



**GEORG FISCHER**  
PIPING SYSTEMS

HFS-4  
4/18/13



GF HARVEL® BLAZEMASTER® CPVC FIRE SPRINKLER PIPE  <FM>   ASTM

THE  
**QUALITY**  
LINE

## GF Harvel® BlazeMaster® CPVC Fire Sprinkler 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)	(0.874)		(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	0.0008	0.5	0.0003	0.3	0.0001	0.2	0.0000	0.2	0.0000	0.1	0.0000	0.1	0.0000	0.0
2	0.0030	1.1	0.0010	0.7	0.0003	0.4	0.0002	0.3	0.0001	0.2	0.0000	0.1	0.0000	0.1
3	0.0063	1.6	0.0020	1.0	0.0006	0.6	0.0003	0.5	0.0001	0.3	0.0000	0.2	0.0000	0.1
4	0.0107	2.1	0.0035	1.3	0.0011	0.8	0.0006	0.6	0.0002	0.4	0.0001	0.3	0.0000	0.2
5	0.0161	2.7	0.0052	1.7	0.0017	1.1	0.0009	0.8	0.0003	0.5	0.0001	0.3	0.0000	0.2
6	0.0226	3.2	0.0073	2.0	0.0023	1.3	0.0012	1.0	0.0004	0.6	0.0002	0.4	0.0001	0.3
7	0.0300	3.7	0.0098	2.4	0.0031	1.5	0.0016	1.1	0.0005	0.7	0.0002	0.5	0.0001	0.3
8	0.0385	4.3	0.0125	2.7	0.0040	1.7	0.0020	1.3	0.0007	0.8	0.0003	0.6	0.0001	0.4
9	0.0478	4.8	0.0155	3.0	0.0049	1.9	0.0025	1.4	0.0008	0.9	0.0003	0.6	0.0001	0.4
10	0.0581	5.3	0.0189	3.4	0.0060	2.1	0.0031	1.6	0.0010	1.0	0.0004	0.7	0.0002	0.5
11	0.0693	5.9	0.0225	3.7	0.0071	2.3	0.0037	1.8	0.0012	1.1	0.0005	0.8	0.0002	0.5
12	0.0814	6.4	0.0264	4.0	0.0084	2.5	0.0043	1.9	0.0014	1.2	0.0006	0.8	0.0002	0.6
13	0.0944	7.0	0.0307	4.4	0.0097	2.7	0.0050	2.1	0.0017	1.3	0.0007	0.9	0.0003	0.6
14	0.1083	7.5	0.0352	4.7	0.0111	2.9	0.0057	2.2	0.0019	1.4	0.0008	1.0	0.0003	0.7
15	0.1230	8.0	0.0400	5.1	0.0127	3.2	0.0065	2.4	0.0022	1.5	0.0009	1.0	0.0003	0.7
16	0.1386	8.6	0.0450	5.4	0.0143	3.4	0.0073	2.6	0.0024	1.6	0.0010	1.1	0.0004	0.8
17	0.1551	9.1	0.0504	5.7	0.0160	3.6	0.0082	2.7	0.0027	1.7	0.0011	1.2	0.0004	0.8
18	0.1724	9.6	0.0560	6.1	0.0177	3.8	0.0091	2.9	0.0030	1.8	0.0012	1.3	0.0005	0.8
19	0.1905	10.2	0.0619	6.4	0.0196	4.0	0.0101	3.0	0.0034	1.9	0.0013	1.3	0.0005	0.9
20	0.2095	10.7	0.0680	6.7	0.0216	4.2	0.0111	3.2	0.0037	2.0	0.0015	1.4	0.0006	0.9
21	0.2293	11.2	0.0745	7.1	0.0236	4.4	0.0121	3.4	0.0040	2.1	0.0016	1.5	0.0006	1.0
22	0.2499	11.8	0.0812	7.4	0.0257	4.6	0.0132	3.5	0.0044	2.2	0.0017	1.5	0.0007	1.0
23	0.2713	12.3	0.0881	7.8	0.0279	4.8	0.0144	3.7	0.0048	2.3	0.0019	1.6	0.0007	1.1
24	0.2935	12.8	0.0953	8.1	0.0302	5.0	0.0155	3.8	0.0052	2.4	0.0020	1.7	0.0008	1.1
25	0.3165	13.4	0.1028	8.4	0.0326	5.3	0.0168	4.0	0.0056	2.5	0.0022	1.7	0.0008	1.2
26	0.3403	13.9	0.1106	8.8	0.0350	5.5	0.0180	4.2	0.0060	2.6	0.0024	1.8	0.0009	1.2
27	0.3649	14.4	0.1185	9.1	0.0376	5.7	0.0193	4.3	0.0064	2.7	0.0025	1.9	0.0010	1.3
28	0.3903	15.0	0.1268	9.4	0.0402	5.9	0.0207	4.5	0.0069	2.9	0.0027	1.9	0.0010	1.3
29	0.4165	15.5	0.1353	9.8	0.0429	6.1	0.0220	4.6	0.0073	3.0	0.0029	2.0	0.0011	1.4
30	0.4435	16.0	0.1441	10.1	0.0457	6.3	0.0235	4.8	0.0078	3.1	0.0031	2.1	0.0012	1.4
31	0.4712	16.6	0.1531	10.4	0.0485	6.5	0.0249	5.0	0.0083	3.2	0.0033	2.2	0.0013	1.5
32	0.4997	17.1	0.1623	10.8	0.0514	6.7	0.0265	5.1	0.0088	3.3	0.0035	2.2	0.0013	1.5
33	0.5290	17.6	0.1718	11.1	0.0545	6.9	0.0280	5.3	0.0093	3.4	0.0037	2.3	0.0014	1.5
34	0.5590	18.2	0.1816	11.5	0.0576	7.1	0.0296	5.4	0.0098	3.5	0.0039	2.4	0.0015	1.6
