

Pipe line resistance

Table for the resistance of water in a pipe line

v= velocity in m/sec.	Q/h	Pipe diameter ID in mm									
		20	25	30	40	50	60	70	80	90	100
0.10	Q	0.11	0.18	0.25	0.45	0.71	1.00	1.40	1.80	2.30	2.80
	h	0.150	0.120	0.091	0.062	0.047	0.036	0.030	0.026	0.022	0.019
0.15	Q	0.17	0.27	0.38	0.68	1.10	1.50	2.10	2.70	3.40	4.20
	h	0.300	0.230	0.180	0.120	0.094	0.075	0.062	0.052	0.046	0.040
0.20	Q	0.23	0.35	0.51	0.91	1.40	2.00	2.80	3.60	4.60	5.70
	h	0.490	0.370	0.300	0.200	0.160	0.120	0.100	0.087	0.075	0.067
0.25	Q	0.28	0.44	0.64	1.10	1.80	2.50	3.50	4.50	5.70	7.10
	h	0.72	0.53	0.44	0.30	0.23	0.18	0.15	0.13	0.11	0.10
0.30	Q	0.34	0.53	0.76	1.40	2.10	3.10	4.20	5.40	6.90	8.50
	h	0.99	0.75	0.6	0.42	0.32	0.26	0.21	0.18	0.16	0.14
0.40	Q	0.45	0.71	1.00	1.80	2.80	4.10	5.50	7.20	9.20	11.30
	h	1.60	1.20	0.99	0.69	0.53	0.43	0.36	0.31	0.27	0.24
0.50	Q	0.57	0.88	1.30	2.30	3.50	5.10	6.90	9.10	11.50	14.10
	h	2.40	1.90	1.50	1.00	0.80	0.65	0.54	0.46	0.40	0.36
0.60	Q	0.68	1.10	1.50	2.70	4.20	6.10	8.30	10.90	13.70	17.00
	h	3.30	2.60	2.10	1.50	1.12	0.90	0.75	0.65	0.57	0.50
0.70	Q	0.79	1.20	1.80	3.20	5.00	7.10	9.70	12.70	16.00	19.80
	h	4.40	3.40	2.70	1.90	1.50	1.20	1.00	0.86	0.75	0.67
0.80	Q	0.94	1.40	2.00	3.60	5.70	8.10	11.10	14.50	18.30	22.60
	h	5.60	4.30	3.40	2.50	1.90	1.50	1.30	1.10	0.98	0.86
0.85	Q	0.96	1.50	2.20	3.90	6.00	8.70	11.80	15.40	19.50	24.00
	h	6.30	4.80	3.90	2.70	2.10	1.70	1.50	1.20	1.10	0.97
0.90	Q	1.0	1.6	2.3	4.1	6.4	9.2	12.5	16.3	20.6	25.5
	h	6.9	5.3	4.3	3.0	2.4	1.9	1.6	1.4	1.2	1.1
0.95	Q	1.1	1.7	2.4	4.3	6.7	9.7	13.2	17.2	21.8	26.9
	h	7.7	5.9	4.8	3.4	2.6	2.1	1.8	1.6	1.3	1.2
1.00	Q	1.15	1.80	2.60	4.50	7.10	10.20	13.90	18.10	22.90	28.30
	h	8.30	6.40	5.10	3.70	2.90	2.30	2.00	1.70	1.50	1.30
1.05	Q	1.2	1.9	2.7	4.8	7.4	10.7	14.6	19.0	24.1	29.7
	h	9.2	7.1	5.7	4.1	3.1	2.5	2.2	1.8	1.6	1.4
1.10	Q	1.25	1.90	2.80	5.00	7.80	11.20	15.20	19.90	25.20	31.10
	h	9.90	7.60	6.20	4.40	3.40	2.80	2.30	2.00	1.80	1.60

- Q = flow rate water per hour in m³
- d = inside diameter of the pipe
- v = velocity in meters
- h = pressure loss per 100m pipe line
in m water column (resistance)

For a strainer, control disc, check valve and a bend assume a resistance of 5m pipe length

