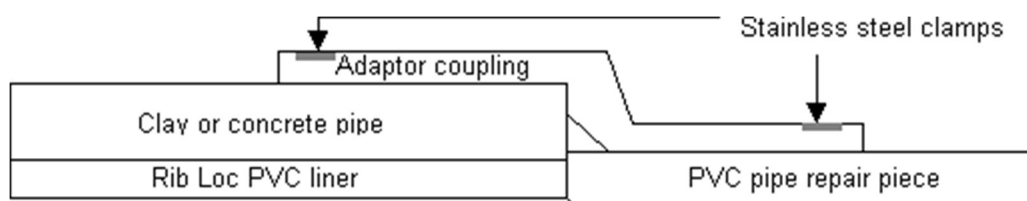


Repair Method for Rib Loc Expanda Liner in Clay or Concrete Pipe

The aim of this procedure is to provide a repair method for clay or concrete pipes which have been relined with Rib Loc Expanda PVC liner, and subsequently damaged locally such that the structural integrity of the liner is compromised. The method involves local excavation of the damaged section of pipe and liner, and replacement with a PVC pipe repair piece cut from standard piping material. This is to be joined to the pipe by proprietary flexible PVC adaptor couplings, secured by stainless steel clamps, as indicated in the drawing below:



The pipe used for the repair piece should have a slightly smaller internal diameter than the Rib Loc liner in the pipe, and a larger outside diameter to ensure the end of the liner is not exposed. Standard PVC pressure pipe is suitable, such as classes 12-18.

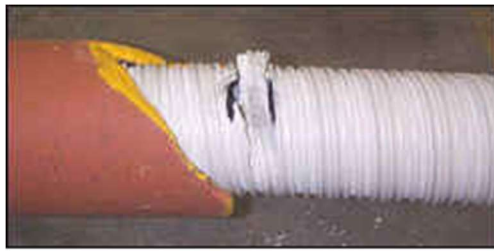
The expected internal diameter of the liner will depend on the internal diameter of the clay or concrete pipe, and the thickness of the Rib Loc Expanda profile used. Typical values are indicated in the table below, but these should be verified at site:

Pipe/liner	I.D. (mm)	I.D. (in)
6in (150mm) with 56Ex	139	5.47
8in (200mm) with 85LEx	189	7.46
10in (250mm) with 85LEx	239	9.39
12in (300mm) with 85LEx	291	11.46
12in (300mm) with 85Ex	287	11.31

This repair method utilises “PlumbQwik” Flexible Adaptor Couplings, produced by Fernco Inc., 300 South Dayton St., Davison MI 48423 Phone: 800-521-1283 Fax: 810-653-8714. Product reference numbers are Series 1002 (for clay pipe) and Series 1006 (for concrete pipe). Depending on the pipe section chosen for the repair piece, the appropriate adaptor coupling should be chosen to match this to the existing pipe.

Procedure

1. Cut damaged section of pipe and liner using disc saw, leaving a smooth square finish to both ends.



2. Inspect inside of pipe ends to ensure remaining liner is sound; if not cut more of the pipe until the damaged section is completely removed. Remove any protruding slivers of profile tee.



3. Apply approved sealant between liner tees around circumference of annulus. This may be a mastic or polyurethane sealant.



4. Cut repair piece to length required to exactly fit removed section of pipe, and round or bevel the inner edges, to prevent snagging of trash.



5. Loosen the stainless-steel clamps on the couplings without removing them, and slide onto each end of the repair piece, smaller end first.



6. Position repair piece into pipeline.



7. Centre each coupling over the joint by pushing level with the pipe ends.



8. Tighten the coupling as recommended by the manufacturer.



9. Repair is now finished.



10. After assembly ensure bedding under pipe and in haunching zone is properly compacted.

Future Jetting

Sewers lined with Expanda Pipe and with their house service line connections sealed with the Interflow Interfit will have their structural capacity restored, their flow capacity increased and be sealed against infiltration, exfiltration, and root ingress.

Maintenance requirements for these lined sewers should be minimal and would typically be restricted to occasional jetting to remove any sediment.

