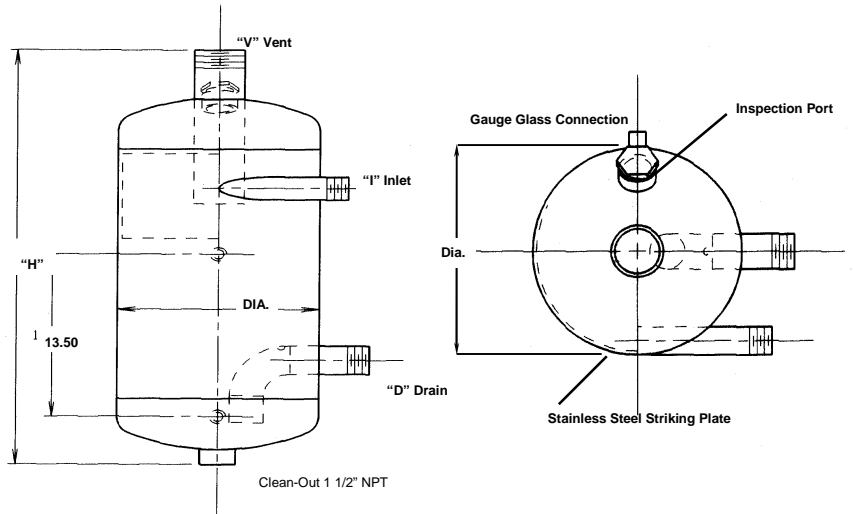


9 Flash Separator

Flash Tanks for Handling Condensate and Flash Steam Recovery:

Penn Flash Separators use a tangential inlet and cyclonic action to instantly separate steam and condensate. Our Flash Separators are smaller in size and more efficient than traditional flash tanks. Because of the unique smaller size they are less expensive than traditional flash tanks. The clean steam can be returned to a lower pressure use saving valuable BTU's and make-up water return on investment can be in a matter of weeks. Easy to use flash steam and selector charts assure proper sizing of a Flash Separator for your condensate requirements. Special tank designs are also available. Penn Separator has over fifty years of experience building pressure vessels to ASME Code. All Penn Flash Separators are constructed to the ASME Code Sec. VIII, Div. I.

- **Smaller Size**
Replaces larger flash tanks
- **Saves Money**
Returns valuable BTU's in flash steam
- **Pre-engineered Design**
Convenient charts for easy selection
- **Quality Construction**
Built to the ASME Code Sec. VIII, Div. 1



Uses of A Flash Separator:

Fig #1

Typical Flash Separator application shows flashing high or medium pressure condensate returns to supplement a low pressure steam use saving valuable BTU's.

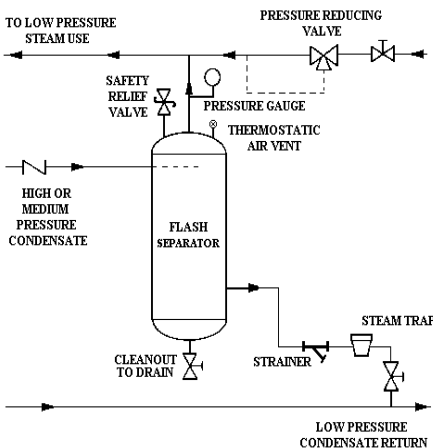


Fig #1

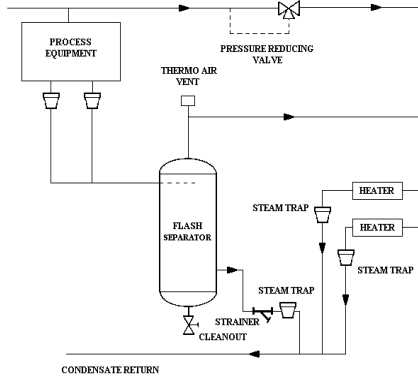


Fig #2

Fig #2

Flash Steam from a high pressure process to supply medium pressure steam to heaters. Flash Steam from the separator vent is 97% quality or better.

Fig #3

Waste condensate that needs cooled to a drain can use a Flash Separator along with our automatic aftercooler fitting and temperature regulator valve that automatically cools condensate to drain to 140°F.

