

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

## **Appendix A**

### **Editor**

Ted W. van der Gulik, P.Eng.  
Senior Engineer

### **Authors**

Stephanie Tam, P.Eng.  
Water Management Engineer

Andrew Petersen, P.Ag.  
Regional Resource Specialist

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# **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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# **A. PROPERTIES OF IRRIGATION PIPE**

Appendix Table A.1 Burst and Working Pressures of Aluminum Irrigation Tubing

Appendix Table A.2 Test and Working Pressures of Straight Seam Steel Pipe

Appendix Table A.3 PVC Irrigation Pipe Working Pressures

## Appendix Table A.1 Burst and Working Pressures of Aluminum Irrigation Tubing

Tube Size [in]	Wall Thickness [in]	Bursting Pressures [psi]	Maximum Recommended Working Pressure [psi] *
2	0.050	1,380	460
3	0.050	766	255
4	0.050	660	220
4	0.072	1,050	350
5	0.052	555	185
5	0.078	717	239
6	0.058	450	150
6	0.083	636	212
7	0.064	393	131
8	0.051	300	100
8	0.064	375	125
8	0.072	441	147
10	0.051	255	85
10	0.064	330	110
10	0.072	351	117
10	0.094	459	153
12	0.064	270	90

\* Based on 3 to 1 safety factor ( $P = 2st/d$ )

P = bursting pressure [psi]  
s = stress (23,000 psi)  
t = wall thickness [in]  
d = tubing diameter [in]

## Appendix Table A.2 Test and Working Pressures of Straight Seam Steel Pipe

Nominal Size OD [in]	Wall Thickness		Test Pressure (75% of 42,000 psi Yield) [psi]	Working Pressure [psi]
	Decimal [in]	Gage or Fraction		
4	0.065	16	945	630
4	0.083	14	1,181	787
4	0.109	12	1,653	1,102
4	0.134	10	2,110	1,407
5	0.083	14	945	630
5	0.109	12	1,323	882
5	0.134	10	1,688	1,125
5	0.188	3/16"	2,368	1,579
6	0.083	14	787	525
6	0.109	12	1,102	735
6	0.134	10	1,407	938
6	0.188	3/16"	1,974	1,316
8	0.083	14	590	393
8	0.109	12	826	551
8	0.134	10	1,055	703
8	0.188	3/16"	1,480	987
10	0.109	12	661	441
10	0.134	10	844	562
10	0.188	3/16"	1,184	789
10	0.250	1/4"	1,575	1,050
12	0.109	12	551	367
12	0.134	10	703	469
12	0.188	3/16"	987	658
12	0.250	1/4"	1,312	875
14	0.109	12	472	315
14	0.134	10	603	402
14	0.188	3/16"	846	564
14	0.250	1/4"	1,125	750
14	0.312	5/16"	1,404	936
16	0.109	12	413	275
16	0.134	10	527	351
16	0.188	3/16"	740	493
16	0.250	1/4"	984	656
16	0.312	5/16"	1,228	819

