Armstrong Vertical Flash Tank
Installation and Maintenance

This bulletin should be used by experienced personnel as a guide to the installation and maintenance of the Armstrong Vertical Flash Tank. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or your local representative if further information is required.

The maximum operating pressure for the Armstrong Vertical Flash Tank is 150 psig (10.3 bar). The maximum design pressure for the Armstrong Flash Tank is 150 psig @ 500°F (10.3 bar @ 260°C). Armstrong Vertical Flash Tanks vary in weight from approximately 60 lbs (27 kg) for Model AFT-6 to 160 lbs (73 kg) for Model AFT-16.

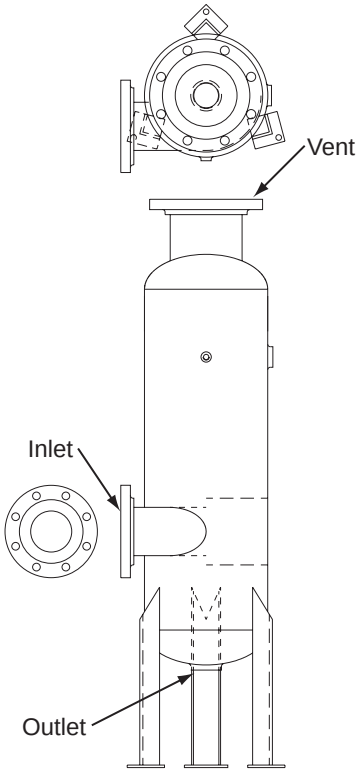
Vertical Flash Tank Operation

1. Condensate from various points of operation enters the flash tank at relatively high pressure. As the condensate enters the low pressure flash tank, part of the condensate flashes into steam. The tangential inlet of the flash tank forces the incoming condensate into a funnel type motion forcing the denser entrained water to the outside of the flash tank to collect on the walls and fall to drain. This leaves dry low pressure steam in the center of the flash tank to rise and exit the flash tank through the vent.

2. The flash steam exits through the vent at the top of the tank and is either vented to atmosphere or piped to a low pressure line for use in low pressure steam applications.

3. The condensate is discharged through the bottom of the flash tank. When piping flash steam into a low pressure steam line and discharging condensate directly to a return line, it is important that the condensate has enough of a pressure differential to overcome any back pressure from the return line. Additionally, the placement of a steam trap after the flash tank would be necessary to prevent blow through of steam. If a steam trap is necessary, an inverted bucket (IB) trap is suggested. The trap should be sized with a 3:1 safety factor. If back pressure exceeds tank pressure, the use of a reservoir and pumping trap may be necessary to ensure proper drainage.

   If the flash tank is held at atmospheric pressure, the use of a steam trap on the discharge line would not be necessary since the flash steam is being vented to atmosphere. The condensate, in this case, would be drained by gravity to a vented receiver which would be placed below the level of the flash tank.



Suggested Installation and Application

1. A flash tank, like a pumping trap or reservoir, should be located below any equipment or steam lines being drained. Condensate return lines should be pitched toward the flash tank. It is important that the flash tank be securely bolted to the surface on which it sits. Accordingly, inlet and outlet piping should be properly supported. **IMPORTANT:** ***The flash tank is not designed to be the sole supporting structure for piping.***

2. When multiple return lines are fed into the flash tank, check valves should be fitted to each line to prevent a reversal flow of condensate and resultant flash steam.

3. It is suggested that the condensate lines, the flash tank and the low pressure steam line be insulated to prevent waste of flash through radiation.

4. If the flash steam will be piped to a low pressure steam line for use in other applications within a plant, such as use in low pressure heating equipment, the flash tank pressure must be controlled accurately.

   A. A back pressure regulator (BPR) should be connected into the low pressure steam line. This will relieve excess pressure in the system when steam demand is less than the amount of flash steam produced. The BPR should be sized to relieve the entire project load. **CAUTION:** ***Do not use a BPR as a safety relief valve.***

B. A pressure reducing valve (PRV) should be connected into the high pressure steam line for make up steam. This will supplement the flash steam when the steam demand is greater than the amount of flash steam produced. The PRV should be sized to provide the entire low pressure steam demand.

