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Table 2. Specifications for Schedule 80 PVC/CPVC

Nominal Size[a] (in)	Outside Diameter[a] D_o (in)	Min Wall Thickness[a] (in)	Max Inside Diameter[b] D_i (in)	Coefficient of Thermal Expansion[c] (in/in/°F)	Max Sustained Temperature[d] (°F)	Unthreaded Water Pressure Rating at 73.4°F[a] (psi)	Threaded Water Pressure Rating at 73.4°F[a] (psi)	Unthreaded Water Pressure Rating at 110°F[b,d] (psi)	Threaded Water Pressure Rating at 110°F[b,d] (psi)
1/8	0.405	0.095	0.215			1230	610	615	305
1/4	0.540	0.119	0.302			1130	570	565	285
3/8	0.675	0.126	0.423			920	460	460	230
1/2	0.840	0.147	0.546			850	420	425	210
3/4	1.050	0.154	0.742			690	340	345	170
1	1.315	0.179	0.957			630	320	315	160
1-1/4	1.660	0.191	1.278			520	260	260	130
1-1/2	1.900	0.200	1.500			470	240	235	120
2	2.375	0.218	1.939			400	200	200	100
2-1/2	2.875	0.276	2.323			420	210	210	105
3	3.500	0.300	2.900			370	190	185	95
3-1/2	4.000	0.318	3.364	0.000030	140	350	170	175	85
4	4.500	0.337	3.826			320	160	160	80
5	5.563	0.375	4.813			290	140	145	70
6	6.625	0.432	5.761			280	140	140	70
8	8.625	0.500	7.625			250	120	125	60
10	10.750	0.593	9.564			230	120	115	60
12	12.750	0.687	11.376			230	110	115	55
14	14.000	0.750	12.500			220	Schedule 80 PVC/CPVC pipe shall not be threaded at these sizes.	110	Schedule 80 PVC/CPVC pipe shall not be threaded at these sizes.
16	16.000	0.843	14.314			220		110	
18	18.000	0.937	16.126			220		110	
20	20.000	1.031	17.938			220		110	
24	24.000	1.218	21.564			210		105	

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Table 2. Specifications for Schedule 80 PVC/CPVC

Nominal Size[a] (in)	PVC Empty Weight[e] (lb/ft)	PVC Full Weight[e] (lb/ft)	CPVC Empty Weight[e] (lb/ft)	CPVC Full Weight[e] (lb/ft)	Modulus of Elasticity E_{110}[f] (psi)	Moment of Inertia I[b,g] (in^4)	Max Unsupp. Length for 0.2% Max Deflection at 110°F[b,h] (ft)	Water Hammer Pressure Wave Velocity[b,i] (ft/s)	Max Water Hammer Press. Surge for 1 ft/s Change in Velocity[b,i] (psi)	Allowable Flexural Stress at 110°F S_{b110}[k] (psi)	Max Bending Moment M[b,l] (in-lbs)	Min Ambient Bending Radius R_b[m] (ft)	Min Hot Box Bending Radius R_h[n] (ft)
1/8	0.06	0.07	0.06	0.08		0.0012	1.8	2681	36		2.4	14.2	0.3
1/4	0.10	0.13	0.11	0.14		0.0038	2.1	2579	35		5.6	18.9	0.3
3/8	0.13	0.19	0.15	0.21		0.0086	2.5	2331	31		10.2	23.6	0.3
1/2	0.20	0.30	0.22	0.32		0.020	2.8	2243	30		19.1	29.4	0.3
3/4	0.27	0.45	0.29	0.48		0.045	3.2	2024	27		34.1	36.8	0.4
1	0.39	0.71	0.43	0.74		0.106	3.7	1939	26		64.2	46.0	0.5
1-1/4	0.54	1.10	0.59	1.15		0.24	4.2	1765	24		116.5	58.1	0.7
1-1/2	0.66	1.42	0.72	1.48		0.39	4.6	1680	23		164.7	66.5	0.8
2	0.91	2.19	0.99	2.27		0.87	5.2	1558	21		292.4	83.1	1.0
2-1/2	1.39	3.22	1.51	3.35		1.92	5.9	1597	22		535.4	100.6	1.3
3	1.86	4.72	2.03	4.89		3.89	6.6	1502	20		890.1	122.5	1.5
3-1/2	2.26	6.12	2.47	6.32	336000	6.28	7.1	1442	19	400	1256.0	140.0	1.8
4	2.71	7.70	2.96	7.95		9.61	7.6	1396	19		1708.5	157.5	2.0
5	3.76	11.65	4.11	11.99		20.67	8.5	1320	18		2972.6	194.7	2.5
6	5.17	16.47	5.65	16.95		40.49	9.5	1297	17		4889.4	231.9	3.0
8	7.86	27.65	8.58	28.37		105.72	11.0	1219	16		9805.6	301.9	
10	11.65	42.79	12.72	43.86		244.84	12.6	1187	16		18220.9	376.3	Pipe Over 6" Dia Shall Not Be Heat Bent
12	16.03	60.09	17.49	61.56		475.10	14.0	1173	16		29810.5	446.3	
14	19.22	72.42	20.98	74.18		687.32	14.9	1169	16		39275.3	490.0	
16	24.71	94.47	26.97	96.74		1156.29	16.2	1159	16		57814.7	560.0	
18	30.92	119.46	33.75	122.30		1833.47	17.5	1152	16		81487.5	630.0	
20	37.82	147.38	41.29	150.85		2771.62	18.7	1146	15		110864.6	700.0	
24	53.67	212.00	58.58	216.91		5671.82	21.1	1137	15		189060.6	840.0	

