



Diamond LOK-21™ Assembly Information

Proper assembly of a Diamond LOK-21™ is much like that of conventional bell-and-spigot PVC pressure pipe. Proper assembly of the joint requires:

- A clean bell and spigot,
- Application of the manufacturer's recommended lubricant,
- Maintenance of straight alignment during assembly,
- And inserting the spigot into the bell until the reference mark is even with the lip of the bell.

Clean

As with conventional bell-and-spigot pipe, the gasket and the groove area behind it should be wiped clean. If mud, dirt, silt, or other foreign material is in the sealing area, it may prevent the gasket from sealing against the spigot. In addition to cleaning the gasket area, the restraint hardware needs to be clean. Debris in this area may prevent the hardware from engaging and keep the restraint mechanism from activating.



The sand and grit shown above must be cleaned from the Diamond LOK-21™ restraint hardware. Dirty hardware may prevent the restraint mechanism from working as designed.



Diamond LOK-21™ is easier to install than other options for restraining PVC pipe. To make an easy installation even simpler, the product comes supplied with end plugs. The end plugs make it easier to keep the bell, gasket area, and **Bulldog** hardware clean. The plugs should be left in place as long as possible. Remove them just prior to assembling the joint.

The end plugs in this Diamond LOK-21™ pipe keep dirt and other foreign matter out of the bell.

Lubricate

Lubing the Diamond LOK-21™ joint is no different than that of conventional PVC pressure pipe. Typical practice is to lube the spigot from the bevel back to a point approximately midway between the end of the pipe and the insertion line. Lube may also be applied to the gasket surface if desired. Use only lubricant supplied or recommended by Diamond Plastics.



Align

Straight alignment is a key element for an easy assembly. Misaligned pipe greatly increases the assembly force required to make the joint. This is especially true for Diamond LOK-21™ restrained joint pipe due to the hardware in the bell of the pipe. Straight alignment is a must. When properly aligned, the pipe joint can be assembled manually using a pry bar.



Assemble

PVC pipe is easy to assemble correctly. Just slide the spigot into the bell until the black assembly line is even with the bell. Do not push the spigot farther into the bell as this reduces the rotational flexibility at the joint and causes unnecessary stress on the bell.



Assembly continues until the insertion line is even with the lip of the bell, as shown above.



Assembly has just begun. The spigot has made contact with the grip ring inside the bell.

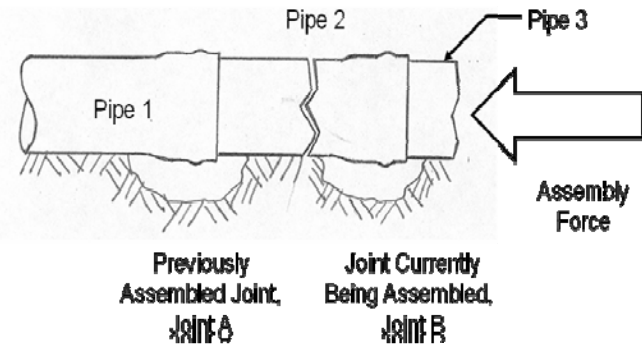
Prevent Over Assembly

When the black assembly line goes past the lip of the bell, it is called over assembled.

A properly assembled joint may become over assembled when subsequent joints are made. The force levering together a new joint (*Joint B*), may cause further insertion of *Pipe 2* into the bell of *Pipe 1*. This may result in the spigot in *Joint A* being over-inserted. When installing pipe in a ditch, the previously assembled pipe (*Pipe 2*) can be center loaded with embedment material. The embedment material holds the pipe in place while the new joint is being made.

In an HDD (Horizontal Directional Drilling) installation when the pipe is joined above ground, it may be necessary to center load *Pipe 2* with a piece of equipment in order to prevent over assembly at *Joint A*.

Alternatively, assembly tools may be used that prevent the assembly forces from moving previously installed pipe. Some examples of these tools are shown below.



The backhoe's bucket center loads the previously installed length of pipe to keep it from moving while the new joint is being assembled.



