suction diffuser with stainless steel basket and diffuser and Class 150 flange for pump connection, butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool with thermometer and/or pressure ports. Standard of Acceptance: Victaulic Series 381.

   c. Suction Drop: 90-degree base elbow with Class 150 flange for pump connection, Wye pattern strainer with stainless steel perforated metal basket, butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool(s) with thermometer and/or pressure ports. Standard of Acceptance: Victaulic Series 382.

R. Diverting Fittings: cast iron body with threaded ends, or wrought copper with solder ends; 125 psig working pressure, 250°F maximum operating temperature. Indicate flow direction on fitting.

S. Basket Strainers:

1. Provide as manufactured by Crane, Metraflex, or Spirax Sarco.
2. 125 psig working pressure; high tensile cast-iron body (ASTM A126, Class B), flanged end connections, bolted cover, perforated Type 304 stainless steel basket, and bottom drain connection.

T. Grooved End Strainers:

1. Provide as manufactured by Victaulic Company, or comparable product as manufactured by Grinnell.
2. Y-Pattern, 2” through 18”: 300 psig working pressure, ductile iron body (ASTM