

# **B.C. SPRINKLER IRRIGATION MANUAL**

## **Appendix B**

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**Prepared and Web Published by**



Ministry of Agriculture

**2014 ISSUE**

# **LIMITATION OF LIABILITY AND USER'S RESPONSIBILITY**

The primary purpose of this manual is to provide irrigation professionals and consultants with a methodology to properly design an agricultural irrigation system. This manual is also used as the reference material for the Irrigation Industry Association's agriculture sprinkler irrigation certification program.

While every effort has been made to ensure the accuracy and completeness of these materials, additional materials may be required to complete more advanced design for some systems. Advice of appropriate professionals and experts may assist in completing designs that are not adequately covered in this manual.

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## Appendix Table B.1 Friction Loss – Aluminum Tubing

<b>Flow [gpm]</b>	<b>Pressure Loss from Friction in psi per 100 ft of Pipe</b>							
	<b>Nominal Size [in]</b>							
	<b>2"</b>	<b>3"</b>	<b>4"</b>	<b>5"</b>	<b>6"</b>	<b>7"</b>	<b>8"</b>	<b>10"</b>
5	0.03							
10	0.14	0.02						
15	0.31	0.04						
20	0.52	0.07	0.02					
25	0.79	0.10	0.03					
30	1.12	0.14	0.03					
40	1.95	0.24	0.06	0.02				
50	2.97	0.37	0.09	0.03	0.01			
60	4.19	0.52	0.12	0.04	0.02			
70	5.61	0.70	0.16	0.05	0.02			
80	7.23	0.89	0.21	0.07	0.03	0.01		
90	9.01	1.12	0.26	0.09	0.03	0.02		
100	11.00	1.38	0.32	0.10	0.04	0.02	0.01	
110		1.64	0.38	0.12	0.05	0.03	0.01	
120		1.95	0.46	0.15	0.06	0.03	0.02	
130		2.24	0.53	0.17	0.07	0.04	0.02	
140		2.60	0.61	0.20	0.08	0.04	0.02	
160		3.36	0.79	0.26	0.10	0.05	0.03	
180		4.19	0.98	0.32	0.13	0.06	0.03	
200		5.12	1.20	0.39	0.16	0.07	0.04	
220		6.11	1.43	0.46	0.19	0.09	0.05	
240		7.24	1.69	0.55	0.23	0.10	0.06	0.02
260		8.41	1.97	0.64	0.26	0.12	0.06	0.02
280		9.70	2.28	0.74	0.30	0.14	0.07	0.03
300		11.02	2.59	0.84	0.34	0.16	0.08	0.03
350			3.48	1.12	0.46	0.22	0.11	0.04
400			4.49	1.44	0.59	0.28	0.14	0.05
450			5.59	1.80	0.73	0.35	0.18	0.06
500			6.81	2.20	0.89	0.42	0.22	0.08
550			8.28	2.67	1.08	0.51	0.27	0.09
600			9.73	3.14	1.27	0.60	0.31	0.11
650			11.30	3.65	1.48	0.70	0.36	0.13
700				4.19	1.70	0.81	0.42	0.14
750				4.79	1.93	0.91	0.48	0.16
800				5.40	2.18	1.03	0.54	0.19
850				6.04	2.44	1.16	0.60	0.21
900				6.78	2.75	1.29	0.68	0.23
950				7.51	3.04	1.44	0.75	0.26
1000				8.27	3.44	1.58	0.82	0.28
1100				9.90	3.99	1.89	0.98	0.32
1200				11.67	4.71	2.23	1.16	0.39
1300					5.47	2.58	1.34	0.43
1400					6.43	2.99	1.56	0.51
1500					7.22	3.41	1.76	0.60
1600					8.14	3.85	2.00	0.70

Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.2 Friction Loss – Aged Steel Pipe, 14 Gage (C = 100)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe							
	Nominal Size [in]							
	4"	5"	6"	8"	10"	12"	14"	16"
40	0.06	0.01						
50	0.09	0.01						
60	0.12	0.03						
70	0.16	0.04						
80	0.23	0.07	0.03					
90	0.27	0.09	0.03					
100	0.32	0.11	0.04					
125	0.52	0.16	0.06					
150	0.71	0.23	0.09					
175	0.97	0.31	0.13	0.03				
200	1.22	0.40	0.16	0.04				
250	1.93	0.61	0.25	0.06	0.02			
300	2.71	0.87	0.35	0.08	0.03			
350	3.62	1.16	0.46	0.11	0.03	0.01		
400	4.63	1.49	0.60	0.14	0.05	0.02		
450	5.89	1.87	0.74	0.18	0.06	0.02		
500	7.19	2.28	0.91	0.22	0.07	0.03	0.01	
600		3.23	1.30	0.31	0.10	0.04	0.02	
700		4.33	1.74	0.41	0.13	0.06	0.03	0.01
800		5.59	2.23	0.53	0.17	0.07	0.03	0.02
900			2.80	0.67	0.22	0.09	0.04	0.02
1,000			3.43	0.81	0.27	0.11	0.05	0.03
1,200			4.81	1.17	0.38	0.15	0.07	0.03
1,400				1.53	0.50	0.20	0.10	0.05
1,600				1.97	0.65	0.26	0.12	0.06
1,800				2.47	0.81	0.33	0.15	0.08
2,000				3.03	1.01	0.39	0.19	0.10
2,500				4.63	1.53	0.61	0.29	0.15
3,000					2.13	0.86	0.40	0.21
3,500					2.88	1.16	0.54	0.28
4,000					3.70	1.50	0.70	0.36
4,500						1.86	0.87	0.45
5,000						2.29	1.07	0.55
6,000						3.23	1.51	0.78
7,000							2.02	1.04
8,000							2.60	1.34
9,000								1.68
10,000								2.05

Friction losses are based on coefficient of retardation (C) = 100. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.3 Friction Loss – PVC Schedule 40 Plastic Pipe (C = 150)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe							
	Nominal Size [in]							
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
1	0.32	0.11	0.03	0.01				
2	1.14	0.39	0.12	0.03	0.02			
3	2.42	0.84	0.26	0.07	0.03	0.01		
4	4.13	1.42	0.44	0.12	0.05	0.01		
5	6.24	2.15	0.66	0.18	0.08	0.02	0.01	
6	8.75	3.02	0.93	0.25	0.12	0.03	0.02	
7	11.64	4.01	1.24	0.33	0.15	0.05	0.02	
8	14.90	5.14	1.59	0.42	0.20	0.06	0.02	
9	18.54	6.39	1.97	0.52	0.25	0.07	0.03	
10	22.53	7.77	2.40	0.63	0.30	0.09	0.04	0.01
11		9.27	2.86	0.75	0.36	0.11	0.04	0.02
12		10.89	3.36	0.89	0.42	0.12	0.05	0.02
14		14.48	4.47	1.18	0.56	0.17	0.07	0.02
16		18.55	5.73	1.51	0.71	0.21	0.09	0.03
18			7.13	1.88	0.89	0.26	0.11	0.04
20			8.66	2.28	1.08	0.32	0.13	0.05
22			10.33	2.72	1.29	0.38	0.16	0.06
24			12.14	3.20	1.51	0.45	0.19	0.07
26			14.08	3.77	1.75	0.52	0.22	0.08
28			16.15	4.25	2.01	0.60	0.25	0.09
30				4.83	2.28	0.68	0.29	0.10
35				6.43	3.04	0.90	0.38	0.13
40				8.23	3.89	1.15	0.49	0.17
45				10.24	4.48	1.43	0.60	0.21
50				12.45	5.88	1.74	0.73	0.26
55				14.85	7.01	2.08	0.88	0.30
60					8.24	2.44	1.03	0.36
65					9.56	2.83	1.19	0.41
70					10.96	3.25	1.37	0.48
75					12.46	3.69	1.56	0.54
80						4.16	1.75	0.61
85						4.66	1.96	0.68
90						5.18	2.18	0.76
95						5.72	2.41	0.84
100						6.29	2.65	0.92
150						13.33	5.62	1.95
200							9.57	3.33
250								5.03
300								7.05
350								9.38

