PPEC Pressure Powered Pump Selection and Sizing

How to Select and Size

From the inlet pressure, back pressure and filling head conditions given below, select the pump size and check valve package which meets the capacity requirement of the application.

Specify pump body type. Select optional extras as required.

For GPM, multiply the capacities below by 0.002.

For kg/h, multiply the capacities below by 0.454.

For liquid specific gravities from 0.9 to 0.65, consult Spirax Sarco.

* Back pressure is the lift height (H) in feet x 0.433 plus psi g in return line, plus downstream piping friction pressure drop in psi g. calculated based on the maximum instantaneous discharge rate of the respective pump selected. (See TIS Sheets)

Note: To achieve rated capacity, pump must be installed with check valves supplied by Spirax Sarco. Use of a substitute check valve may effect the performance of the pump.

Condensate load	3000 lb/h	(1360 kg/h)
Steam pressure available for operating pump	75 psi g	(5.17 bar g)
Vertical lift from pump to the return piping	30 feet	(9.144 meters)
Pressure in the return piping (piping friction negligible)	25 psi g	(1.72 bar g)
Filling head on the pump available	6 inches	(152.4 mm)

Solution:

1. Calculate "H", the total lift or back pressure, against which the condensate must be pumped. = (30 x 0.433) + 25 = 38 psi g
2. From capacity table, with 75 psi g inlet pressure and 40 psi g back pressure, choose a 1½" pump with stainless steel check valves, which has a capacity of 3300 lb/h.

Note from capacity multiplying factor charts:
A. Pump capacity if filling head is 24 in: 1.3 x 3,300 = 4290 lb/h
B. Pump capacity using compressed air: 1.12 x 3,300 = 3696 lb/h (% back pressure is 38 ÷ 75 = 50%)

Capacity lb/h

When installed with recommended filling head above top of pump.

Operating Inlet Pressure psi g	Total Lift Back Pressure psi g	Filling head 6"			
		Liquid Specific Gravity 0.9 to 1.0			
		Single pump PPEC			
		Check valve Size			
		1" Bronze	1½" Bronze	1" Stainless steel	1½" Stainless steel
125	15	2,100	3,400	2,600	5,100
125	40	1,900	2,900	2,400	4,500
125	60	1,700	2,500	2,200	4,050
125	80	1,500	2,100	1,900	3,100
125	100	1,300	1,600	1,700	2,650
125	115	1,200	1,350	1,350	1,900
100	15	2,100	3,400	2,550	4,950
100	40	1,800	2,800	2,300	4,000
100	60	1,600	2,400	2,200	3,250
100	80	1,400	1,800	1,750	2,500
75	15	2,100	3,300	2,500	4,800
75	40	1,700	2,500	2,200	3,300
75	60	1,300	2,000	2,000	2,450
50	10	2,000	3,300	2,400	4,400
50	25	1,700	2,700	2,150	3,350
50	40	1,400	2,000	1,650	2,100
25	5	2,000	3,400	2,700	5,000
25	10	1,700	3,000	2,350	3,800
25	15	1,400	2,600	1,800	3,300
10	2	1,900	3,000	2,200	3,000
10	5	1,600	2,600	1,900	2,600
5	2	1,500	2,400	1,700	2,400

* For Capacity Multiplying Factors for Motive Gas Supplies and Other Filling Heads see back side of this page.

Note: Capacity shown when fitted with specified check valves only.

