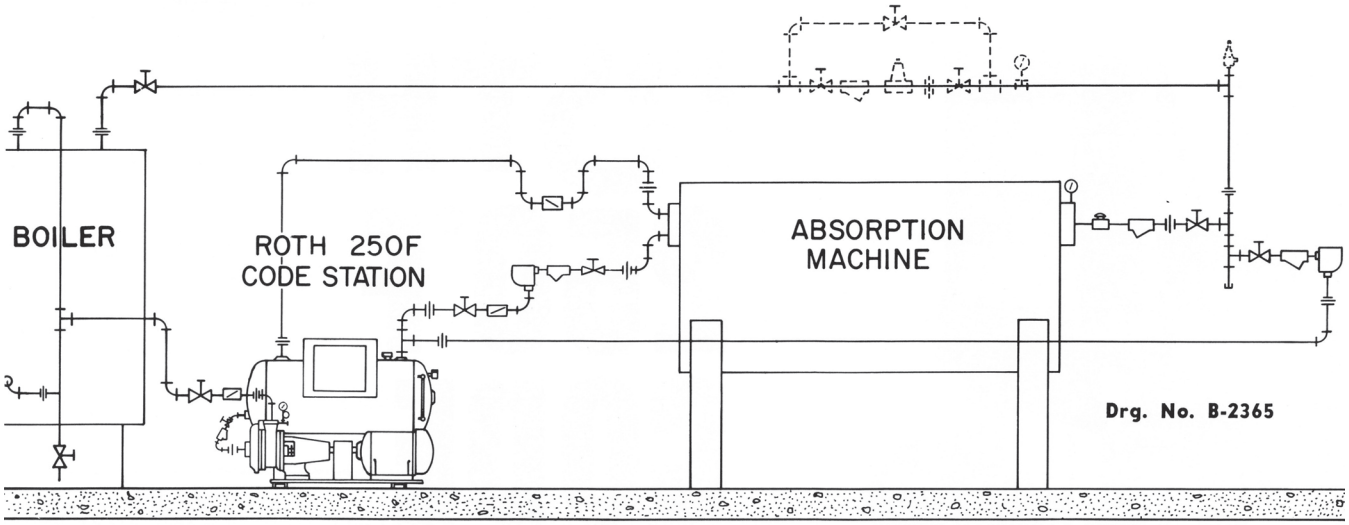
ROTH PUMP COMPANY

250˚F CONDENSATE UNITS

A full line of return stations with ASME code receivers for hot condensate from absorption coolers, kettles, and other equipment condensing at 200°F to 250°F.

Equipped with Roth Hot Condensate pumps designed for 15 to 150 PSI discharge pressure handling 250˚F condensate at one foot NPSH.

Low silhouette design reserves about 3 feet vertical distance from cooler outlet to receiver inlet when mounted on the same level.



Illustrative schematic layout of steam and condensate piping for a lithium bromide absorber and a Roth 250°F condensate station shows installation advantages of Roth low silhouette design. At full absorber load pressurized condensate returns to the receiver at 240°F. Vapor and liquid separate in the receiver. Steam vents back to absorber through a bleeder line. At high liquid level the float switch starts pump and pumps out to the boiler against full boiler pressure plus line loss. In the event of load drop in the absorber to 40% load with lower temperature condensate the bleeder line vents the receiver to the corresponding pressure of the condensate. The condensate then flows normally to the receiver and pump operates normally handling atmospheric instead of pressurized condensate. The pump is designed to handle either pressurized or atmospheric condensate at temperatures from 33°F to 250°F with one foot NPSH. Each model is selected for capacity at 200% of absorber full load. Each pump is sized to return against full boiler pressure plus line losses.

Roth 250°F Hot Condensate return stations are suitable for handling returns from Lithium Bromide Absorption Chillers, steam kettles, steam retorts, steam presses, and other steam condensing equipment operating in a temperature range between 210°F/ 98°C and 250°F / 121°C.