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		20	25	30	40	50	60	70	80	90	100
1.15	Q	1.3	2.0	2.9	5.2	8.1	11.7	15.9	20.8	26.3	32.5
	h	10.8	8.3	6.7	4.8	3.8	3.0	2.6	2.2	2.0	1.7
1.20	Q	1.4	2.1	3.1	5.4	8.5	12.2	16.6	21.7	27.5	33.9
	h	11.7	9.0	7.2	5.2	4.0	3.3	2.8	2.4	2.1	1.9
1.25	Q	1.45	2.20	3.20	5.70	8.80	12.80	17.30	22.60	28.60	35.40
	h	12.50	9.70	7.80	5.60	4.30	3.50	3.00	2.60	2.30	2.00
1.50	Q	1.7	2.7	3.8	6.8	10.6	15.3	20.8	27.1	34.4	42.4
	h	17.4	13.5	10.1	7.8	6.1	5.0	4.2	3.6	3.2	2.8
1.75	Q	2.0	3.1	4.5	7.9	12.4	17.8	24.3	31.7	40.1	49.5
	h	23.1	18.0	14.6	10.5	8.1	6.6	5.7	4.8	4.3	3.8
2.00	Q	2.3	3.5	5.0	9.1	14.1	20.4	27.7	36.2	45.8	56.6
	h	29.6	23.0	18.6	13.4	10.5	8.6	7.2	6.2	5.5	4.9
2.50	Q	2.8	4.4	6.4	11.3	17.7	25.5	34.6	45.2	57.3	70.7
	h	45.0	34.7	28.3	20.5	16.0	13.1	11.1	9.6	8.4	7.5
3.00	Q	3.4	5.3	7.6	13.6	21.2	30.5	41.6	54.3	68.7	84.8
	h	62.9	47.9	39.6	28.8	24.7	18.6	15.8	13.6	11.8	10.7

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v= velocity in m/sec.	Q/h	Pipe diameter ID in mm									
		125	150	175	200	225	250	275	300	350	400
0.10	Q	4.4	6.4	8.7	11.2	14.3	17.7	21.4	25.5	34.6	45.2
	h	0.0150	0.0120	0.0098	0.0083	0.0072	0.0064	0.0057	0.0052	0.0043	0.0037
0.15	Q	6.6	9.5	13.0	17.0	21.5	26.5	31.2	38.2	52.0	68.0
	h	0.0300	0.0250	0.0200	0.0170	0.0150	0.0130	0.0120	0.0110	0.0091	0.0078
0.20	Q	8.8	12.7	17.3	22.6	28.6	35.3	42.8	50.9	69.3	90.5
	h	0.051	0.041	0.035	0.030	0.026	0.023	0.021	0.019	0.016	0.013
0.25	Q	11.1	15.9	21.7	28.3	35.8	44.2	53.5	63.6	86.6	113.0
	h	0.077	0.062	0.052	0.045	0.039	0.035	0.031	0.028	0.024	0.021
0.30	Q	13.3	19.1	26.0	33.9	42.9	53.0	64.2	76.3	104.0	136.0
	h	0.110	0.087	0.073	0.063	0.055	0.049	0.044	0.040	0.033	0.029
0.40	Q	17.7	25.5	34.6	45.2	57.3	70.7	85.5	102.0	139.0	181.0
	h	0.180	0.150	0.120	0.110	0.094	0.084	0.077	0.069	0.058	0.050
0.50	Q	22.1	31.8	43.3	56.6	71.6	88.4	107.0	127.0	173.0	226.0
	h	0.280	0.230	0.190	0.160	0.140	0.130	0.120	0.100	0.089	0.077
0.60	Q	26.5	38.2	52.0	67.9	85.9	106.0	128.0	153.0	208.0	271.0
	h	0.39	0.32	0.27	0.23	0.21	0.18	0.16	0.15	0.12	0.11
0.70	Q	31.0	44.5	60.6	79.2	100.0	124.0	150.0	178.0	242.0	317.0
	h	0.52	0.43	0.36	0.31	0.27	0.24	0.22	0.20	0.17	0.15
0.80	Q	35.3	50.7	69.3	90.5	115.0	141.0	171.0	204.0	277.0	362.0
	h	0.67	0.55	0.46	0.40	0.35	0.31	0.28	0.26	0.22	0.19
0.85	Q	37.6	54.1	73.6	96.1	122.0	150.0	182.0	216.0	294.0	385.0
	h	0.75	0.62	0.52	0.45	0.40	0.35	0.32	0.29	0.25	0.21
0.90	Q	39.8	57.3	77.9	102.0	129.0	159.0	192.0	229.0	312.0	407.0
	h	0.84	0.69	0.58	0.50	0.44	0.39	0.36	0.32	0.27	0.24
0.95	Q	42.0	60.4	82.3	107.0	136.0	168.0	203.0	242.0	329.0	420.0
	h	0.93	0.77	0.65	0.56	0.50	0.44	0.40	0.36	0.30	0.26
1.00	Q	44.2	63.6	86.6	113.0	143.0	177.0	214.0	254.0	346.0	452.0
	h	1.00	0.84	0.71	0.61	0.54	0.48	0.44	0.40	0.34	0.29
1.05	Q	46.4	66.8	90.9	119.0	150.0	186.0	225.0	267.0	364.0	475.0
	h	1.10	0.92	0.78	0.67	0.60	0.53	0.48	0.44	0.37	0.32
1.10	Q	48.6	70.0	95.3	124.0	157.0	194.0	235.0	280.0	381.0	498.0
	h	1.20	1.00	0.85	0.74	0.65	0.58	0.52	0.48	0.40	0.35

