

Saunders® Flow Coefficients 2-Way Forgings

In order to provide a comparator of flow features for valves and associated equipment in a process system, they must be tested and measured under the same conditions. The resulting Cv or Kv value is used as a calculation basis for different working valve scenarios across applications.

Imperial Formula

$$Q = C_v \times K_1 \sqrt{\frac{P \Delta P}{ST}}$$

Where:

- Q = Quantity flowing in cubic feet per hour at NTP (SCFH)
- C_v = Valve coefficient
- K₁ = A constant = 1364
- P = Upstream pressure lbf/in² absolute
- ΔP = Pressure drop, lbf/in²
- S = Specific gravity (air = 1)
- T = Temperature °R absolute (°F + 460)

Note: NTP (Normal Temperature and Pressure) is 14.7 lbf/in² absolute and 60°F.

C_v values expressed in GPM per one psi pressure drop.



Metric Formula

$$Q = K_v \times K_2 \sqrt{\frac{P \Delta P}{ST}}$$

Where:

- Q = Quantity flowing in cubic meters per hour at NTP (Nm³/hr)
- K_v = Valve coefficient
- K₂ = A constant = 450
- P = Upstream pressure kg/cm² absolute
- ΔP = Pressure drop, kg/cm²
- S = Specific gravity (air = 1)
- T = Temperature °K absolute (°C + 273)

Note: NTP (Normal Temperature and Pressure) is 1 Kg/cm² absolute and 20°C.

K_v values expressed in m³/h per one bar pressure drop.

2-Way Forged Bodies Tube OD ASME BPE

Saunders® - Standard Mark III 2-Way Forgings

Kv Values m³/h

Nominal Size (mm)	O/D (mm)	Wall (mm)	I/D (mm)	Kv (m³/h)		Specification
				10%	100%	
8 ¹	12.7	1.65	9.4	0.7	1.62	Tube OD ASME BPE
15	12.7	1.65	9.4	0.73	2.18	Tube OD ASME BPE
20	19.05	1.65	15.75	0.82	4.77	Tube OD ASME BPE
25	25.4	1.65	22.1	3.04	11.33	Tube OD ASME BPE
40	38.1	1.65	34.8	5.19	30.41	Tube OD ASME BPE
50	50.8	1.65	47.5	8.3	52.26	Tube OD ASME BPE
65	63.5	1.65	60.2	17.57	82.84	Tube OD ASME BPE
80	76.2	1.65	72.9	22.06	124.22	Tube OD ASME BPE
100 ²	101.6	2.11	97.38	36.17	166.52	Tube OD ASME BPE
150 ²	152.4	2.77	146.86	63.09	349.17	Tube OD ASME BPE

Cv Values (US gal/min)

Nominal Size (inch)	O/D (inch)	Wall (inch)	I/D (inch)	Cv (US gal/min)		Specification
				10%	100%	
0.25 ¹	0.5	0.065	0.37	0.8	1.87	Tube OD ASME BPE
0.5	0.5	0.065	0.37	0.84	2.52	Tube OD ASME BPE
0.75	0.75	0.065	0.62	0.95	5.51	Tube OD ASME BPE
1	1	0.065	0.87	3.51	13.1	Tube OD ASME BPE
1.5	1.5	0.065	1.37	6	35.15	Tube OD ASME BPE
2	2	0.065	1.87	9.6	60.41	Tube OD ASME BPE
2.5	2.5	0.065	2.37	20.31	95.76	Tube OD ASME BPE
3	3	0.065	2.87	25.5	143.6	Tube OD ASME BPE
4 ²	4	0.083	3.83	41.82	192.5	Tube OD ASME BPE
6 ²	6	0.109	5.78	72.94	403.65	Tube OD ASME BPE

1. DN8 (0.25") Body with DN15 (0.5") tube end.

2. DN100 (4") & DN150 (6") Sizes are machined from solid barstock (values based on CFD Analysis.)

2-Way Forged Bodies Tube OD ASME

Saunders® - Standard Mark IV 2-Way Forgings

Kv Values m³/h

Nominal Size (mm)	Code	O/D (mm)	Wall (mm)	I/D (mm)	Kv (m ³ /h)		Specification
					10%	100%	
8	3D	10	1	8	0.1	1.4	DIN11866 Series A / DIN11850 Series 2
10 ¹	73	13	1.5	10	0.2	2.3	DIN11866 Series A / DIN11850 Series 2
15	74	19	1.5	16	0.5	4.7	DIN11866 Series A / DIN11850 Series 2
20	75	23	1.5	20	0.5	5	DIN11866 Series A / DIN11850 Series 2
25	76	29	1.5	26	1.3	12	DIN11866 Series A / DIN11850 Series 2
32 ²	77	35	1.5	32	6	25	DIN11866 Series A / DIN11850 Series 2
40	78	41	1.5	38	7.2	27.7	DIN11866 Series A / DIN11850 Series 2
50	79	53	1.5	50	12.8	53.5	DIN11866 Series A / DIN11850 Series 2
65	70	70	2	66	16.9	75.7	DIN11866 Series A / DIN11850 Series 1
80	71	85	2	81	21.5	128.7	DIN11866 Series A / DIN11850 Series 1
100 ³	72	104	2	100	29.5	173.8	DIN11866 Series A / DIN11850 Series 1
150 ³	C9	154	2	150	60.5	356	DIN11866 Series A / DIN11850 Series 1

Nominal Size (mm)	Code	O/D (mm)	Wall (mm)	I/D (mm)	Kv (m ³ /h)		Specification
					10%	100%	
8	93	13.5	1.6	10.3	0.1	2.39	DIN11866 Series B / ISO1127 Series 1
10 ¹	98	17.2	1.6	14	0.2	3.4	DIN11866 Series B / ISO1127 Series 1
15	0D	21.3	1.6	18.1	0.4	5	DIN11866 Series B / ISO1127 Series 1
20	0K	26.9	1.6	23.7	0.3	5.4	DIN11866 Series B / ISO1127 Series 1
25	0U	33.7	2	29.7	1	15.1	DIN11866 Series B / ISO1127 Series 1
32 ²	1A	42.4	2	38.4	2.1	26.5	DIN11866 Series B / ISO1127 Series 1
40	1G	48.3	2	44.3	2.4	29.5	DIN11866 Series B / ISO1127 Series 1
50	1N	60.3	2	56.3	5	56.9	DIN11866 Series B / ISO1127 Series 1
65	1X	76.1	2	72.1	13.7	80.4	DIN11866 Series B / ISO1127 Series 1
80	2H	88.9	2.3	84.3	18.5	145.9	DIN11866 Series B / ISO1127 Series 1
100 ³	9V	114.3	2.3	109.7	32.6	191.65	DIN11866 Series B / ISO1127 Series 1
150 ³	8R	168.3	2.6	163.1	70	411.48	DIN11866 Series B / ISO1127 Series 1

1. DN10 tube specification is machined from a DN15 Body.
2. DN32 tube specification is machined from a DN40 Body.
3. DN100/150 Sizes are machined from solid barstock (values based on CFD Analysis.)

Saunders® Flow Coefficients

2-Way Forgings

Estimated Flow for Standard Machined Bodies

Tee Valves $C_v = 2\text{-way } C_v \times 0.9$

Tank Bottom Valves $C_v = 2\text{-way } C_v \times 0.85$

Contact Saunders® for assistance with flow characteristics of non-standard block configurations



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