

**ACCEPTABLE METHODS FOR CHANGE OF DIRECTION OF PVC PIPELINES FOR MUNICIPAL WATER
 ASTM D 2241 (SDR Series) PRODUCT APPLICATIONS (INTEGRAL GASKETED BELL)**

Methods Permitted = 1. Allowable Longitudinal Bending, 2. Angular Joint Deflection, 3. Use of Fittings

1. Allowable Longitudinal Bending Method – Figure 1.

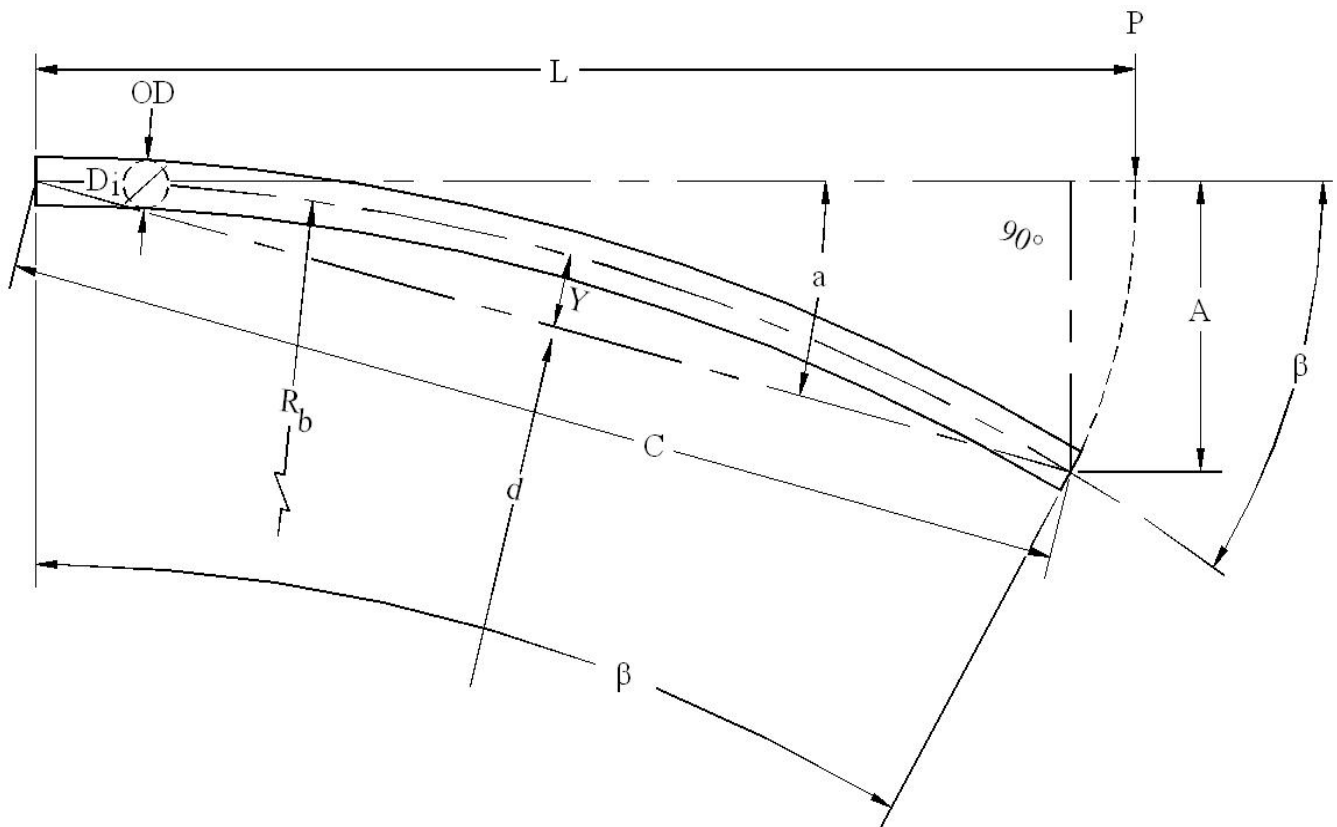


Figure 1: Longitudinal Bending Diagram is provided by the Uni-Bell PVC Pipe Association “Handbook of PVC Pipe Design and Construction”.

The allowable bending of National’s ASTM D 2241 (SDR Series) PVC pressure pipe may be achieved by following the recommended procedures and limits as defined:

1. **IMPORTANT:** Each pipe length must be kept in straight alignment with the previously laid pipe (joint) length. Then properly lubricate the integral bell and spigot end, insert the spigot end into the gasketed bell until the reference (stop) mark is flush with the leading edge of the bell lip.
2. No joint deflection is permitted when using the allowable pipe bending option. It is important when longitudinal (barrel) bending of PVC is being done that the integral bell joint must be braced to ensure it remains in straight alignment with the joint to prohibit axial deflection.
3. Move to the opposite end of the pipe and manually position to the allowable offset (Table 1.) A block and bar may be used on large/heavier diameter pipe to provide continually controlled movement. Never use excavation equipment to obtain offset.
4. Partially backfill installed pipe length to secure placements.
5. If additional offset is required then proceed from sequence 1, on the next pipe length.

Rb = Minimum bending radius or radius of curve are determined for 20' pipe lay length. Do not exceed these flexural stress limits of the pipe.

Caution: Over insertion of the spigot end into the integral bell and/or exceeding the recommended offset may create material stress at the joint assembly.

National Pipe & Plastics, Inc. does not permit longitudinal (allowable) bending of municipal water pipe in diameters larger than 12". It is important when longitudinal (barrel bending) of PVC water pipe is done that the integral bell is braced to ensure it remains in straight alignment with the joint to prohibit axial bending.

Table 1 – Allowable Bending Offset

AWWA C900 – 16 In 20 Foot Lengths, Sb=800 PSI, /E=400,000 PSI				
Nominal Size	Do (inches)	Rb (Feet)	Laying Length = 20 Foot	
			a (degree)	A (Inch)
4"	4.800	75	5.7	24
6"	6.900	111	4.0	17
8"	9.050	144	3.0	13
10"	11.100	179	2.5	10
12"	13.200	213	2.1	9

2. Angular Joint Deflection Method – Figure 2

Table 2 – Angular Joint Deflection Limits

Nominal Size (inches)	Maximum Axial Joint Deflection Offset (Inches)	Maximum Axial Joint Deflection Offset (Degrees)
4-12	4	1
14+	4	1

The design of National Pipe & Plastics, Inc. Gasketed Integral bell system allows for a maximum of 1 degree of Axial joint deflection after proper assembly. When applying joint deflection to achieve a change in system alignment, the pipe barrel must be controlled and not intentionally bent.

3. Use of Fittings Method

Another acceptable method for making pipeline curvatures can be achieved by using PVC or Mechanical Joint (MJ) fittings. These change of direction fittings include elbows, tees, and wyes. Examples of standard elbows for molded fittings include 22-1/2, 45, and 90 degrees. It is important to point out that these fittings are permitted for use throughout the system, however, the change in direction they provide at the fitting will result in a thrust force reaction. This thrust force will attempt to push the assembled pipe joints apart and will need to be counteracted by using properly designed thrust blocks or appurtenances such as external pipe restraints.