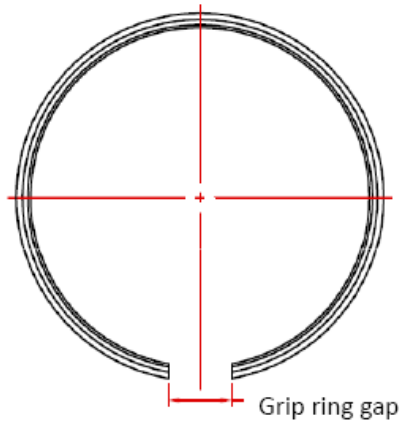
This assembly tool is called the Eagle Claw and is available from Pro Pipe Solutions.



This assembly tool uses a chain wrapped around the bell and a lever bar to make the joint.

Inspect Diamond LOK-21™ Hardware

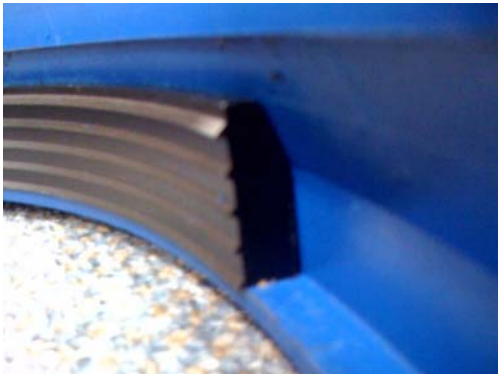
So far, the discussion has focused on the similarities of the assembly of Diamond LOK-21™ restrained joint PVC pipe and conventional PVC with Reiber style gaskets formed within the bell when manufacturing the pipe. There are a few items to check that are unique to Diamond LOK-21™. Checking these items prior to assembly of a Diamond LOK-21™ joint will help ensure that the job goes smoothly.



Occasionally, the grip ring may have a gap that is too small. (See Table 1 for gap size tolerance guidance). The picture above and to the right shows a grip ring with an excessively narrow gap and demonstrates how the grip ring sits too low at the 3:00 o'clock position. (Note: The grip ring was wedged to a much smaller diameter with steel shims. The situation was greatly exaggerated to better illustrate the point.) In the photo above and right, the grip ring may become cocked inside the casing when it comes in contact with the spigot during assembly. If this occurs, assembly forces increase dramatically.



If the gap in the grip ring is too narrow, the grip ring should be removed from the casing. (The points are sharp and care should be taken when verifying proper direction.) Then, the gap can be increased by manually springing the ring apart as shown in the photo. Thick gloves are recommended as the teeth on the grip ring are quite sharp. Once the gap has been increased, re-install the grip ring in the casing.



Once the gap has been increased, the grip ring will naturally want to sit at the back of the casing and away from the spigot as it enters the bell during assembly. The grip ring should be able to be rotated easily inside the casing. The gap size for AWWA C900 PVC pipe, by diameter, is given in Table 1. The gap shown in Table 1 is the gap that the grip ring should have after it has been installed in the casing. (The gap prior to installation will be larger.)

Note, when re-installing the grip ring, the grip ring should be oriented such that the tapered end of the grip ring matches the tapered end of the casing pocket. If the grip ring is installed backwards, it will not be able to be rotated easily inside the casing. Moreover, it will not be possible to make the joint.

**Table 1: Ring Gap for
AWWA C900 PVC Pipe Using the Bulldog Restraint System
Gap Shown To Be Measured After Grip Ring Is Placed Inside the Casing**

Nominal Pipe Diameter (In.)	Gap Size (In.)
4	13/16 to 1-1/16
6	1-1/4 to 1-1/2
8	1-5/8 to 2
10	2 to 2-3/8
12	2-1/2 to 2-3/4

Check the List

- The bell, gasket, gasket groove, and Diamond Lok-21 hardware are clean.
- Just prior to assembly, the spigot was lubricated with the correct lube.
- Straight alignment was maintained during assembly.
- Assembly stopped when the insertion line was even with the bell.
- Previously assembled pipe did not move when subsequent joints were made.
- Prior to assembly, the grip ring was checked to make sure it was positioned correctly in the casing. If it was not, the grip ring was manually adjusted so that it would sit in the casing properly.