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Table 2. Specifications for Schedule 80 PVC/CPVC

Nominal Size[a] (in)	Min Operating Scouring Flow Rate at V=0.5 fps[b] (gpm)	Recommended Min Scouring Flow Rate at V=2 fps[b] (gpm)	Max Design Suction Flow Rate at V=4.5 fps[b] (gpm)	Max Design Discharge Flow Rate at V=6.5 fps[b] (gpm)	Max Code Suction Flow Rate at V=6 fps[b] (gpm)	Max Code Discharge Flow Rate at V=8 fps[b] (gpm)	Manning's n-Value[c] (dimensionless)	Half-Full Cross-Sectional Area[b] (in^2)	Half-Full Hydraulic Radius[b] (in)
1/8	0	0	1	1	1	1		0.02	0.05
1/4	0	0	1	1	1	2		0.04	0.08
3/8	0	1	2	3	3	4		0.07	0.11
1/2	0	1	3	5	4	6		0.12	0.14
3/4	1	3	6	9	8	11		0.22	0.19
1	1	4	10	15	13	18		0.36	0.24
1-1/4	2	8	18	26	24	32		0.64	0.32
1-1/2	3	11	25	36	33	44		0.88	0.38
2	5	18	41	60	55	74		1.48	0.48
2-1/2	7	26	59	86	79	106		2.12	0.58
3	10	41	93	134	124	165		3.30	0.73
3-1/2	14	55	125	180	166	222	0.011	4.44	0.84
4	18	72	161	233	215	287		5.75	0.96
5	28	113	255	369	340	454		9.10	1.20
6	41	162	366	528	487	650		13.03	1.44
8	71	285	640	925	854	1,139		22.83	1.91
10	112	448	1,008	1,455	1,344	1,791		35.92	2.39
12	158	634	1,426	2,059	1,901	2,534		50.82	2.84
14	191	765	1,721	2,486	2,295	3,060		61.36	3.13
16	251	1,003	2,257	3,260	3,009	4,013		80.46	3.58
18	318	1,273	2,865	4,138	3,820	5,093		102.12	4.03
20	394	1,575	3,545	5,120	4,726	6,302		126.36	4.48
24	569	2,277	5,122	7,399	6,830	9,107		182.61	5.39

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Table 2. Specifications for Schedule 80 PVC/CPVC

