

B.C. Agricultural Drainage Manual

Appendix C - Head Loss Tables

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The primary purpose of the B.C. Drainage Manual is to provide farmers as well as water management professionals and consultants with technical information on the design, installation and maintenance of agricultural drainage systems.

Individual chapters may rely on information that is presented in other chapters of the manual. There is a risk that downloading individual chapters may not present all of the required information in its entirety. A complete bound manual is available from the Irrigation Industry Association of BC.

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Appendix C.

Head Loss Tables (Based on Hazen-Williams Formula)

Table C1. Friction Loss 14 Gauge Aged Steel Pipe (Friction Loss in m per 100 m of Pipe)								
Flow litres/s	Nominal Pipe Size (mm)							
	100	125	150	200	250	300	350	400
10	1.83	.59	.24					
15	4.06	1.26	.53	.13				
20	6.98	2.24	.88	.21	.07			
25	10.51*	3.38	1.36	.32	.11			
30	15.10	4.79	1.91	.46	.15	.06		
35		6.47	2.60	.62	.20	.08	.04	
40		8.32	3.35	.80	.25	.11	.05	
45		10.38	4.17	.98	.31	.14	.07	.04
50			5.06	1.20	.39	.16	.08	.05
60			7.20	1.71	.57	.23	.10	.06
70			9.66	2.32	.76	.30	.14	.07
80				2.98	.97	.39	.18	.08
90				3.66	1.20	.48	.22	.12
100				4.47	1.47	.59	.27	.14
110				5.37	1.76	.72	.33	.17
120				6.35	2.10	.83	.39	.21
130				7.45	2.48	.96	.47	.25
140				8.61	2.86	1.12	.54	.29
150					3.24	1.28	.61	.32
175					4.29	1.72	.81	.42
200					5.50	2.22	1.03	.54
250					8.40	3.40	1.59	.82
300						4.80	2.36	1.16
350						5.80	3.02	1.56
400							3.88	2.00
450							4.84	2.49
500							5.90	3.04
550								3.65
600								4.31

Based on C = 100

* Flow rates in the grey area exceed 2.25 m/s flow velocity and should be avoided.

Table C2. Friction Loss - PVC Class 160 psi
(Friction Loss in m per 100 m of Pipe)

Flow litres/s	Nominal Pipe Size (mm)											
	25	32	38	50	63.5	75	100	125	150	200	250	300
0.10	0.10	0.03	0.01	0.01								
0.25	0.53	0.16	0.08	0.03	0.01							
0.50	1.91	0.57	0.30	0.10	0.04	0.02						
0.75	4.05	1.21	0.63	0.21	0.08	0.03	0.01					
1	6.90	2.06	1.07	0.36	0.14	0.05	0.02	0.01				
2	24.90	7.43	3.85	1.30	0.51	0.20	0.06	0.02	0.01			
3	52.76	15.75	8.15	2.75	1.08	0.42	0.12	0.04	0.02	0.01		
4		26.83	13.89	4.68	1.85	0.71	0.21	0.07	0.03	0.01		
5		40.56	21.00	7.08	2.79	1.08	0.32	0.11	0.05	0.01		
6			29.43	9.93	3.92	1.51	0.44	0.16	0.07	0.02	0.01	
7			39.16	13.21	5.21	2.01	0.59	0.21	0.09	0.02	0.01	
8				16.91	6.67	2.57	0.76	0.27	0.12	0.03	0.01	
9				21.03	8.30	3.20	0.94	0.34	0.14	0.04	0.01	0.01
10				25.56	10.08	3.88	1.14	0.41	0.17	0.05	0.02	0.01
11				30.50	12.03	4.63	1.36	0.49	0.21	0.06	0.02	0.01
12				35.83	14.13	5.44	1.60	0.57	0.24	0.07	0.02	0.01
13				41.56	16.39	6.31	1.86	0.66	0.28	0.08	0.03	0.01
14					18.80	7.24	2.13	0.76	0.32	0.09	0.03	0.01
15					21.37	8.23	2.42	0.86	0.37	0.10	0.03	0.02
20					36.40	14.02	4.12	1.47	0.63	0.17	0.06	0.03
25						21.20	6.23	2.23	0.95	0.26	0.09	0.04
30						29.71	8.74	3.12	1.33	0.37	0.13	0.05
35						39.53	11.62	4.15	1.77	0.49	0.17	0.07
40							14.88	5.31	2.27	0.63	0.21	0.09
45							18.51	6.61	2.82	0.78	0.27	0.12
50							22.50	8.03	3.43	0.95	0.32	0.15
60							31.54	11.26	4.80	1.33	0.46	0.20
70								14.98	6.39	1.77	0.61	0.26
80								19.19	8.19	2.27	0.78	0.34
90								23.86	10.18	2.82	0.96	0.42
100								29.00	12.37	3.43	1.17	0.51
110								34.60	14.76	4.09	1.40	0.61
120								40.65	17.34	4.80	1.64	0.72
130									20.12	5.57	1.91	0.83
140									23.08	6.39	2.19	0.95
150									26.22	7.26	2.49	1.08
175									34.88	9.66	3.31	1.44
200									44.67	12.37	4.23	1.85
225										15.39	5.27	2.30
250										18.71	6.40	2.79
275										22.32	7.64	3.33
300										26.22	8.97	3.91

