Friction Loss in Pipe Fittings - Plastic Pipe, Schedule 80

Fitting	Condition	Friction Loss for Water in Terms of Equivalent Length of Straight Pipe - feet											
		Nominal Pipe Size, inch											
		1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2
		Actual Inside Pipe Diameter, inch											
		0.215	0.302	0.423	0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364
90° Standard Elbow	- - -	0.64	0.90	1.25	1.60	2.10	2.60	3.50	4.00	5.50	6.20	7.70	8.91
90° Long Radius Elbow	- - -	0.43	0.60	0.81	1.00	1.40	1.70	2.30	2.70	4.30	5.10	6.30	7.30
90° Street Elbow	- - -	1.07	1.50	2.06	2.60	3.40	4.40	5.80	6.70	8.60	10.3	12.8	14.8
90° Square Corner Elbow	- - -	1.21	1.70	2.35	3.00	3.90	5.00	6.50	7.60	9.80	11.7	14.6	16.9
45° Standard Elbow	- - -	0.36	0.50	0.66	0.80	1.10	1.40	1.80	2.10	2.80	3.30	4.10	4.75
45° Street Elbow	- - -	0.57	0.80	1.06	1.30	1.80	2.30	3.00	3.50	4.50	5.40	6.60	7.65
Standard Tee	Thru Flow	0.43	0.60	0.81	1.00	1.40	1.70	2.30	2.70	4.30	5.10	6.30	7.30
	Branch Flow	1.28	1.80	2.81	4.00	5.10	6.00	6.90	8.10	12.0	14.3	16.3	19.2
Angle Valve	Full Open - No Obstruction	3.13	4.40	5.99	7.50	10.0	12.7	16.7	19.5	25.0	29.8	37.1	42.9
	Full Open - Disc	4.34	6.10	8.30	10.4	13.7	17.5	23.0	26.8	34.5	41.2	51.1	59.1
Gate Valve	Full Open	0.28	0.40	0.55	0.70	0.90	1.10	1.50	1.70	2.20	2.70	3.30	3.85
	3/4 Open	0.78	1.10	1.47	1.80	2.40	3.10	4.00	4.70	6.00	7.20	8.90	10.3
	1/2 Open	3.49	4.90	6.65	8.30	11.0	14.0	18.4	21.5	27.6	32.9	40.9	47.3
	1/4 Open	19.4	27.3	36.8	45.7	61.8	78.7	104	121	155	185	230	266
Globe Valve, Full Open	Conventional - No obstruction	7.33	10.3	14.0	17.6	23.3	29.7	39.1	45.6	58.6	70.0	86.9	101
	Conventional w/ disc	9.75	13.7	18.6	23.3	30.9	39.3	51.8	60.4	77.5	92.6	115	133
	Y-pattern, stem at 60°	3.77	5.30	7.24	9.10	12.0	15.3	20.1	23.5	30.1	36.0	44.7	51.7
	Y-pattern, stem at 45°	3.13	4.40	5.99	7.50	10.0	12.7	16.7	19.5	25.0	29.8	37.1	42.9

Fitting	Condition	Friction Loss for Water in Terms of Equivalent Length of Straight Pipe - feet										
		Nominal Pipe Size, inch										
		4	5	6	8	10	12	14	16	18	20	24
		Actual Inside Pipe Diameter, inch										
		3.826	4.813	5.761	7.625	9.564	11.376	12.500	14.314	16.126	17.938	21.564
90° Standard Elbow	- - -	10.1	12.7	15.2	20.0	25.1	29.8	32.8	37.5	42.3	47.0	56.5
90° Long Radius Elbow	- - -	8.3	10.4	12.5	16.5	20.7	24.7	27.1	31.0	35.0	38.9	46.7
90° Street Elbow	- - -	16.8	21.1	25.3	33.3	41.8	49.7	54.6	62.5	70.5	78.4	94.2
90° Square Corner Elbow	- - -	19.1	24.0	28.8	37.9	47.6	56.7	62.3	71.3	80.3	89.3	107
45° Standard Elbow	- - -	5.4	6.8	8.1	10.6	13.4	15.9	17.5	20.0	22.6	25.1	30.2
45° Street Elbow	- - -	8.7	10.9	13.1	17.3	21.7	25.9	28.4	32.5	36.7	40.8	49.0
Standard Tee	Thru Flow	8.3	10.4	12.5	16.5	20.7	24.7	27.1	31.0	35.0	38.9	46.7
	Branch Flow	22.1	27.4	32.2	39.9	50.1	59.7	65.5	75.1	84.6	94.1	113
Angle Valve	Full Open	48.6	61.2	73.3	96.4	121	144	158	181	204	227	273
	Full Open - Disc	67.1	84.4	101	133	167	199	218	250	282	314	377
	Full Open	4.4	5.5	6.6	8.6	10.9	12.9	14.2	16.3	18.3	20.4	24.5
Gate Valve	3/4 Open	11.7	14.8	17.7	23.3	29.2	34.8	38.2	43.7	49.3	54.8	65.9
	1/2 Open	53.7	67.6	80.9	106	134	159	175	200	225	251	302
	1/4 Open	302	380	455	599	752	895	983	1,130	1,270	1,410	1,700
Globe Valve, Full Open	Straight - No obstruction	114	144	172	226	284	338	371	425	479	533	641
	Straight w/ disc	151	190	227	299	376	448	492	563	634	705	848
	Y-pattern, Stem at 60°	58.7	73.8	88.4	116	146	174	191	219	247	274	330
	Y-pattern, Stem at 45°	48.6	61.2	73.3	96.4	121	144	158	181	204	227	273

This table was originally developed from tests on PVC [poly(vinyl chloride)] pipe, but the values apply to all thermoplastic piping materials with equally smooth interior surfaces.