



Sizing a Flash Vessel on up to Three Trap Pressures

Note: The full table for flash vessel sizing is shown overleaf.

Example:

The example below considers condensate from three steam systems at different pressures, 20 bar g, 10 bar g and 6 bar g, discharging into a flash vessel designed to operate at 2 bar g.

The condensate loads are **1000 kg/h**, **2000 kg/h** and **4000 kg/h** respectively.

By consulting the table and entering the relevant data into the boxes below, the total amount of flash steam can be calculated in kg/h. This is multiplied by the 'LP factor' according to the flash vessel pressure to give total volume flow in m³/h.

Five 'Velocity factors' are shown: **67**, **138**, **243**, **385**, **560** each of which relate to a 3 m/s take-off velocity for flash vessels FV6, FV8, FV12, FV15, and FV18 respectively. By dividing the 'Total volume' by each of the 'Velocity factors', five take-off velocities are obtained.

Choose the smallest flash vessel with a take-off velocity of less than 3 m/s.

The example shows an **FV8** being the smallest flash vessel with a take-off velocity of 2.7 m/s.

Trap pressure bar g	Flash pressure bar g													
	0	0.5	1	1.5	2	2.5	3	4	5	6	7	8	9	10
	% flash													
25	24.5	22.6	21.2	20.0	18.9	18.0	17.2	15.7	14.4	13.3	12.2	11.3	10.4	9.5
24	24.1	22.2	20.7	19.5	18.5	17.6	16.7	15.3	14.0	12.8	11.8	10.8	9.9	9.0
23	23.6	21.7	20.3	19.1	18.0	17.1	16.3	14.8	13.5	12.3	11.3	10.3	9.4	8.5
22	23.2	21.3	19.8	18.6	17.6	16.6	15.8	14.3	13.0	11.8	10.8	9.8	8.9	8.0
21	22.7	20.8	19.3	18.1	17.1	16.1	15.3	13.8	12.5	11.3	10.3	9.3	8.4	7.5
20	22.2	20.3	18.8	17.6	16.6	15.6	14.8	13.3	12.0	10.8	9.7	8.7	7.8	6.9
19	21.7	19.8	18.3	17.1	16.0	15.1	14.2	12.7	11.4	10.2	9.2	8.2	7.2	6.4
18	21.2	19.3	17.8	16.6	15.5	14.5	13.7	12.2	10.8	9.7	8.6	7.6	6.7	5.8
17	20.6	18.7	17.2	16.0	14.9	14.0	13.1	11.6	10.3	9.1	8.0	7.0	6.1	5.2
16	20.1	18.2	16.7	15.4	14.3	13.4	12.5	11.0	9.7	8.5	7.4	6.4	5.4	4.5
15	19.5	17.6	16.1	14.8	13.7	12.8	11.9	10.4	9.0	7.8	6.7	5.7	4.8	3.9
14	18.9	16.9	15.4	14.2	13.1	12.1	11.2	9.7	8.4	7.1	6.0	5.0	4.1	3.2
13	18.2	16.3	14.8	13.5	12.4	11.4	10.6	9.0	7.6	6.4	5.3	4.3	3.3	2.4
12	17.5	15.6	14.1	12.8	11.7	10.7	9.8	8.3	6.9	5.7	4.6	3.5	2.6	1.7
11	16.8	14.8	13.3	12.0	10.9	10.0	9.1	7.5	6.1	4.9	3.8	2.7	1.8	0.9
10	16.1	14.1	12.5	11.3	10.1	9.2	8.3	6.7	5.3	4.1	2.9	1.9	0.9	-
9	15.2	13.2	11.7	10.4	9.3	8.3	7.4	5.8	4.4	3.2	2.0	1.0	-	-
8	14.4	12.3	10.8	9.5	8.4	7.4	6.5	4.9	3.5	2.2	1.1	-	-	-
7	13.4	11.4	9.8	8.5	7.4	6.4	5.4	3.8	2.4	1.2	-	-	-	-
6	12.3	10.3	8.7	7.4	6.3	5.2	4.3	2.7	1.3	-	-	-	-	-
5	11.2	9.1	7.5	6.2	5.0	4.0	3.1	1.4	-	-	-	-	-	-
4	9.8	7.7	6.1	4.8	3.6	2.6	1.7	-	-	-	-	-	-	-
3	8.3	6.2	4.5	3.2	2.0	0.9	-	-	-	-	-	-	-	-
2	6.3	4.2	2.6	1.2	-	-	-	-	-	-	-	-	-	-
1	3.8	1.7	-	-	-	-	-	-	-	-	-	-	-	-

LP Factor =	1.673	1.149	0.881	0.714	0.603	0.522	0.461	0.374	0.315	0.272	0.240	0.215	0.194	0.177
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Trap pressure	Flash pressure	% Flash		Condensate load	=	Mass flash	
20 bar g	2 bar g	16.6%	X	1000 kg/h	=	166 kg/h	Total flash steam 620 kg/h
10 bar g	2 bar g	10.1%	X	2000 kg/h	=	202 kg/h	
6 bar g	2 bar g	6.3%	X	4000 kg/h	=	252 kg/h	
				Velocity factor	=	* Velocity	Choose on < 3 m/s
				67	=	5.6 m/s	FV6
				138	=	2.7 m/s	FV8 ✓
				243	=	1.6 m/s	FV12
				385	=	1.0 m/s	FV15
				560	=	0.7 m/s	FV18

Total flash steam 620 kg/h X **LP factor** 0.603 = **Total volume** 374 m³/h ÷

* Note: Size on a take-off velocity of 3 m/s or less.

