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# Table 1. Specifications for Schedule 40 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 | 0.068 | 0.269 | | | 810 | | 405 | |
| 1/4 | 0.540 | 0.088 | 0.364 | | | 780 | | 390 | |
| 3/8 | 0.675 | 0.091 | 0.493 | | | 620 | | 310 | |
| 1/2 | 0.840 | 0.109 | 0.622 | | | 600 | | 300 | |
| 3/4 | 1.050 | 0.113 | 0.824 | | | 480 | | 240 | |
| 1 | 1.315 | 0.133 | 1.049 | | | 450 | | 225 | |
| 1-1/4 | 1.660 | 0.140 | 1.380 | | | 370 | | 185 | |
| 1-1/2 | 1.900 | 0.145 | 1.610 | | | 330 | | 165 | |
| 2 | 2.375 | 0.154 | 2.067 | | | 280 | Schedule 40 PVC/CPVC pipe shall not be threaded. Use molded fittings if threads are required. | 140 | Schedule 40 PVC/CPVC pipe shall not be threaded. Use molded fittings if threads are required. |
| 2-1/2 | 2.875 | 0.203 | 2.469 | | | 300 | | 150 | |
| 3 | 3.500 | 0.216 | 3.068 | | | 260 | | 130 | |
| 3-1/2 | 4.000 | 0.226 | 3.548 | 0.000030 | 140 | 240 | | 120 | |
| 4 | 4.500 | 0.237 | 4.026 | | | 220 | | 110 | |
| 5 | 5.563 | 0.258 | 5.047 | | | 190 | | 95 | |
| 6 | 6.625 | 0.280 | 6.065 | | | 180 | | 90 | |
| 8 | 8.625 | 0.322 | 7.981 | | | 160 | | 80 | |
| 10 | 10.750 | 0.365 | 10.020 | | | 140 | | 70 | |
| 12 | 12.750 | 0.406 | 11.938 | | | 130 | | 65 | |
| 14 | 14.000 | 0.437 | 13.126 | | | 130 | | 65 | |
| 16 | 16.000 | 0.500 | 15.000 | | | 130 | | 65 | |
| 18 | 18.000 | 0.562 | 16.876 | | | 130 | | 65 | |
| 20 | 20.000 | 0.593 | 18.814 | | | 120 | | 60 | |
| 24 | 24.000 | 0.687 | 22.626 | | | 120 | | 60 | |