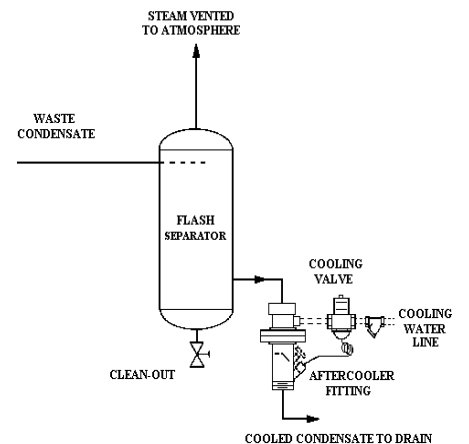


Fig #3

Flash Separator Selector Charts

Flash Separators are sized for the condensate flow entering the tank and the amount of flash steam that is produced when venting to a lower pressure. To select a flash separator use Chart "A" to determine the flash steam amount and Chart "B" that gives the size of tank and nozzle connections sizes required.

To use **Chart A** follow the "PRESSURE FROM" (horizontal at the top) down vertically to the "FLASH TO" pressure. All pressures are in psig.

To use **Chart B** select the Flash Separator by finding the flash amount across the top and going down to the total condensate flow rate entering the separator shown on the left side of the chart.

CHART "A" - PERCENTAGE FLASH STEAM

	600	500	450	400	350	300	250	200	150	100	75	50	0
500	2.8												
400	5.8	3.1	1.3										
350	7.5	4.8	3.0	1.8									
300	9.2	6.6	4.8	3.6	1.9								
250	11.1	8.5	6.8	5.6	3.9	2.1							
225	12.2	9.7	8.0	6.8	5.1	3.3	1.2						
200	13.3	10.8	9.1	7.9	6.2	4.4	2.4						
175	14.4	11.9	10.3	9.1	7.4	5.7	3.7	1.3					
150	15.7	13.2	11.6	10.4	8.8	7.0	5.0	2.7					
125	17.1	14.6	13.0	11.9	10.3	8.5	6.6	4.3	1.6				
100	18.6	16.2	14.6	13.5	11.9	10.2	8.3	6.0	3.4				
75	20.3	18.0	16.4	15.3	13.7	12.1	10.2	7.9	5.4	2.0			
50	22.6	20.3	18.8	17.7	16.1	14.5	12.6	10.4	7.9	4.6	2.6		
25	25.4	23.1	21.6	20.6	19.1	17.5	15.6	13.5	11.0	7.8	5.9	3.3	
15	26.9	24.7	23.2	22.1	20.6	19.0	17.2	15.1	12.7	9.5	7.6	5.1	1.8
10	27.8	25.6	24.2	23.1	21.6	20.1	18.3	16.2	13.8	10.6	8.7	6.2	2.9
5	28.9	26.7	25.2	24.2	22.7	21.1	19.4	17.3	14.9	11.8	9.9	7.4	4.2
0	30.2	28.0	26.6	25.6	24.1	22.6	20.8	18.8	16.4	13.3	11.4	9.0	5.8

The drain and vent sizes listed in Chart "B" are based on atmospheric operating conditions. When the flashing to pressure is above atmospheric pressure smaller drain and vent sizes can be used. The drain size in no case should be smaller than the trap connection size.

To determine the minimum vent size use the following formula.

$$\text{Dia.} = .0184 \times \sqrt{F \times SV}$$

Where:

Dia. Equals the minimum diameter of vent (inches)

F The amount of flash steam in lbs./hour

SV Is the specific volume of steam (cu.ft./lbs.)

Flash Separator Suggested Specifications:

Furnish and install as shown on plans a Vertical Cyclone Flash Separator Model No. FS _____" Dia. - _____" height, as selected for a condensate flow rate of _____#/hr. at _____ psig flashing to a pressure of _____ psi. The nozzles also selected for the flow rate shall include a _____" tangential inlet with stainless steel wear plate to match the condensate line size, a _____" water leg overflow type condensate drain, and a _____" centrally located steam vent to produce 97% quality flash steam. The tank shall include coupling connections for a level gauge, inspection openings and tank cleanout. Materials and locations per our spec print C-4B.

Optional accessories that can be provided include a (external float level controller with a pneumatic or mechanical control valve or Armstrong trap model no. _____) properly sized for the condensate drain flow rate, inlet check valves (list sizes) as required for multiple inlets at various pressures, tank clean-out ball valve, safety valve to protect the tank from over-pressurizing or to maintain a maximum venting pressure, pressure gauge with iron siphon, or industrial type thermometer.

Optional supports include angle legs with floor pads. Three legs are provided on 24" diameter separators and smaller and four legs are provided on larger separators. Special mounting bracket designs are also available.