Nominal Size[a] (in)	Min Slope to Maintain Min 2 ft/s Scouring Velocity[p] (rise/run %)	0.5% Slope (≈1/16" per ft)		1% Slope (≈1/8" per ft)		1.5% Slope (≈3/16" per ft)		2% Slope (≈1/4" per ft)	
		Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)
1/8 1/4 3/8 1/2	Too Small to Use for Gravity Flow								
3/4	6.0%								
1	4.0%								
1-1/4	3.0%								
1-1/2	2.5%							5.2	1.90
2	1.5%			7.3	1.59	9.0	1.95	10.4	2.25
2-1/2	1.5%			11.8	1.79	14.5	2.20	16.8	2.54
3	1.0%	15.1	1.47	21.4	2.08	26.2	2.55	30.3	2.94
3-1/2	1.0%	22.5	1.62	31.8	2.30	39.0	2.81	45.0	3.25
4	1.0%	31.7	1.77	44.8	2.50	54.9	3.06	63.4	3.54
5	0.5%	58.5	2.06	82.7	2.92	101.2	3.57	116.9	4.12
6	0.5%	94.4	2.32	133.5	3.29	163.5	4.03	188.8	4.65
8	0.5%	199.4	2.80	282.0	3.96	345.3	4.85	398.8	5.60
10	0.5%	364.8	3.26	515.9	4.61	631.9	5.64	729.6	6.52
12	0.5%	579.4	3.66	819.5	5.17	1,003.6	6.34	1,158.9	7.32
14	0.5%	745.0	3.90	1,053.5	5.51	1,290.3	6.75	1,489.9	7.79
16	0.5%	1,069.2	4.26	1,512.1	6.03	1,852.0	7.38	2,138.5	8.53
18	0.5%	1,469.3	4.62	2,077.9	6.53	2,544.9	8.00	2,938.6	9.23
20	0.5%	1,951.8	4.96	2,760.3	7.01	3,380.6	8.58	3,903.6	9.91
24	0.5%	3,189.0	5.60	4,509.9	7.92	5,523.5	9.70	6,378.0	11.21

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Table 2. Specifications for Schedule 80 PVC/CPVC

	2.5% Slope (≈5/16" per ft)		3% Slope (≈3/8" per ft)		4% Slope (≈1/2" per ft)		5% Slope (≈5/8" per ft)		6% Slope (≈3/4" per ft)	
Nominal Size[a] (in)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)	Max Carrying Capacity[q] (gpm)	Velocity at Max Carrying Capacity[b] (ft/s)
1/8									0.1	0.90
1/4									0.1	1.13
3/8									0.3	1.41
1/2									0.6	1.67
3/4							1.3	1.87	1.4	2.05
1			1.9	1.72	2.2	1.99	2.5	2.22	2.7	2.43
1-1/4	3.8	1.90	4.2	2.09	4.8	2.41	5.4	2.69	5.9	2.95
1-1/2	5.8	2.12	6.4	2.32	7.4	2.68	8.3	3.00	9.0	3.28
2	11.6	2.51	12.7	2.75	14.6	3.18	16.4	3.56	17.9	3.90
2-1/2	18.7	2.84	20.5	3.11	23.7	3.59	26.5	4.01	29.0	4.39
3	33.9	3.29	37.1	3.60	42.8	4.16	47.9	4.65	52.4	5.09
3-1/2	50.3	3.63	55.1	3.98	63.6	4.59	71.1	5.13	77.9	5.62
4	70.9	3.96	77.6	4.33	89.7	5.00	100.2	5.59	109.8	6.13
5	130.7	4.61	143.2	5.05	165.3	5.83	184.8	6.52	202.5	7.14
6	211.1	5.20	231.3	5.69	267.0	6.57	298.6	7.35	327.1	8.05
8	445.8	6.26	488.4	6.86	563.9	7.92	630.5	8.86	690.7	9.71
10	815.8	7.29	893.6	7.98	1,031.9	9.22	1,153.7	10.30	1,263.8	11.29
12	1,295.7	8.18	1,419.3	8.96	1,638.9	10.35	1,832.4	11.57	2,007.3	12.67
14	1,665.8	8.71	1,824.8	9.54	2,107.1	11.02	2,355.8	12.32	2,580.6	13.49
16	2,390.9	9.53	2,619.1	10.44	3,024.2	12.06	3,381.2	13.48	3,703.9	14.77
18	3,285.5	10.32	3,599.0	11.31	4,155.8	13.06	4,646.3	14.60	5,089.8	15.99
20	4,364.4	11.08	4,780.9	12.14	5,520.6	14.02	6,172.2	15.67	6,761.3	17.17
24	7,130.8	12.53	7,811.4	13.72	9,019.8	15.85	10,084.4	17.72	11,047.0	19.41

Table 2. Specifications for Schedule 80 PVC/CPVC

[a]ASTM D1785-12 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120: Type I Grade 1 (ASTM D1784-11 Cell Class 12454-B) with a hydrostatic design stress of 2,000 psi (14 Mpa) designated as PVC1120.