USE WITH ABSORPTION AIR CONDITIONING

Manufacturers of lithium bromide absorption units have developed equipment for cold generation that will provide the maximum in tons of absorber capacity at minimum annual costs. By substituting the heat from gas or oil in place of electric power operational savings can be realized for the generation of cold.

STEAM AS A HEAT SOURCE

The common heat source for Absorption Machines is steam, from low pressure (15 PSI/ 1 Bar) heating boilers, from medium pressure (125-150 PSI/ 8.6-10Bar) steam generators, or from high pressure (250+ PSI/ 17+ Bar) water tube boilers. Irregardless of the source of the steam, a properly designed and applied condensate return is essential to obtain the peak design efficiency of the absorption machine.

STEAM DESIGN CONSIDERATIONS

A number of special problems exist.

1. Installation

Steam utilized at 15 PSI/ 1 Bar results in 240°F/ 116 °C condensate out of the solution concentrator. To insure against backup of condensate, traps should be set at 3 ft /1 m or greater below the condensate outlet. The height of this outlet from the machine foundation is usually from 6 ft./ 180 cm to 8 ft./ 240 cm depending on the size of the machine. Allowing for 0.5 ft./ 15 cm for the trap allows only 2.5 ft./ 76 cm to 4 ft / 122 cm elevation for the height of the condensate unit when installed on the same level. Since the pump on the base is about 1 ft./ 30 cm, floor to center of pump suction, the receiver level must be as low as possible and the pump should be sized to pump 240°F/ 116 °C boiling water with 1 foot/ 30 cm NPSH.

2. Operation

The pump handles liquid, but does not handle large volumes of vapor. The condensate settles in the receiver separation into liquid and vapor. No vacuum is pulled in the trap at any time and there is no tendency to draw supply steam through the absorption unit.

The pump is controlled by the liquid level in the receiver and is sized 30% larger then the maximum condensate flow at start-up. The receiver will pump down to low level periodically under all operation conditions preventing any condensate from backing up into the cooler so long as the trap functions properly.

3. Where to pump the hot condensate

To gain the most system efficiency 240°F/ 116 °C condensate should be returned directly to the boiler. The practice of pumping to a deaerator should be avoided since the deaerator inlet valving sometimes refuses the full condensate flow requiring recirculation of condensate back to the receiver with attendant heat losses and possible flooding. In addition, the returns from the absorption cooler seldom require deaeration and therefore present no over sizing problem if passed around the deaerator. A thermostatic vent in the condensate receiver is sufficient to eliminate non-condensables at start-up.

4. Vented Condensate Units

The use of vented condensate return units designed for 200°F / 93°C condensate is to be avoided. The receiver when vented to atmosphere will flash any condensate that is returning above atmospheric boiling point. This flashing to the atmosphere results in heat and water losses that lower system efficiency and overload water conditioning equipment in the make-up water line.

5. Condensate Coolers

The use of condensate coolers in the line ahead of the condensate pump is to be avoided, since the temperature of the returning condensate is not maintained at 240°F/ 116 °C but drops on a low load condition. The best system practice dictates setting of the condensate unit close to the absorption unit. If this is at some distance from the boiler, a cooling water line for a condensate cooler presents unnecessary complication and expense. Even after flashing, the near boiling condensate is beyond the limitation of most atmospheric condensate pumps and will cause vapor binding with dry run damage, or will deteriorate seal, gaskets, packing and the motor insulation of close-coupled motor pumps.

A COMPLETE SOLUTION

A complete solution requires: a condensate return station with non-vented ASME code receiver set at one foot/ 30 cm above the pump center; a pump that will deliver full volume without cavitation or loss of operation life at one foot NPSH and 240°F: an available range of selection of discharge pressures from 15 PSI/ 1 Bar to 150 PSI/ 10.3 Bar: capacities for 12 GPM/ 42 LPM to 150 GPM/ 560 LPM; and a float switch mounted on the receiver that will not cycle due to surges of condensate from the steam traps.

ROTH 250°F/ 121°C CONDENSATE RETURN STATIONS

A Roth 250°F condensate return station is designed to be a complete solution, and eliminating the need for careful balancing and sizing required in a gravity or wet return system and makes possible the operation of a lithium bromide absorption machine at peak rated capacity. No other pumping system can meet all the conditions specified.