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.4 Friction Loss – PVC Class 100 PSI Plastic Pipe (C = 150)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe						
	Nominal Size [in]						
	3-1/2"	4"	5"	6"	8"	10"	12"
50	0.09	0.05	0.02	0.01			
55	0.11	0.06	0.02	0.01			
60	0.13	0.07	0.03	0.01			
65	0.15	0.08	0.03	0.01			
70	0.17	0.09	0.03	0.01			
75	0.19	0.11	0.04	0.02			
80	0.21	0.12	0.04	0.02	0.01		
85	0.24	0.13	0.05	0.02	0.01		
90	0.27	0.15	0.05	0.02	0.01		
95	0.29	0.17	0.06	0.03	0.01		
100	0.32	0.18	0.06	0.03	0.01		
150	0.69	0.39	0.14	0.06	0.02	0.01	
200	1.17	0.66	0.23	0.10	0.03	0.01	
250	1.77	1.00	0.35	0.15	0.04	0.01	
300	2.48	1.39	0.50	0.21	0.06	0.02	
350	3.29	1.86	0.66	0.28	0.08	0.03	
400	4.22	2.38	0.85	0.36	0.10	0.03	
450	5.24	2.96	1.05	0.45	0.12	0.04	
500	6.38	3.59	1.28	0.55	0.15	0.05	
550	7.61	4.29	1.53	0.65	0.18	0.06	
600	8.94	5.04	1.79	0.77	0.21	0.07	
700		6.70	2.39	1.02	0.28	0.09	0.04
800		8.58	3.06	1.31	0.36	0.12	0.05
900			3.80	1.63	0.45	0.15	0.07
1,000			4.62	1.98	0.55	0.18	0.08
1,200			6.48	2.77	0.77	0.26	0.11
1,400				3.68	1.02	0.34	0.15
1,600				4.72	1.31	0.44	0.19
1,800				5.87	1.62	0.55	0.24
2,000					1.97	0.66	0.29
2,200					2.35	0.79	0.35
2,400					2.77	0.93	0.41
2,600					3.21	1.08	0.48
2,800					3.68	1.24	0.55
3,000					4.18	1.41	0.62
3,200					4.71	1.58	0.70
3,400						1.77	0.79
3,600						1.97	0.88
3,800						2.18	0.97
4,000						2.39	1.06

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.5 Friction Loss – PVC Class 125 PSI Plastic Pipe (C = 150)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe							
	Nominal Size [in]							
	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"
1	0.02	0.01						
2	0.06	0.02	0.01					
3	0.13	0.04	0.02	0.01				
4	0.22	0.07	0.03	0.01				
5	0.33	0.10	0.05	0.02	0.01			
6	0.46	0.14	0.07	0.02	0.01			
7	0.62	0.19	0.09	0.03	0.01			
8	0.79	0.24	0.12	0.04	0.02	0.01		
9	0.98	0.30	0.15	0.05	0.02	0.01		
10	1.19	0.36	0.18	0.06	0.02	0.01		
11	1.42	0.43	0.22	0.07	0.03	0.01	0.01	
12	1.67	0.51	0.25	0.09	0.03	0.01	0.01	
14	2.22	0.67	0.34	0.11	0.05	0.02	0.01	
16	2.85	0.86	0.43	0.15	0.06	0.02	0.01	
18	3.54	1.07	0.54	0.18	0.07	0.03	0.01	
20	4.31	1.30	0.65	0.22	0.09	0.03	0.02	
22	5.14	1.56	0.78	0.26	0.10	0.04	0.02	
24	6.04	1.83	0.92	0.31	0.12	0.05	0.02	
26	7.00	2.12	1.06	0.36	0.14	0.05	0.03	0.02
28	8.03	2.43	1.22	0.41	0.16	0.06	0.03	0.02
30	9.13	2.76	1.39	0.47	0.18	0.07	0.04	0.02
35	12.14	3.68	1.84	0.62	0.25	0.09	0.05	0.03
40	15.55	4.71	2.36	0.80	0.31	0.12	0.06	0.04
45	19.34	5.86	2.94	0.99	0.39	0.15	0.08	0.04
50	23.50	7.12	3.57	1.21	0.48	0.18	0.10	0.05
55	28.04	8.49	4.26	1.44	0.57	0.22	0.11	0.06
60	32.94	9.98	5.00	1.69	0.67	0.26	0.13	0.08
65	38.21	11.57	5.80	1.96	0.77	0.30	0.16	0.09
70	43.83	13.27	6.65	2.25	0.89	0.34	0.18	0.10
75		15.08	7.56	2.56	1.01	0.39	0.20	0.11
80		17.00	8.52	2.88	1.14	0.44	0.23	0.13
85		19.02	9.53	3.23	1.27	0.49	0.26	0.14
90		21.14	10.60	3.59	1.41	0.54	0.28	0.16
95		23.37	11.71	3.96	1.56	0.60	0.31	0.18
100		25.69	12.88	4.36	1.72	0.66	0.35	0.19
150			27.30	9.24	3.64	1.40	0.73	0.41
200				15.74	6.20	2.39	1.25	0.70
250					9.38	3.61	1.88	1.06
300					13.15	5.06	2.64	1.49
350					17.49	6.73	3.57	1.98
400						8.62	4.50	2.53
450						10.72	5.59	3.15
500						13.03	6.80	3.83
550							8.11	4.57
600							9.53	5.37

