



FRICTION LOSS TABLES



HYDRAULIC DATA FOR WATER

Friction losses in pipe; C=100

1/2 inch

0.546" I.D.

3/4 inch

0.742" I.D.

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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0.5	0.686	0.01	1.10
1	1.37	0.03	3.96
1.5	2.06	0.07	8.38
2	2.74	0.12	14.3
2.5	3.43	0.18	21.6
3	4.11	0.26	30.2
3.5	4.80	0.36	40.2
4	5.48	.47	51.4
4.5	6.17	0.59	64.0
5	6.86	0.73	77.7
5.5	7.54	0.88	92.7
6	8.23	1.05	109
6.5	8.91	1.23	126
7	9.6	1.43	145
7.5	10.3	1.6	165
8	11.0	1.9	185
8.5	11.6	2.1	207
9	12.3	2.4	231
9.5	13.0	2.6	255
10	13.7	2.9	280

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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1.5	1.11	0.02	1.88
2	1.48	0.03	3.21
2.5	1.86	0.05	4.85
3	2.23	0.08	6.79
3.5	2.60	0.11	9.03
4	2.97	0.14	11.6
4.5	3.34	0.17	14.4
5	3.71	0.21	17.5
6	4.45	0.31	24.5
7	5.20	0.42	32.6
8	5.94	0.55	41.7
9	6.68	0.69	51.8
10	7.42	0.86	63.0
11	8.17	1.04	75.1
12	8.91	1.23	88.3
13	9.63	1.44	102
14	10.4	1.7	117
16	11.9	2.2	150
18	13.4	2.8	187
20	14.8	3.4	227

1 inch

0.957" I.D.

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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2	0.89	0.01	0.930
3	1.34	0.03	1.97
4	1.79	0.05	3.28
5	2.23	0.08	5.07
6	2.68	0.11	7.10
8	3.57	0.20	12.1
10	4.46	0.31	18.3
12	5.36	0.45	25.6
14	6.25	0.61	34.0
16	7.14	0.79	43.6

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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18	8.03	1.00	54.2
20	8.92	1.24	65.8
22	9.82	1.50	78.5
24	10.7	1.8	94.4
26	11.6	2.1	107
28	12.5	2.4	123
30	13.4	2.8	139
35	15.6	3.8	185
40	17.9	5.0	237
45	20.1	6.3	295



HYDRAULIC DATA FOR WATER

Friction losses in pipe; C=100

1-1/4 inch

1.278" I.D.

1-1/2 inch

1.500" I.D.

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
4	1.00	0.02	0.821
6	1.50	0.04	1.74
8	2.00	0.06	2.96
10	2.50	0.10	4.47
12	3.00	0.14	6.26
14	3.50	0.19	8.33
16	4.00	0.25	10.7
18	4.50	0.31	13.3
20	5.00	0.39	16.1
25	6.25	0.61	24.9
30	7.50	0.87	34.1
35	8.75	1.19	45.4
40	10.0	1.6	58.1
50	12.5	2.4	87.8
60	15.0	3.5	123
70	17.5	4.8	164
80	20.0	6.2	209
90	22.5	7.9	260

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
20	3.63	0.20	7.39
24	4.36	0.30	10.4
28	5.08	0.40	13.8
30	5.45	0.46	15.7
32	5.81	0.52	17.6
34	6.17	0.59	19.7
36	6.54	0.66	21.9
38	6.90	0.74	24.2
40	7.26	0.82	26.7
42	7.63	0.90	29.2
44	7.99	0.99	31.8
46	8.35	1.08	34.5
48	8.72	1.18	37.3
50	9.08	1.28	40.3
60	10.9	1.8	56.4
70	12.7	2.5	75.0
80	14.5	3.3	96.1
90	16.3	4.1	119
100	18.2	5.1	145
120	21.8	7.4	203
140	25.4	10.0	271

2 inch

1.939" I.D.

