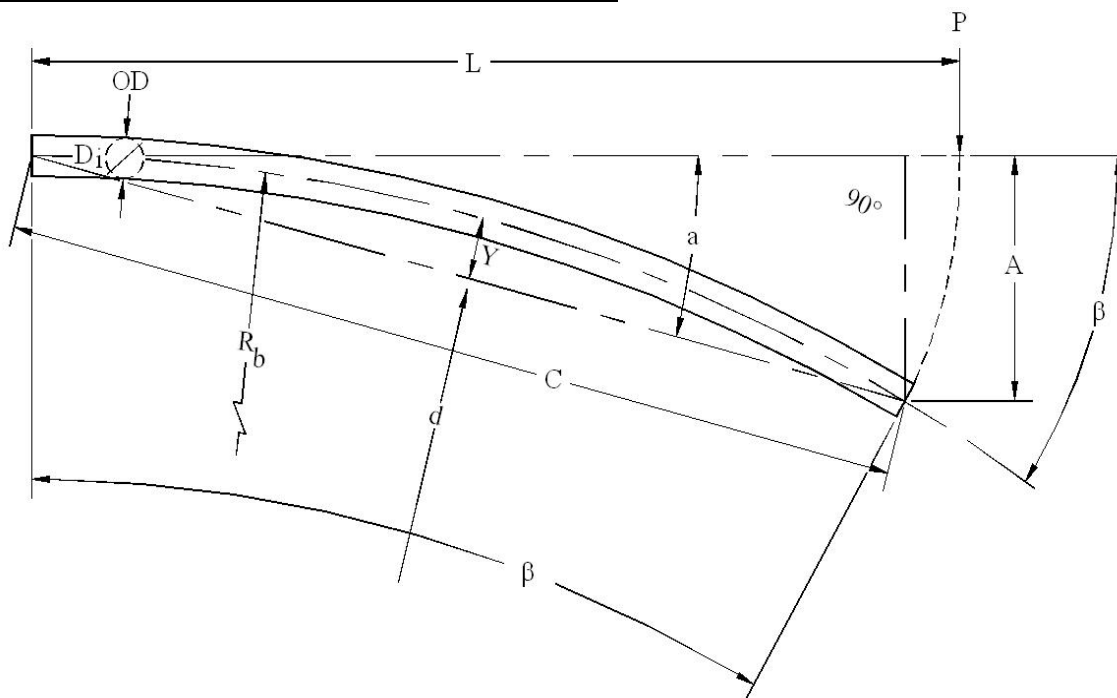


ACCEPTABLE METHODS FOR CHANGE OF DIRECTION OF PVC PIPELINES FOR MUNICIPAL SEWER and STORM DRAINAGE PRODUCT APPLICATIONS (INTEGRAL GASKETED BELL)

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

1. Allowable Longitudinal Bending Method – Figure 1.



The allowable bending of National's ASTM D 3034 & ASTM F 679 PVC sewer pipe may be achieved by following the recommended procedures and limits as defined:

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

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 next pipe length. Caution: Over insertion of the spigot end and/or exceeding the recommended offset may create material stress at the joint assembly.

R_b = Minimum bending radius or radius of curve are determined for 14' and 20' pipe lay length. Do not exceed Flexural Stress limits of pipe.

National Pipe & Plastics, Inc. does not permit longitudinal (allowable) bending of diameters larger than 15". It is important when longitudinal (barrel bending) of PVC sewer pipe is done that the integral bell is braced to ensure it remains in straight alignment with the joint to prohibit axial bending.

Table 1a – Allowable Bending Offset

ASTM D 3034-15, 14 Foot Lengths, Sb = 1,600 PSI , 500,000 PSI				
Nominal Size	Do (inches)	Rb (Feet)	Laying Length = 14 Foot	
			a (degree)	A (Inch)
4"	4.215	55	6.8	18
6"	6.275	82	4.6	12
8"	8.400	109	3.4	9
10"	10.500	137	2.7	7
12"	12.500	163	2.3	6
15"	15.300	199	1.8	5

Table 1b – Allowable Bending Offset

ASTM D 3034-15, 20 Foot Lengths, Sb = 1,600 PSI , 500,000 PSI				
Nominal Size	Do (inches)	Rb (Feet)	Laying Length = 14 Foot	
			a (degree)	A (Inch)
4"	4.215	55	10.4	43
6"	6.275	82	7.0	29
8"	8.400	109	5.2	22
10"	10.500	137	4.2	18
12"	12.500	163	3.5	15
15"	15.300	199	2.9	12

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)	R* Radius of Curve (Feet)
4-24	2.8	1	802

R* Radius of Curve determined for 14' laying length.

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.

Use of Fittings Method

The use of PVC fittings of pipe lengths may be a more appropriate method of linear redirection during installation where unstable soil conditions exist.