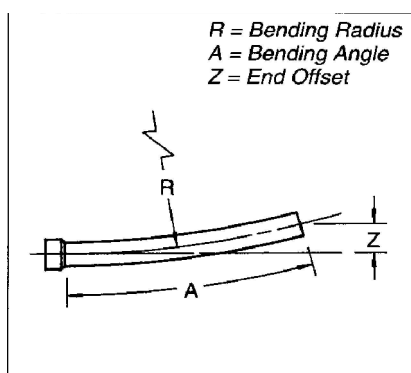


LONGITUDINAL BENDING OF PVC PIPE

PVC products are made from unplasticized polyvinyl chloride (PVC) compounds, which allow these products to flex without breaking. Consequently, these products can be purposely curved along their length a certain amount without adversely affecting their pressure-carrying or load-carrying ability.

Figure 1 Longitudinally Curved Pipe



Curving a pipe along its length is commonly referred to as longitudinal bending. See Figure 1 for an illustration of a pipe that has been longitudinally bent.

There are two important limitations to the longitudinal bending 1) the bending stresses that are induced in the pipe due to the bending, and 2) the axial deflection of gasketed pipe joints. These limitations are discussed below.

Bending Stresses

For a pipe of a given material, the stresses that are induced in the pipe when it is bent depend upon the radius of bending curvature and the diameter of the pipe. Smaller bending radii cause greater stresses in pipe walls. Also, larger diameter pipes will be stressed more than smaller diameter pipes for a given

bending radius. Wall thickness is not a consideration for bending stresses.

The following are guides for determining the minimum bending radii of our pipe and conduit products

| | |
|--|----------|
| Pressure Rated Pipe (ASTM D 1785, ASTM D 2241, AWWA C905) | 200 x OD |
| Pressure Class Pipe (AWWA C900) | 250 x OD |
| Non-Pressure Sewer and Drain Pipe (ASTM D 3034, ASTM D 2729, ASTM F 679) | 160 x OD |
| Electrical Conduit and Utility Duct | 160 x OD |
| <i>OD = Outside Diameter of Pipe in Inches</i> | |

The minimum Bending Radius (R), and maximum End Offset (Z), can be found in the tables on the back of this sheet.

Longitudinal bending by mechanical means must be controlled to prevent excessive loading and/or damage to the pipe. In many cases, bending of PVC pipe can and should be accomplished manually. Pipes with large diameters and/or thick walls may be very difficult to properly bend, so fittings may be required to achieve directional changes in these cases.

WATER / IRRIGATION PRESSURE PIPES

IPS-Sized - 20' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| ½ | 0.840 | 14.0 | 17.3 |
| ¾ | 1.050 | 17.5 | 12.9 |
| 1 | 1.315 | 21.9 | 9.8 |
| 1¼ | 1.660 | 27.7 | 7.6 |
| 1½ | 1.900 | 31.7 | 6.5 |
| 2 | 2.375 | 39.6 | 5.2 |
| 2½ | 2.875 | 47.9 | 4.2 |
| 3 | 3.500 | 58.3 | 3.5 |
| 4 | 4.500 | 75.0 | 2.7 |
| 5 | 5.563 | 92.7 | 2.2 |
| 6 | 6.625 | 110.4 | 1.8 |
| 8 | 8.625 | 143.8 | 1.4 |
| 10 | 10.750 | 179.2 | 1.1 |
| 12 | 12.750 | 212.5 | 0.9 |

PIP-Sized - 20' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| 6 | 6.140 | 102.3 | 2.0 |
| 8 | 8.160 | 136.0 | 1.5 |
| 10 | 10.200 | 170.0 | 1.2 |
| 12 | 12.240 | 204.0 | 1.0 |
| 15 | 15.300 | 255.0 | 0.8 |
| 18 | 18.701 | 311.7 | 0.6 |
| 21 | 22.047 | 367.5 | 0.5 |
| 24 | 24.803 | 413.4 | 0.5 |

IP-Sized - 20' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| 18 | 18.360 | 306.0 | 0.7 |
| 20 | 20.400 | 340.0 | 0.6 |

C900 - 20' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| 4 | 4.800 | 100.0 | 2.0 |
| 6 | 6.900 | 143.8 | 1.4 |
| 8 | 9.050 | 188.5 | 1.1 |
| 10 | 11.100 | 231.3 | 0.9 |
| 12 | 13.200 | 275.0 | 0.7 |

