

Friction Loss Characteristics

Class 160 IPS PVC Plastic Pipe

(1120,1220) C=150 SDR 26

PSI Loss Per 100 Feet of Pipe Sizes 1" thru 5"

Nominal Size	Flow Rate vs. Pressure Loss vs. Pipe Size vs. Wall Thickness																Nominal Size
Pipe ID	1"		1¼"		1½"		2"		2½"		3"		4"		5"		Pipe ID
Pipe OD	1.195		1.532		1.754		2.193		2.655		3.230		4.154		5.133		Pipe OD
Wall Thick	0.060		0.064		0.073		0.091		0.110		0.135		0.173		0.214		Wall Thick
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	Flow GPM
1	0.29	0.02	0.17	0.01	0.13	0.00											1
2	0.57	0.06	0.35	0.02	0.27	0.01	0.17	0.00									2
3	0.86	0.14	0.52	0.04	0.40	0.02	0.25	0.01									3
4	1.14	0.23	0.70	0.07	0.53	0.04	0.34	0.01	0.23	0.00							4
5	1.43	0.35	0.87	0.11	0.66	0.05	0.42	0.02	0.29	0.01							5
6	1.71	0.49	1.04	0.15	0.80	0.08	0.51	0.03	0.35	0.01	0.23	0.00					6
7	2.00	0.66	1.22	0.20	0.93	0.10	0.59	0.03	0.41	0.01	0.27	0.01					7
8	2.29	0.84	1.39	0.25	1.06	0.13	0.68	0.04	0.46	0.02	0.31	0.01					8
9	2.57	1.05	1.56	0.31	1.19	0.16	0.76	0.05	0.52	0.02	0.35	0.01					9
10	2.86	1.27	1.74	0.38	1.33	0.20	0.85	0.07	0.58	0.03	0.39	0.01					10
11	3.14	1.52	1.91	0.45	1.46	0.23	0.93	0.08	0.64	0.03	0.43	0.01					11
12	3.43	1.78	2.09	0.53	1.59	0.28	1.02	0.09	0.69	0.04	0.47	0.01					12
13	3.71	2.07	2.26	0.62	1.72	0.32	1.10	0.11	0.75	0.04	0.51	0.02	0.31	0.00			13
14	4.00	2.37	2.43	0.71	1.86	0.37	1.19	0.12	0.81	0.05	0.55	0.02	0.33	0.01			14
15	4.29	2.70	2.61	0.80	1.99	0.42	1.27	0.14	0.87	0.06	0.59	0.02	0.35	0.01			15
16	4.57	3.04	2.78	0.91	2.12	0.47	1.36	0.16	0.93	0.06	0.63	0.02	0.38	0.01			16
17	4.86	3.40	2.96	1.01	2.25	0.53	1.44	0.18	0.98	0.07	0.66	0.03	0.40	0.01			17
18	5.14	3.78	3.13	1.13	2.39	0.58	1.53	0.20	1.04	0.08	0.70	0.03	0.43	0.01			18
19	5.43	4.18	3.30	1.25	2.52	0.65	1.61	0.22	1.10	0.09	0.74	0.03	0.45	0.01			19
20	5.71	4.59	3.48	1.37	2.65	0.71	1.70	0.24	1.16	0.09	0.78	0.04	0.47	0.01			20
22	6.29	5.48	3.82	1.64	2.92	0.85	1.87	0.29	1.27	0.11	0.86	0.04	0.52	0.01	0.34	0.00	22
24	6.86	6.44	4.17	1.92	3.18	0.99	2.04	0.34	1.39	0.13	0.94	0.05	0.57	0.01	0.37	0.01	24
25	7.14	6.94	4.35	2.07	3.32	1.07	2.12	0.36	1.45	0.14	0.98	0.05	0.59	0.02	0.39	0.01	25
26	7.43	7.47	4.52	2.23	3.45	1.15	2.21	0.39	1.50	0.15	1.02	0.06	0.61	0.02	0.40	0.01	26
28	8.00	8.56	4.87	2.56	3.71	1.32	2.38	0.45	1.62	0.18	1.09	0.07	0.66	0.02	0.43	0.01	28
30	8.57	9.73	5.22	2.91	3.98	1.50	2.55	0.51	1.74	0.20	1.17	0.08	0.71	0.02	0.46	0.01	30
32	9.14	10.97	5.56	3.27	4.24	1.69	2.71	0.57	1.85	0.23	1.25	0.09	0.76	0.03	0.50	0.01	32
34	9.71	12.27	5.91	3.66	4.51	1.90	2.88	0.64	1.97	0.25	1.33	0.10	0.80	0.03	0.53	0.01	34
35	10.00	12.95	6.08	3.87	4.64	2.00	2.97	0.67	2.03	0.27	1.37	0.10	0.83	0.03	0.54	0.01	35
36	10.29	13.64	6.26	4.07	4.77	2.11	3.05	0.71	2.08	0.28	1.41	0.11	0.85	0.03	0.56	0.01	36
38	10.86	15.08	6.61	4.50	5.04	2.33	3.22	0.79	2.20	0.31	1.49	0.12	0.90	0.04	0.59	0.01	38
40	11.43	16.58	6.95	4.95	5.30	2.56	3.39	0.86	2.32	0.34	1.56	0.13	0.95	0.04	0.62	0.01	40
