

Friction Loss Characteristics

**Type K Copper Water Tube**

C=140

PSI Loss Per 100 Feet of Tube (PSI/100ft.)

Size	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
O.D.	0.625	0.750	0.875	1.125	1.375	1.625	2.125	2.625	3.125
I.D.	0.5270	0.652	0.745	0.995	1.245	1.481	1.959	2.435	2.907
Wall Thk	0.049	0.049	0.065	0.065	0.065	0.072	0.083	0.095	0.109

Flow GPM	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss	Velocity FPS	PSI loss
1	1.46	1.09	0.95	0.39	0.73	0.20	0.41	0.05	0.26	0.02	0.18	0.01	0.10	0.00				
2	2.93	3.94	1.94	1.40	1.47	0.73	0.82	0.18	0.52	0.06	0.37	0.03	0.21	0.01				
3	4.40	8.35	2.87	2.97	2.20	1.55	1.23	0.38	0.78	0.13	0.55	0.05	0.31	0.01	0.20	0.00		
4	5.87	14.23	3.83	5.05	2.94	2.64	1.64	0.65	1.05	0.22	0.74	0.09	0.42	0.02	0.27	0.01	0.19	0.00
5	7.34	21.51	4.79	7.64	3.67	3.99	2.06	0.98	1.31	0.33	0.93	0.14	0.53	0.04	0.34	0.01	0.24	0.01
6	8.841	30.15	5.75	10.70	4.41	5.60	2.47	1.37	1.57	0.46	1.11	0.20	0.63	0.05	0.41	0.02	0.28	0.01
7	10.28	40.11	6.71	14.24	5.14	7.44	2.88	1.82	1.84	0.61	1.30	0.26	0.74	0.07	0.48	0.02	0.33	0.01
8	11.75	51.37	7.67	18.24	5.88	9.53	3.29	2.33	2.41	0.78	1.48	0.34	0.85	0.09	0.55	0.03	0.38	0.01
9	13.22	63.89	8.63	22.68	6.61	11.86	3.70	2.90	2.36	0.97	1.67	0.42	0.95	0.11	0.61	0.04	0.43	0.02
10	14.69	77.66	9.59	27.57	7.35	14.41	4.12	3.53	2.63	1.18	1.86	0.51	1.06	0.13	0.68	0.05	0.48	0.02
11	16.15	92.68	10.55	32.89	8.08	17.19	4.53	4.21	2.89	1.41	2.04	0.61	1.16	0.16	0.75	0.05	0.53	0.02
12	17.62	108.8	11.51	38.64	8.82	20.20	4.94	4.94	3.15	1.66	2.23	0.71	1.27	0.18	0.82	0.06	0.57	0.03
14			13.43	51.41	10.29	26.87	5.76	6.57	3.68	2.21	2.60	0.95	1.48	0.24	0.95	0.08	0.67	0.04
16			15.35	65.83	11.76	34.41	6.59	8.42	4.21	2.83	2.97	1.22	1.70	0.31	1.10	0.11	0.77	0.05
18			17.27	81.88	13.23	42.80	7.41	10.47	4.73	3.52	3.34	1.51	1.91	0.39	1.23	0.13	0.86	0.06
20			19.19	99.53	14.70	52.02	8.24	12.73	5.23	4.28	3.72	1.84	2.11	0.47	1.37	0.16	0.96	0.07
22					16.17	62.06	9.06	15.18	5.79	5.10	4.09	2.19	2.33	0.56	1.51	0.20	1.06	0.08
24					17.64	72.92	9.89	17.84	6.31	5.99	4.46	2.58	2.55	0.66	1.65	0.23	1.15	0.10
26					19.11	84.57	10.71	20.69	6.84	6.95	4.83	2.99	2.75	0.77	1.78	0.27	1.25	0.11
28							11.53	23.73	7.37	7.98	5.20	3.43	2.97	0.88	1.92	0.30	1.35	0.13
30							12.36	26.97	7.89	9.06	5.58	3.89	3.18	1.00	2.06	0.35	1.44	0.15
35							14.42	35.88	9.21	12.06	6.51	5.18	3.72	1.33	2.40	0.46	1.68	0.19
40							16.48	45.95	10.52	15.44	7.44	6.63	4.25	1.70	2.75	0.59	1.93	0.25
45							18.54	57.15	11.84	19.20	8.37	8.25	4.78	2.12	3.00	0.73	2.17	0.31
50							20.60		13.16	23.34	9.30	10.03	5.31	2.57	3.44	0.89	2.41	0.38
55							22.66		14.47	27.85	10.23	11.97	5.84	3.07	3.78	1.06	2.65	0.45
60							24.72		15.79	32.71	11.16	14.06	6.37	3.60	4.12	1.25	2.89	0.53
65							26.78		17.10	37.94	12.09	16.31	6.91	4.18	4.47	1.45	3.13	0.61
70							28.84		18.42	43.52	13.02	18.70	7.44	4.80	4.81	1.66	3.37	0.70
75							30.90		19.74	49.46	13.95	21.25	7.97	5.45	5.16	1.89	3.62	0.80
80							32.96				14.88	23.95	8.50	6.14	5.50	2.13	3.86	0.90
85							35.02				15.81	26.80	9.06	6.87	5.84	2.38	4.10	1.01
90							37.08				16.74	29.79	9.56	7.64	6.19	2.65	4.34	1.12
95							39.14				17.67	32.93	10.09	8.44	6.53	2.93	4.58	1.24
100							41.20				18.60	36.21	10.63	9.28	6.88	3.22	4.82	1.36
110							45.32						11.69	11.08	7.56	3.84	5.31	1.62
120							49.44						12.75	13.01	8.25	4.52	5.79	1.91
130							53.56						13.82	15.09	8.94	5.24	6.27	2.21
140							57.68						14.88	17.31	9.63	6.01	6.75	2.54
150							61.80						15.94	19.67	10.32	6.83	7.24	2.88
160							65.92						17.01	22.17	11.00	7.69	7.72	3.25
170							70.04						18.07	24.81	11.69	8.61	8.20	3.64
180							74.16						19.13	27.58	12.38	9.57	8.69	4.04
190							78.28								13.07	10.58	9.17	4.47
200							82.40								13.76	11.63	9.65	4.91
225							90.96								15.48	14.47	10.86	6.11
250							99.52								17.20	17.58	12.07	7.43
275							108.08								18.92	20.98	13.27	8.86
300							116.64										14.48	10.41
325							125.20										15.69	12.07
350							133.76										16.89	13.85
375							142.32										18.10	15.73
400							150.88										19.31	17.73
425																		
450																		
475																		
500																		
550																		

Note: Figures below **bold** line indicate velocities over 5' per second. Use with caution.

Velocity of flow values are computed from the general equation  $V = .408 Q/d^2$

Friction pressure loss values are computed from the equation  $[hf = 0.2083 (100/c) 1.852 Q^{1.852}/d^{4.866}] \times .433$  for loss per 100' of pipe.