



Condensate Line Sizing

Condensate return lines on the discharge side of steam traps must be able to accommodate the flow of both water and flash steam. While the percentage, by weight, of flash steam may be rather low, its overall volume in comparison to the liquid is very large. By determining the quantity of flash steam and sizing the return line for velocities between 4,000 and 6,000 ft/min, the two-phase flow within the pipe can be accommodated. The information required for sizing is the condensate load in lb/h, inlet pressure to steam trap(s) in psi g and return line system pressure.

Example:

Size a condensate return line from a 160 psi g steam trap discharging to 20 psi g. flash tank. Load is 3,000 lb/h.

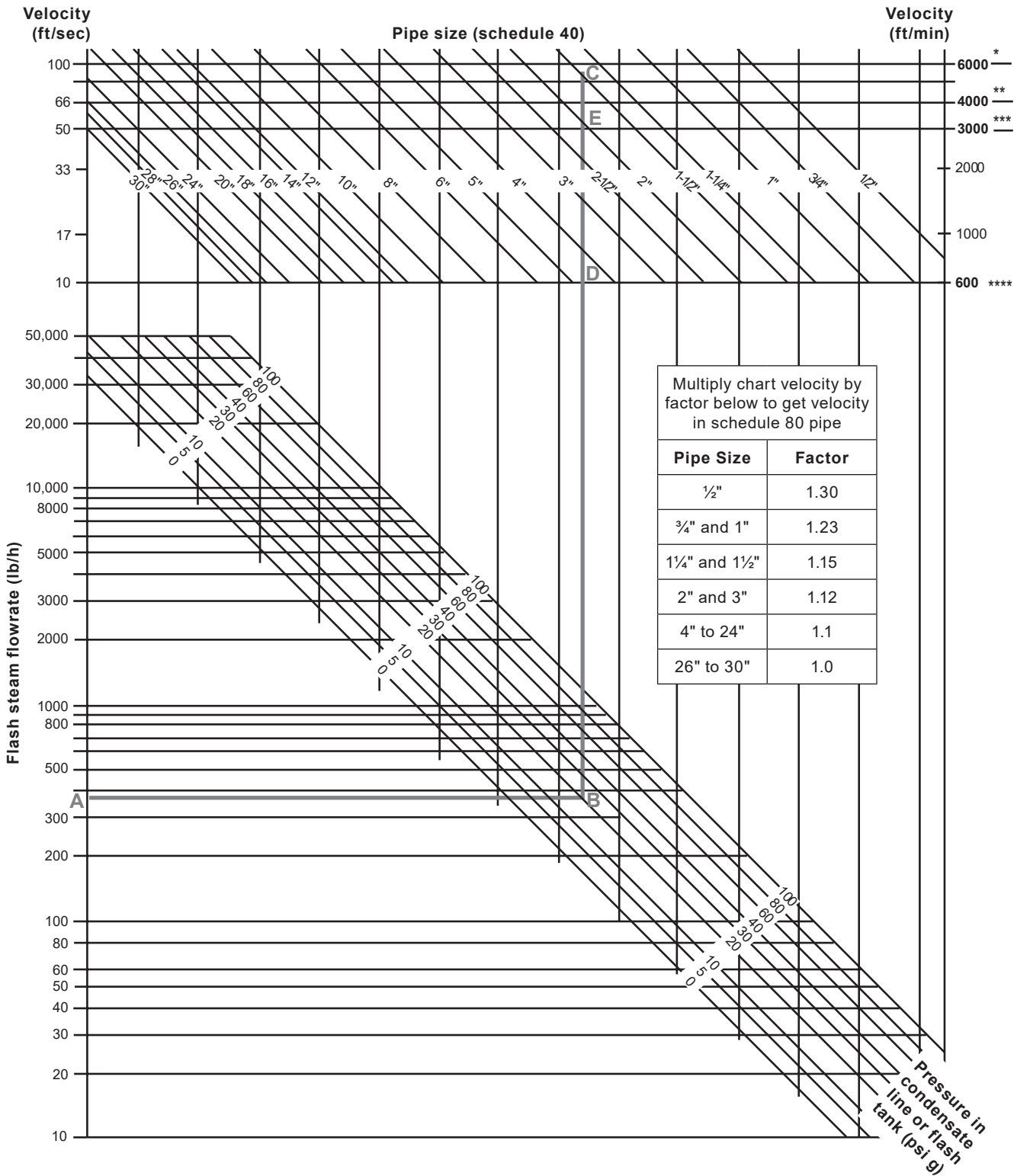
1. Determine percent flash steam produced using table. With a steam pressure of 160 psi g and a flash tank pressure of 20 psi g read a value of 12.4%.
2. Next, multiply the condensate load by the percent flash from step #1 to determine the flowrate, of flash steam produced.
 $3,000 \text{ lb/h} \times .124 = 372 \text{ lb/h}$.
3. Enter Condensate Recovery Sizing chart at the flash steam flowrate of 372 lb/h at "A" and move horizontally to the right to the flash tank pressure of 20 psi g "B". Rise vertically to choose a condensate return line size which will give a velocity between 4,000 and 6,000 ft/min, "C". In this example, an 1-½" schedule 40 pipe with a velocity of approximately 5,000 ft/min. If schedule 80 pipe is to be used, refer to table within body of chart. Multiply the velocity by the factor to determine whether the velocity is within acceptable limits.

Percent Flash Steam

Produced when Condensate is discharged to atmosphere or into a flash tank controlled at various pressures.

Pressure psi g	Atmosphere	Flash Tank Pressure — psi g									
	0	2	5	10	15	20	30	40	60	80	100
5	1.7	1.0	0								
10	2.9	2.2	1.4	0							
15	4.0	3.2	2.4	1.1	0						
20	4.9	4.2	3.4	2.1	1.1	0					
30	6.5	5.8	5.0	3.8	2.6	1.7	0				
40	7.8	7.1	6.4	5.1	4.0	3.1	1.3	0			
60	10.0	9.3	8.6	7.3	6.3	5.4	3.6	2.2	0		
80	11.7	11.1	10.3	9.0	8.1	7.1	5.5	4.0	1.9	0	
100	13.3	12.6	11.8	10.6	9.7	8.8	7.0	5.7	3.5	1.7	0
125	14.8	14.2	13.4	12.2	11.3	10.3	8.6	7.4	5.2	3.4	1.8
160	16.8	16.2	15.4	14.1	13.2	12.4	10.6	9.5	7.4	5.6	4.0
200	18.6	18.0	17.3	16.1	15.2	14.3	12.8	11.5	9.3	7.5	5.9
250	20.6	20.0	19.3	18.1	17.2	16.3	14.7	13.6	11.2	9.8	8.2
300	22.7	21.8	21.1	19.9	19.0	18.2	16.7	15.4	13.4	11.8	10.1
350	24.0	23.3	22.6	21.6	20.5	19.8	18.3	17.2	15.1	13.5	11.9
400	25.3	24.7	24.0	22.9	22.0	21.1	19.7	18.5	16.5	15.0	13.4

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- * Recommended Service
- ** Condensate Return Line Sizing
- *** Vent Pipe Sizing
- **** Flash Tank Diameter Sizing