42	12.00	18.15	7.30	5.42	5.57	2.80	3.56	0.95	2.43	0.37	1.64	0.14	0.99	0.04	0.65	0.02	42
44	12.57	19.78	7.65	5.91	5.84	3.06	3.73	1.03	2.55	0.41	1.72	0.16	1.04	0.05	0.68	0.02	44
45	12.86	20.62	7.82	6.16	5.97	3.19	3.82	1.07	2.60	0.42	1.76	0.16	1.06	0.05	0.70	0.02	45
46	13.14	21.48	8.00	6.41	6.10	3.32	3.90	1.12	2.66	0.44	1.80	0.17	1.09	0.05	0.71	0.02	46
48	13.71	23.24	8.34	6.94	6.37	3.59	4.07	1.21	2.78	0.48	1.88	0.18	1.13	0.05	0.74	0.02	48
50	14.29	25.07	8.69	7.48	6.63	3.87	4.24	1.31	2.89	0.52	1.96	0.20	1.18	0.06	0.77	0.02	50
55	15.71	29.90	9.56	8.93	7.29	4.62	4.67	1.56	3.18	0.61	2.15	0.24	1.30	0.07	0.85	0.02	55
60	17.14	35.13	10.43	10.49	7.96	5.43	5.09	1.83	3.47	0.72	2.35	0.28	1.42	0.08	0.93	0.03	60
65	18.57	40.75	11.30	12.16	8.62	6.30	5.51	2.12	3.76	0.84	2.54	0.32	1.54	0.09	1.01	0.03	65
70			12.17	13.95	9.28	7.22	5.94	2.44	4.05	0.96	2.74	0.37	1.66	0.11	1.08	0.04	70
75			13.04	15.86	9.95	8.21	6.36	2.77	4.34	1.09	2.93	0.42	1.77	0.12	1.16	0.04	75
80			13.91	17.87	10.61	9.25	6.79	3.12	4.63	1.23	3.13	0.47	1.89	0.14	1.24	0.05	80
85			14.78	19.99	11.27	10.35	7.21	3.49	4.92	1.38	3.32	0.53	2.01	0.16	1.32	0.06	85
90			15.65	22.23	11.94	11.50	7.64	3.88	5.21	1.53	3.52	0.59	2.13	0.17	1.39	0.06	90
95			16.51	24.57	12.60	12.72	8.06	4.29	5.50	1.69	3.72	0.65	2.25	0.19	1.47	0.07	95
100			17.38	27.01	13.26	13.98	8.48	4.72	5.79	1.86	3.91	0.72	2.36	0.21	1.55	0.08	100
110			19.12	32.23	14.59	16.68	9.33	5.63	6.37	2.22	4.30	0.85	2.60	0.25	1.70	0.09	110
120					15.91	19.60	10.18	6.61	6.95	2.61	4.69	1.00	2.84	0.30	1.86	0.11	120
130					17.24	22.73	11.03	7.67	7.52	3.02	5.08	1.16	3.07	0.34	2.01	0.12	130
140					18.57	26.08	11.88	8.79	8.10	3.47	5.47	1.34	3.31	0.39	2.17	0.14	140
150					19.89	29.63	12.73	9.99	8.68	3.94	5.87	1.52	3.55	0.45	2.32	0.16	150
160							13.57	11.26	9.26	4.44	6.26	1.71	3.78	0.50	2.48	0.18	160
170							14.42	12.60	9.84	4.97	6.65	1.91	4.02	0.56	2.63	0.20	170
180							15.27	14.01	10.42	5.52	7.04	2.13	4.26	0.63	2.79	0.22	180
190							16.12	15.48	11.00	6.11	7.43	2.35	4.49	0.69	2.94	0.25	190
200							16.97	17.02	11.58	6.72	7.82	2.59	4.73	0.76	3.10	0.27	200
225							19.09	21.17	13.02	8.35	8.80	3.22	5.32	0.95	3.48	0.34	225
250									14.47	10.15	9.78	3.91	5.91	1.15	3.87	0.41	250
275									15.92	12.11	10.75	4.67	6.50	1.37	4.26	0.49	275
300									17.36	14.23	11.73	5.48	7.09	1.61	4.65	0.58	300
325									18.81	16.50	12.71	6.36	7.68	1.87	5.03	0.67	325
350											13.69	7.29	8.28	2.14	5.42	0.77	350
375											14.67	8.29	8.87	2.44	5.81	0.87	375
400											15.64	9.34	9.46	2.75	6.19	0.98	400
425											16.62	10.45	10.05	3.07	6.58	1.10	425
450											17.60	11.62	10.64	3.41	6.97	1.22	450
475											18.58	12.84	11.23	3.77	7.36	1.35	475
500													11.82	4.15	7.74	1.48	500
400	Shaded area represents velocities over 5 FPS. Use with caution where water hammer is a concern.																400

