

## 250°F CONDENSATE UNITS



A.I.A. File No.

# 15

**BOILERS & BOILER EQUIPMENT**  
boiler accessories

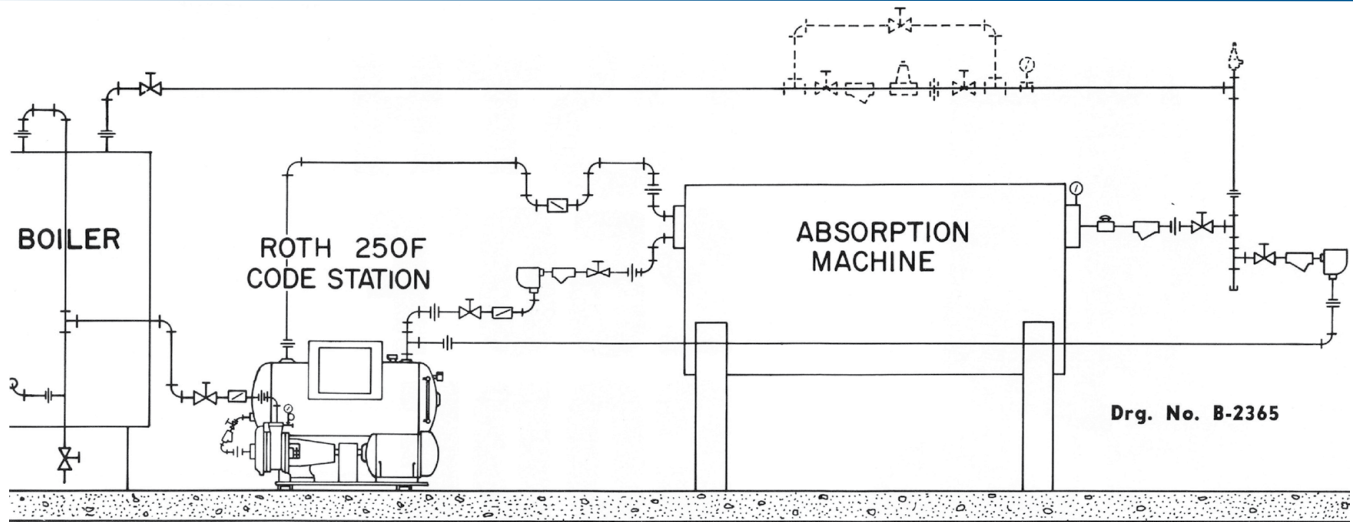
A full line of return stations with ASME code receivers for hot condensate from absorption coolers, kettles, and other equipment condensing at 200°F to 250°F.

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.

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## ROTH PUMP COMPANY



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, four 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 than 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:

- 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   | 1/2      | 1 1/4       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 28.2     | LD7         | LD7D   | 3/4      | 1 1/2       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 43.5     | LV3         | LV3D   | 1        | 1 1/4       | 60        |
| 481-550                | 11000           | 22.0 | 1    | 43.5     | LV3         | LV3D   | 1        | 1 1/4       | 60        |
| 551-680                | 13600           | 27.2 | 1    | 55.0     | LV6         | LV6D   | 2        | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 75.0     | LV8         | LV8D   | 2        | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 87.0     | LW3         | LW3D   | 2        | 2           | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 119      | LW12        | LW12D  | 7 1/2    | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 145      | LW7         | LW7D   | 7 1/2    | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | 179      | LY1         | LY1D   | 7 1/2    | 3*          | 200       |

**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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 29.2     | LD15        | LD15D  | 2        | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 46.0     | LV7         | LV7D   | 3        | 2           | 60        |
| 481-550                | 11000           | 22.0 | 1    | 46.0     | LV7         | LV7D   | 3        | 2           | 60        |
| 551-680                | 13600           | 27.2 | 1    | 64.5     | LV11        | LV11D  | 5        | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 91       | LV14        | LV14D  | 7 1/2    | 3*          | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 91       | LW12        | LW12D  | 7 1/2    | 3*          | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 106      | LW8         | LW8D   | 10       | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 142      | LW11        | LW11D  | 15       | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | 166      | LY3         | LY3D   | 15       | 3*          | 200       |