[b]Determined by calculation using previous columns in the table.

[c]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 8.34. For example, a 100 ft pipe with ΔT = 10°F will expand (0.000030 in/in/°F) • (100 ft) • (12 in/ft) • (10°F) = 0.36 inches. "A good rule of thumb in the design of PVC piping systems is to allow 3/8 inches of length variation for every 100 ft of pipe for each 10°F change in temperature (5.4 mm / 10 m / 10°C)."

[d]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 5.12, Table 5.3: Thermal de-rating factor is 0.50 for temperature of 110°F which approximates the maximum temperature expected in any watershape.

[e]Eslon Thermoplastics, Engineering & Specifications Manual, 5th Edition, Page 6: Specific Gravity SG_{PVC} = 1.42, SG_{CPVC} = 1.55, SG_{H2O} = 1.0. Calculated using diameter specifications.

[f]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 8.9, Table 8.3: Modulus of elasticity correction factor is 0.84 for temperature of 110°F. ASTM D1784-11 Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinly Chloride) (CPVC) Compounds, Cell Class 12454-B: Modulus of elasticity $E_{73.4}$ = 400000 psi, E_{110} = 0.84 • $E_{73.4}$ = 336000 psi.

[g]Moment of inertia, $I = \pi / 64 \cdot (D_o^4 - D_i^4)$.

[h]Max deflection of a simply supported beam, $\Delta_{max} = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I)$ where Δ_{max} = limit 0.2% span length = 0.2% • L and w = uniformly distributed load (CPVC Full Weight used for slightly conservative analysis). Substituting, rearranging, and unit converting the equation: Max unsupported length for 0.2% max deflection, $L = (0.002 \cdot 384 \cdot E_{110} \cdot I \cdot (12 \text{ in/ft}) / (5 \cdot \text{CPVC Full Weight}))^{1/3} / (12 \text{ in/ft})$.

[i]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 5.16: Pressure wave velocity = $4660 / (1.0 + K \cdot D_i / (E_{110} \cdot \text{Min Wall Thickness}))^{1/2}$ where bulk modulus of water K = 300000 psi.

[j]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 5.16: Pressure surge = Pressure Wave Velocity • ΔV / ((2.3066587 ft of head/psi) • (32.174049 ft/sec^2)) where ΔV = 1 ft/s. For higher changes in velocity ΔV, multiply Pressure Surge accordingly (e.g., for ΔV = 3 ft/s multiply table values by 3).

[k]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 8.5: Allowable flexural stress from longitudinal bending, $S_b = (HDB - S_t) \cdot TD / SF$ where hydrostatic design basis HDB = 4000 psi at 73.4°F (23°C) for Cell Class 12454, tensile stress from longitudinal thrust S_t = HDB / 2 = 2000 psi, thermal de-rating factor TD = 0.50 for 110°F (43°C), and safety factor SF = 2.5 for bending of pressure class pipe. S_b = (4000 psi - 2000 psi) • 0.5 / 2.5 = 400 psi.

[l]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 8.7: Bending moment induced by longitudinal bending of pipes, $M = S_b \cdot I / c$ where c = distance from neutral axis to extreme fiber = D_o / 2 inches.

[m]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 8.8: Minimum bending radius for pipe at ambient temperature, $R_b = E_{110} \cdot I / M / (12 \text{ in/ft})$.

[n]National Fire Protection Association, NFPA 70: 2014 National Electric Code, Chapter 9, Table 2, Page 70-756 addresses minimum bend radiuses measured to the centerline of the conduit for nominal sizes 1/2" through 6" diameter. This table uses the same 4" (0.3 ft) minimum for sizes below 1/2" diameter. Hot boxes (e.g., Current Tools, Greenlee, etc.) are intended for use with conduit only although we have had success using them for water pipe since our pressures are typically far below the pressure ratings noted above. Heat bending water pipe is done at the installer's sole risk and liability.

[o]PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 9.81: "Studies in the laboratory, and more importantly, in actual use, have found the value of "n" for PVC to range from 0.007 to 0.011." Table uses the more conservative value of 0.011.

[p]Determined by looking at the velocities calculated at the right. The slope of the lowest velocity approximately 2 ft/s or greater was noted.

[q]Determined by calculation using Manning's equation. Values where the corresponding velocity is less than 2 ft/s minimum scouring velocity were grayed out and are not recommended for design.