Shaded area represents velocities over 5 FPS.
Use with caution where water hammer is a concern.

Friction Loss Characteristics
Class 200 IPS PVC Plastic Pipe
(1120,1220) C=150 SDR 21
PSI Loss Per 100 Feet of Pipe Sizes ¾" thru 4"

Nominal Size	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	Nominal Size			
Pipe ID	0.93	1.189	1.502	1.720	2.149	2.601	3.166	3.620	4.072	Pipe ID			
Pipe OD	1.050	1.315	1.660	1.900	2.375	2.875	3.500	4.000	4.500	Pipe OD			
Wall Thick	0.060	0.063	0.079	0.090	0.113	0.137	0.167	0.190	0.214	Wall Thick			
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM		
1	0.47	0.06	0.29	0.02	0.18	0.01	0.14	0.00			1		
2	0.94	0.22	0.58	0.07	0.36	0.02	0.28	0.01			2		
3	1.42	0.46	0.87	0.14	0.54	0.04	0.41	0.02			3		
4	1.89	0.79	1.15	0.24	0.72	0.08	0.55	0.04			4		
5	2.36	1.19	1.44	0.36	0.90	0.12	0.69	0.06			5		
6	2.83	1.67	1.73	0.51	1.09	0.16	0.83	0.08			6		
7	3.30	2.23	2.02	0.67	1.27	0.22	0.97	0.11			7		
8	3.77	2.85	2.31	0.86	1.45	0.28	1.10	0.14			8		
9	4.25	3.55	2.60	1.07	1.63	0.34	1.24	0.18			9		
10	4.72	4.31	2.89	1.30	1.81	0.42	1.38	0.22			10		
12	5.66	6.04	3.46	1.83	2.17	0.59	1.65	0.30			12		
14	6.60	8.04	4.04	2.43	2.53	0.78	1.93	0.40			14		
15	7.08	9.13	4.33	2.76	2.71	0.89	2.07	0.46			15		
16	7.55	10.29	4.62	3.11	2.89	1.00	2.21	0.52			16		
18	8.49	12.80	5.19	3.87	3.26	1.24	2.48	0.64			18		
20	9.43	15.56	5.77	4.71	3.62	1.51	2.76	0.78			20		
22	10.38	18.56	6.35	5.62	3.98	1.80	3.03	0.93			22		
24	11.32	21.81	6.93	6.60	4.34	2.12	3.31	1.09			24		
25	11.79	23.52	7.22	7.12	4.52	2.28	3.45	1.18			25		
26	12.27	25.29	7.50	7.65	4.70	2.45	3.59	1.27			26		
28	13.21	29.01	8.08	8.78	5.06	2.82	3.86	1.46			28		
30	14.15	32.96	8.66	9.97	5.43	3.20	4.14	1.65			30		
32	15.10	37.15	9.24	11.24	5.79	3.61	4.41	1.86			32		
34	16.04	41.56	9.81	12.58	6.15	4.03	4.69	2.09			34		
35	16.51	43.86	10.10	13.27	6.33	4.26	4.83	2.20			35		
36	16.98	46.21	10.39	13.98	6.51	4.48	4.96	2.32			36		
38	17.93	51.07	10.97	15.45	6.87	4.96	5.24	2.56			38		
40	18.87	56.16	11.54	16.99	7.23	5.45	5.52	2.82			40		
42	19.81	61.47	12.12	18.60	7.60	5.97	5.79	3.08			42		
44	20.76	67.00	12.70	20.27	7.96	6.50	6.07	3.36			44		
45			12.99	21.13	8.14	6.78	6.21	3.51			45		
46			13.28	22.01	8.32	7.06	6.34	3.65			46		
48			13.85	23.82	8.68	7.64	6.62	3.95			48		
50			14.43	25.69	9.04	8.24	6.90	4.26			50		
55			15.87	30.65	9.95	9.83	7.59	5.08			55		
60			17.32	36.00	10.85	11.55	8.27	5.97			60		
65			18.76	41.76	11.76	13.39	8.96	6.93			65		
70					12.66	15.36	9.65	7.95			70		
75					13.56	17.46	10.34	9.03			75		
80					14.47	19.67	11.03	10.17			80		
85					15.37	22.01	11.72	11.38			85		
90					16.28	24.47	12.41	12.65			90		
95					17.18	27.05	13.10	13.99			95		
100					18.09	29.74	13.79	15.38			100		
110					19.89	35.48	15.17	18.35			110		
120						16.55	21.56	10.60	7.30		120		
130						17.93	25.00	11.48	8.46		130		
140						19.31	28.68	12.37	9.71		140		
150							13.25	11.03	9.05	4.36	150		
175							15.46	14.67	10.55	5.80	175		
200							17.67	18.79	12.06	7.42	200		
225							19.88	23.37	13.57	9.23	225		
250									15.08	11.22	250		
275									16.58	13.39	275		
300									18.09	15.73	300		
350									14.25	8.04	350		
400									16.28	10.29	400		
450									18.32	12.80	450		
500										15.57	8.11	500	
550										17.12	9.67	550	
600										18.68	11.36	600	
700											17.22	8.53	700
800											19.68	10.92	800
	Shaded area represents velocities over 5 FPS. Use with caution where water hammer is a concern.												

Shaded area represents velocities over 5 FPS.
Use with caution where water hammer is a concern.

Friction Loss Characteristics
Class 315 IPS PVC Plastic Pipe
(1120,1220) C=150 SDR 13.5
PSI Loss Per 100 Feet of Pipe Sizes ½" thru 3"