C905 - 20' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| 14 | 15.300 | 255.0 | 0.8 |
| 16 | 17.400 | 290.0 | 0.7 |
| 18 | 19.500 | 325.0 | 0.6 |
| 20 | 21.600 | 360.0 | 0.6 |
| 24 | 25.800 | 430.0 | 0.5 |

GRAVITY SEWER PIPES

20' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| 4 | 4.215 | 56.2 | 3.6 |
| 6 | 6.275 | 83.7 | 2.4 |
| 8 | 8.400 | 112.0 | 1.8 |
| 10 | 10.500 | 140.0 | 1.4 |
| 12 | 12.500 | 166.7 | 1.2 |
| 15 | 15.300 | 204.0 | 1.0 |
| 18 | 18.701 | 249.3 | 0.8 |
| 21 | 22.047 | 294.0 | 0.7 |
| 24 | 24.803 | 330.7 | 0.6 |

14' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| 4 | 4.215 | 56.2 | 1.7 |
| 6 | 6.275 | 83.7 | 1.2 |
| 8 | 8.400 | 112.0 | 0.9 |
| 10 | 10.500 | 140.0 | 0.7 |
| 12 | 12.500 | 166.7 | 0.6 |
| 15 | 15.300 | 204.0 | 0.5 |
| 18 | 18.701 | 249.3 | 0.4 |
| 21 | 22.047 | 294.0 | 0.3 |
| 24 | 24.803 | 330.7 | 0.3 |

ELECTRICAL CONDUITS/DUCTS

20' Lengths

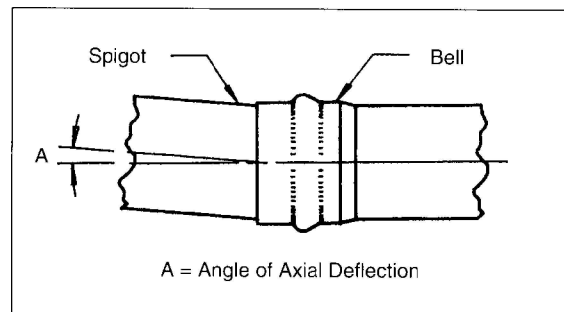
| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| ½ | 0.840 | 11.2 | 24.8 |
| ¾ | 1.050 | 14.0 | 17.3 |
| 1 | 1.315 | 17.5 | 12.8 |
| 1¼ | 1.660 | 22.1 | 9.7 |
| 1½ | 1.900 | 25.3 | 8.3 |
| 2 | 2.375 | 31.7 | 6.5 |
| 2½ | 2.875 | 38.3 | 5.3 |
| 3 | 3.500 | 46.7 | 4.4 |
| 3½ | 4.000 | 53.3 | 3.8 |
| 4 C | 4.350 | 58.0 | 3.5 |
| 4 | 4.500 | 60.0 | 3.4 |
| 5 | 5.563 | 74.2 | 2.7 |
| 6 | 6.625 | 88.3 | 2.3 |

10' Lengths

| SIZE (in) | OD (in) | R (ft) | Z (ft) |
|-----------|---------|--------|--------|
| ½ | 0.840 | 11.2 | 4.8 |
| ¾ | 1.050 | 14.0 | 3.7 |
| 1 | 1.315 | 17.5 | 2.9 |
| 1¼ | 1.660 | 22.1 | 2.3 |
| 1½ | 1.900 | 25.3 | 2.0 |
| 2 | 2.375 | 31.7 | 1.6 |
| 2½ | 2.875 | 38.3 | 1.3 |
| 3 | 3.500 | 46.7 | 1.1 |
| 3½ | 4.000 | 53.3 | 0.9 |
| 4C | 4.350 | 58.0 | 0.9 |
| 4 | 4.500 | 60.0 | 0.8 |
| 5 | 5.563 | 74.2 | 0.7 |
| 6 | 6.625 | 88.3 | 0.6 |

Gasketed Joint Axial Deflection

Figure 2 Axial Deflection of Gasketed Joint



Note: Joint Deflection Shown Exaggerated For Demonstration Purposes

A maximum of two degree of axial gasketed joint deflection is recommended. If greater curvature or joint deflection is desired than what is recommended, fittings should be used. There are many fittings for PVC pipe available for this purpose.

It is difficult to longitudinally bend gasketed pipe without causing axial deflection at the joints. For this reason, gasketed pipe joints must be restrained from excessive axial deflection if the pipe is to be longitudinally bent. It is sometimes possible to accomplish this by backfilling over the joint before bending the pipe body.