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.



**Appendix Table B.5 Friction Loss – PVC Class 125 PSI Plastic Pipe (C = 150) cont.**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe				
	Nominal Size [in]				
	5"	6"	8"	10"	12"
75	0.04	0.02			
80	0.05	0.02	0.01		
85	0.05	0.02	0.01		
90	0.06	0.02	0.01		
95	0.06	0.03	0.01		
100	0.07	0.03	0.01		
150	0.15	0.06	0.02	0.01	
200	0.25	0.11	0.03	0.01	
250	0.38	0.16	0.04	0.02	0.01
300	0.53	0.23	0.06	0.02	0.01
350	0.71	0.30	0.08	0.03	0.01
400	0.90	0.39	0.11	0.04	0.02
450	1.12	0.48	0.13	0.05	0.02
500	1.37	0.58	0.16	0.06	0.02
600	1.91	0.82	0.23	0.08	0.03
650		0.95	0.26	0.09	0.04
700		1.09	0.30	0.10	0.05
750		1.24	0.34	0.12	0.05
800		1.39	0.39	0.13	0.06
850		1.56	0.43	0.15	0.06
900		1.73	0.48	0.16	0.07
950		1.92	0.53	0.18	0.08
1,000		2.11	0.58	0.20	0.09
1,100		2.52	0.70	0.24	0.10
1,200		2.96	0.82	0.28	0.12
1,300		3.43	0.95	0.33	0.14
1,400		3.93	1.09	0.37	0.16
1,500		4.47	1.24	0.42	0.18
1,600		5.04	1.39	0.48	0.21
1,700		5.63	1.56	0.53	0.23
1,800		6.26	1.73	0.59	0.26
1,900			1.92	0.66	0.29
2,000			2.11	0.72	0.31
2,200			2.51	0.86	0.38
2,400			2.95	1.01	0.44
2,600			3.43	1.17	0.51
2,800			3.93	1.35	0.59
3,000			4.47	1.53	0.67
3,500				2.04	0.89
4,000				2.61	1.14
4,500				3.24	1.41
5,000					1.72