Nominal Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		Nominal Size
Pipe ID	0.716		0.894		1.121		1.414		1.618		2.023		2.449		2.982		Pipe ID
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		Pipe OD
Wall Thick	0.062		0.078		0.097		0.123		0.141		0.176		0.213		0.259		Wall Thick
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	Flow GPM
1	0.80	0.22	0.51	0.07	0.32	0.02	0.20	0.01	0.16	0.00							1
2	1.59	0.78	1.02	0.27	0.65	0.09	0.41	0.03	0.31	0.01	0.20	0.00					2
3	2.39	1.65	1.53	0.56	0.97	0.19	0.61	0.06	0.47	0.03	0.30	0.01	0.20	0.00			3
4	3.18	2.82	2.04	0.96	1.30	0.32	0.82	0.10	0.62	0.05	0.40	0.02	0.27	0.01			4
5	3.98	4.26	2.55	1.45	1.62	0.48	1.02	0.16	0.78	0.08	0.50	0.03	0.34	0.01	0.23	0.00	5
6	4.78	5.97	3.06	2.03	1.95	0.67	1.22	0.22	0.94	0.11	0.60	0.04	0.41	0.02	0.28	0.01	6
7	5.57	7.95	3.57	2.70	2.27	0.90	1.43	0.29	1.09	0.15	0.70	0.05	0.48	0.02	0.32	0.01	7
8	6.37	10.18	4.08	3.45	2.60	1.15	1.63	0.37	1.25	0.19	0.80	0.06	0.54	0.03	0.37	0.01	8
9	7.16	12.66	4.59	4.30	2.92	1.43	1.84	0.46	1.40	0.24	0.90	0.08	0.61	0.03	0.41	0.01	9
10	7.96	15.38	5.10	5.22	3.25	1.74	2.04	0.56	1.56	0.29	1.00	0.10	0.68	0.04	0.46	0.01	10
11	8.75	18.35	5.62	6.23	3.57	2.07	2.24	0.67	1.71	0.35	1.10	0.12	0.75	0.05	0.50	0.02	11
12	9.55	21.56	6.13	7.32	3.90	2.43	2.45	0.79	1.87	0.41	1.20	0.14	0.82	0.05	0.55	0.02	12
13	10.35	25.01	6.64	8.49	4.22	2.82	2.65	0.91	2.03	0.47	1.30	0.16	0.88	0.06	0.60	0.02	13
14	11.14	28.69	7.15	9.74	4.55	3.24	2.86	1.05	2.18	0.54	1.40	0.18	0.95	0.07	0.64	0.03	14
15	11.94	32.60	7.66	11.07	4.87	3.68	3.06	1.19	2.34	0.62	1.50	0.21	1.02	0.08	0.69	0.03	15
16	12.73	36.73	8.17	12.47	5.19	4.15	3.26	1.34	2.49	0.70	1.60	0.23	1.09	0.09	0.73	0.04	16
17	13.53	41.10	8.68	13.95	5.52	4.64	3.47	1.50	2.65	0.78	1.69	0.26	1.16	0.10	0.78	0.04	17
18	14.33	45.69	9.19	15.51	5.84	5.16	3.67	1.67	2.81	0.86	1.79	0.29	1.22	0.12	0.83	0.04	18
19	15.12	50.50	9.70	17.14	6.17	5.70	3.88	1.84	2.96	0.96	1.89	0.32	1.29	0.13	0.87	0.05	19
20	15.92	55.53	10.21	18.85	6.49	6.27	4.08	2.03	3.12	1.05	1.99	0.35	1.36	0.14	0.92	0.05	20
22	17.51	66.25	11.23	22.49	7.14	7.48	4.49	2.42	3.43	1.25	2.19	0.42	1.50	0.17	1.01	0.06	22
24	19.10	77.84	12.25	26.42	7.79	8.79	4.90	2.84	3.74	1.47	2.39	0.50	1.63	0.20	1.10	0.08	24
25			12.76	28.50	8.12	9.48	5.10	3.06	3.90	1.59	2.49	0.54	1.70	0.21	1.15	0.08	25
26			13.27	30.65	8.44	10.19	5.31	3.29	4.05	1.71	2.59	0.58	1.77	0.23	1.19	0.09	26
28			14.29	35.15	9.09	11.69	5.71	3.78	4.36	1.96	2.79	0.66	1.90	0.26	1.28	0.10	28
30			15.31	39.95	9.74	13.28	6.12	4.29	4.68	2.23	2.99	0.75	2.04	0.30	1.38	0.11	30
32			16.34	45.02	10.39	14.97	6.53	4.84	4.99	2.51	3.19	0.85	2.18	0.33	1.47	0.13	32
34			17.36	50.37	11.04	16.75	6.94	5.41	5.30	2.81	3.39	0.95	2.31	0.37	1.56	0.14	34
35			17.87	53.14	11.36	17.67	7.14	5.71	5.45	2.96	3.49	1.00	2.38	0.39	1.61	0.15	35
36			18.38	55.99	11.69	18.62	7.35	6.02	5.61	3.12	3.59	1.05	2.45	0.42	1.65	0.16	36
38			19.40	61.89	12.34	20.58	7.75	6.65	5.92	3.45	3.79	1.16	2.59	0.46	1.74	0.18	38
40					12.99	22.63	8.16	7.31	6.23	3.79	3.99	1.28	2.72	0.50	1.84	0.19	40
42					13.64	24.77	8.57	8.00	6.55	4.15	4.19	1.40	2.86	0.55	1.93	0.21	42
44					14.29	27.00	8.98	8.72	6.86	4.53	4.39	1.53	2.99	0.60	2.02	0.23	44
45					14.61	28.15	9.18	9.09	7.01	4.72	4.49	1.59	3.06	0.63	2.06	0.24	45
46					14.94	29.32	9.39	9.47	7.17	4.92	4.59	1.66	3.13	0.65	2.11	0.25	46
48					15.58	31.72	9.79	10.25	7.48	5.32	4.79	1.79	3.27	0.71	2.20	0.27	48
50					16.23	34.21	10.20	11.05	7.79	5.74	4.98	1.93	3.40	0.76	2.29	0.29	50
55					17.86	40.82	11.22	13.19	8.57	6.84	5.48	2.31	3.74	0.91	2.52	0.35	55
60					19.48	47.95	12.24	15.49	9.35	8.04	5.98	2.71	4.08	1.07	2.75	0.41	60
65							13.26	17.97	10.13	9.33	6.48	3.14	4.42	1.24	2.98	0.48	65
70							14.28	20.61	10.91	10.70	6.98	3.61	4.76	1.42	3.21	0.55	70
75							15.30	23.42	11.69	12.16	7.48	4.10	5.10	1.62	3.44	0.62	75
80							16.32	26.39	12.47	13.70	7.98	4.62	5.44	1.82	3.67	0.70	80
85							17.35	29.53	13.25	15.33	8.47	5.17	5.78	2.04	3.90	0.78	85
90							18.37	32.83	14.03	17.04	8.97	5.75	6.12	2.27	4.13	0.87	90
95							19.39	36.28	14.81	18.83	9.47	6.35	6.46	2.51	4.36	0.96	95
100									15.58	20.71	9.97	6.98	6.80	2.76	4.59	1.06	100
110									17.14	24.71	10.97	8.33	7.48	3.29	5.05	1.26	110
120									18.70	29.03	11.96	9.79	8.16	3.86	5.51	1.48	120
130											12.96	11.35	8.84	3.48	5.96	1.72	130
140											13.96	13.02	9.52	5.14	6.42	1.97	140
150											14.95	14.80	10.20	5.84	6.88	2.24	150
175											17.45	19.69	11.90	7.77	8.03	2.98	175
200											19.94	25.21	13.61	9.95	9.18	3.82	200
225													15.31	12.37	10.32	4.75	225
250													17.01	15.04	11.47	5.77	250
275													18.71	17.94	12.62	6.88	275
300															13.76	8.09	300
325															14.91	9.38	325
350															16.06	10.76	350
400															18.35	13.78	400

Shaded area represents velocities over 5 FPS.
Use with caution where water hammer is a concern.