LBS/HR															
Condensate		100	500	700	1000	2000	3000	4000	8000	12000	18000	21000	25000	35000	
100,000	HEIGHT	108	108	108	108	108	108	108	108	108	108	108	108	108	
	DIA.	30	30	30	30	30	30	30	30	30	30	30	30	36	
	DRAIN	5	5	5	5	5	5	5	5	5	5	5	5	6	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	16	18	
90,000	HEIGHT	96	96	96	96	96	96	96	96	96	96	96	96	96	
	DIA.	30	30	30	30	30	30	30	30	30	30	30	30	36	
	DRAIN	5	5	5	5	5	5	5	5	5	5	4	4	4	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	16	18	
80,000	HEIGHT	96	96	96	96	96	96	96	96	96	96	96	96	96	
	DIA.	24	24	24	24	24	24	24	24	24	24	24	24	30	
	DRAIN	5	5	5	5	5	5	5	5	5	4	4	4	4	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	16	18	
70,000	HEIGHT	72	72	72	72	72	72	72	72	72	72	72	72	72	
	DIA.	24	24	24	24	24	24	24	24	24	24	24	24	30	
	DRAIN	4	4	4	4	4	4	4	4	4	4	4	4	4	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	16	18	
60,000	HEIGHT	56	56	56	56	56	56	56	56	56	56	56	56	56	
	DIA.	24	24	24	24	24	24	24	24	24	24	24	24	30	
	DRAIN	4	4	4	4	4	4	4	4	4	4	4	4	4	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	16	16	
50,000	HEIGHT	72	72	72	72	72	72	72	72	72	72	72	72	72	
	DIA.	20	20	20	20	20	20	20	20	20	20	20	24	30	
	DRAIN	4	4	4	4	4	4	4	4	4	4	4	3	3	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	16	16	
40,000	HEIGHT	56	56	56	56	56	56	56	56	56	56	56	56	56	
	DIA.	20	20	20	20	20	20	20	20	20	20	20	24	30	
	DRAIN	4	4	4	4	4	4	4	4	4	3	3	3	3	
	VENT	2	2	2.5	3	4	5	6	8	10	12	14	14	14	
30,000	HEIGHT	56	56	56	56	56	56	56	56	56	56	56	56	56	
	DIA.	18	18	18	18	18	18	18	18	18	18	18	20	24	
	DRAIN	3	3	3	3	3	3	3	3	3	3	3	2.5	2.5	
	VENT	2	2	2.5	3	4	5	6	8	10	12	12	12	12	
20,000	HEIGHT	56	56	56	56	56	56	56	56	56	56	56	56	56	
	DIA.	14	14	14	14	14	14	14	14	14	14	14	16	20	
	DRAIN	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2	2	
	VENT	2	2	2.5	3	4	5	6	8	10	10	10	10	10	
10,000	HEIGHT	34	34	34	34	34	34	34	34	34	34	34	34	34	
	DIA.	14	14	14	14	14	14	14	14	14	14	14	14	16	
	DRAIN	2	2	2	2	2	2	2	2	2	1.5	1.5	1.5	1.5	
	VENT	2	2	2.5	3	4	5	6	8	8	8	8	8	8	
5,000	HEIGHT	34	34	34	34	34	34	34	34	34	34	34	34	34	
	DIA.	10	10	10	10	10	10	10	10	10	10	10	10	14	
	DRAIN	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.25	1.25	1.25	1.25	
	VENT	2	2	2.5	3	4	5	6	6	6	6	6	6	6	
3,000	HEIGHT	34	34	34	34	34	34	34	34	34	34	34	34	34	
	DIA.	10	10	10	10	10	10	10	10	10	10	10	10	14	
	DRAIN	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	
	VENT	2	2	2.5	3	4	4	4	4	4	4	4	4	4	
2,000	HEIGHT	34	34	34	34	34	34	34	34	34	34	34	34	34	
	DIA.	8	8	8	8	8	8	8	8	8	8	8	8	10	
	DRAIN	1.25	1.25	1	1	1	1	1	1	1	1	1	1	1	
	VENT	2	2	2.5	3	3	3	3	3	3	3	3	3	3	
1,000	HEIGHT	34	34	34	34	34	34	34	34	34	34	34	34	34	
	DIA.	6	8	8	8	8	8	8	8	8	8	8	8	8	
	DRAIN	1	1	1	1	1	1	1	1	1	1	1	1	1	
	VENT	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	