IMPORTANT: A properly sized safety relief valve should be installed on the flash tank. It should be set for the flash tanks maximum allowable working pressure (MAWP) or the MAWP of equipment being supplied by the low pressure steam.

Flash Tank Sizing

Selecting the proper flash tank depends upon the condensate load entering the vessel and the corresponding amount of flash steam that is generated. See the sizing example below.

The percentage of flash steam generated inside a vessel is calculated by the following formula:

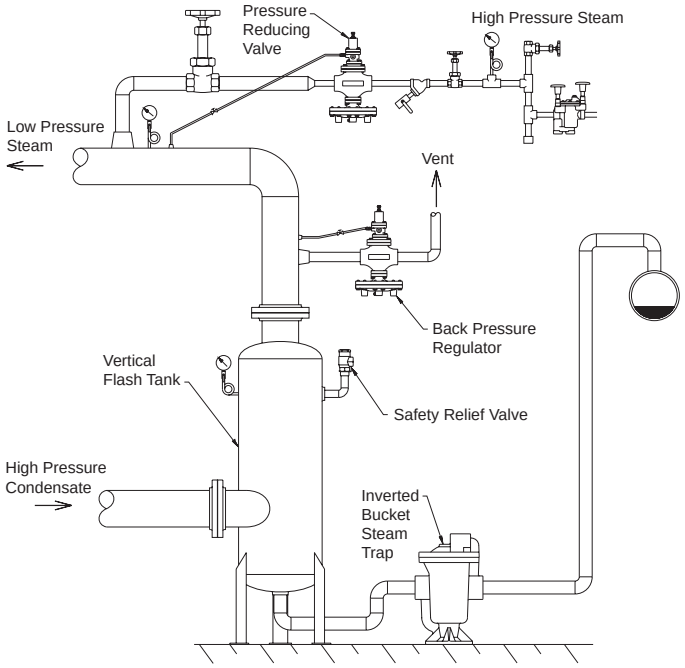
$$\% \text{ of flash steam} = \frac{SH - SL \times 100}{H}$$

SH = Sensible heat in the condensate at the higher pressure before discharge.

SL = Sensible heat in the condensate at the lower pressure to which the discharge takes place.

H = Latent heat in the steam at the lower pressure to which the condensate had been discharged.

Note: Exact temperatures can be located in the steam table.



Let's say for example that we have 300°F (149°C) condensate flowing at 10,000 lb/hr @ 125 psig into a flash tank held at 15 psig. Calculate the amount of flash steam generated at these parameters.

$$\% \text{ flash steam} = \frac{324.82 - 218.82 \times 100}{945.3}$$

% flash steam = .112 or 11.2%

To find the amount of flash steam in lb/hr we would need to multiply our condensate load by the percent of flash steam produced. In this case we would have the following:

.112 x 10,000 lb/hr = 1,120 lb/hr flash steam produced

According to this example, you will neeed a flash tank that can handle 1120 lb/hr flash steam. This would be Armstrong's model AFT-12. For further sizing questions, please see Armstrong's All Product Catalog 326 or call the factory.

Troubleshooting

Symptoms(s)	Problem(s)	Solution(s)
Flash Tank Vibrates Excessively	Possibly water hammer. Condensate lines and/or flash vessel may be undersized. Vessel not secured.	Contact Factory
Excessive Flash Steam	Need to adjust pressure reducing valve or back pressure regulator	If too much flash steam is being produced, set your back pressure regulator to reduce excess steam pressure or reduce make-up steam through PRV
Back Pressure Regulator Vents Often	Differential settings between BPR and PRV	Set PRV on make-up steam a few psi below desired low steam pressure and set the BPR a few psi above desired low steam pressure
Blowing Steam Into Return Line, Pressurizing Return Line	Steam trap may have failed	Replace trap.
Flash Tank Floods and/or Upstream Equipment Floods	Steam trap or pump trap on discharge line may have failed. Discharge check valve may have failed.	Isolate and check traps and check valves
Saferty Relief Valve Blows	Set point on valve too low.	Set valve for maximum pressure rating of vessel or the maximum operating pressure of equipment downstream. Replace if it blows.