Friction Loss Characteristics
Schedule 40 IPS PVC Plastic Pipe
 (1120,1220) C=150 PSI Loss Per 100 Feet of Pipe
 Sizes ½" thru 3"

Nominal Size	Sizes ½" thru 3"														Nominal Size		
Pipe ID	½"		¾"		1"		1¼"		1½"		2"		2½"		3"	Pipe ID	
Pipe OD	0.622		0.824		1.049		1.380		1.610		2.067		2.469		3.068	Pipe OD	
Wall Thick	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500	Wall Thick	
	0.109		0.113		0.133		0.140		0.145		0.154		0.203		0.216		
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	Flow GPM
1	1.05	0.43	0.60	0.11	0.37	0.03	0.21	0.01	0.16	0.00							1
2	2.11	1.55	1.20	0.39	0.74	0.12	0.43	0.03	0.31	0.02	0.19	0.00					2
3	3.16	3.28	1.80	0.84	1.11	0.26	0.64	0.07	0.47	0.03	0.29	0.01	0.20	0.00			3
4	4.22	5.59	2.40	1.42	1.48	0.44	0.86	0.12	0.63	0.05	0.38	0.02	0.27	0.01			4
5	5.27	8.45	3.00	2.15	1.85	0.66	1.07	0.17	0.79	0.08	0.48	0.02	0.33	0.01	0.22	0.00	5
6	6.33	11.85	3.61	3.02	2.22	0.93	1.29	0.25	0.94	0.12	0.57	0.03	0.40	0.01	0.26	0.01	6
7	7.38	15.76	4.21	4.01	2.60	1.24	1.50	0.33	1.10	0.15	0.67	0.05	0.47	0.02	0.30	0.01	7
8	8.44	20.18	4.81	5.14	2.97	1.59	1.71	0.42	1.26	0.20	0.76	0.06	0.54	0.02	0.35	0.01	8
9	9.49	25.10	5.41	6.39	3.34	1.97	1.93	0.52	1.42	0.25	0.86	0.07	0.60	0.03	0.39	0.01	9
10	10.55	30.51	6.01	7.77	3.71	2.40	2.14	0.63	1.57	0.30	0.95	0.09	0.67	0.04	0.43	0.01	10
11	11.60	36.40	6.61	9.26	4.08	2.86	2.36	0.75	1.73	0.36	1.05	0.11	0.74	0.04	0.48	0.02	11
12	12.65	42.77	7.21	10.88	4.45	3.36	2.57	0.89	1.89	0.42	1.15	0.12	0.80	0.05	0.52	0.02	12
13	13.71	49.60	7.81	12.62	4.82	3.90	2.79	1.03	2.05	0.48	1.24	0.14	0.87	0.06	0.56	0.02	13
14	14.76	56.90	8.41	14.48	5.19	4.47	3.00	1.18	2.20	0.56	1.34	0.16	0.94	0.07	0.61	0.02	14
15	15.82	64.65	9.01	16.45	5.56	5.08	3.21	1.34	2.36	0.63	1.43	0.19	1.00	0.08	0.65	0.03	15
16	16.87	72.86	9.61	18.54	5.93	5.73	3.43	1.51	2.52	0.71	1.53	0.21	1.07	0.09	0.69	0.03	16
17	17.93	81.52	10.22	20.75	6.30	6.41	3.64	1.69	2.68	0.80	1.62	0.24	1.14	0.10	0.74	0.03	17
18	18.98	90.62	10.82	23.06	6.67	7.12	3.86	1.88	2.83	0.89	1.72	0.26	1.20	0.11	0.78	0.04	18
19			11.42	25.49	7.04	7.87	4.07	2.07	2.99	0.98	1.81	0.29	1.27	0.12	0.82	0.04	19
20			12.02	28.03	7.42	8.66	4.28	2.28	3.15	1.08	1.91	0.32	1.34	0.13	0.87	0.05	20
22			13.22	33.44	8.16	10.33	4.71	2.72	3.46	1.28	2.10	0.38	1.47	0.16	0.95	0.06	22
24			14.42	39.29	8.90	12.14	5.14	3.20	3.78	1.51	2.29	0.45	1.61	0.19	1.04	0.07	24
25			15.02	42.38	9.27	13.09	5.36	3.45	3.94	1.63	2.39	0.48	1.67	0.20	1.08	0.07	25
26			15.62	45.57	9.64	14.08	5.57	3.71	4.09	1.75	2.48	0.52	1.74	0.22	1.13	0.08	26
28			16.83	52.27	10.38	16.15	6.00	4.25	4.41	2.01	2.67	0.60	1.87	0.25	1.21	0.09	28
30			18.03	59.40	11.12	18.35	6.43	4.83	4.72	2.28	2.86	0.68	2.01	0.28	1.30	0.10	30
32			19.23	66.94	11.86	20.68	6.86	5.44	5.04	2.57	3.06	0.76	2.14	0.32	1.39	0.11	32
34					12.61	23.13	7.28	6.09	5.35	2.88	3.25	0.85	2.28	0.36	1.47	0.12	34
35					12.98	24.41	7.50	6.43	5.51	3.04	3.34	0.90	2.34	0.38	1.52	0.13	35
36					13.35	25.72	7.71	6.77	5.67	3.20	3.44	0.95	2.41	0.40	1.56	0.14	36
38					14.09	28.43	8.14	7.48	5.98	3.54	3.63	1.05	2.54	0.44	1.65	0.15	38
40					14.83	31.26	8.57	8.23	6.30	3.89	3.82	1.15	2.68	0.49	1.73	0.17	40
42					15.57	34.22	9.00	9.01	6.61	4.25	4.01	1.26	2.81	0.53	1.82	0.18	42
44					16.31	37.29	9.43	9.82	6.93	4.64	4.20	1.37	2.94	0.58	1.91	0.20	44
45					16.68	38.88	9.64	10.24	7.08	4.83	4.30	1.43	3.01	0.60	1.95	0.21	45
46					17.06	40.49	9.86	10.66	7.24	5.04	4.39	1.49	3.08	0.63	1.99	0.22	46
48					17.80	43.81	10.28	11.54	7.56	5.45	4.58	1.62	3.21	0.68	2.08	0.24	48
50					18.54	47.26	10.71	12.44	7.87	5.88	4.77	1.74	3.35	0.73	2.17	0.25	50
55							11.78	14.84	8.66	7.01	5.25	2.08	3.68	0.88	2.38	0.30	55
60							12.85	17.44	9.44	8.24	5.73	2.44	4.02	1.03	2.60	0.36	60
65							13.93	20.23	10.23	9.55	6.21	2.83	4.35	1.19	2.82	0.41	65
70							15.00	23.20	11.02	10.96	6.68	3.25	4.69	1.37	3.03	0.48	70
75							16.07	26.36	11.81	12.45	7.16	3.69	5.02	1.55	3.25	0.54	75
80							17.14	29.71	12.59	14.03	7.64	4.16	5.35	1.75	3.47	0.61	80
85							18.21	33.24	13.38	15.70	8.12	4.65	5.69	1.96	3.68	0.68	85
90							19.28	36.95	14.17	17.45	8.59	5.17	6.02	2.18	3.90	0.76	90
95									14.95	19.29	9.07	5.72	6.36	2.41	4.12	0.84	95
100									15.74	21.21	9.55	6.29	6.69	2.65	4.33	0.92	100
110									17.31	25.31	10.50	7.50	7.36	3.16	4.77	1.10	110
120									18.89	29.74	11.46	8.82	8.03	3.71	5.20	1.29	120
130											12.41	10.22	8.70	4.31	5.63	1.50	130
140											13.37	11.73	9.37	4.94	6.07	1.72	140
150											14.32	13.33	10.04	5.61	6.50	1.95	150
160											15.28	15.02	10.71	6.33	6.94	2.20	160
170											16.23	16.80	11.38	7.08	7.37	2.46	170
180											17.19	18.68	12.05	7.87	7.80	2.73	180
190											18.14	20.65	12.72	8.70	8.24	3.02	190
200											19.10	22.70	13.39	9.56	8.67	3.32	200
225													15.06	11.89	9.75	4.13	225
250													16.73	14.46	10.84	5.02	250
275													18.41	17.25	11.92	5.99	275
300															13.00	7.04	300
325															14.09	8.17	325
350															15.17	9.37	350
375															16.25	10.64	375
400															17.34	12.00	400