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Trap pressure bar g	Flash pressure bar g													
	0	0.5	1	1.5	2	2.5	3	4	5	6	7	8	9	10
	% flash													
40	29.9	28.1	26.8	25.6	24.6	23.7	22.9	21.5	20.3	19.2	18.2	17.3	16.5	15.6
39	29.6	27.8	26.4	25.3	24.3	23.4	22.6	21.2	20.0	18.9	17.9	17.0	16.1	15.3
38	29.3	27.5	26.1	25.0	23.9	23.1	22.3	20.9	19.6	18.5	17.5	16.6	15.7	14.9
37	29.0	27.2	25.8	24.6	23.6	22.7	21.9	20.5	19.3	18.2	17.2	16.2	15.4	14.6
36	28.7	26.8	25.4	24.3	23.3	22.4	21.6	20.2	18.9	17.8	16.8	15.9	15.0	14.2
35	28.3	26.5	25.1	23.9	22.9	22.0	21.2	19.8	18.5	17.4	16.4	15.5	14.6	13.8
34	27.9	26.1	24.7	23.5	22.5	21.6	20.8	19.4	18.2	17.0	16.0	15.1	14.2	13.4
33	27.6	25.8	24.4	23.2	22.2	21.3	20.5	19.0	17.8	16.7	15.7	14.7	13.8	13.0
32	27.2	25.4	24.0	22.8	21.8	20.9	20.1	18.7	17.4	16.3	15.3	14.3	13.4	12.6
31	26.9	25.0	23.6	22.4	21.4	20.5	19.7	18.3	17.0	15.9	14.9	13.9	13.0	12.2
30	26.5	24.7	23.2	22.0	21.0	20.1	19.3	17.9	16.6	15.5	14.4	13.5	12.6	11.8
29	26.1	24.3	22.9	21.7	20.6	19.7	18.9	17.5	16.2	15.1	14.0	13.1	12.2	11.3
28	25.7	23.9	22.4	21.3	20.2	19.3	18.5	17.0	15.8	14.6	13.6	12.6	11.7	10.9
27	25.3	23.5	22.0	20.8	19.8	18.9	18.1	16.6	15.3	14.2	13.2	12.2	11.3	10.5
26	24.9	23.1	21.6	20.4	19.4	18.5	17.6	16.2	14.9	13.8	12.7	11.7	10.8	10.0
25	24.5	22.6	21.2	20.0	18.9	18.0	17.2	15.7	14.4	13.3	12.2	11.3	10.4	9.5
24	24.1	22.2	20.7	19.5	18.5	17.6	16.7	15.3	14.0	12.8	11.8	10.8	9.9	9.0
23	23.6	21.7	20.3	19.1	18.0	17.1	16.3	14.8	13.5	12.3	11.3	10.3	9.4	8.5
22	23.2	21.3	19.8	18.6	17.6	16.6	15.8	14.3	13.0	11.8	10.8	9.8	8.9	8.0
21	22.7	20.8	19.3	18.1	17.1	16.1	15.3	13.8	12.5	11.3	10.3	9.3	8.4	7.5
20	22.2	20.3	18.8	17.6	16.6	15.6	14.8	13.3	12.0	10.8	9.7	8.7	7.8	6.9
19	21.7	19.8	18.3	17.1	16.0	15.1	14.2	12.7	11.4	10.2	9.2	8.2	7.2	6.4
18	21.2	19.3	17.8	16.6	15.5	14.5	13.7	12.2	10.8	9.7	8.6	7.6	6.7	5.8
17	20.6	18.7	17.2	16.0	14.9	14.0	13.1	11.6	10.3	9.1	8.0	7.0	6.1	5.2
16	20.1	18.2	16.7	15.4	14.3	13.4	12.5	11.0	9.7	8.5	7.4	6.4	5.4	4.5
15	19.5	17.6	16.1	14.8	13.7	12.8	11.9	10.4	9.0	7.8	6.7	5.7	4.8	3.9
14	18.9	16.9	15.4	14.2	13.1	12.1	11.2	9.7	8.4	7.1	6.0	5.0	4.1	3.2
13	18.2	16.3	14.8	13.5	12.4	11.4	10.6	9.0	7.6	6.4	5.3	4.3	3.3	2.4
12	17.5	15.6	14.1	12.8	11.7	10.7	9.8	8.3	6.9	5.7	4.6	3.5	2.6	1.7
11	16.8	14.8	13.3	12.0	10.9	10.0	9.1	7.5	6.1	4.9	3.8	2.7	1.8	0.9
10	16.1	14.1	12.5	11.3	10.1	9.2	8.3	6.7	5.3	4.1	2.9	1.9	0.9	-
9	15.2	13.2	11.7	10.4	9.3	8.3	7.4	5.8	4.4	3.2	2.0	1.0	-	-
8	14.4	12.3	10.8	9.5	8.4	7.4	6.5	4.9	3.5	2.2	1.1	-	-	-
7	13.4	11.4	9.8	8.5	7.4	6.4	5.4	3.8	2.4	1.2	-	-	-	-
6	12.3	10.3	8.7	7.4	6.3	5.2	4.3	2.7	1.3	-	-	-	-	-
5	11.2	9.1	7.5	6.2	5.0	4.0	3.1	1.4	-	-	-	-	-	-
4	9.8	7.7	6.1	4.8	3.6	2.6	1.7	-	-	-	-	-	-	-
3	8.3	6.2	4.5	3.2	2.0	0.9	-	-	-	-	-	-	-	-
2	6.3	4.2	2.6	1.2	-	-	-	-	-	-	-	-	-	-
1	3.8	1.7	-	-	-	-	-	-	-	-	-	-	-	-

LP Factor =	1.673	1.149	0.881	0.714	0.603	0.522	0.461	0.374	0.315	0.272	0.240	0.215	0.194	0.177
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