40

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## Table 1. Specifications for Schedule 40 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 | 0.04 | 0.07 | 0.05 | 0.07 | | 0.0011 | 1.7 | 2189 | 29 | | 2.1 | 14.2 | 0.3 |
| 1/4 | 0.08 | 0.12 | 0.08 | 0.13 | | 0.0033 | 2.1 | 2151 | 29 | | 4.9 | 18.9 | 0.3 |
| 3/8 | 0.10 | 0.19 | 0.11 | 0.19 | | 0.0073 | 2.4 | 1929 | 26 | | 8.6 | 23.6 | 0.3 |
| 1/2 | 0.15 | 0.29 | 0.17 | 0.30 | | 0.017 | 2.7 | 1888 | 25 | | 16.3 | 29.4 | 0.3 |
| 3/4 | 0.20 | 0.44 | 0.22 | 0.45 | | 0.037 | 3.1 | 1700 | 23 | | 28.2 | 36.8 | 0.4 |
| 1 | 0.30 | 0.68 | 0.33 | 0.71 | | 0.087 | 3.5 | 1643 | 22 | | 53.1 | 46.0 | 0.5 |
| 1-1/4 | 0.41 | 1.06 | 0.45 | 1.10 | | 0.19 | 4.0 | 1489 | 20 | | 93.8 | 58.1 | 0.7 |
| 1-1/2 | 0.49 | 1.37 | 0.54 | 1.42 | | 0.31 | 4.3 | 1411 | 19 | | 130.5 | 66.5 | 0.8 |
| 2 | 0.66 | 2.12 | 0.72 | 2.18 | | 0.67 | 4.8 | 1293 | 17 | | 224.3 | 83.1 | 1.0 |
| 2-1/2 | 1.05 | 3.12 | 1.15 | 3.22 | | 1.53 | 5.5 | 1353 | 18 | | 425.6 | 100.6 | 1.3 |
| 3 | 1.37 | 4.58 | 1.50 | 4.70 | | 3.02 | 6.1 | 1260 | 17 | | 689.6 | 122.5 | 1.5 |
| 3-1/2 | 1.65 | 5.94 | 1.80 | 6.09 | 336000 | 4.79 | 6.6 | 1203 | 16 | 400 | 957.5 | 140.0 | 1.8 |
| 4 | 1.95 | 7.47 | 2.13 | 7.65 | | 7.23 | 7.0 | 1159 | 16 | | 1285.8 | 157.5 | 2.0 |
| 5 | 2.65 | 11.32 | 2.89 | 11.56 | | 15.16 | 7.8 | 1084 | 15 | | 2180.4 | 194.7 | 2.5 |
| 6 | 3.44 | 15.96 | 3.75 | 16.28 | | 28.14 | 8.5 | 1033 | 14 | | 3398.3 | 231.9 | 3.0 |
| 8 | 5.17 | 26.86 | 5.64 | 27.33 | | 72.49 | 9.8 | 969 | 13 | | 6723.6 | 301.9 | |
| 10 | 7.33 | 41.52 | 8.00 | 42.19 | | 160.73 | 11.1 | 923 | 12 | | 11961.6 | 376.3 | Pipe Over 6" Dia Shall Not Be Heat Bent |
| 12 | 9.69 | 58.22 | 10.58 | 59.11 | | 300.21 | 12.2 | 893 | 12 | | 18836.6 | 446.3 | |
| 14 | 11.46 | 70.13 | 12.51 | 71.18 | | 428.61 | 12.9 | 884 | 12 | | 24491.8 | 490.0 | |
| 16 | 14.99 | 91.60 | 16.36 | 92.97 | | 731.94 | 14.1 | 884 | 12 | | 36597.1 | 560.0 | |
| 18 | 18.95 | 115.93 | 20.69 | 117.66 | | 1171.49 | 15.3 | 884 | 12 | | 52066.0 | 630.0 | |
| 20 | 22.26 | 142.78 | 24.29 | 144.82 | | 1703.71 | 16.2 | 860 | 12 | | 68148.3 | 700.0 | |
| 24 | 30.97 | 205.28 | 33.81 | 208.12 | | 3421.28 | 18.1 | 845 | 11 | | 114042.5 | 840.0 | |

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## Table 1. Specifications for Schedule 40 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 | | 0.03 | 0.07 |
| 1/4 | 0 | 1 | 1 | 2 | 2 | 3 | | 0.05 | 0.09 |
| 3/8 | 0 | 1 | 3 | 4 | 4 | 5 | | 0.10 | 0.12 |
| 1/2 | 0 | 2 | 4 | 6 | 6 | 8 | | 0.15 | 0.16 |
| 3/4 | 1 | 3 | 7 | 11 | 10 | 13 | | 0.27 | 0.21 |
| 1 | 1 | 5 | 12 | 18 | 16 | 22 | | 0.43 | 0.26 |
| 1-1/4 | 2 | 9 | 21 | 30 | 28 | 37 | | 0.75 | 0.35 |
| 1-1/2 | 3 | 13 | 29 | 41 | 38 | 51 | | 1.02 | 0.40 |
| 2 | 5 | 21 | 47 | 68 | 63 | 84 | | 1.68 | 0.52 |
| 2-1/2 | 7 | 30 | 67 | 97 | 90 | 119 | | 2.39 | 0.62 |
| 3 | 12 | 46 | 104 | 150 | 138 | 184 | | 3.70 | 0.77 |
| 3-1/2 | 15 | 62 | 139 | 200 | 185 | 247 | 0.011 | 4.94 | 0.89 |
| 4 | 20 | 79 | 179 | 258 | 238 | 317 | | 6.37 | 1.01 |
| 5 | 31 | 125 | 281 | 405 | 374 | 499 | | 10.00 | 1.26 |
| 6 | 45 | 180 | 405 | 585 | 540 | 720 | | 14.45 | 1.52 |
| 8 | 78 | 312 | 702 | 1,014 | 936 | 1,247 | | 25.01 | 2.00 |
| 10 | 123 | 492 | 1,106 | 1,598 | 1,475 | 1,966 | | 39.43 | 2.51 |
| 12 | 174 | 698 | 1,570 | 2,268 | 2,093 | 2,791 | | 55.97 | 2.98 |
| 14 | 211 | 844 | 1,898 | 2,742 | 2,531 | 3,374 | | 67.66 | 3.28 |
| 16 | 275 | 1,102 | 2,479 | 3,580 | 3,305 | 4,406 | | 88.36 | 3.75 |
| 18 | 349 | 1,394 | 3,137 | 4,532 | 4,183 | 5,577 | | 111.84 | 4.22 |
| 20 | 433 | 1,733 | 3,899 | 5,632 | 5,199 | 6,932 | | 139.00 | 4.70 |
| 24 | 627 | 2,506 | 5,639 | 8,146 | 7,519 | 10,026 | | 201.04 | 5.66 |