35	0.5898	18.7	0.1916	11.8	0.0607	7.4	0.0312	5.6	0.0104	3.6	0.0041	2.4	0.0016	1.6
36	0.6214	19.3	0.2018	12.1	0.0640	7.6	0.0329	5.8	0.0109	3.7	0.0043	2.5	0.0017	1.7
37	0.6537	19.8	0.2123	12.5	0.0673	7.8	0.0346	5.9	0.0115	3.8	0.0046	2.6	0.0017	1.7
38	0.6868	20.3	0.2231	12.8	0.0707	8.0	0.0364	6.1	0.0121	3.9	0.0048	2.6	0.0018	1.8
39	0.7206	20.9	0.2341	13.1	0.0742	8.2	0.0381	6.2	0.0127	4.0	0.0050	2.7	0.0019	1.8
40	0.7551	21.4	0.2453	13.5	0.0777	8.4	0.0400	6.4	0.0133	4.1	0.0053	2.8	0.0020	1.9
41	0.7904	21.9	0.2568	13.8	0.0814	8.6	0.0418	6.6	0.0139	4.2	0.0055	2.9	0.0021	1.9
42	0.8265	22.5	0.2685	14.2	0.0851	8.8	0.0437	6.7	0.0146	4.3	0.0058	2.9	0.0022	2.0
43	0.8632	23.0	0.2804	14.5	0.0889	9.0	0.0457	6.9	0.0152	4.4	0.0060	3.0	0.0023	2.0
44	0.9007	23.5	0.2926	14.8	0.0927	9.2	0.0477	7.0	0.0159	4.5	0.0063	3.1	0.0024	2.1
45	0.9390	24.1	0.3050	15.2	0.0967	9.5	0.0497	7.2	0.0165	4.6	0.0065	3.1	0.0025	2.1
46	0.9779	24.6	0.3177	15.5	0.1007	9.7	0.0518	7.4	0.0172	4.7	0.0068	3.2	0.0026	2.2
47	1.0176	25.1	0.3306	15.8	0.1048	9.9	0.0539	7.5	0.0179	4.8	0.0071	3.3	0.0027	2.2
48	1.0580	25.7	0.3437	16.2	0.1089	10.1	0.0560	7.7	0.0186	4.9	0.0074	3.3	0.0028	2.3
49	1.0992	26.2	0.3570	16.5	0.1132	10.3	0.0582	7.8	0.0194	5.0	0.0077	3.4	0.0029	2.3
50	1.1410	26.7	0.3706	16.8	0.1175	10.5	0.0604	8.0	0.0201	5.1	0.0080	3.5	0.0031	2.3
52	1.2269	27.8	0.3985	17.5	0.1263	10.9	0.0649	8.3	0.0216	5.3	0.0086	3.6	0.0033	2.4
54	1.3156	28.9	0.4274	18.2	0.1354	11.4	0.0696	8.6	0.0232	5.5	0.0092	3.8	0.0035	2.5
56	1.4072	29.9	0.4571	18.9	0.1449	11.8	0.0745	9.0	0.0248	5.7	0.0098	3.9	0.0038	2.6
58	1.5016	31.0	0.4878	19.5	0.1546	12.2	0.0795	9.3	0.0265	5.9	0.0105	4.0	0.0040	2.7
60	1.5988	32.1	0.5193	20.2	0.1646	12.6	0.0846	9.6	0.0282	6.1	0.0111	4.2	0.0043	2.8
62	1.6988	33.2	0.5518	20.9	0.1749	13.0	0.0899	9.9	0.0299	6.3	0.0118	4.3	0.0045	2.9
64	1.8015	34.2	0.5852	21.6	0.1855	13.5	0.0954	10.2	0.0317	6.5	0.0126	4.5	0.0048	3.0
66	1.9071	35.3	0.6195	22.2	0.1963	13.9	0.1010	10.6	0.0336	6.7	0.0133	4.6	0.0051	3.1
68	2.0153	36.4	0.6546	22.9	0.2075	14.3	0.1067	10.9	0.0355	6.9	0.0141	4.7	0.0054	3.2
70	2.1264	37.4	0.6907	23.6	0.2189	14.7	0.1126	11.2	0.0375	7.1	0.0148	4.9	0.0057	3.3
GPM														
72	0.7277	24.3	0.2306	15.1	0.1186	11.5	0.0395	7.3	0.0156	5.0	0.0060	3.4	0.0060	3.4
74	0.7655	24.9	0.2426	15.6	0.1247	11.8	0.0415	7.5	0.0164	5.1	0.0063	3.5	0.0063	3.5
76	0.8042	25.6	0.2549	16.0	0.1311	12.2	0.0436	7.7	0.0173	5.3	0.0066	3.6	0.0066	3.6
78	0.8438	26.3	0.2674	16.4	0.1375	12.5	0.0458	7.9	0.0181	5.4	0.0069	3.7	0.0069	3.7
80	0.8843	27.0	0.2802	16.8	0.1441	12.8	0.0480	8.1	0.0190	5.6	0.0073	3.8	0.0073	3.8
82	0.9256	27.6	0.2933	17.2	0.1508	13.1	0.0502	8.3	0.0199	5.7	0.0076	3.8	0.0076	3.8
84	0.9678	28.3	0.3067	17.7	0.1577	13.4	0.0525	8.6	0.0208	5.8	0.0080	3.9	0.0080	3.9
86	1.0109	29.0	0.3204	18.1	0.1647	13.8	0.0548	8.8	0.0217	6.0	0.0083	4.0	0.0083	4.0
88	1.0548	29.7	0.3343	18.5	0.1719	14.1	0.0572	9.0	0.0226	6.1	0.0087	4.1	0.0087	4.1
90	1.0995	30.3	0.3485	18.9	0.1792	14.4	0.0596	9.2	0.0236	6.3	0.0091	4.2	0.0091	4.2