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
6	0.65	0.0	0.23
14	1.52	0.04	1.10
22	2.39	0.09	2.53
30	3.26	0.17	4.49
35	3.80	0.22	5.97
40	4.35	0.29	74.64
45	4.89	0.37	9.50
50	5.43	0.46	11.5
55	5.98	0.56	13.7
60	6.52	0.66	16.2
65	7.06	0.77	18.8
70	7.61	0.90	21.5
75	8.15	1.03	24.5
80	8.69	1.17	27.6
85	9.03	1.27	30.8
90	9.78	1.49	34.3

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
95	10.3	1.6	37.9
100	10.9	1.8	41.6
110	12.0	2.2	49.7
120	13.0	2.6	58.3
130	14.1	3.1	67.7
140	15.2	3.6	77.6
150	16.3	4.1	88.4
160	17.4	4.7	99.3
180	19.6	6.0	124
200	21.7	7.3	150
220	23.9	8.9	179
240	26.1	10.6	210
260	28.3	12.4	244
280	30.4	14.4	280
300	32.6	16.5	318



HYDRAULIC DATA FOR WATER

Friction losses in pipe; C=100

2-1/2 inch

2.469" I.D.

3 inch

3.0" I.D.

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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8	0.54	0.00	0.120
10	0.67	0.01	0.182
12	0.80	0.01	0.254
14	0.941	0.01	0.338
16	1.07	0.02	0.433
18	1.21	0.02	0.538
20	1.34	0.03	0.654
22	1.47	0.03	0.780
24	1.61	0.04	0.917
26	1.74	0.05	1.06
28	1.88	0.05	1.22
30	2.01	0.06	1.39
35	2.35	0.09	1.84
40	2.68	0.11	2.36
45	3.02	0.14	2.93
50	3.35	0.17	3.56
55	3.69	0.21	4.24
60	4.02	0.25	4.99
65	4.36	0.30	5.79
70	4.69	0.34	6.64
75	5.03	0.39	7.55
80	5.36	0.45	8.50
85	5.70	0.50	9.51
90	6.03	0.57	10.6
95	6.37	0.63	11.7
100	6.70	0.70	12.8
110	7.37	0.84	15.3
120	8.04	1.00	18.0
130	8.71	1.18	20.9
140	9.38	1.37	23.9
150	10.0	1.6	27.3
160	10.7	1.8	30.7
170	11.4	2.0	34.3
180	12.1	2.3	38.1
190	12.7	2.5	42.1
200	13.4	2.8	46.3
220	14.7	3.4	55.3
240	16.1	4.0	66.4
260	17.4	4.7	75.3
280	18.8	5.5	86.3
300	20.1	6.3	98.1
350	23.5	8.6	130
400	26.8	11.2	167
450	30.2	14.2	208
500	33.5	17.4	252

5	0.54	0.00	0.163
10	0.45	0.00	0.070
15	0.68	0.01	0.149
20	0.91	0.01	0.254
25	1.13	0.02	0.383
30	1.36	0.03	0.537
35	1.59	0.04	0.714
40	1.82	0.05	0.914
45	2.04	0.06	1.14
50	2.27	0.08	1.38
55	2.50	0.10	1.64
60	2.72	0.12	1.94
65	2.95	0.14	2.24
70	3.40	0.18	2.92
80	3.63	0.20	3.30
85	3.86	0.23	3.69
90	4.09	0.26	4.10
95	4.31	0.29	4.53
100	4.54	0.32	4.98
110	4.99	0.39	5.94
120	5.45	0.46	6.98
130	5.90	0.54	8.09
140	6.35	0.63	9.28
150	6.81	0.72	10.6
160	7.26	0.82	11.9
180	8.16	1.03	14.8
200	9.08	1.28	18.0
220	9.99	1.55	21.4
240	10.9	1.8	25.2
260	11.8	2.2	29.2
280	12.7	2.5	33.5
300	13.6	2.9	38.0
320	14.5	3.3	42.8
340	15.4	3.7	47.9
360	16.3	4.1	53.3
380	17.3	4.6	58.9
400	18.2	5.1	64.7
420	19.1	5.7	70.8
440	20.0	6.2	77.2
460	20.9	6.8	83.8
480	21.8	7.4	90.7
500	22.7	8.0	97.8
550	25.0	9.7	117
600	27.2	11.5	137
650	29.5	13.5	159



HYDRAULIC DATA FOR WATER

Friction losses in pipe; C=100

3-1/2 inch

3.5" I.D.