Please see the below Roth bulletins for addition designs:

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Bulletin 1H99 for 200°F-250°F/ 93°C-121°C low return condensate stations.
Bulletin F204 for return of condensate up to 350°F/ 176°C.
Bulletin P204 for return of condensate up to 400°F/ 204°C

FOR 10 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	14.3	LD1	LD1D	1/3	1	30
161-260	5200	10.4	1	24.8	LD5	LD5D	½	1 ¼	60
261-360	7200	14.4	1	28.2	LD7	LD7D	3/4	1 ¼	60
361-480	9600	19.2	1	43.5	LV3	LV3D	1	1 ¼	100
481-550	11000	22.0	1	43.5	LV3	LV3D	1	1 ¼	100
551-680	13600	27.2	1	55.0	LV6	LV6D	2	2	100
681-900	18000	36.0	1	75.0	LV8	LV8D	2	2	200
901-1100	22000	44.0	1	87.0	LW3	LW3D	2	2	200
1101-1300	26000	52.0	1	119	LW12	LW12D	7 ½	3*	200
1301-1500	30000	60.0	1	145	LW7	LW7D	7 ½	3*	350
1501-2000	40000	80.0	1	179	LY1	LY1D	7 ½	3*	350

FOR 15 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	13.2	LD2	LD2D	1/2	1	30
161-260	5200	10.4	1	23.5	LD6	LD6D	3/4	1 1/4	60
261-360	7200	14.4	1	29.6	LD10	LD10D	3/4	1 1/4	60
361-480	9600	19.2	1	41.5	LV3	LV3D	1	1 1/4	100
481-550	11000	22.0	1	54.0	LV6	LV6D	2	1 1/4	100
551-680	13600	27.2	1	54.0	LV6	LV6D	2	2	100
681-900	18000	36.0	1	75.0	LV8	LV8D	2	2	200
901-1100	22000	44.0	1	115	LW12	LW12D	7 1/2	2	200
1101-1300	26000	52.0	1	115	LW12	LW12D	7 1/2	3*	200
1301-1500	30000	60.0	1	140	LW7	LW7D	7 1/2	3*	350
1501-2000	40000	80.0	1	174	LY1	LY1D	7 1/2	3*	350

FOR 20 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	17.4	LD3	LD3D	1/2	1	30
161-260	5200	10.4	1	21.6	LD6	LD6D	3/4	1 1/4	60
261-360	7200	14.4	1	32.5	LD11	LD11D	1	1 1/4	60
361-480	9600	19.2	1	39.7	LV4	LV4D	1 1/2	1 1/4	100
481-550	11000	22.0	1	54.0	LV6	LV6D	2	2	100
551-680	13600	27.2	1	54.0	LV6	LV6D	2	2	100
681-900	18000	36.0	1	72.0	LV8	LV8D	2	2	200
901-1100	22000	44.0	1	86.0	LW4	LW4D	3	2	200
1101-1300	26000	52.0	1	111.5	LW12	LW12D	7 1/2	3*	200
1301-1500	30000	60.0	1	133.0	LW7	LW7D	7 1/2	3*	350
1501-2000	40000	80.0	1	169.5	LY1	LY1D	7 1/2	3*	350

FOR 30 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	15.2	LD4	LD4	3/4	1	30
161-260	5200	10.4	1	21.2	LD8	LD8	1	1 1/4	60
261-360	7200	14.4	1	29.3	LD13	LD13	1 1/2	1 1/4	60
361-480	9600	19.2	1	43.5	LV5	LV5	2	2	100
481-550	11000	22.0	1	43.5	LV5	LV5	2	2	100
551-680	13600	27.2	1	63.0	LV9	LV9	3	2	100
681-900	18000	36.0	1	81.0	LV11	LV11	5	2	200
901-1100	22000	44.0	1	104.0	LW12	LW12	7 1/2	3*	200
1101-1300	26000	52.0	1	124.0	LW8	LW8	10	3*	200
1301-1500	30000	60.0	1	160.0	LW10	LW10	10	3*	350
1501-2000	40000	80.0	1	160.0	LY4	LY4	10	3*	350