**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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 29.6     | LD10        | LD10D  | 3/4      | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 41.5     | LV3         | LV3D   | 1        | 1 1/4       | 60        |
| 481-550                | 11000           | 22.0 | 1    | 54.0     | LV6         | LV6D   | 2        | 1 1/4       | 60        |
| 551-680                | 13600           | 27.2 | 1    | 54.0     | LV6         | LV6D   | 2        | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 75.0     | LV8         | LV8D   | 2        | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 115      | LW12        | LW12D  | 7 1/2    | 3*          | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 115      | LW12        | LW12D  | 7 1/2    | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 140      | LW7         | LW7D   | 7 1/2    | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | 174      | LY1         | LY1D   | 7 1/2    | 3*          | 200       |

**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  | 3        | 1 1/4       | 30        |
| 161-260                | 5200            | 10.4 | 1    | 20.1           | LD17        | LD17D  | 3        | 1 1/4       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 33.5           | LD20        | LD20D  | 5        | 2           | 30        |
| 361-480                | 9600            | 19.2 | 1    | 43.5           | LV1         | LV1D   | 5        | 2           | 60        |
| 481-550                | 11000           | 22.0 | 1    | 43.5           | LV1         | LV1D   | 5        | 2           | 60        |
| 551-680                | 13600           | 27.2 | 1    | 59.0           | LV12        | LV12D  | 5        | 1 1/2       | 60        |
| 681-900                | 18000           | 36.0 | 1    | 76             | LV17        | LV17D  | 10       | 3*          | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 87             | LW13        | LW13D  | 15       | 3*          | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 121            | LW11        | LW11D  | 15       | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 121            | LW11        | LW11D  | 15       | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | ON APPLICATION |             |        |          |             |           |

**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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 32.5     | LD11        | LD11D  | 1        | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 39.7     | LV4         | LV4D   | 1 1/2    | 1 1/4       | 60        |
| 481-550                | 11000           | 22.0 | 1    | 54.0     | LV6         | LV6D   | 2        | 2           | 60        |
| 551-680                | 13600           | 27.2 | 1    | 54.0     | LV6         | LV6D   | 2        | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 72.0     | LV8         | LV8D   | 2        | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 86.0     | LW4         | LW4D   | 3        | 2           | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 111.5    | LW12        | LW12D  | 7 1/2    | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 133.0    | LW7         | LW7D   | 7 1/2    | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | 169.5    | LY1         | LY1D   | 7 1/2    | 3*          | 200       |

**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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 36.7           | LD38        | LD38D  | 5        | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 43.7           | LV41        | LV41D  | 7 1/2    | 1 1/4       | 60        |
| 481-550                | 11000           | 22.0 | 1    | 43.7           | LV41        | LV41D  | 7 1/2    | 1 1/4       | 60        |
| 551-680                | 13600           | 27.2 | 1    | 65.7           | LV51        | LV51D  | 10       | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 96.0           | LV53        | LV53D  | 15       | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 96.0           | LW61        | LW61D  | 15       | 2           | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 126.0          | LW62        | LW62D  | 20       | 2           | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 126.0          | LW62        | LW62D  | 20       | 2           | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | ON APPLICATION |             |        |          |             |           |

**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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 29.3     | LD13        | LD13   | 1 1/2    | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 43.5     | LV5         | LV5    | 2        | 2           | 60        |
| 481-550                | 11000           | 22.0 | 1    | 43.5     | LV5         | LV5    | 2        | 2           | 60        |
| 551-680                | 13600           | 27.2 | 1    | 63.0     | LV9         | LV9    | 3        | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 81.0     | LV11        | LV11   | 5        | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 104.0    | LW12        | LW12   | 7 1/2    | 3*          | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 124.0    | LW8         | LW8    | 10       | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 160.0    | LW10        | LW10   | 10       | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | 160.0    | LY4         | LY4    | 10       | 3*          | 200       |