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## Table 1. Specifications for Schedule 40 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<br>1/4<br>3/8<br>1/2 | Too Small to Use for Gravity Flow | | | | | | | | |
| 3/4 | 5.0% | | | | | | | | |
| 1 | 4.0% | | | | | | | | |
| 1-1/4 | 2.5% | | | | | | | 4.2 | 1.79 |
| 1-1/2 | 2.0% | | | | | 5.5 | 1.72 | 6.3 | 1.99 |
| 2 | 1.5% | | | 8.7 | 1.66 | 10.6 | 2.03 | 12.3 | 2.35 |
| 2-1/2 | 1.5% | | | 13.9 | 1.87 | 17.1 | 2.29 | 19.7 | 2.64 |
| 3 | 1.0% | 17.6 | 1.53 | 24.9 | 2.16 | 30.5 | 2.64 | 35.2 | 3.05 |
| 3-1/2 | 1.0% | 25.9 | 1.68 | 36.7 | 2.38 | 44.9 | 2.91 | 51.8 | 3.36 |
| 4 | 1.0% | 36.3 | 1.83 | 51.4 | 2.59 | 62.9 | 3.17 | 72.6 | 3.66 |
| 5 | 0.5% | 66.3 | 2.13 | 93.8 | 3.01 | 114.9 | 3.69 | 132.7 | 4.26 |
| 6 | 0.5% | 108.3 | 2.41 | 153.1 | 3.40 | 187.6 | 4.17 | 216.6 | 4.81 |
| 8 | 0.5% | 225.2 | 2.89 | 318.5 | 4.08 | 390.0 | 5.00 | 450.4 | 5.78 |
| 10 | 0.5% | 413.1 | 3.36 | 584.2 | 4.75 | 715.5 | 5.82 | 826.1 | 6.72 |
| 12 | 0.5% | 659.0 | 3.78 | 931.9 | 5.34 | 1,141.3 | 6.54 | 1,317.9 | 7.56 |
| 14 | 0.5% | 848.6 | 4.02 | 1,200.2 | 5.69 | 1,469.9 | 6.97 | 1,697.3 | 8.05 |
| 16 | 0.5% | 1,211.4 | 4.40 | 1,713.2 | 6.22 | 2,098.2 | 7.62 | 2,422.8 | 8.80 |
| 18 | 0.5% | 1,658.7 | 4.76 | 2,345.7 | 6.73 | 2,872.9 | 8.24 | 3,317.3 | 9.52 |
| 20 | 0.5% | 2,216.4 | 5.12 | 3,134.5 | 7.23 | 3,839.0 | 8.86 | 4,432.9 | 10.23 |
| 24 | 0.5% | 3,625.2 | 5.79 | 5,126.8 | 8.18 | 6,279.0 | 10.02 | 7,250.3 | 11.57 |