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.6 Friction Loss – PVC Class 160 PSI Plastic Pipe (C = 150)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe						
	Nominal Size [in]						
	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
1	0.02	0.01					
2	0.06	0.02	0.01				
3	0.14	0.04	0.02				
4	0.23	0.07	0.04	0.01			
5	0.35	0.11	0.05	0.02			
6	0.49	0.15	0.08	0.03	0.01		
7	0.66	0.20	0.10	0.03	0.01		
8	0.84	0.25	0.13	0.04	0.02		
9	1.05	0.31	0.16	0.05	0.02		
10	1.27	0.38	0.20	0.07	0.03	0.01	
11	1.52	0.45	0.23	0.08	0.03	0.01	
12	1.78	0.53	0.28	0.09	0.04	0.01	
14	2.37	0.71	0.37	0.12	0.05	0.02	
16	3.04	0.91	0.47	0.16	0.06	0.02	
18	3.78	1.13	0.58	0.20	0.08	0.03	
20	4.59	1.37	0.71	0.24	0.09	0.04	0.01
22	5.48	1.64	0.85	0.29	0.11	0.04	0.01
24	6.44	1.92	1.00	0.34	0.13	0.05	0.02
26	7.47	2.23	1.15	0.39	0.15	0.06	0.02
28	8.57	2.56	1.32	0.45	0.18	0.07	0.02
30	9.74	2.91	1.50	0.51	0.20	0.08	0.02
35		3.87	2.00	0.68	0.27	0.10	0.03
40		4.95	2.56	0.86	0.34	0.13	0.04
45		6.16	3.19	1.08	0.42	0.16	0.05
50		7.49	3.88	1.31	0.52	0.20	0.06
55		8.93	4.62	1.56	0.62	0.24	0.07
60		10.49	5.43	1.83	0.72	0.28	0.08
65			6.30	2.12	0.84	0.32	0.09
70			7.23	2.44	0.96	0.37	0.11
75			8.21	2.77	1.09	0.42	0.12
80			9.25	3.12	1.23	0.47	0.14
85			10.35	3.49	1.38	0.53	0.16
90				3.88	1.53	0.59	0.17
95				4.29	1.69	0.65	0.19
100				4.72	1.86	0.72	0.21
150				10.00	3.94	1.52	0.45
200					6.72	2.59	0.76
250					10.16	3.91	1.15
300						5.49	1.61
350						7.30	2.15
400						9.35	2.75
450							3.42
500							4.15
550							4.96
600							5.82

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.6 Friction Loss – PVC Class 160 PSI Plastic Pipe (C = 150) cont.**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe				
	Nominal Size [in]				
	5"	6"	8"	10"	12"
50	0.02				
55	0.02				
60	0.03	0.01			
65	0.03	0.01			
70	0.04	0.02			
75	0.04	0.02			
80	0.05	0.02			
85	0.06	0.02			
90	0.06	0.03			
95	0.07	0.03			
100	0.08	0.03	0.01		
150	0.16	0.07	0.02		
200	0.27	0.12	0.03	0.01	
250	0.41	0.18	0.05	0.02	
300	0.58	0.25	0.07	0.02	0.01
350	0.77	0.33	0.09	0.03	0.01
400	0.98	0.42	0.12	0.04	0.02
450	1.22	0.52	0.14	0.05	0.02
500	1.48	0.63	0.18	0.06	0.03
550	1.77	0.76	0.21	0.07	0.03
600	2.08	0.89	0.25	0.08	0.04
650	2.41	1.03	0.29	0.10	0.04
700	2.77	1.18	0.33	0.11	0.05
750	3.14	1.34	0.37	0.13	0.06
800	3.54	1.51	0.42	0.14	0.06
850	3.96	1.69	0.47	0.16	0.07
900	4.41	1.88	0.52	0.18	0.08
950	4.87	2.08	0.58	0.20	0.09
1,000	5.36	2.29	0.63	0.22	0.09
1,100	6.39	2.73	0.76	0.26	0.11
1,200		3.20	0.89	0.30	0.13
1,300		3.72	1.03	0.35	0.15
1,400		4.26	1.18	0.40	0.18
1,500		4.84	1.34	0.46	0.20
1,600			1.51	0.52	0.23
1,700			1.69	0.58	0.25
1,800			1.88	0.64	0.28
1,900			2.08	0.71	0.31
2,000			2.29	0.78	0.34
2,500			3.46	1.18	0.52
3,000				1.66	0.72
3,500				2.20	0.96
4,000				2.82	1.23
4,500					1.53
5,000					1.86