**FOR 125 PSI DIFFERENTIAL PRESSURE**

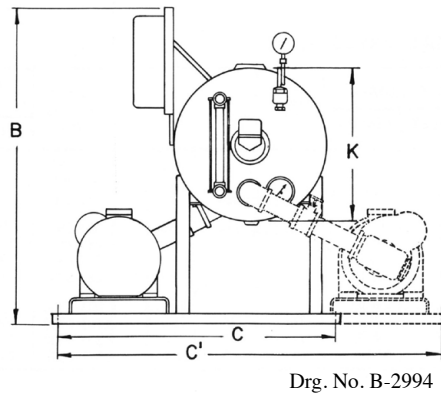
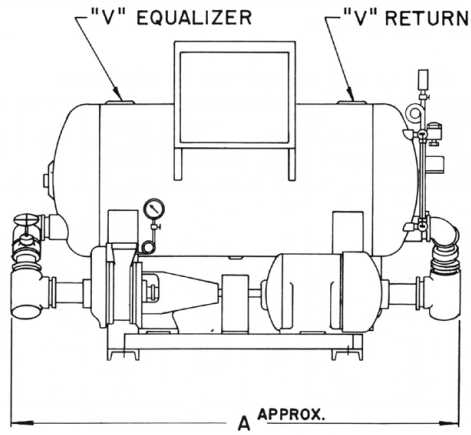
| Absorber Capacity Tons | Condensing Rate |      | Pump |                | Unit Number |        | Motor HP | Pump Disch. | Rec. Cap. |
|------------------------|-----------------|------|------|----------------|-------------|--------|----------|-------------|-----------|
|                        | Lbs./Hr.        | 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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 33.6           | LD40        | LD40D  | 7 1/2    | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 39.0           | LV42        | LV42D  | 7 1/2    | 1 1/4       | 60        |
| 481-550                | 11000           | 22.0 | 1    | 44.8           | LV43        | LV43D  | 10       | 2           | 60        |
| 551-680                | 13600           | 27.2 | 1    | 62.8           | LV52        | LV52D  | 15       | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 93.0           | LV54        | LV54D  | 15       | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 93.0           | LW63        | LW63D  | 15       | 2           | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 119.0          | LW64        | LW64D  | 25       | 2           | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 119.0          | LW64        | LW64D  | 25       | 2           | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | ON APPLICATION |             |        |          |             |           |

**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       | 30        |
| 261-360                | 7200            | 14.4 | 1    | 32.7     | LD15        | LD15D  | 2        | 1 1/4       | 30        |
| 361-480                | 9600            | 19.2 | 1    | 39.8     | LV5         | LV5D   | 2        | 2           | 60        |
| 481-550                | 11000           | 22.0 | 1    | 48.0     | LV7         | LV7D   | 3        | 2           | 60        |
| 551-680                | 13600           | 27.2 | 1    | 57.0     | LV10        | LV10D  | 5        | 2           | 60        |
| 681-900                | 18000           | 36.0 | 1    | 77.0     | LV11        | LV11D  | 5        | 2           | 60        |
| 901-1100               | 22000           | 44.0 | 1    | 97.5     | LW12        | LW12D  | 7 1/2    | 3*          | 100       |
| 1101-1300              | 26000           | 52.0 | 1    | 115.0    | LW8         | LW8D   | 10       | 3*          | 100       |
| 1301-1500              | 30000           | 60.0 | 1    | 151.0    | LW10        | LW10D  | 10       | 3*          | 100       |
| 1501-2000              | 40000           | 80.0 | 1    | 176.0    | LY3         | LY3D   | 15       | 3*          | 200       |

**FOR 150 PSI DIFFERENTIAL PRESSURE**

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## 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 250, 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)(250)(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.

**ROTH PUMP COMPANY**  
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