

# Reference Data

## ■ Conversion of Units

Length	$\mu\text{m}$	mm	cm	m	in	ft
	1	$1 \times 10^3$	$1 \times 10^{-4}$	$1 \times 10^{-6}$	$3.94 \times 10^{-5}$	$3.28 \times 10^{-6}$
	$1 \times 10^3$	1	0.1	$1 \times 10^{-3}$	$3.94 \times 10^{-2}$	$3.28 \times 10^{-3}$
	$1 \times 10^4$	10	1	$1 \times 10^{-2}$	$3.94 \times 10^{-1}$	$3.28 \times 10^{-2}$
	$1 \times 10^6$	$1 \times 10^3$	100	1	$3.94 \times 10$	3.28
	$2.54 \times 10^4$	25.4	2.54	$2.54 \times 10^{-2}$	1	$8.33 \times 10^{-2}$
	$3.05 \times 10^5$	$3.05 \times 10^2$	$3.05 \times 10$	$3.05 \times 10^{-1}$	12	1

Viscosity	1 P = 100 cP 1 St = 100 cSt
Weight	1 kg $\approx$ 2.21 lb 1 lb $\approx$ 0.454 kg
Temperature	$[^\circ\text{F}] \approx ([^\circ\text{C}] \times 9/5) + 32$ $[^\circ\text{C}] \approx 5/9 ([^\circ\text{F}] - 32)$

Area	$\text{cm}^2$	$\text{m}^2$	$\text{in}^2$	$\text{ft}^2$
	1	$1 \times 10^{-4}$	0.155	$1.08 \times 10^{-3}$
	$1 \times 10^4$	1	$1.55 \times 10^3$	10.8
	6.45	$6.45 \times 10^{-4}$	1	$6.94 \times 10^{-3}$
$9.30 \times 10^2$	$9.30 \times 10^{-2}$	$1.44 \times 10^2$	1	

Volume	$\text{cm}^3$	L (Liter)	$\text{m}^3$ (kL)	$\text{ft}^3$	imperial gal.	U.S. gal.
	1	$1 \times 10^{-3}$	$1 \times 10^{-6}$	$3.53 \times 10^{-5}$	$2.2 \times 10^{-4}$	$2.64 \times 10^{-4}$
	$1 \times 10^3$	1	$1 \times 10^{-3}$	$3.53 \times 10^{-2}$	0.220	0.264
	$1 \times 10^6$	$1 \times 10^3$	1	35.3	220	264
	$2.83 \times 10^4$	28.3	$2.83 \times 10^{-2}$	1	6.23	7.48
	$4.55 \times 10^3$	4.55	$4.55 \times 10^{-3}$	0.16	1	1.2
	$3.79 \times 10^3$	3.79	$3.79 \times 10^{-3}$	0.134	0.833	1

## ■ Water flow rate and proper pipe size

Nominal size		Steel pipe		Flow rate (L/min) when pressure loss is 0.01–0.03MPa per pipe length of 10 m
A	B	Inside dia. (mm)	Outside dia. (mm)	
6A	1/8B	6.5	10.5	1.3–2.2
8A	1/4B	9.2	13.8	3–5.2
10A	3/8B	12.7	17.3	7–12
15A	1/2B	16.1	21.7	12–21
20A	3/4B	21.6	27.2	22–38
25A	1B	27.6	34.0	38–65
32A	1 1/4B	35.7	42.7	70–120
40A	1 1/2B	41.6	48.6	120–210
50A	2B	52.9	60.5	215–370
65A	2 1/2B	67.9	76.3	410–700
80A	3B	80.7	89.1	680–1,200
100A	4B	105.3	114.3	1,200–2,100
125A	5B	130.8	139.8	2,100–3,600
150A	6B	155.2	165.2	3,300–5,700

Pressure	MPa	bar	$\text{kg}/\text{cm}^2$	psi (lb/in <sup>2</sup> )	atm	mmHg	mmH <sub>2</sub> O (mmAq)
	1	10	10.2	145	9.87	$7.5 \times 10^3$	$1.02 \times 10^5$
	0.1	1	1.02	14.5	0.987	750	$1.02 \times 10^4$
	0.098	0.981	1	14.2	0.968	736	$1 \times 10^4$
	$6.89 \times 10^{-3}$	0.069	0.070	1	0.068	51.7	703
	0.101	1.01	1.03	14.7	1	760	$1.03 \times 10^4$
	$1.33 \times 10^{-4}$	$1.33 \times 10^{-3}$	$1.36 \times 10^{-3}$	0.019	$1.32 \times 10^{-3}$	1	13.6
	$9.81 \times 10^{-6}$	$9.81 \times 10^{-5}$	$1 \times 10^{-4}$	$1.42 \times 10^{-3}$	$9.68 \times 10^{-5}$	0.074	1

Flow rate	L/min	$\text{m}^3/\text{min}$	$\text{m}^3/\text{hr}$	$\text{in}^3/\text{hr}$	$\text{ft}^3/\text{hr}$	Imperial gal./min	U.S. gal./min
	1	$1 \times 10^{-3}$	0.06	$3.66 \times 10^3$	2.12	0.22	0.264
	$1 \times 10^3$	1	60	$3.66 \times 10^6$	$2.12 \times 10^3$	220	264
	16.7	0.017	1	$6.10 \times 10^4$	35.3	3.67	4.40
	$2.73 \times 10^{-4}$	$2.7 \times 10^{-7}$	$1.64 \times 10^{-5}$	1	$5.79 \times 10^{-4}$	$6.01 \times 10^{-5}$	$7.22 \times 10^{-5}$
	0.472	$4.72 \times 10^{-4}$	0.028	$1.73 \times 10^3$	1	0.104	0.125
	4.55	$4.55 \times 10^{-3}$	0.273	$1.66 \times 10^4$	9.63	1	1.20
	3.79	$3.79 \times 10^{-3}$	0.227	$1.39 \times 10^4$	8.02	0.833	1