Based on C = 100

* Flow rates in the grey area exceed 2.25 m/s flow velocity and should be avoided.

Table C3. Friction Loss - Schedule 40 Standard Steel Pipe
(Friction Loss in m per 100 m of Pipe)

Flow litres/s	Nominal Pipe Size (mm)											
	50	63.5	75	100	125	150	200	250	300	400	450	600
0.10	0.01	0.01										
0.25	0.08	0.03	0.01									
0.50	0.28	0.12	0.04	0.01								
0.75	0.60	0.25	0.09	0.02	0.01							
1	1.02	0.43	0.15	0.04	0.01	0.01						
2	3.67	1.54	0.54	0.14	0.05	0.02	0.01					
3	7.77	3.27	1.14	0.30	0.10	0.04	0.01					
4	13.24	5.58	1.94	0.52	0.17	0.07	0.02	0.01				
5	10.01	8.43	2.93	0.78	0.26	0.11	0.03	0.01				
6	28.05	11.81	4.11	1.09	0.36	0.15	0.04	0.01	0.01			
7	37.32	15.72	5.46	1.46	0.48	0.20	0.05	0.02	0.01			
8	47.79	20.13	6.99	1.86	0.62	0.25	0.07	0.02	0.01			
9	59.44	25.03	8.70	2.32	0.77	0.32	0.08	0.03	0.01			
10	72.24	30.43	10.57	2.82	0.94	0.38	0.10	0.03	0.01			
11	86.19	36.30	12.61	3.36	1.12	0.46	0.12	0.04	0.02	0.01		
12	101.26	42.65	14.82	3.95	1.32	0.54	0.14	0.05	0.02	0.01		
13	117.44	49.46	17.19	4.58	1.53	0.62	0.16	0.05	0.02	0.01		
14		56.74	19.72	5.25	1.75	0.72	0.19	0.06	0.03	0.01		
15		64.47	22.40	5.97	1.99	0.81	0.21	0.07	0.03	0.01	0.01	
20			38.17	10.17	3.39	1.39	0.36	0.12	0.05	0.02	0.01	
25			57.70	15.38	5.12	2.09	0.55	0.18	0.08	0.03	0.01	
30				21.56	7.18	2.94	0.77	0.26	0.11	0.04	0.02	
35				28.68	9.55	3.90	1.03	0.34	0.14	0.05	0.03	0.01
40				36.72	12.23	5.00	1.31	0.43	0.19	0.06	0.03	0.01
45				45.68	15.21	6.22	1.64	0.54	0.23	0.08	0.04	0.01
50				55.52	18.48	7.56	1.99	0.66	0.28	0.09	0.05	0.01
60					25.91	10.60	2.79	0.92	0.39	0.13	0.07	0.02
70					34.47	14.10	3.71	1.23	0.52	0.17	0.10	0.02
80						18.05	4.75	1.57	0.67	0.22	0.12	0.03
90						22.45	5.90	1.95	0.83	0.27	0.15	0.04
100						27.29	7.18	2.37	1.01	0.33	0.19	0.05
110						32.56	8.56	2.83	1.21	0.40	0.22	0.05
120							10.06	3.32	1.42	0.47	0.26	0.06
130							11.66	3.86	1.64	0.54	0.31	0.07
140							13.38	4.42	1.89	0.62	0.35	0.08
150							15.20	5.03	2.14	0.71	0.40	0.10
175							20.23	6.69	2.85	0.94	0.53	0.13
200								8.56	3.65	1.20	0.68	0.16
225								10.65	4.54	1.49	0.84	0.20
250								12.94	5.52	1.82	1.02	0.25
275								15.44	6.58	2.17	1.22	0.29
300								18.14	7.74	2.55	1.44	0.34

Based on C = 100

* Flow rates in the grey area exceed 2.25 m/s flow velocity and should be avoided.