FOR 40 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	13.3	LD4	LD4D	3/4	1	30
161-260	5200	10.4	1	22.3	LD12	LD12D	1 1/2	1 1/4	60
261-360	7200	14.4	1	32.7	LD15	LD15D	2	1 1/4	60
361-480	9600	19.2	1	39.8	LV5	LV5D	2	2	100
481-550	11000	22.0	1	48.0	LV7	LV7D	3	2	100
551-680	13600	27.2	1	57.0	LV10	LV10D	5	2	100
681-900	18000	36.0	1	77.0	LV11	LV11D	5	2	200
901-1100	22000	44.0	1	97.5	LW12	LW12D	7 1/2	3*	200
1101-1300	26000	52.0	1	115.0	LW8	LW8D	10	3*	200
1301-1500	30000	60.0	1	151.0	LW10	LW10D	10	3*	350
1501-2000	40000	80.0	1	176.0	LY3	LY3D	15	3*	350

*250 lb. USAS Flange

FOR 50 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	12.8	LD9	LD9D	1 1/2	1 1/4	30
161-260	5200	10.4	1	22.0	LD14	LD14D	2	1 1/4	60
261-360	7200	14.4	1	29.2	LD15	LD15D	2	1 1/4	60
361-480	9600	19.2	1	46.0	LV7	LV7D	3	2	100
481-550	11000	22.0	1	46.0	LV7	LV7D	3	2	100
551-680	13600	27.2	1	64.5	LV11	LV11D	5	2	100
681-900	18000	36.0	1	91	LV14	LV14D	7 1/2	3*	200
901-1100	22000	44.0	1	91	LW12	LW12D	7 1/2	3*	200
1101-1300	26000	52.0	1	106	LW8	LW8D	10	3*	200
1301-1500	30000	60.0	1	142	LW11	LW11D	15	3*	350
1501-2000	40000	80.0	1	166	LY3	LY3D	15	3*	350

FOR 75 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	12.3	LD16	LD16D	2	1 1/4	30
161-260	5200	10.4	1	20.1	LD17	LD17D	3	1 1/4	60
261-360	7200	14.4	1	33.5	LD20	LD20D	5	2	60
361-480	9600	19.2	1	43.5	LV1	LV1D	5	2	100
481-550	11000	22.0	1	43.5	LV1	LV1D	5	2	100
551-680	13600	27.2	1	59.0	LV12	LV12D	5	1 1/2	100
681-900	18000	36.0	1	76	LV17	LV17D	10	3*	200
901-1100	22000	44.0	1	87	LW13	LW13D	15	3*	200
1101-1300	26000	52.0	1	121	LW11	LW11D	15	3*	350
1301-1500	30000	60.0	1	121	LW11	LW11D	15	3*	350
1501-2000	40000	80.0	1	ON APPLICATION					

FOR 100 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	13.6	LD35	LD35D	3	1 1/4	30
161-260	5200	10.4	1	27.1	LD37	LD37D	5	1 1/4	60
261-360	7200	14.4	1	36.7	LD38	LD38D	5	1 1/4	60
361-480	9600	19.2	1	43.7	LV41	LV41D	7 1/2	1 1/4	100
481-550	11000	22.0	1	43.7	LV41	LV41D	7 1/2	1 1/4	100
551-680	13600	27.2	1	65.7	LV51	LV51D	10	2	100
681-900	18000	36.0	1	96.0	LV53	LV53D	15	2	200
901-1100	22000	44.0	1	96.0	LW61	LW61D	15	2	200
1101-1300	26000	52.0	1	126.0	LW62	LW62D	20	2	350
1301-1500	30000	60.0	1	126.0	LW62	LW62D	20	2	350
1501-2000	40000	80.0	1	ON APPLICATION					