Nominal Pipe Size:	1 inch		1 1/4 inches		1 1/2 inches		2 inches		2 1/2 inches		3 inches	
Avg. I.D. (inches)	(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
92	1.1452	31.0	0.3629	19.3	0.1866	14.7	0.0621	9.4	0.0246	6.4	0.0094	4.3
94	1.1917	31.7	0.3777	19.8	0.1942	15.0	0.0646	9.6	0.0256	6.5	0.0098	4.4
96	1.2390	32.3	0.3927	20.2	0.2019	15.4	0.0672	9.8	0.0266	6.7	0.0102	4.5
98	1.2872	33.0	0.4079	20.6	0.2098	15.7	0.0698	10.0	0.0276	6.8	0.0106	4.6
100	1.3362	33.7	0.4235	21.0	0.2177	16.0	0.0725	10.2	0.0287	7.0	0.0110	4.7
110	1.5938	37.1	0.5051	23.1	0.2597	17.6	0.0864	11.2	0.0342	7.7	0.0131	5.2
120	1.8722	40.4	0.5933	25.2	0.3051	19.2	0.1015	12.2	0.0402	8.3	0.0154	5.6
130	2.1710	43.8	0.6880	27.3	0.3538	20.8	0.1178	13.2	0.0466	9.0	0.0179	6.1