The smooth wall of the UPVC liner, compared to concrete or clay pipes, means that build-up of scale is less likely. While roots may enter the sewer by growing in an unrehabilitated house service line, they should be removed by root cutting in the house service line rather than the sewer.

As with all maintenance work in sewers, the equipment used should be compatible with the task required and the condition of the sewer.

For sewers lined with Expanda Pipe and which have the Interfit installed at lateral connections, testing has shown that cleaning with commonly used types of jetters will not cause damage provided the following pressure and flow rate are not exceeded:

- Maximum Pressure: 1,800psi (12.4 MPa)
- Maximum Flow Rate: 187 Litres/minute

The use of high impact descaling style nozzles is not recommended.

Ability of Pipe Liner to Incorporate New Connections in the Future

Future connections to pipelines lined with Expanda Pipe can be made by adapting methods typically used for installing connections to previously installed pipelines.

A commonly used method is to remove a section of lined pipe at the location where the connection is to be made and to install a UPVC tee piece. The UPVC tee piece is connected to the existing pipe via pipe clamps (Fernco, Wang, etc). Epoxy mortar should be used to smooth the internal interface between the tee and the Expanda Pipe liner.

An alternative is to use a stainless-steel junction. The host pipe and the liner have a hole cut to match the required shape of the junction – whether circular (for 90° junction, or elliptical for an oblique junction. The stainless-steel junction is fixed to the host pipe. Epoxy mortar should be used to internally seal the connection between the liner and the host pipe.

Please refer to the “Connecting to Lined Sewers – Saddle” & “QAL-SOP-0050 - Repair of Connection Into Exposed Helically Lined Pipes”, appended to the end of this document, for further details.

Life Expectancy

The life expectancy of these liners is greater than 100 years.

Design has been carried out in accordance with the method given in AS/NZS2566.1 using the long term (50 year) design basis of the liner material determined in accordance with that Standard.

The latest Australian Standard for PVC pipe has the following Clause in the preface referring to life expectancy. This is equally applicable to Expanda Pipe liners which are made from the same material.

“It should be noted that, by convention, plastics pipe systems are often designed on the basis of 50 years extrapolated test data. This is established international practice but is not intended to imply the service life of drainage pipes is limited to 50 years. For correctly manufactured and installed systems, the actual life cannot be predicted, but can logically be expected to be well in excess of 100 years before major rehabilitation is required.”

Connecting to Lined Sewers

New connections to sewers lined with Interflow PVC ribbed liners can be made using a PVC saddle. It is connected directly to the liner.

Requirements

PVC Saddle with a PVC base curved to match the size of the liner. The spigot protrudes through the base so allows it to be positively located on the liner.

They are available from plumbing merchants or directly from manufacturers such as Leap Australasia, Aymroo, Fabfit. They may also be called "boss connectors" or "clamp-on bosses."

Stainless steel hose clamps sized to match the diameter of the sewer. Suitable types are made by Deks Industries.

Epoxy adhesive mortar, such as Sikadur 31 or Megapoxy

Air tool for cutting into the PVC ribbed liner

Procedure

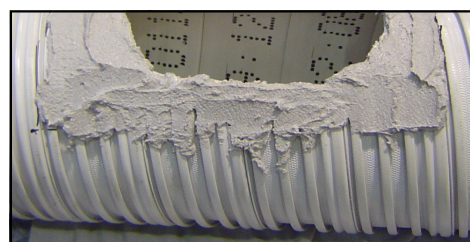
1. The PVC-U saddle must be attached to the spiral wound liner, so the tops of the liner must be exposed, clean and free from loose material.
2. Place the PVC-U Saddle in the required position on the liner and, through the branch, mark the shape of the required hole.
3. Cut the hole in the liner with an air-tool. Make sure the edges are smooth.
4. Place the PVC-U Saddle on the liner and mark out the outline of the base.
5. Apply epoxy resin adhesive mortar (Sikadur 31, Megapoxy or equivalent) to the outside of the liner and the underside of the PVC-U Saddle. Position it firmly on the liner.
6. Attach the stainless steel connector straps on each side of the branch.
7. Reach in through the branch and firmly apply epoxy mortar around the joint to leave a smooth finish.
8. Backfill to the Authority Specification. Note that this may require encasement of the connection in concrete.