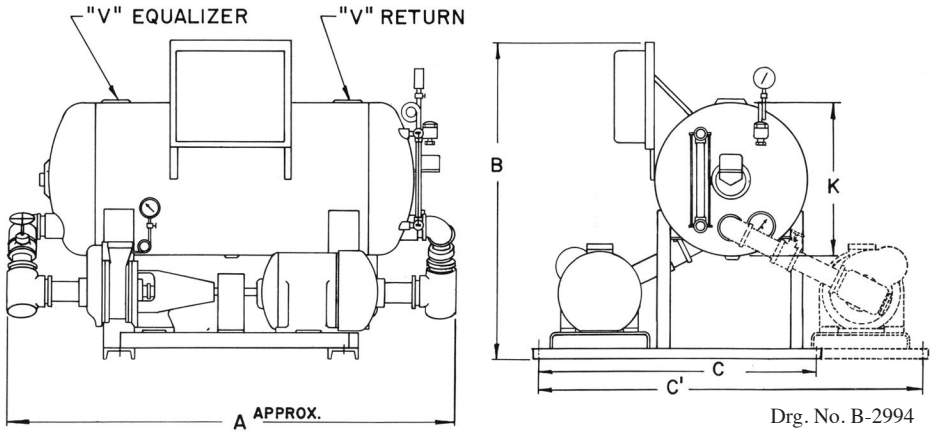
FOR 125 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	16.2	LD36	LD36D	5	1 1/4	30
161-260	5200	10.4	1	24.1	LD39	LD39D	5	1 1/4	60
261-360	7200	14.4	1	33.6	LD40	LD40D	7 1/2	1 1/4	60
361-480	9600	19.2	1	39.0	LV42	LV42D	7 1/2	1 1/4	100
481-550	11000	22.0	1	44.8	LV43	LV43D	10	2	100
551-680	13600	27.2	1	62.8	LV52	LV52D	15	2	100
681-900	18000	36.0	1	93.0	LV54	LV54D	15	2	200
901-1100	22000	44.0	1	93.0	LW63	LW63D	15	2	200
1101-1300	26000	52.0	1	119.0	LW64	LW64D	25	2	350
1301-1500	30000	60.0	1	119.0	LW64	LW64D	25	2	350
1501-2000	40000	80.0	1	ON APPLICATION					

FOR 150 PSI DIFFERENTIAL PRESSURE

Absorber Capacity Tons	Condensing Rate		Pump		Unit Number		Motor HP	Pump Disch.	Rec. Cap.
	Lbs./Hr.	GPM	NPSH	Act. GPM	SIMPLEX	DUPLEX			
50-160	3200	6.4	1	14.8	LD36	LD36	5	1 1/4	30
161-260	5200	10.4	1	21.1	LD39	LD39	5	1 1/4	60
261-360	7200	14.4	1	30.8	LD40	LD40	7 1/2	1 1/4	60
361-480	9600	19.2	1	42.0	LV43	LV43	10	2	100
481-550	11000	22.0	1	46.2	LV44	LV44	15	2	100
551-680	13600	27.2	1	56.6	LV45	LV45	15	2	100
681-900	18000	36.0	1	91.0	LV54	LV54	15	2	200
901-1100	22000	44.0	1	91.0	LW63	LW63	15	2	200
1101-1300	26000	52.0	1	112.5	LW64	LW64	25	2	350
1301-1500	30000	60.0	1	ON APPLICATION					
1501-2000	40000	80.0	1	ON APPLICATION					

Additional receiver capacities of 500, 750, & 1000 gallons available.



Drg. No. B-2994

DIMENSIONS IN INCHES

SIMPLEX AND DUPLEX

RECEIVER CAPACITY	A	B	C	C1	K	V
30 GAL.	60	53	33	52	16	3"
60 GAL.	64	53	38	54	18	3"
100 GAL.	75	53	42	58	24	3"
200 GAL.	87	53	46	65	30	3"

Additional receiver capacities of 350, 500, 750, & 1000 gallons available.

SPECIFICATION FORM FOR 250°F CONDENSATE RETURN STATIONS

Furnish as shown on the drawings OR as specified below:

Roth 250°F Condensate Return Station – Model # _____or equal.