**Appendix Table A.3 PVC Irrigation Pipe Working Pressures**

Nominal Size [in]	Schedule	Series	SDR	Outside Diameter [in]	Wall Thickness [in]	Inside Diameter [in]	Weight of Pipe per 100 ft [lb]	Maximum Working Pressure (23 °C) [psi]	
1/2"	80	200	5.7	0.840	0.147	0.546	21	850	
	40		7.8	0.840	0.109	0.622	16	600	
			21.0	0.840	0.060	0.680	13	200	
3/4"	80	200	6.8	1.050	0.154	0.742	28	690	
	40		9.3	1.050	0.113	0.824	23	480	
			21.0	1.050	0.060	0.890	17	200	
1"	80	200	7.3	1.315	0.179	0.957	41	630	
	40		9.9	1.315	0.133	1.049	32	450	
			21.0	1.315	0.063	1.155	20	200	
1-1/4"	80	200	8.7	1.660	0.191	1.278	56	520	
	40		11.8	1.660	0.140	1.380	43	370	
			21.0	1.660	0.079	1.500	27	200	
1-1/2"	80	200	9.5	1.900	0.200	1.500	68	470	
	40		13.1	1.900	0.145	1.610	51	330	
			21.0	1.900	0.090	1.720	34	200	
			160	26.0	1.900	0.080	1.740	32	160
2"	80	200	10.9	2.375	0.218	1.939	93	400	
	40		15.4	2.375	0.154	2.067	68	280	
			21.0	2.375	0.113	2.149	52	200	
			160	26.0	2.375	0.091	2.193	43	160
2-1/2"	80	200	10.4	2.875	0.276	2.323	141	420	
	40		14.2	2.875	0.203	2.469	107	300	
			21.0	2.875	0.137	2.601	75	200	
			160	26.0	2.875	0.110	2.655	62	160
3"	80	200	11.7	3.500	0.300	2.900	191	370	
	40		16.2	3.500	0.216	3.068	141	260	
			21.0	3.500	0.167	3.116	110	200	
			160	26.0	3.500	0.135	3.230	91	160
			125	32.5	3.500	0.108	3.284	73	125
			100	41.0	3.500	0.085	3.330	61	100
4"	80	200	13.4	4.500	0.337	3.826	277	320	
	40		18.0	4.500	0.237	4.026	200	220	
			21.0	4.500	0.214	4.072	181	200	
			160	26.0	4.500	0.173	4.154	149	160
			125	32.5	4.500	0.138	4.224	121	125
			100	41.0	4.500	0.110	4.280	99	100
5"	80	200	14.8	5.563	0.375	4.813	390	290	
	40		21.6	5.563	0.258	5.047	270	190	
			21.0	5.563	0.265	5.033	278	200	
			160	26.0	5.563	0.214	5.135	228	160
			125	32.5	5.563	0.171	5.221	182	125
			100	41.0	5.563	0.136	5.291	148	100

## Appendix Table A.3 PVC Irrigation Pipe Working Pressures

(cont.)

Nominal Size [in]	Schedule	Series	SDR	Outside Diameter [in]	Wall Thickness [in]	Inside Diameter [in]	Weight of Pipe per 100 ft [lb]	Maximum Working Pressure (23 °C) [psi]
6"	80		15.3	6.625	0.432	5.761	528	280
		200	21.0	6.625	0.315	5.995	395	200
		160	26.0	6.625	0.255	6.115	322	160
		125	32.5	6.625	0.204	6.217	259	125
		100	41.0	6.625	0.161	6.301	208	100
8"	80		17.3	8.625	0.500	7.625	800	250
		200	21.0	8.625	0.411	7.803	666	200
		160	26.0	8.625	0.332	7.961	545	160
		125	32.5	8.625	0.266	8.093	441	125
		100	41.0	8.625	0.210	8.205	349	100
10"	80		18.1	10.750	0.593	9.564	1,240	230
		200	21.0	10.750	0.512	9.726	1,035	200
		160	26.0	10.750	0.413	9.924	845	160
		125	32.5	10.750	0.331	10.088	682	125
		100	41.0	10.750	0.262	10.226	556	100
12"	80		18.6	12.750	0.687	11.376	1,680	230
		200	21.0	12.750	0.607	11.536	1,454	200
		160	26.0	12.750	0.490	11.770	1,190	160
		125	32.5	12.750	0.392	11.872	957	125
		100	41.0	12.750	0.311	12.128	766	100
14"		160	26.0	14.000	0.538	12.924	1,430	160
		125	32.5	14.000	0.431	13.138	1,155	125
		100	41.0	14.000	0.342	13.316	925	100
16"		160	26.0	16.000	0.615	14.770	1,875	160
		125	32.5	16.000	0.492	15.016	1,510	125
		100	41.0	16.000	0.391	15.218	1,200	100
18"		160	26.0	18.000	0.693	16.614	2,370	160
		125	32.5	18.000	0.554	16.892	1,910	125
		100	41.0	18.000	0.440	17.120	1,530	100
20"		160	26.0	20.000	0.770	18.460	2,930	160
		125	32.5	20.000	0.615	18.770	2,360	125
		100	41.0	20.000	0.489	19.022	1,895	100
24"		160	26.0	24.000	0.924	22.152	4,230	160
		125	32.5	24.000	0.740	22.520	3,410	125
		100	41.0	24.000	0.585	22.830	2,710	100

Source: Sceptre Manufacturing Company Ltd.

$$\text{Standard Dimension Ratio (SDR)} = \frac{\text{Outside Diameter}}{\text{Wall Thickness}}$$

The maximum working pressure of PVC pipe decreases as the SDR increases.

**Maximum working pressure = potential pressure surges + operating pressure**

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