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.7 Friction Loss – PVC Class 200 PSI Plastic Pipe (C = 150)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe						
	Nominal Size [in]						
	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
1	0.02	0.01					
2	0.07	0.02	0.01				
3	0.14	0.04	0.02				
4	0.24	0.08	0.04	0.01			
5	0.36	0.12	0.06	0.02			
6	0.51	0.16	0.08	0.03	0.01		
7	0.67	0.22	0.11	0.04	0.01		
8	0.86	0.28	0.14	0.05	0.02		
9	1.07	0.34	0.18	0.06	0.02		
10	1.30	0.42	0.22	0.07	0.03	0.01	
11	1.56	0.50	0.26	0.09	0.03	0.01	
12	1.83	0.59	0.30	0.10	0.04	0.02	
14	2.43	0.78	0.40	0.14	0.05	0.02	
16	3.11	1.00	0.52	0.17	0.07	0.03	
18	3.87	1.24	0.64	0.22	0.09	0.03	
20	4.71	1.51	0.78	0.26	0.10	0.04	0.01
22	5.62	1.80	0.93	0.32	0.12	0.05	0.01
24	6.60	2.12	1.09	0.37	0.15	0.06	0.02
26	7.65	2.46	1.27	0.43	0.17	0.07	0.02
28	8.78	2.82	1.46	0.49	0.19	0.07	0.02
30	9.98	3.20	1.66	0.56	0.22	0.09	0.02
35		4.26	2.20	0.75	0.29	0.11	0.03
40		5.45	2.82	0.95	0.38	0.14	0.04
45		6.78	3.51	1.19	0.47	0.18	0.05
50		8.24	4.26	1.44	0.57	0.22	0.06
55		9.83	5.09	1.72	0.68	0.26	0.08
60		11.55	5.97	2.02	0.80	0.31	0.09
65			6.93	2.35	0.93	0.36	0.10
70			7.95	2.69	1.06	0.41	0.12
75			9.03	3.06	1.21	0.46	0.14
80			10.18	3.44	1.36	0.52	0.15
85				3.85	1.52	0.59	0.17
90				4.28	1.69	0.65	0.19
95				4.74	1.87	0.72	0.21
100				5.21	2.06	0.79	0.23
150				11.04	4.36	1.68	0.49
200					7.43	2.85	0.84
250						4.31	1.27
300						6.05	1.78
350						8.05	2.36
400							3.03
450							3.77
500							4.58
550							5.46
600							6.42

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.7 Friction Loss – PVC Class 200 PSI Plastic Pipe (C = 150) cont.**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe				
	Nominal Size [in]				
	5"	6"	8"	10"	12"
50	0.02				
55	0.03				
60	0.03	0.01			
65	0.04	0.02			
70	0.04	0.02			
75	0.05	0.02			
80	0.05	0.02			
85	0.06	0.03			
90	0.07	0.03			
95	0.08	0.03			
100	0.08	0.04	0.01		
150	0.18	0.08	0.02		
200	0.30	0.13	0.04	0.01	
250	0.45	0.19	0.05	0.02	
300	0.63	0.27	0.07	0.03	0.01
350	0.84	0.36	0.10	0.03	0.01
400	1.08	0.46	0.13	0.04	0.02
450	1.34	0.57	0.16	0.05	0.02
500	1.63	0.70	0.19	0.07	0.03
550	1.95	0.83	0.23	0.08	0.03
600	2.29	0.98	0.27	0.09	0.04
650	2.65	1.14	0.31	0.11	0.05
700	3.04	1.30	0.36	0.12	0.05
750	3.46	1.48	0.41	0.14	0.06
800	3.90	1.67	0.46	0.16	0.07
850	4.36	1.87	0.52	0.18	0.08
900	4.85	2.07	0.57	0.20	0.09
950	5.36	2.29	0.63	0.22	0.09
1,000	5.89	2.52	0.70	0.24	0.10
1,100	7.03	3.01	0.83	0.28	0.12
1,200		3.53	0.98	0.33	0.15
1,300		4.10	1.13	0.39	0.17
1,400		4.70	1.30	0.45	0.19
1,500		5.34	1.48	0.51	0.22
1,600		6.02	1.66	0.57	0.25
1,700			1.86	0.64	0.28
1,800			2.07	0.71	0.31
1,900			2.29	0.78	0.34
2,000			2.52	0.86	0.38
2,500			3.80	1.30	0.57
3,000				1.83	0.80
3,500				2.43	1.06
4,000				3.11	1.36
4,500				3.87	1.69
5,000					2.05

