TRENCHLESS INSTALLATIONS USING EXTERNAL HARDWARE

For trenchless installations, pipe can either be pushed or pulled into place. Options to properly install PVC pipe in these instances include the use of:

1. External hardware when there is sufficient clearance to allow an increase in the outer diameter of the pipe assembly (typically for tunnels or casings).
2. Internal hardware when minimizing the outer diameter of the assembly is critical (tunnels, casings, or other trenchless methods). Internal restraint systems are discussed in PVC Pipe Joints – Trenchless Options and Chapter 13 of the *Handbook of PVC Pipe*.

This document discusses trenchless installation of gasketed bell-and-spigot PVC pipe using external hardware.

PREVENTION OF OVER-INSERTION

In a properly assembled gasketed PVC pipe, the spigot is not bottomed out in the bell. Instead, there is a small gap between the end of the spigot and the inside of the bell. The practice of "homing" or pushing the spigot fully into the bell joint is incorrect because joint performance may be affected. For more information, see Expansion Gaps for Gasketed PVC Pipe: Maximizing Joint Performance and Gasketed PVC Pipe: The Importance of Insertion Lines.

When installing PVC pipe by pushing through a casing or tunnel, external hardware such as casing spacers, tunnel skids, or pipe stops may be used to prevent over-insertion. A mechanical device is installed at each joint on the outside of the pipe flush with the insertion line (Figure 1). These devices are not intended to prevent joint separation, so pulling a pipe string with these external devices is not recommended unless there are other means of preventing joint separation.

Figure 1: Casing Spacer

PREVENTION OF JOINT SEPARATION

When pipe is pulled through a casing or a tunnel, external restraint harnesses may be used to prevent the joint from separating during the pull (Figure 2). These devices do not prevent over-insertion, so pushing lengths of pipe with these external restraints is not recommended unless some other method of preventing over-insertion is used.

Figure 2: Bell Harness

PROPER DESIGN AND INSTALLATION

Considerations for installations using external hardware include:

- Sizing: The inside diameter of the casing/tunnel must be larger than the maximum outside diameter of any of the components on the pipe string.
- Friction forces: Friction between the restraining device and the pipe must be greater than the friction between the pipe assembly and the inside surface of the casing/tunnel.
- Manufacturers' recommendations: Recommended installation procedures should be followed to enable PVC pipe to achieve its full expected service life.

References: PVC Pipe Association documents: "Expansion Gaps for Gasketed PVC Pipe: Maximizing Joint Performance"; "Gasketed PVC Pipe: The Importance of Insertion Lines"; Handbook of PVC Pipe; "PVC Pipe Joints – Trenchless Options"