4 inch

4.0" I.D.

FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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FLOW US gal per min.	Velocity ft. per sec.	Velocity head ft.	Head loss ft. per 100 ft.
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15	0.50	0.00	0.061
20	0.67	0.01	0.120
25	0.84	0.01	0.181
30	1.00	0.02	0.254
35	1.17	0.02	0.337
40	1.34	0.03	0.432
45	1.51	0.04	0.537
50	1.67	0.04	0.653
60	2.01	0.06	0.914
70	2.34	0.09	1.22
80	2.68	0.11	1.546
90	3.01	0.14	1.94
100	3.33	0.17	2.35
110	3.68	0.21	2.81
120	4.02	0.25	3.30
130	4.35	0.29	3.82
140	4.68	0.34	4.38
150	5.02	0.39	4.99
160	56.35	0.44	5.61
170	5.69	0.50	6.28
180	6.02	0.56	6.98
190	6.35	0.63	7.71
200	6.69	0.70	8.48
220	7.35	0.84	10.1
240	8.03	1.00	11.9
260	8.70	1.18	13.8
280	9.36	1.36	15.8
300	10.0	1.55	18.0
320	10.7	1.8	20.2
340	11.4	2.0	22.6
360	12.0	2.2	25.2
380	12.7	2.5	27.8
400	13.4	2.8	30.6
420	14.0	3.1	33.5
440	14.7	3.4	36.5
460	15.4	3.7	39.6
480	16.1	4.0	42.8
500	16.7	4.3	46.2
550	18.4	5.3	55.1
600	20.1	6.3	64.7
650	21.8	7.4	75.1
700	23.4	8.5	86.1
750	25.1	9.8	97.8
800	26.8	11.2	110
850	28.4	12.5	123

20	0.51	0.00	0.063
30	0.77	0.01	0.132
40	1.02	0.02	0.266
50	1.28	0.03	0.341
60	1.53	0.04	0.477
70	1.79	0.05	0.635
80	2.04	0.06	0.813
90	2.30	0.08	1.01
100	2.55	0.10	1.23
110	2.81	0.12	1.47
120	3.06	0.15	1.72
130	3.32	0.17	2.00
140	3.57	0.20	2.29
150	3.83	0.23	2.61
160	4.08	0.26	2.93
170	4.34	0.29	3.28
180	4.60	0.33	3.64
190	4.86	0.37	4.03
200	5.11	0.41	4.43
220	5.62	0.49	5.28
240	6.13	0.58	6.21
260	6.64	0.69	7.20
280	7.15	0.79	8.25
300	7.66	0.91	9.38
320	8.17	1.04	10.6
340	8.68	1.17	11.8
360	9.19	1.31	13.1
380	9.70	1.46	14.5
400	10.2	1.6	16.0
420	10.7	1.8	17.5
440	11.2	1.9	19.0
460	11.7	2.1	20.7
480	12.3	2.3	22.4
500	12.8	2.5	24.1
550	14.0	3.0	28.8
600	15.3	3.6	33.8
650	16.6	4.3	39.2
700	17.9	5.0	45.0
750	19.2	5.7	51.1
800	20.4	6.5	57.6
850	21.7	7.3	64.4
900	23.0	8.2	71.6
950	24.3	9.2	79.1
1000	25.5	10.1	87.0
1100	28.1	12.3	104



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