- Q = flow rate water per hour in m³
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v= velocity in m/sec.	Q/h	Pipe diameter ID in mm									
		125	150	175	200	225	250	275	300	350	400
1.15	Q	50.8	73.2	99.6	130.0	165.0	203.0	246.0	293.0	398.0	520.0
	h	1.30	1.10	0.93	0.81	0.71	0.63	0.57	0.52	0.44	0.38
1.20	Q	53.0	76.3	104.0	136.0	172.0	212.0	257.0	305.0	416.0	543.0
	h	1.50	1.10	1.00	0.87	0.77	0.69	0.62	0.57	0.48	0.42
1.25	Q	55.2	79.5	108.0	141.0	179.0	221.0	267.0	318.0	433.0	565.0
	h	1.60	1.30	1.10	0.94	0.83	0.74	0.67	0.61	0.52	0.45
1.50	Q	66.3	95.4	130.0	170.0	215.0	265.0	321.0	382.0	520.0	679.0
	h	2.20	1.80	1.50	1.30	1.20	1.10	0.96	0.87	0.74	0.64
1.75	Q	77.3	111.0	152.0	198.0	250.0	309.0	374.0	445.0	606.0	792.0
	h	3.00	2.40	2.10	1.80	1.60	1.40	1.30	1.20	0.99	0.86
2.00	Q	88.4	127.0	173.0	226.0	286.0	353.0	428.0	509.0	693.0	905.0
	h	3.8	3.2	2.7	2.3	2.1	1.8	1.7	1.5	1.3	1.1
2.50	Q	110.0	159.0	216.0	283.0	358.0	422.0	535.0	636.0	866.0	1131.0
	h	5.9	4.9	4.1	3.2	3.1	2.9	2.6	2.4	2.0	1.7
3.00	Q	133	191	260	339	429	530	641	763	1039	1357
	h	8.4	6.9	5.9	5.1	4.5	4.1	3.7	3.4	2.9	2.5

