



FlameGuard[®]
PIPING PRODUCTS
Friction Loss Table

Friction Loss (PSI per Linear Foot) and Velocity (Feet per second) (Hazen-Williams C Factor =150)

Nominal Pipe Size:	3/4 inch		1 inch		1-1/4 inches		1-1/2 inches		2 inches		2-1/2 inches		3 inches	
Avg. I.D. (inches)	(.874)		(1.101)		(1.394)		(1.598)		(2.003)		(2.423)		(2.950)	
GPM	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity
1	.0008	.5	.0003	.3	.0001	.2	.0000	.1	.0000	.1	.0000	.0	.0000	.0
2	.0028	1.0	.0009	.6	.0003	.4	.0002	.3	.0001	.2	.0000	.1	.0000	.0
3	.0059	1.5	.0020	.9	.0006	.6	.0003	.4	.0001	.3	.0000	.2	.0000	.1
4	.0101	2.0	.0033	1.3	.0011	.8	.0006	.6	.0002	.4	.0001	.2	.0000	.1
5	.0152	2.6	.0051	1.6	.0016	1.0	.0008	.7	.0003	.5	.0001	.3	.0000	.2
6	.0214	3.1	.0071	1.9	.0023	1.2	.0012	.9	.0004	.6	.0002	.4	.0001	.2
7	.0284	3.6	.0094	2.3	.0030	1.4	.0016	1.1	.0005	.7	.0002	.4	.0001	.3
8	.0364	4.1	.0121	2.6	.0039	1.6	.0020	1.2	.0007	.8	.0003	.5	.0001	.3
9	.0452	4.7	.0150	2.9	.0048	1.8	.0025	1.4	.0008	.9	.0003	.6	.0001	.4
10	.0550	5.2	.0182	3.3	.0059	2.0	.0030	1.5	.0010	1.0	.0004	.6	.0002	.4
11	.0656	5.7	.0217	3.6	.0070	2.2	.0036	1.7	.0012	1.1	.0005	.7	.0002	.5
12	.0770	6.2	.0255	3.9	.0082	2.5	.0043	1.9	.0014	1.2	.0006	.8	.0002	.5
13	.0893	6.7	.0296	4.3	.0095	2.7	.0049	2.0	.0017	1.3	.0007	.9	.0003	.6
14	.1024	7.3	.0340	4.6	.0109	2.9	.0057	2.2	.0019	1.4	.0008	.9	.0003	.6
15	.1164	7.8	.0386	4.9	.0124	3.1	.0064	2.3	.0022	1.5	.0009	1.0	.0003	.7
16	.1312	8.3	.0435	5.3	.0140	3.3	.0072	2.5	.0024	1.6	.0010	1.1	.0004	.7
17	.1467	8.8	.0486	5.6	.0156	3.5	.0081	2.7	.0027	1.7	.0011	1.1	.0004	.7
18	.1631	9.4	.0541	5.9	.0174	3.7	.0090	2.8	.0030	1.8	.0012	1.2	.0005	.8
19	.1802	9.9	.0597	6.3	.0192	3.9	.0100	3.0	.0034	1.9	.0013	1.3	.0005	.8
20	.1982	10.4	.0657	6.6	.0211	4.1	.0110	3.1	.0037	2.0	.0015	1.3	.0006	.9
21	.2169	10.9	.0719	6.9	.0231	4.3	.0120	3.3	.0040	2.1	.0016	1.4	.0006	.9
22	.2364	11.5	.0783	7.3	.0252	4.5	.0131	3.5	.0044	2.2	.0017	1.5	.0007	1.0
23	.2567	12.0	.0851	7.6	.0273	4.7	.0142	3.6	.0048	2.3	.0019	1.6	.0007	1.0
24	.2777	12.5	.0920	7.9	.0296	5.0	.0153	3.8	.0052	2.4	.0020	1.6	.0008	1.1
25	.2995	13.0	.0993	8.3	.0319	5.2	.0166	3.9	.0056	2.5	.0022	1.7	.0008	1.1
26	.3220	13.5	.1067	8.6	.0343	5.4	.0178	4.1	.0060	2.6	.0024	1.8	.0009	1.2
27	.3453	14.1	.1144	8.9	.0368	5.6	.0191	4.2	.0064	2.7	.0025	1.8	.0010	1.2
28	.3693	14.6	.1224	9.3	.0394	5.8	.0204	4.4	.0069	2.8	.0027	1.9	.0010	1.3
29	.3941	15.1	.1306	9.6	.0420	6.0	.0218	4.6	.0073	2.9	.0029	2.0	.0011	1.3
30	.4196	15.6	.1391	9.9	.0447	6.2	.0232	4.7	.0078	3.0	.0031	2.0	.0012	1.4
31	.4458	16.2	.1478	10.2	.0475	6.4	.0246	4.9	.0083	3.1	.0033	2.1	.0013	1.4
32	.4728	16.7	.1567	10.6	.0504	6.6	.0261	5.0	.0088	3.2	.0035	2.2	.0013	1.5
33	.5005	17.2	.1659	10.9	.0533	6.8	.0277	5.2	.0093	3.3	.0037	2.2	.0014	1.5
34	.5289	17.7	.1753	11.2	.0564	7.0	.0292	5.4	.0098	3.4	.0039	2.3	.0015	1.5
35	.5580	18.2	.1850	11.6	.0595	7.2	.0308	5.5	.0104	3.5	.0041	2.4	.0016	1.6
36	.5879	18.8	.1949	11.9	.0626	7.5	.0325	5.7	.0109	3.6	.0043	2.5	.0017	1.6
37	.6185	19.3	.2050	12.2	.0659	7.7	.0342	5.8	.0115	3.7	.0046	2.5	.0017	1.7
38	.6498	19.8	.2154	12.6	.0692	7.9	.0359	6.0	.0121	3.8	.0048	2.6	.0018	1.7
39	.6817	20.3	.2260	12.9	.0726	8.1	.0377	6.2	.0127	3.9	.0050	2.7	.0019	1.8
40	.7144	20.9	.2368	13.2	.0761	8.3	.0395	6.3	.0133	4.0	.0053	2.7	.0020	1.8
GPM														
41	.2479	13.6	.0797	8.5	.0413	6.5	.0139	4.1	.0055	2.8	.0021	1.9	.0021	1.9
42	.2592	13.9	.0833	8.7	.0432	6.6	.0146	4.2	.0058	2.9	.0022	1.9	.0022	1.9
43	.2707	14.2	.0870	8.9	.0451	6.8	.0152	4.3	.0060	2.9	.0023	2.0	.0023	2.0
44	.2824	14.6	.0908	9.1	.0471	7.0	.0159	4.4	.0063	3.0	.0024	2.0	.0024	2.0
45	.2944	14.9	.0947	9.3	.0491	7.1	.0165	4.5	.0065	3.1	.0025	2.1	.0025	2.1
46	.3067	15.2	.0986	9.5	.0511	7.3	.0172	4.6	.0068	3.2	.0026	2.1	.0026	2.1
47	.3191	15.6	.1026	9.7	.0532	7.4	.0179	4.7	.0071	3.2	.0027	2.2	.0027	2.2
48	.3318	15.9	.1067	10.0	.0553	7.6	.0186	4.8	.0074	3.3	.0028	2.2	.0028	2.2
49	.3447	16.2	.1108	10.2	.0575	7.7	.0194	4.9	.0077	3.4	.0029	2.2	.0029	2.2
50	.3578	16.6	.1150	10.4	.0597	7.9	.0201	5.0	.0080	3.4	.0030	2.3	.0030	2.3
52	.3847	17.2	.1237	10.8	.0642	8.2	.0216	5.2	.0086	3.6	.0033	2.4	.0033	2.4
54	.4126	17.9	.1326	11.2	.0688	8.5	.0232	5.4	.0092	3.7	.0035	2.5	.0035	2.5
56	.4413	18.6	.1419	11.6	.0736	8.9	.0248	5.7	.0098	3.8	.0038	2.6	.0038	2.6
58	.4709	19.2	.1514	12.0	.0785	9.2	.0265	5.9	.0105	4.0	.0040	2.7	.0040	2.7
60	.5013	19.9	.1612	12.5	.0836	9.5	.0282	6.1	.0111	4.1	.0043	2.8	.0043	2.8
62	.5327	20.5	.1713	12.9	.0888	9.8	.0299	6.3	.0118	4.3	.0045	2.9	.0045	2.9
64	.5649	21.2	.1816	13.3	.0942	10.1	.0317	6.5	.0126	4.4	.0048	3.0	.0048	3.0
66	.5980	21.9	.1923	13.7	.0997	10.5	.0336	6.7	.0133	4.5	.0051	3.0	.0051	3.0
68	.6320	22.5	.2032	14.1	.1054	10.8	.0355	6.9	.0141	4.7	.0054	3.1	.0054	3.1
70	.6668	23.2	.2144	14.5	.1112	11.1	.0375	7.1	.0148	4.8	.0057	3.2	.0057	3.2
72	.7025	23.9	.2258	15.0	.1171	11.4	.0395	7.3	.0156	5.0	.0060	3.3	.0060	3.3
74	.7390	24.5	.2376	15.4	.1232	11.7	.0415	7.5	.0164	5.1	.0063	3.4	.0063	3.4
76	.7764	25.2	.2496	15.8	.1295	12.0	.0436	7.7	.0173	5.2	.0066	3.5	.0066	3.5
78	.8146	25.9	.2619	16.2	.1358	12.4	.0458	7.9	.0181	5.4	.0069	3.6	.0069	3.6
80	.8536	26.5	.2744	16.6	.1424	12.7	.0480	8.1	.0190	5.5	.0073	3.7	.0073	3.7

