

Representative Resistance Coefficients (K) for Ball Valves

Reference: CRANE physical properties of fluids and flow characteristics of valves, fittings, and pipe

Pipe friction data for clean commercial steel pipe with flow in zone of complete turbulence	
Nominal size	Friction Factor (fT)
1/2	0.027
3/4	0.025
1	0.023
1 1/4	0.022
1 1/2	0.021
2	0.019
2 1/2	0.018
3	0.018
4	0.017
5	0.016
6	0.015
8 ~ 10	0.014
12 ~ 16	0.013
18 ~ 24	0.012

$$\beta = d_1/d_2 \quad \text{for smaller diameter}$$

$$\beta^2 = (d_1/d_2)^2 = a_1/a_2 \quad \text{for larger diameter}$$

Where d_1 and d_2 stand for diameter of valve outlet

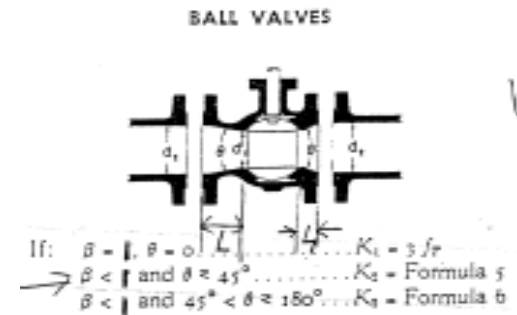
Where a_1 and a_2 stand for cross section areas of d_1 and d_2

If $\beta = 1, \theta = 0, K_1 = 3 \cdot fT$ (Table 1)

If $\beta < 1, \theta = 45^\circ, K_2 = (K_1 + \sin\theta/2(0.8(1-\beta^2) + 2.6(1-\beta^2)^2)/\beta^4$ (Table 2)

If $\beta < 1, 45^\circ < \theta \leq 180^\circ, K_2 = (K_1 + 0.5 (\sin\theta/2)(1-\beta^2) + (1-\beta^2)^2)/\beta^4$ (Table 3)

$$C_v = (29.9 \cdot d^2) / \sqrt{K}$$



If $\beta=1$, $\theta=0$, $K1=3*FT$

(Table 1)

Nominal size		Friction Factor (fT)	d1=d2 (mm)	K1	Cv	Kv
d					(gallon/min)	Cv/1.17
½	0.5	0.027	15	0.081	36.64	31.32
¾	0.75	0.025	20	0.075	67.69	57.86
1	1	0.023	25	0.069	110.27	94.25
1¼	1.25	0.022	32	0.066	184.73	157.89
1½	1.5	0.021	38	0.063	266.62	227.88
2	2	0.019	50	0.057	485.30	414.78
2½	2.5	0.018	65	0.054	842.62	720.19
3	3	0.018	80	0.054	1276.40	1090.94
4	4	0.017	100	0.051	2052.20	1754.01
5	5	0.016	125	0.048	3305.24	2824.99
6	6	0.015	150	0.045	4915.64	4201.40
8	8	0.014	200	0.042	9045.64	7731.31
10		0.014				
12		0.013				
12 ~ 16		0.013				
18 ~ 24		0.012				



If $\beta < 1$, $\theta \leq 45^\circ$, $K2 = (K1 + \sin\theta/2(0.8(1-\beta^2) + 2.6(1-\beta^2)^2)/\beta^4$ (Table 2)

Nominal size	d	Friction Factor (fT)	d1	d2	θ	β	K1	K2	Cv	Kv
									(gallon/min)	Cv/1.17
½	0.5	0.027	11.1	12.7	40	0.87	0.081	0.277	14.21	
¾	0.75	0.025					0.075			
1	1	0.023					0.069			
1¼	1.25	0.022					0.066			
1½	1.5	0.021					0.063			
2	2	0.019					0.057			
2½	2.5	0.018					0.054			
3	3	0.018					0.054			
4	4	0.017					0.051			
5	5	0.016					0.048			
6	6	0.015					0.045			
8 ~ 10		0.014					0.042			
12 ~ 16		0.013					0.039			
18 ~ 24		0.012					0.036			

If $\beta < 1$, $45^\circ < \theta \leq 180^\circ\text{C}$, $K2 = (K1 + 0.5 \sqrt{(\sin \theta / 2)(1 - \beta^2) + (1 - \beta^2)^2}) / \beta^4$ (Table 3)

Nominal size		Friction Factor (fT)	d1	d2	θ	β	K1	K2	Cv	Kv
d									(gallon/min)	Cv/1.17
½	0.5	0.027					0.081			
¾	0.75	0.025					0.075			
1	1	0.023					0.069			
1¼	1.25	0.022					0.066			
1½	1.5	0.021					0.063			
2	2	0.019					0.057			
2½	2.5	0.018					0.054			
3	3	0.018					0.054			
4	4	0.017					0.051			
5	5	0.016					0.048			
6	6	0.015					0.045			
8 ~ 10		0.014					0.042			
12 ~ 16		0.013					0.039			
18 ~ 24		0.012					0.036			

Cv or Kv values for individual valve type are available upon request. Please contact us.

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