GPM	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity
140	0.7891	29.4	0.4058	22.4	0.1351	14.3	0.0534	9.7	0.0205	6.6	0.0094	4.3
150	0.8966	31.5	0.4610	24.0	0.1534	15.3	0.0607	10.4	0.0233	7.0	0.0102	4.5
160	1.0103	33.6	0.5195	25.6	0.1729	16.3	0.0684	11.1	0.0262	7.5	0.0106	4.6
170	1.1302	35.7	0.5811	27.2	0.1934	17.3	0.0765	11.8	0.0294	8.0	0.0110	4.7
180	1.2562	37.8	0.6460	28.8	0.2150	18.3	0.0851	12.5	0.0326	8.4	0.0114	4.8
190	1.3884	39.9	0.7139	30.4	0.2376	19.3	0.0940	13.2	0.0361	8.9	0.0118	4.9
200	1.5266	42.0	0.7850	32.0	0.2613	20.4	0.1034	13.9	0.0396	9.4	0.0122	5.0
210	1.6708	44.1	0.8591	33.6	0.2859	21.4	0.1132	14.6	0.0434	9.9	0.0126	5.1
220	1.8209	46.2	0.9363	35.2	0.3116	22.4	0.1233	15.3	0.0473	10.3	0.0130	5.2
230	1.9770	48.3	1.0166	36.8	0.3384	23.4	0.1339	16.0	0.0513	10.8	0.0134	5.3
240	2.1390	50.4	1.0999	38.4	0.3661	24.4	0.1449	16.7	0.0556	11.3	0.0138	5.4
250	2.3067	52.6	1.1862	40.0	0.3948	25.5	0.1562	17.4	0.0599	11.7	0.0142	5.5

GPM	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity
260	1.2754	41.6	0.4245	26.5	0.1680	18.1	0.0644	12.2	0.0205	6.6	0.0094	4.3
270	1.3676	43.2	0.4552	27.5	0.1801	18.8	0.0691	12.7	0.0217	6.8	0.0100	4.4
280	1.4628	44.8	0.4869	28.5	0.1927	19.5	0.0739	13.1	0.0230	7.1	0.0104	4.5
290	1.5609	46.4	0.5195	29.5	0.2056	20.2	0.0788	13.6	0.0243	7.3	0.0108	4.6
300	1.6620	48.0	0.5532	30.5	0.2189	20.9	0.0839	14.1	0.0256	7.5	0.0112	4.7
310	1.7659	49.6	0.5878	31.6	0.2326	21.6	0.0892	14.6	0.0269	7.7	0.0116	4.8
320	1.8727	51.2	0.6233	32.6	0.2467	22.3	0.0946	15.0	0.0282	7.9	0.0120	4.9
330	1.9824	52.8	0.6598	33.6	0.2611	23.0	0.1001	15.5	0.0295	8.1	0.0124	5.0
340	2.0950	54.4	0.6973	34.6	0.2759	23.7	0.1058	16.0	0.0308	8.3	0.0128	5.1

GPM	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity
350	0.7357	35.6	0.2911	24.4	0.1117	16.4	0.0361	8.9	0.0118	4.9	0.0094	4.3
360	0.7751	36.7	0.3067	25.0	0.1176	16.9	0.0375	9.1	0.0122	5.0	0.0098	4.4
370	0.8154	37.7	0.3227	25.7	0.1237	17.4	0.0389	9.3	0.0126	5.1	0.0102	4.5
380	0.8566	38.7	0.3390	26.4	0.1300	17.8	0.0403	9.5	0.0130	5.2	0.0106	4.6
390	0.8988	39.7	0.3557	27.1	0.1364	18.3	0.0417	9.7	0.0134	5.3	0.0110	4.7
400	0.9419	40.7	0.3727	27.8	0.1429	18.8	0.0431	9.9	0.0138	5.4	0.0114	4.8
410	0.9859	41.7	0.3901	28.5	0.1496	19.2	0.0445	10.1	0.0142	5.5	0.0118	4.9
430	1.0767	43.8	0.4261	29.9	0.1634	20.2	0.0473	10.3	0.0154	5.6	0.0126	5.1
450	1.1712	45.8	0.4635	31.3	0.1777	21.1	0.0501	10.5	0.0166	5.8	0.0134	5.3
470	1.2693	47.9	0.5023	32.7	0.1926	22.1	0.0529	10.7	0.0178	6.0	0.0142	5.5
490	1.3710	49.9	0.5425	34.1	0.2081	23.0	0.0557	10.9	0.0190	6.2	0.0150	5.7
510	1.4763	51.9	0.5842	35.5	0.2240	23.9	0.0585	11.1	0.0202	6.4	0.0158	5.9
530	1.5852	54.0	0.6273	36.9	0.2406	24.9	0.0613	11.3	0.0214	6.6	0.0166	6.1
550	1.6977	56.0	0.6718	38.3	0.2576	25.8	0.0641	11.5	0.0226	6.8	0.0174	6.3
570	1.8136	58.0	0.7177	39.7	0.2752	26.8	0.0669	11.7	0.0238	7.0	0.0182	6.5
590	1.9331	60.1	0.7650	41.0	0.2934	27.7	0.0697	11.9	0.0250	7.2	0.0190	6.7
610	2.0561	62.1	0.8136	42.4	0.3120	28.6	0.0725	12.1	0.0262	7.4	0.0198	6.9