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Table 1. Specifications for Schedule 40 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 | 1.04 |
| 1/4 | | | | | | | | | 0.2 | 1.28 |
| 3/8 | | | | | | | | | 0.5 | 1.56 |
| 1/2 | | | | | | | | | 0.9 | 1.83 |
| 3/4 | | | | | 1.5 | 1.80 | 1.7 | 2.01 | 1.8 | 2.20 |
| 1 | | | 2.5 | 1.83 | 2.8 | 2.11 | 3.2 | 2.36 | 3.5 | 2.59 |
| 1-1/4 | 4.7 | 2.00 | 5.1 | 2.20 | 5.9 | 2.54 | 6.6 | 2.83 | 7.2 | 3.11 |
| 1-1/2 | 7.0 | 2.22 | 7.7 | 2.43 | 8.9 | 2.81 | 10.0 | 3.14 | 10.9 | 3.44 |
| 2 | 13.7 | 2.62 | 15.0 | 2.87 | 17.4 | 3.32 | 19.4 | 3.71 | 21.3 | 4.07 |
| 2-1/2 | 22.0 | 2.95 | 24.1 | 3.24 | 27.9 | 3.74 | 31.2 | 4.18 | 34.1 | 4.58 |
| 3 | 39.3 | 3.41 | 43.1 | 3.74 | 49.8 | 4.32 | 55.6 | 4.83 | 60.9 | 5.29 |
| 3-1/2 | 58.0 | 3.76 | 63.5 | 4.12 | 73.3 | 4.76 | 82.0 | 5.32 | 89.8 | 5.83 |
| 4 | 81.2 | 4.09 | 88.9 | 4.48 | 102.7 | 5.18 | 114.8 | 5.79 | 125.8 | 6.34 |
| 5 | 148.3 | 4.76 | 162.5 | 5.21 | 187.6 | 6.02 | 209.8 | 6.73 | 229.8 | 7.37 |
| 6 | 242.1 | 5.38 | 265.3 | 5.89 | 306.3 | 6.80 | 342.4 | 7.61 | 375.1 | 8.33 |
| 8 | 503.5 | 6.46 | 551.6 | 7.07 | 636.9 | 8.17 | 712.1 | 9.13 | 780.0 | 10.01 |
| 10 | 923.6 | 7.52 | 1,011.8 | 8.23 | 1,168.3 | 9.51 | 1,306.2 | 10.63 | 1,430.9 | 11.64 |
| 12 | 1,473.5 | 8.45 | 1,614.1 | 9.25 | 1,863.8 | 10.68 | 2,083.8 | 11.95 | 2,282.7 | 13.09 |
| 14 | 1,897.6 | 9.00 | 2,078.8 | 9.86 | 2,400.3 | 11.38 | 2,683.7 | 12.73 | 2,939.8 | 13.94 |
| 16 | 2,708.7 | 9.84 | 2,967.3 | 10.77 | 3,426.3 | 12.44 | 3,830.8 | 13.91 | 4,196.4 | 15.24 |
| 18 | 3,708.9 | 10.64 | 4,062.9 | 11.66 | 4,691.4 | 13.46 | 5,245.2 | 15.05 | 5,745.8 | 16.48 |
| 20 | 4,956.1 | 11.44 | 5,429.2 | 12.53 | 6,269.1 | 14.47 | 7,009.0 | 16.18 | 7,678.0 | 17.72 |
| 24 | 8,106.1 | 12.94 | 8,879.8 | 14.17 | 10,253.5 | 16.36 | 11,463.8 | 18.29 | 12,557.9 | 20.04 |

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Table 1. Specifications for Schedule 40 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 $\Delta T$ = 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 $\Delta_{max}$ = 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 • $\Delta V$ / ((2.3066587 ft of head/psi) • (32.174049 ft/s$^2$) where $\Delta V$ = 1 ft/s. For higher changes in velocity $\Delta V$, multiply Pressure Surge accordingly (e.g., for $\Delta V$ = 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.

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