(One)(Two) 1 Foot NPSHr Pumps For _____ GPM at _____ PSI at 250°F.
Receiver capacity shall be (30)(60)(100)(200)(350)(500)(750)(1000)gallons.
Receiver material shall be steel (50)(100)(200) PSIG ASME Code construction, with Code stamp.
Motor(s) shall be for _____ Voltage (60)(50) cycle (1)(3) phase current (Drip Proof)(TEFC)(TEFC Svr Duty)((Explosion Proof) construction.
Float switches/mechanical alternator shall be NEMA (1)(4)(7,9).
(Optional) Starter(s) enclosure shall be NEMA (1)(4)(4X)(7,9)(12) with a control voltage of _____.

Unit shall be furnished as a factory package unit and shall include the following components:

Pump(s) shall be Low NPSH regenerative turbine type with bronze impeller, renewable liners and stainless steel shaft. Pump NPSHr shall be a constant 1 Foot/ 0.3 Meter across the entire curve for consistent performance without regard to changing system conditions. Pump(s) must handle full rated capacity without loss or vapor binding at 1 ft. NPSHr. The pump(s) shall contain a mechanical seal with a silicone carbide seat suitable for 250°F water. Pump(s) shall be constructed so that shaft and impeller are entirely supported by grease lubricated sealed ball bearings.

Pump(s) to include the following:

• Pressure gauge(s) stem mounted with 3-1/2 inch dial, drawn steel case, phosphor bronze tube and brass socket, complete with shut off cock(s).

• One horizontal steel receiver of stated capacity and ASME code construction pressure rating with ASME Code stamp, and connections for inlet, outlet, drain, thermometer, pressure gauge, gauge glass, and float switch/mechanical alternator. Receiver shall be bolted to channel legs for easy field removability.

Receiver to include the following items:

• One thermostatic air vent to vent noncondensable gasses with tank pressure gauge.

• Level Gauge: One 1/2 inch, 175 lb. Pressure polished brass water gauge of proper size with bronze valve bodies conforming to ASTM specification B62, 1/8 inch bronze drain cock, non-heat round die cast valve wheels, 3/16 inch bronze guard rods and 5/8 inch high pressure glass tubing.

• Tank Thermometer: One stem mounted bi-metal thermometer with 3 inch dial, 50°-500°F range, and 4 inch stem, complete with thermowell.

• Provide all piping between receiver outlet and pump(s) suction complete with self cleaning "L" type strainer(s) and gate valves. Pipe, strainers, and valves must be sized for less than 3 ft/second velocity liquid flow at maximum pump capacity and specified operating head. All pipe fittings shall be suitable for 125 PSI.

• Motor(s) shall be sized to be non-overloading at any working pressure below design pressure.

• Motor(s) to be flexible coupled to the pump(s) using Woods coupling with suitable coupling guard to meet current OSHA regulations.

• Float switch/mechanical alternator with float rod packed for 250°F condensate:

-For single pump stations the float switch shall be 2-pole Square D or equal suitable for across-the-line starts on single phase current up to 1 HP load, direct actuated by float and float rod.

-For two pump stations the mechanical alternator shall be 2-pole Square D or equal to select first one pump and then the other and arranged to start the second pump if the first pump cannot handle peak returns.

• (Optional) Magnetic starter(s) with HOA switch(es), disconnect(s), and control transformer(s) shall be factory mounted in one enclosure and wired to the motor(s).

All of the above to be furnished as a complete package unit, factory assembled, piped, wired and ready for connection to services at the building.

GENERAL REQUIREMENTS

Each bidder's written proposal shall include the equipment and materials as specified herein as their base bid. However, if the bidder desires to submit one or more alternate proposals, a summary of advantages to the purchaser, with complete descriptive, technical, dimensional, and price data, shall be submitted in writing for each proposal. Alternate proposals will not be given consideration if adequate information is not included.

Any exception to the specification shall be clearly stated in writing. If any of the requirements cannot be fulfilled, the bidder shall state his reasons in detail and propose a reasonable alternate. If no exceptions are taken, it will be understood that the bidder's proposal is based on strict conformance to all requirements of the specification and related attachments.

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