Friction losses are based on coefficient of retardation (C) = 150. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.8 Friction Loss – Polyethylene (PE) SDR-Pressure Rated Pipe (C = 140)**

Flow [gpm]	Pressure Loss from Friction in psi per 100 ft of Pipe							
	Nominal Size [in]							
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
1	0.49	0.12	0.04	0.01				
2	1.76	0.45	0.14	0.04	0.02			
3	3.73	0.95	0.29	0.08	0.04	0.01		
4	6.35	1.62	0.50	0.13	0.06	0.02		
5	9.60	2.44	0.76	0.20	0.09	0.03		
6	13.46	3.43	1.06	0.28	0.13	0.04	0.02	
7	17.91	4.56	1.41	0.37	0.18	0.05	0.02	
8	22.93	5.84	1.80	0.47	0.22	0.07	0.03	
9		7.26	2.24	0.59	0.28	0.08	0.03	
10		8.82	2.73	0.72	0.34	0.10	0.04	0.01
12		12.37	3.82	1.01	0.48	0.14	0.06	0.02
14		16.46	5.08	1.34	0.63	0.19	0.08	0.03
16			6.51	1.71	0.81	0.24	0.10	0.04
18			8.10	2.13	1.01	0.30	0.13	0.04
20			9.84	2.59	1.22	0.36	0.15	0.05
22			11.74	3.09	1.46	0.43	0.18	0.06
24			13.79	3.63	1.72	0.51	0.21	0.07
26			16.00	4.21	1.99	0.59	0.25	0.09
28				4.83	2.28	0.68	0.29	0.10
30				5.49	2.59	0.77	0.32	0.11
35				7.31	3.45	1.02	0.43	0.15
40				9.36	4.42	1.31	0.55	0.19
45				11.64	5.50	1.63	0.69	0.24
50				14.14	6.68	1.98	0.83	0.29
55					7.97	2.36	1.00	0.35
60					9.36	2.78	1.17	0.41
65					10.86	3.22	1.36	0.47
70					12.46	3.69	1.56	0.54
75					14.16	4.20	1.77	0.61
80						4.73	1.99	0.69
85						5.29	2.23	0.77
90						5.88	2.48	0.86
95						6.50	2.74	0.95
100						7.15	3.01	1.05
150						15.15	6.38	2.22
200							10.87	3.78
300								8.01

Friction losses are based on coefficient of retardation (C) = 140. Friction losses below the dotted lines are too high; therefore, a bigger pipe size is recommended. This table shows losses without couplers. To obtain approximate coupler friction losses, add equivalent loss of 6 ft of pipe per coupler.

**Appendix Table B.9 Approximate Pressure Loss in Steel Pipe Fittings**

Nominal Pipe Size [in]	Expressed as Equivalent Footage of Pipe					
	90° Elbow or Eccentric Reducer	45° Elbow	Tee Side Outlet	Run of Std. Tee	Globe Valve	Gate Valve
2"	6	2.5	11	4	58	1.2
2.5"	6.5	3	13	5	70	1.4
3"	8	4	16	6	90	1.8
4"	11	5	20	7	120	2.3
6"	16	8	31	12	170	3.3
8"	21	10	42	14		
10"	26	13	56	17		
12"	32	15	66	20		

**Appendix Table B.10 Approximate Pressure Loss in Plastic Pipe Fittings**

Nominal Pipe Size [in]	Expressed as Equivalent Footage of Pipe				
	90° Elbow	45° Elbow	Tee Side Outlet	Run of Std. Tee	Coupling
1"	6	3	12	4	3
1.5"	9	4	18	6	4
2"	11	5	24	8	6
3"	17	8	36	11	8
4"	24	10	45	15	11
6"	34	16	70	21	18
8"	45	20	90	28	24

(BLANK)