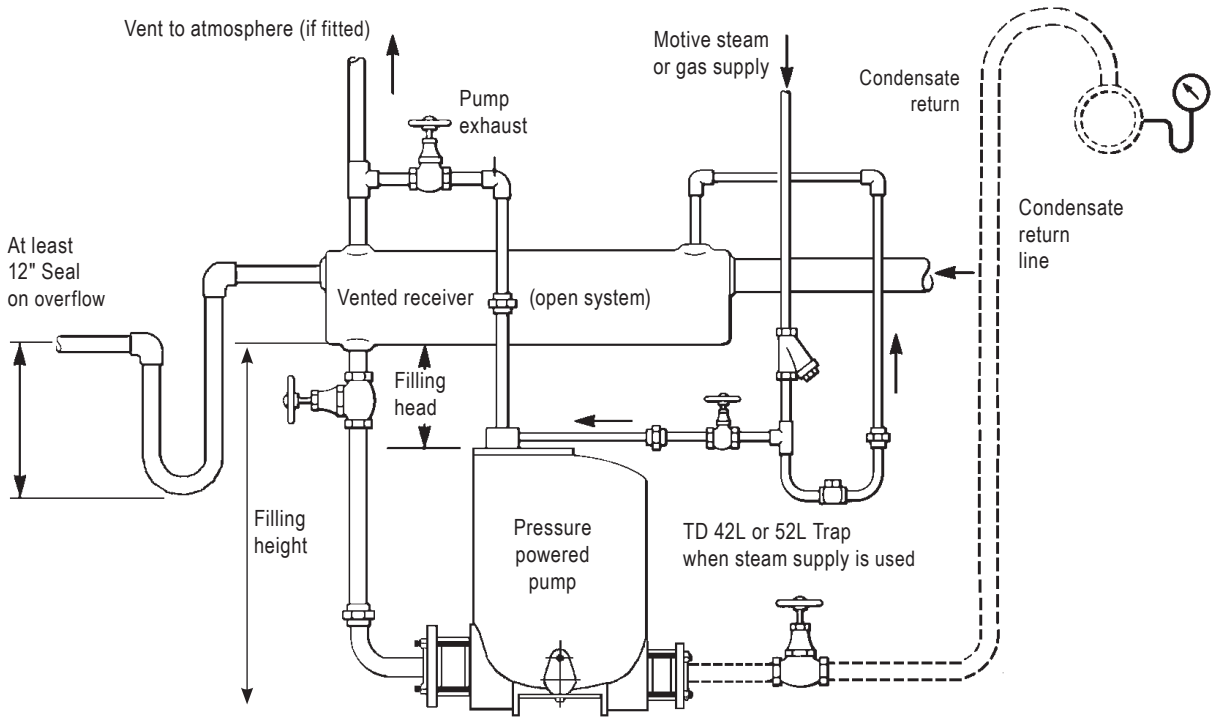
Capacity multiplying factors for motive gas supply (other than steam)

1" PPEC									
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Backpressure Vs. Motive Pressure (BP/MP)
1.10	1.13	1.16	1.20	1.25	1.30	1.35	1.40	1.45	Capacity Multiplying Factors
1½" PPEC									
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Backpressure Vs. Motive Pressure (BP/MP)
1.00	1.00	1.03	1.09	1.18	1.20	1.33	1.45	1.50	Capacity Multiplying Factors

Capacity multiplying factors for other filling heads

Filling Head		Capacity Multiplying Factors Check valve and piping size, pump type
Inches	mm	1" and 1½" PPEC
0	0	*0.7
6	152	1.0
12	305	1.1
18	457	1.2
24	610	1.3
36	914	1.5
48	1219	
60	1524	

* When using a PPEC below 6" filling head, a swing check valve must always be fitted to the inlet.



Recommended installation

The pump is fitted with vented receiver or an inlet reservoir. Details of the application will determine whether a vented receiver or an inlet reservoir will be needed to accomplish this.

Vented receiver (Open system)

To drain condensate from a single or multiple source an "open" system, a vented receiver should be installed in a horizontal plane above and ahead of the pump. Sufficient receiver volume is needed above the filling head level to accept the condensate reaching the receiver during the pump discharge stroke. More important, the receiver must be sized to allow sufficient area for complete flash steam separation from the condensate. The chart below shows proper vented receiver sizing (per criteria set forth in the A.S.H.R.A.E. Handbook) based on the amount of flash steam present. If the receiver is sized as shown below, there will be sufficient volume for condensate storage and sufficient area for flash steam separation. The receiver can be a length of large diameter pipe or a tank.

Pump size – up to 3"x2"

Flash steam up to	Pipe size		Vent line diameter
	Diameter	Length	
75 lb/h	4"	36"	1½"
150 lb/h	6"	36"	2"
300 lb/h	8"	36"	3"
600 lb/h	10''	36"	4"
900 lb/h	14"	36"	6"
1200 lb/h	16"	36"	6"
2000 lb/h	20"	36"	8"

Inlet reservoir piping (Closed system)

To drain condensate from a single piece of equipment in a "closed" system, a reservoir should be installed in a horizontal plane above and ahead of the pump. Sufficient reservoir volume is needed above the filling head level to accept the condensate reaching the reservoir during the pump discharge stroke. The chart below shows minimum reservoir sizing, based on condensate load, needed to prevent equipment flooding during the pump discharge stroke. The reservoir can be a length of large diameter pipe or a tank.

Pump size – up to 3"x2"

Liquid lb/h	Reservoir Pipe Size				
	3"	4"	6"	8"	10"
500 or Less	2'				
1000	2'				
1500	3'	2'			
2000	3.5'	2'	1'		
3000		3'	2'		
4000		4'	2'	1'	
5000		6'	3'	2'	
6000			3'	2'	
7000			3'	2'	
8000			4'	2'	
9000			4.5'	3'	2'
10,000			5'	3'	2'
11,000			5'	3'	2'