Nominal Pipe Size:	3/4 inch		1 inch		1-1/4 inches		1-1/2 inches		2 inches		2-1/2 inches		3 inches	
Avg. I.D. (inches)	(.874)		(1.101)		(1.394)		(1.598)		(2.003)		(2.423)		(2.950)	
GPM	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity
GPM														
82	.2873	17.0	.1490	13.0	.0502	8.3	.0199	5.7	.0076	3.8				
84	.3004	17.5	.1558	13.3	.0525	8.5	.0208	5.8	.0080	3.9				
86	.3137	17.9	.1627	13.6	.0548	8.7	.0217	5.9	.0083	4.0				
88	.3274	18.3	.1698	14.0	.0572	8.9	.0226	6.1	.0087	4.1				
90	.3413	18.7	.1770	14.3	.0596	9.1	.0236	6.2	.0090	4.2				
92	.3554	19.1	.1844	14.6	.0621	9.3	.0246	6.4	.0094	4.3				
94	.3698	19.5	.1918	14.9	.0646	9.5	.0256	6.5	.0098	4.4				
96	.3845	20.0	.1995	15.2	.0672	9.8	.0266	6.6	.0102	4.5				
98	.3995	20.4	.2072	15.5	.0698	9.9	.0276	6.8	.0106	4.5				
100	.4147	20.8	.2151	15.9	.0725	10.1	.0287	6.9	.0110	4.6				
110	.4947	22.9	.2566	17.5	.0864	11.2	.0342	7.6	.0131	5.1				
120	.5810	25.0	.3014	19.1	.1015	12.2	.0402	8.3	.0154	5.6				
130	.6738	27.0	.3495	20.6	.1178	13.2	.0466	9.0	.0178	6.0				
140	.7728	29.1	.4009	22.2	.1351	14.2	.0534	9.7	.0205	6.5				
150	.8780	31.2	.4554	23.8	.1534	15.2	.0607	10.4	.0232	7.0				