Shaded area represents velocities over 5 FPS.
 Use with caution where water hammer is a concern.

Friction Loss Characteristics Schedule 40 Standard Steel Pipe

C=100 Sizes ½" thru 3"
PSI Loss Per 100 Feet of Pipe

Nominal Size	PSI Loss Per 100 Feet of Pipe															Nominal Size		
Pipe ID	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		Pipe ID	
Pipe OD	0.622		0.824		1.049		1.380		1.610		2.067		2.469		3.068		Pipe OD	
Wall Thick	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		Pipe OD	
	0.109		0.113		0.133		0.140		0.145		0.154		0.203		0.216		Wall Thick	
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	Flow GPM	
1	1.05	0.91	0.60	0.23	0.37	0.07	0.21	0.02	0.16	0.01	0.10	0.00					1	
2	2.11	3.28	1.20	0.84	0.74	0.26	0.43	0.07	0.31	0.03	0.19	0.01	0.13	0.00			2	
3	3.16	6.95	1.80	1.77	1.11	0.55	0.64	0.14	0.47	0.07	0.29	0.02	0.20	0.01	0.13	0.00	3	
4	4.22	11.85	2.40	3.02	1.48	0.93	0.86	0.25	0.63	0.12	0.38	0.03	0.27	0.01	0.17	0.01	4	
5	5.27	17.91	3.00	4.56	1.85	1.41	1.07	0.37	0.79	0.18	0.48	0.05	0.33	0.02	0.22	0.01	5	
6	6.33	25.10	3.61	6.39	2.22	1.97	1.29	0.52	0.94	0.25	0.57	0.07	0.40	0.03	0.26	0.01	6	
7	7.38	33.40	4.21	8.50	2.60	2.63	1.50	0.69	1.10	0.33	0.67	0.10	0.47	0.04	0.30	0.01	7	
8	8.44	42.77	4.81	10.88	2.97	3.36	1.71	0.89	1.26	0.42	0.76	0.12	0.54	0.05	0.35	0.02	8	
9	9.49	53.19	5.41	13.54	3.34	4.18	1.93	1.10	1.42	0.52	0.86	0.15	0.60	0.06	0.39	0.02	9	
10	10.55	64.65	6.01	16.45	3.71	5.08	2.14	1.34	1.57	0.63	0.95	0.19	0.67	0.08	0.43	0.03	10	
11	11.60	77.14	6.61	19.63	4.08	6.06	2.36	1.60	1.73	0.75	1.05	0.22	0.74	0.09	0.48	0.03	11	
12	12.65	90.62	7.21	23.06	4.45	7.12	2.57	1.88	1.89	0.89	1.15	0.26	0.80	0.11	0.52	0.04	12	
13	13.71	105.1	7.81	26.75	4.82	8.26	2.79	2.18	2.05	1.03	1.24	0.30	0.87	0.13	0.56	0.04	13	
14	14.76	120.6	8.41	30.68	5.19	9.48	3.00	2.50	2.20	1.18	1.34	0.35	0.94	0.15	0.61	0.05	14	
15	15.82	137.0	9.01	34.87	5.56	10.77	3.21	2.84	2.36	1.34	1.43	0.40	1.00	0.17	0.65	0.06	15	
16	16.87	154.4	9.61	39.29	5.93	12.14	3.43	3.20	2.52	1.51	1.53	0.45	1.07	0.19	0.69	0.07	16	
17	17.93	172.7	10.22	43.96	6.30	13.58	3.64	3.58	2.68	1.69	1.62	0.50	1.14	0.21	0.74	0.07	17	
18	18.98	192.0	10.82	48.87	6.67	15.10	3.86	3.97	2.83	1.88	1.72	0.56	1.20	0.23	0.78	0.08	18	
19			11.42	54.02	7.04	16.69	4.07	4.39	2.99	2.07	1.81	0.62	1.27	0.26	0.82	0.09	19	
20			12.02	59.40	7.42	18.35	4.28	4.83	3.15	2.28	1.91	0.68	1.34	0.28	0.87	0.10	20	
22			13.22	70.87	8.16	21.89	4.71	5.76	3.46	2.72	2.10	0.81	1.47	0.34	0.95	0.12	22	
24			14.42	83.26	8.90	25.72	5.14	6.77	3.78	3.20	2.29	0.95	1.61	0.40	1.04	0.14	24	
25			15.02	89.80	9.27	27.74	5.36	7.30	3.94	3.45	2.39	1.02	1.67	0.43	1.08	0.15	25	
26			15.62	96.56	9.64	29.83	5.57	7.85	4.09	3.71	2.48	1.10	1.74	0.46	1.13	0.16	26	