GPM	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity	Friction Loss	Velocity
630	0.8637	43.8	0.3312	29.6	0.0361	8.9	0.0118	4.9	0.0094	4.3	0.0094	4.3
650	0.9151	45.2	0.3509	30.5	0.0375	9.1	0.0122	5.0	0.0098	4.4	0.0098	4.4
670	0.9678	46.6	0.3712	31.4	0.0389	9.3	0.0126	5.1	0.0102	4.5	0.0102	4.5
690	1.0220	48.0	0.3919	32.4	0.0403	9.5	0.0130	5.2	0.0106	4.6	0.0106	4.6
720	1.1057	50.1	0.4240	33.8	0.0417	9.7	0.0134	5.3	0.0110	4.7	0.0110	4.7
750	1.1924	52.2	0.4573	35.2	0.0431	9.9	0.0138	5.4	0.0114	4.8	0.0114	4.8
780	1.2822	54.3	0.4917	36.6	0.0445	10.1	0.0142	5.5	0.0118	4.9	0.0118	4.9
810	1.3749	56.4	0.5273	38.0	0.0459	10.3	0.0146	5.6	0.0122	5.0	0.0122	5.0
840	1.4706	58.4	0.5640	39.4	0.0473	10.5	0.0150	5.7	0.0126	5.1	0.0126	5.1
870	1.5692	60.5	0.6018	40.8	0.0487	10.7	0.0154	5.8	0.0130	5.2	0.0130	5.2
900	1.6708	62.6	0.6407	42.2	0.0501	10.9	0.0158	5.9	0.0134	5.3	0.0134	5.3
930	1.7753	64.7	0.6808	43.7	0.0515	11.1	0.0162	6.0	0.0138	5.4	0.0138	5.4
960	1.8827	66.8	0.7220	45.1	0.0529	11.3	0.0166	6.2	0.0142	5.5	0.0142	5.5
1000	2.0303	69.6	0.7786	46.9	0.0543	11.5	0.0170	6.4	0.0146	5.6	0.0146	5.6

# GF Harvel® BlazeMaster® CPVC Fire Sprinkler Piping Products

## Friction Loss Table



**Georg Fischer Harvel LLC**  
P.O. BOX 757 Easton, PA 18044-0757  
USA  
Phone +1 (610) 252-7355  
Fax +1 (610) 253-4436  
harvel.gfh.ps@georgfischer.com  
www.HarvelSprinklerPipe.com  
www.gfpiping.com

### Allowance for Friction Loss in Fittings (Equivalent Feet of Pipe)

	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
<b>Tee Run</b>	1	1	1	1	1	2	2
<b>Tee Branch</b>	3	5	6	8	10	12	15
<b>90° Elbow</b>	7	7	8	9	11	12	13
<b>45° Elbow</b>	1	1	2	2	2	3	4
<b>Coupling</b>	1	1	1	1	1	2	2

# GF Harvel® BlazeMaster® CPVC Fire Sprinkler Piping Products



The procedures and information contained in this publication are based on the best available information and believed to be reliable. However, GF Harvel cannot guarantee the performance of materials and the integrity of installations not under its direct control. Therefore, no warranty – expressed or implied, is made as to the suitability of these products and procedures for any particular application.

For detailed information on specific uses and applications of GF Harvel® BlazeMaster® CPVC Fire Sprinkler piping products, please contact Georg Fischer Harvel LLC.

Member of: **AFSA NFPA NFSA**



Assessed to ISO 9001  
LPCB Ref. No. 270 – Harvel Plastics Easton  
LPCB Ref. No. 455 – Harvel Plastics Bakersfield



**Georg Fischer Harvel LLC**  
P.O. BOX 757 Easton, PA 18044-0757  
USA  
Phone +1 (610) 252-7355  
Fax +1 (610) 253-4436  
[harvel.gfh.ps@georgfischer.com](mailto:harvel.gfh.ps@georgfischer.com)  
[www.HarvelSprinklerPipe.com](http://www.HarvelSprinklerPipe.com)  
[www.gfpiping.com](http://www.gfpiping.com)