GPM														
160	.5132	25.4	.1729	16.2	.0684	11.1	.0262	7.5						
170	.5741	27.0	.1934	17.3	.0765	11.8	.0293	7.9						
180	.6381	28.6	.2150	18.3	.0851	12.5	.0326	8.4						
190	.7053	30.2	.2376	19.3	.0940	13.2	.0360	8.9						
200	.7755	31.8	.2613	20.3	.1034	13.9	.0396	9.3						
210	.8487	33.4	.2859	21.3	.1132	14.6	.0433	9.8						
220	.9250	35.0	.3116	22.4	.1233	15.3	.0472	10.3						

GPM														
230	.3384	23.4	.1339	16.0	.0513	10.7								
240	.3661	24.4	.1449	16.6	.0555	11.2								
250	.3948	25.4	.1562	17.3	.0598	11.7								
260	.4245	26.4	.1680	18.0	.0643	12.1								
270	.4552	27.4	.1801	18.7	.0690	12.6								
280	.4869	28.5	.1927	19.4	.0738	13.1								
290	.5195	29.5	.2056	20.1	.0787	13.6								
300	.5532	30.5	.2189	20.8	.0838	14.0								
310	.5878	31.5	.2326	21.5	.0891	14.5								
320	.6233	32.5	.2467	22.2	.0944	15.0								
330	.6598	33.6	.2611	22.9	.1000	15.4								
340	.6973	34.6	.2759	23.6	.1056	15.9								
350	.7357	35.6	.2911	24.3	.1115	16.4								
360	.7751	36.6	.3067	25.0	.1174	16.8								
370	.8154	37.6	.3227	25.7	.1235	17.3								
380	.8566	38.6	.3390	26.4	.1298	17.8								
390	.8988	39.7	.3557	27.1	.1362	18.2								
400	.9419	40.7	.3727	27.8	.1427	18.7								

GPM														
410	.3901	28.5	.1494	19.2										
430	.4261	29.9	.1631	20.1										
450	.4635	31.3	.1774	21.1										
470	.5023	32.7	.1923	22.0										
490	.5425	34.0	.2077	22.9										
510	.5842	35.4	.2237	23.9										
530	.6273	36.8	.2402	24.8										
550	.6718	38.2	.2572	25.7										
570	.7177	39.6	.2748	26.7										
590	.7650	41.0	.2929	27.6										

GPM														
610	.3115	28.6												
630	.3307	29.5												
650	.3504	30.4												
670	.3706	31.4												
690	.3913	32.3												
720	.4233	33.7												
750	.4565	35.1												
780	.4909	36.5												
810	.5264	37.9												
840	.5630	39.4												
870	.6008	40.8												
900	.6397	42.2												
930	.6797	43.6												
960	.7208	45.0												
1000	.7774	46.9												

Allowance for Friction Loss in Fittings (Equivalent Feet of Pipe)							
	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
<i>Tee Run</i>	1	1	1	1	1	2	2
<i>Tee Branch</i>	3	5	6	8	10	12	15
<i>90° Elbow</i>	4	5	6	7	9	12	13
<i>90° Elbow - Sweep</i>	1.2	1.5	NA	1.9	2.0	NA	5.8
<i>45° Elbow</i>	1	1	2	2	2	3	4
<i>Coupling</i>	1	1	1	1	1	2	2

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