28			16.83	110.8	10.38	34.22	6.00	9.01	4.41	4.25	2.67	1.26	1.87	0.53	1.21	0.18	28	
30			18.03	125.9	11.12	38.88	6.43	10.24	4.72	4.83	2.86	1.43	2.01	0.60	1.30	0.21	30	
32					11.86	43.81	6.86	11.54	5.04	5.45	3.06	1.62	2.14	0.68	1.39	0.24	32	
34					12.61	49.02	7.28	12.91	5.35	6.10	3.25	1.81	2.28	0.76	1.47	0.26	34	
35					12.98	51.72	7.50	13.62	5.51	6.43	3.34	1.91	2.34	0.80	1.52	0.28	35	
36					13.35	54.49	7.71	14.35	5.67	6.78	3.44	2.01	2.41	0.85	1.56	0.29	36	
38					14.09	60.23	8.14	15.86	5.98	7.49	3.63	2.22	2.54	0.94	1.65	0.33	38	
40					14.83	66.24	8.57	17.44	6.30	8.24	3.82	2.44	2.68	1.03	1.73	0.36	40	
42					15.57	72.50	9.00	19.09	6.61	9.02	4.01	2.67	2.81	1.13	1.82	0.39	42	
44					16.31	79.02	9.43	20.81	6.93	9.83	4.20	2.91	2.94	1.23	1.91	0.43	44	
45					16.68	82.38	9.64	21.69	7.08	10.25	4.30	3.04	3.01	1.28	1.95	0.44	45	
46					17.06	85.80	9.86	22.59	7.24	10.67	4.39	3.16	3.08	1.33	1.99	0.46	46	
48					17.80	92.84	10.28	24.44	7.56	11.55	4.58	3.42	3.21	1.44	2.08	0.50	48	
50					18.54	100.1	10.71	26.36	7.87	12.45	4.77	3.69	3.35	1.55	2.17	0.54	50	
55							11.78	31.45	8.66	14.86	5.25	4.40	3.68	1.85	2.38	0.64	55	
60							12.85	36.95	9.44	17.45	5.73	5.17	4.02	2.18	2.60	0.76	60	
65							13.93	42.86	10.23	20.24	6.21	6.00	4.35	2.53	2.82	0.88	65	
70							15.00	49.16	11.02	23.22	6.68	6.88	4.69	2.90	3.03	1.01	70	
75							16.07	55.86	11.81	26.39	7.16	7.82	5.02	3.29	3.25	1.14	75	
80							17.14	62.96	12.59	29.74	7.64	8.82	5.35	3.71	3.47	1.29	80	
85							18.21	70.44	13.38	33.27	8.12	9.86	5.69	4.15	3.68	1.44	85	
90									14.17	36.98	8.59	10.96	6.02	4.62	3.90	1.60	90	
95									14.95	40.88	9.07	12.12	6.36	5.10	4.12	1.77	95	
100									15.74	44.95	9.55	13.33	6.69	5.61	4.33	1.95	100	
110									17.31	53.63	10.50	15.90	7.36	6.70	4.77	2.33	110	
120									18.89	63.01	11.46	18.68	8.03	7.87	5.20	2.73	120	
130											12.41	21.66	8.70	9.12	5.63	3.17	130	
140											13.37	24.85	9.37	10.47	6.07	3.64	140	
150											14.32	28.24	10.04	11.89	6.50	4.13	150	
160											15.28	31.82	10.71	13.40	6.94	4.66	160	
170											16.23	35.61	11.38	15.00	7.37	5.21	170	
180											17.19	39.58	12.05	16.67	7.80	5.79	180	
190											18.14	43.75	12.72	18.43	8.24	6.40	190	
200													13.39	20.26	8.67	7.04	200	
225													15.06	25.20	9.75	8.76	225	
250													16.73	30.63	10.84	10.64	250	
275													18.41	36.54	11.92	12.70	275	
300	Shaded area represents velocities over 5 FPS. Use with caution where water hammer is a concern.															13.00	14.92	300
325																14.09	17.30	325
350																15.17	19.85	350
375																16.25	22.56	375
400															17.34	25.42	400	

Shaded area represents velocities over 5 FPS.
Use with caution where water hammer is a concern.

