LINK-PIPE® INC.
Manufacturer of No-Dig Pipe Repair Products

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LINK-PIPE PVC™ SLEEVE INSTALLATION PROCEDURE (FOR LPR DESIGN)

1. **Product Description:** Link-Pipe PVC™ sleeve is made of rigid PVC. This material is generally used in pressure pipes. Design of the sleeve consists of five segments: one bottom segment 'B' and two side panel segments 'S' are larger in size and form the major structure of the sleeve; two crown segments 'C' are smaller and their purpose is to lock the sleeve in place. The crown set of segments 'C' are also called as '**Flaps**'.
2. The sleeve is first transported into the pipe. In most cases this requires passing through the Access Chamber (ACh) cover frame opening. Since the sleeve is larger than the opening, sleeve is disassembled. This allows the sleeve to be passed through the manhole cover frame.
3. The hinges will then be reattached on the floor of the Access Chamber
4. O-rings are then placed into the grooves and tied up with the provided cable-ties to keep them aligned during the sleeve expansion process.
5. The sleeve is now ready to be transported to the repair spot in the pipe. Watch out that the O-rings will not get damaged.
6. At the repair site the sleeve is either placed so as to cover the damaged area, or if joint sealing is required, the sleeve is centered on the joint.
7. Sleeve expansion is now ready to start:
   - 7.1. Only one jack is needed for the installation of this LPR series design.
   - 7.2. Set up the jack vertically sitting on the bottom of segment 'B' of the sleeve.
   - 7.3. Activate the jack to push up to the 'Flaps'. Expand the jack carefully observing that the tongues of the Flaps fit into the grooves along the entire length.
   - 7.4. Expanding the jack always pushes the 'Flaps' until they spring out with a snapping sound. Snapping sound indicates a good and tight installation.
   - 7.5. O-rings create a holding force that prevents the sleeve from becoming loose.
8. The sleeve is designed to have an annular space between outside surface of the sleeve and inside surface of the host pipe. This annular space must be filled with grout to provide a load transfer medium from host pipe to the sleeve. Water activated chemical grout also seals if infiltration is the problem.
   - 8.1. Water-acting grout requires water presence in the annular space. This may need pouring about a liter, or quart, of water through the vent nipple at the sleeve invert.
   - 8.2. Liquid chemical grout is then pumped through the water into the annular space until dense foam, or liquid grout, starts emerging from the crown vent.
   - 8.3. Both vent holes are then closed and the job is complete.

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9. One may observe some grout emerging because of high pressure being created during the curing process. High pressure helps sealing and if the leaking joint or cracks in the pipe material are open, curing pressure forces the grout into surrounding soil and combines with it creating a solid concrete-like saddle around the damaged pipe.

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Further Explanations and Suggestions:

1. Metal hinges alone are not strong enough to withstand the installation forces. Their purpose is only to hold the segments together or to guide the tongue of one segment 'C' or called "Flap" into the groove of another "C" segments. Those tongues provide hinge strength for installation. It is therefore important to watch that the tongue fits into the groove without slipping out. Slip-out may happen if hinges may have been twisted in transport or handling.
2. When grout cures, some foam is forced out through segment joints. To reduce this from happening, some grout may be painted on the joints a couple hours before the installation, or before leaving the shop.

TIPS with pictures

To install the sleeve, only one jack and one hydraulic pump is needed. For the hydraulic pump, model P80 from 'SIMPLEX' or 'ENERPAC' is recommended. Be aware that the jack is heavy and very slippery when working on the PVC material. It is recommended to set up the jack and try it once before the real installation.

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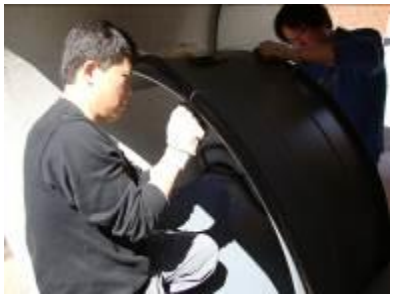
1. Prepare and set up the bottom piece segment 'B'. Fix the o-ring with the cable tie. (The white X marked on the O-ring should be placed at the middle of the grove and match up the other white mark to the cable tie holes.) -- Left picture. Place this segment onto the bottom of the pipe. -- Right picture


2. Prepare and set up one of the side panel segment 'S'. Screw the hinges and fix the o-rings. (Match up the white mark to the cable tie holes)

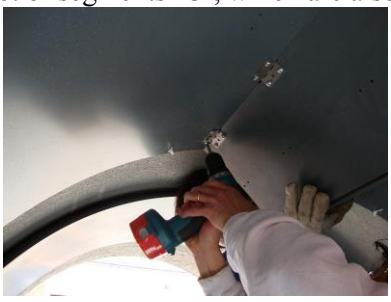




3. Prepare and set up another side panel segment 'S'. Screw the hinges and fix the o-rings.



4. Assemble the top part -- the crown set of segments 'C', which are also called as '**Flaps**'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5. Set up the jack for the installation.






6. Installation is completed.

Notes:

1. Match up the white marks on the o-rings to the cable tie holes to have the o-rings stretched evenly.
2. When holding the sleeve, never place hand/fingers to the sleeve segment joints or your fingers may be clamed as the **PVC material is very slippery**.
3. Before pumping up the jack, **make sure all tongues and grooves are matched.**
4. Pump the jack slowly with caution. After every 2-3 pumps or when you feel the pump is very tight, it is advised to give about 20 seconds or more for the sleeve to settle before you further pump again.
5. When the sleeve is installed, screw the ¼" NPT copper fittings (included in the grout package) to the segment 'B' and connect a piece of flexible hose for grout pumping. First pour about 0.5-1litter of water into the pipe gap through this hole if the pipe is dry for the grout to react and foam

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up. There is a small-predrilled hole at the top segment "C" to let the air out while grout is being pumped. Use a screw (the hinge screw in the package) to stop when finishing pumping the grout. Fold and tighten the flexible plastic hose till the grout is cured.

6. Pictures above are for your reference only.

Link-Pipe Hydraulic Jack Set-up Information
(For LPR 1010 jack only)

For the vertical jack set-up, you need

1. One hydraulic cylinder of model #R1010 from 'SIMPLEX' or model #RC1010 from 'ENERPAC'. (These 2 kinds of cylinders both have 10 tons capacity with a 10-inch stroke. They are almost the same, just from different manufacturers.)
2. A steel pipe spacer (Refer to the chart bellow) of 2.25" O.D. can be used to extend the height of the cylinder. Join the cylinder and the steel pipe spacer with a connector of 24" length x 2.25" I.D. (approximately) thin pipe.
3. Two pieces of 3" x 24" long heavy-duty channel iron pushers at both ends.

A model #P-392 from 'ENERPAC' or model #P42 from 'SIMPLEX' hydraulic hand pump will be able to control the system. You will also need the appropriate length of hydraulic hose and fittings.

Spacer reference
(In inches)

Pipe Dia.	36	39	42	48	54	60	66	72				
Spacer length	10	13	16	22	28	34	40	46				

Note:

1) The hydraulic cylinder has a 2.24" O.D., however, with paint the dimension can vary up to 2.29". The pipe selected to host the cylinder and the spacer (This is here call the connector) may have to be about 2.29" I.D. or greater.
2) And this cylinder host pipe as the connector wall thickness may be thinner as 1/8" in order for the whole assembly to be lighter in weight. The spacer wall thickness can be 3/16" or thicker.

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