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		450	500	550	600	650	700	750	800	900	1000
0.10	Q	57.3	70.7	85.5	102.0	119.0	139.0	159.0	181.0	229.0	283.0
	h	0.0032	0.0029	0.0026	0.0023	0.0021	0.0020	0.0018	0.0017	0.0015	0.0013
0.15	Q	86.0	106.0	128.0	153.0	179.0	208.0	239.0	271.0	344.0	424.0
	h	0.0069	0.0061	0.0055	0.0050	0.0045	0.0042	0.0039	0.0036	0.0032	0.0028
0.20	Q	115.0	141.0	171.0	194.0	239.0	277.0	318.0	362.0	458.0	565.0
	h	0.0120	0.0110	0.0095	0.0086	0.0079	0.0072	0.0067	0.0062	0.0055	0.0049
0.25	Q	143.0	177.0	214.0	254.0	299.0	346.0	398.0	452.0	573.0	707.0
	h	0.0180	0.0160	0.0150	0.0130	0.0120	0.0110	0.1000	0.0096	0.0084	0.0075
0.30	Q	172.0	212.0	257.0	305.0	358.0	416.0	477.0	543.0	687.0	848.0
	h	0.025	0.023	0.021	0.019	0.017	0.016	0.015	0.014	0.012	0.011
0.40	Q	229.0	283.0	342.0	407.0	478.0	554.0	636.0	724.0	856.0	1131.0
	h	0.044	0.039*	0.035	0.032	0.029	0.027	0.025	0.024	0.021	0.019
0.50	Q	286.0	353.0	428.0	509.0	597.0	693.0	795.0	905.0	1145.0	1414.0
	h	0.067	0.060	0.054	0.050	0.045	0.045	0.039	0.036	0.032	0.029
0.60	Q	344.0	424.0	513.0	611.0	717.0	831.0	954.0	1086.0	1374.0	1696.0
	h	0.096	0.086	0.077	0.070	0.064	0.060	0.056	0.052	0.046	0.041
0.70	Q	401.0	495.0	599.0	713.0	836.0	970.0	1113.0	1267.0	1603.0	1979.0
	h	0.130	0.120	0.100	0.095	0.087	0.081	0.075	0.070	0.062	0.055
0.80	Q	458.0	565.0	684.0	814.0	956.0	1108.0	1272.0	1447.0	1832.0	2262.0
	h	0.170	0.150	0.132	0.120	0.110	0.100	0.097	0.091	0.080	0.072
0.85	Q	487.0	601.0	727.0	865.0	1015.0	1178.0	1352.0	1538.0	1947.0	2403.0
	h	0.190	0.170	0.150	0.140	0.130	0.120	0.110	0.100	0.090	0.081
0.90	Q	515.0	636.0	770.0	916.0	1075.0	1247.0	1431.0	1629.0	2061.0	2545.0
	h	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09
0.95	Q	544.0	672.0	813.0	967.0	1135.0	1316.0	1511.0	1719.0	2176.0	2686.0
	h	0.23	0.21	0.19	0.17	0.16	0.15	0.14	0.13	0.11	0.10
1.00	Q	573.0	707.0	855.0	1018.0	1195.0	1385.0	1590.0	1810.0	2290.0	2827.0
	h	0.26	0.23	0.21	0.19	0.17	0.16	0.15	0.14	0.12	0.11
1.05	Q	601.0	742.0	898.0	1069.0	1254.0	1455.0	1670.0	1900.0	2405.0	2945.0
	h	0.28	0.25	0.23	0.21	0.19	0.18	0.17	0.16	0.14	0.12
1.10	Q	630.0	778.0	941.0	1120.0	1310.0	1524.0	1749.0	1991.0	2519.0	3110.0
	h	0.31	0.28	0.25	0.23	0.21	0.20	0.18	0.17	0.15	0.13

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		450	500	550	600	650	700	750	800	900	1000
1.15	Q	658.0	813.0	984.0	1171.0	1374.0	1593.0	1829.0	2081.0	2634.0	3252.0
	h	0.34	0.30	0.27	0.25	0.23	0.21	0.20	0.19	0.16	0.15
1.20	Q	687.0	848.0	1026.0	1221.0	1434.0	1663.0	1909.0	2171.0	2748.0	3393.0
	h	0.37	0.32	0.30	0.27	0.25	0.23	0.22	0.20	0.18	0.16
1.25	Q	716.0	884.0	1069.0	1272.0	1493.0	1732.0	1988.0	2262.0	2863.0	3534.0
	h	0.40	0.35	0.32	0.29	0.27	0.25	0.23	0.22	0.19	0.17
1.50	Q	859.0	1060.0	1283.0	1527.0	1791.0	2078.0	2386.0	2714.0	3435.0	4241.0
	h	0.57	0.51	0.46	0.42	0.38	0.36	0.33	0.31	0.27	0.25
1.75	Q	1002.0	1238.0	1497.0	1781.0	2091.0	2425.0	2783.0	3167.0	4008.0	4948.0
	h	0.76	0.69	0.62	0.57	0.52	0.49	0.43	0.42	0.37	0.33
2.00	Q	1145.0	1414.0	1711.0	2036.0	2389.0	2771.0	3181.0	3619.0	4580.0	5655.0
	h	0.99	0.89	0.81	0.74	0.68	0.63	0.59	0.55	0.48	0.43
2.50	Q	1431.0	1767.0	2138.0	2545.0	2987.0	3464.0	3976.0	4524.0	5726.0	7069.0
	h	1.50	1.40	1.20	1.10	1.05	0.98	0.91	0.85	0.75	0.67
3.00	Q	1718	2121	2566	3054	3584	4156	4771	5429	6871	8482
	h	2.20	2.00	1.80	1.60	1.50	1.40	1.30	1.20	1.10	0.96

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