Friction Loss Characteristics Polyethylene (PE) Pipe - SDR Pressure Rated Tube

C=140 SDR 7, 9, 11.5, 15 Sizes ½" thru 2"
PSI Loss Per 100 Feet of Pipe

Nominal Size Pipe ID	½" 0.622		¾" 0.824		1" 1.049		1¼" 1.380		1½" 1.610		2" 2.067		Nominal Size Pipe ID
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	Flow GPM
1	1.05	0.49	0.60	0.12	0.37	0.04	0.21	0.01	0.16	0.00	0.10	0.00	1
2	2.11	1.76	1.20	0.45	0.74	0.14	0.43	0.04	0.31	0.02	0.19	0.01	2
3	3.16	3.73	1.80	0.95	1.11	0.29	0.64	0.08	0.47	0.04	0.29	0.01	3
4	4.22	6.35	2.40	1.62	1.48	0.50	0.86	0.13	0.63	0.06	0.38	0.02	4
5	5.27	9.60	3.00	2.44	1.85	0.76	1.07	0.20	0.79	0.09	0.48	0.03	5
6	6.33	13.46	3.61	3.43	2.22	1.06	1.29	0.28	0.94	0.13	0.57	0.04	6
7	7.38	17.91	4.21	4.56	2.60	1.41	1.50	0.37	1.10	0.18	0.67	0.05	7
8	8.44	22.93	4.81	5.84	2.97	1.80	1.71	0.47	1.26	0.22	0.76	0.07	8
9	9.49	28.52	5.41	7.26	3.34	2.24	1.93	0.59	1.42	0.28	0.86	0.08	9
10	10.55	34.67	6.01	8.82	3.71	2.73	2.14	0.72	1.57	0.34	0.95	0.10	10
11	11.60	41.36	6.61	10.53	4.08	3.25	2.36	0.86	1.73	0.40	1.05	0.12	11
12	12.65	48.60	7.21	12.37	4.45	3.82	2.57	1.01	1.89	0.48	1.15	0.14	12
13	13.71	56.36	7.81	14.34	4.82	4.43	2.79	1.17	2.05	0.55	1.24	0.16	13
14	14.76	64.65	8.41	16.45	5.19	5.08	3.00	1.34	2.20	0.63	1.34	0.19	14
15	15.82	73.47	9.01	18.70	5.56	5.78	3.21	1.52	2.36	0.72	1.43	0.21	15
16	16.87	82.79	9.61	21.07	5.93	6.51	3.43	1.71	2.52	0.81	1.53	0.24	16
17	17.93	92.63	10.22	23.57	6.30	7.28	3.64	1.92	2.68	0.91	1.62	0.27	17
18	18.98	103.0	10.82	26.21	6.67	8.10	3.86	2.13	2.83	1.01	1.72	0.30	18
19			11.42	28.97	7.04	8.95	4.07	2.36	2.99	1.11	1.81	0.33	19
20			12.02	31.85	7.42	9.84	4.28	2.59	3.15	1.22	1.91	0.36	20
22			13.22	38.00	8.16	11.74	4.71	3.09	3.46	1.46	2.10	0.43	22
24			14.42	44.65	8.90	13.79	5.14	3.63	3.78	1.72	2.29	0.51	24
25			15.02	48.15	9.27	14.87	5.36	3.92	3.94	1.85	2.39	0.55	25
26			15.62	51.78	9.64	16.00	5.57	4.21	4.09	1.99	2.48	0.59	26
28			16.83	59.40	10.38	18.35	6.00	4.83	4.41	2.28	2.67	0.68	28
30			18.03	67.50	11.12	20.85	6.43	5.49	4.72	2.59	2.86	0.77	30
32			19.23	76.06	11.86	23.50	6.86	6.19	5.04	2.92	3.06	0.87	32
34					12.61	26.29	7.28	6.92	5.35	3.27	3.25	0.97	34
35					12.98	27.74	7.50	7.30	5.51	3.45	3.34	1.02	35
36					13.35	29.22	7.71	7.69	5.67	3.63	3.44	1.08	36
38					14.09	32.30	8.14	8.50	5.98	4.02	3.63	1.19	38
40					14.83	35.52	8.57	9.35	6.30	4.42	3.82	1.31	40
42					15.57	38.88	9.00	10.24	6.61	4.83	4.01	1.43	42
44					16.31	42.38	9.43	11.16	6.93	5.27	4.20	1.56	44
45					16.68	44.18	9.64	11.63	7.08	5.49	4.30	1.63	45
46					17.06	46.01	9.86	12.12	7.24	5.72	4.39	1.70	46
48					17.80	49.79	10.28	13.11	7.56	6.19	4.58	1.84	48
50					18.54	53.70	10.71	14.14	7.87	6.68	4.77	1.98	50
55							11.78	16.87	8.66	7.97	5.25	2.36	55
60							12.85	19.82	9.44	9.36	5.73	2.77	60
65							13.93	22.98	10.23	10.86	6.21	3.22	65
70							15.00	26.36	11.02	12.45	6.68	3.69	70
75							16.07	29.96	11.81	14.15	7.16	4.19	75
80							17.14	33.76	12.59	15.95	7.64	4.73	80
85							18.21	37.77	13.38	17.84	8.12	5.29	85
90							19.28	41.99	14.17	19.83	8.59	5.88	90
95									14.95	21.92	9.07	6.50	95
100									15.74	24.11	9.55	7.15	100
110									17.31	28.76	10.50	8.53	110
120									18.89	33.79	11.46	10.02	120
130											12.41	11.62	130
140											13.37	13.33	140
150											14.32	15.14	150
160											15.28	17.07	160
170											16.23	19.09	170
180											17.19	21.23	180
190											18.14	23.46	190
200											19.10	25.80	200

Shaded area represents velocities over 5 FPS.
Use with caution where water hammer is a concern.