PVC saddle sized for liner



Use the saddle as a template to mark the size and shape of the hole to be cut.



Apply epoxy resin adhesive mortar to the saddle base and the area of the liner where the base will connect



Saddle attached to the liner by the epoxy mortar and stainless steel strips. Reach in through the branch to smooth the joint.

SOP – Repair of & Connection into Exposed Helically Lined Pipes

Product/Doc. Number	QA-SOP-0050
Product Name	Repair of & Connection into Exposed Helically Lined Pipes
Issued by	Nic Camelotti
Date	17/02/2021

Revision Register

Rev. No.	Revision Date	By	Revision Details
1	25/03/2021	N Camelotti	Initial release
2	10/05/2021	N Camelotti	Removed requirement to patch / Interfit the repairs / connections

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1. Purpose

This procedure details the steps required to perform Repair of, or connection into Exposed Helically Lined Pipes. The four scenarios covered are:

1. **Repairing a Damaged section** of Exposed Lined Pipe where the **Host Pipe** is **NOT Intact** (see section 2.1).
2. **Repairing a Damaged section** of Exposed Lined Pipe where the **Host Pipe** is **INTACT** (see section 2.2).
3. **Making a New Lateral Connection** into an Exposed Lined Pipe where the **Host Pipe** is **NOT Intact** (see section 2.3).
4. **Making a New Lateral Connection** into an Exposed Lined Pipe where the **Host Pipe** is **INTACT** (see section 2.4).



Note that all references in this SOP are made in regard to 150mm (6") mains, however the same procedures can be carried out for larger diameter mains using appropriately sized Pipe, Couplers, etc.


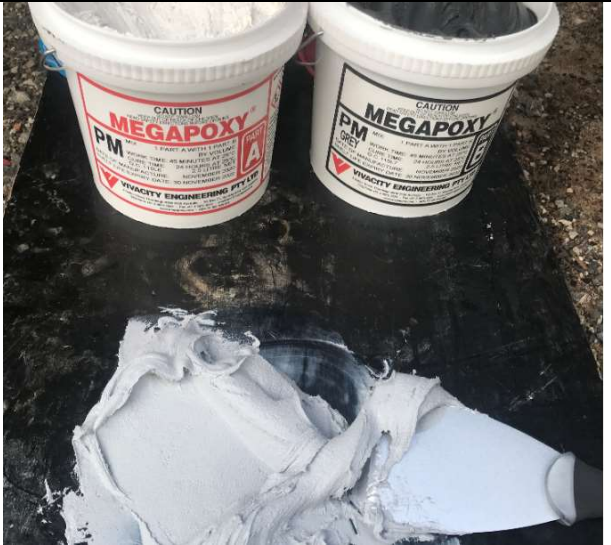

2. Procedures

2.1. Repairing a Damaged Section of Lined Pipe – Host Pipe NOT Intact


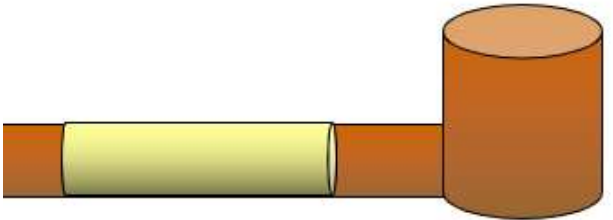
Materials Required:

- 2 off “Fernco Flexseal **SC165** Couplers” (available from Reece Civil) – Note that the SC165 Coupler is only applicable to 6” Liners. Use the appropriately sized coupler for the diameter of the Liner/PVC filler piece.
- PVC DWV Pipe to suit the Host Pipe Diameter (sufficient length to bridge the repair).
- “**Megapoxy PM** Epoxy Filling Paste” (available from Interflow Stores).

2.1.1	Cleanly & squarely cut out the damaged section of pipe / liner.	
2.1.2	Remove remnants of degraded host pipe from the outside of the liner at each of the two exposed ends for a minimum length of 75mm & clean the outside of the liner.	

2.1.3	Cut a piece of DWV PVC pipe to fill the gap in the liner.	
2.1.4	Mix enough Megapoxy PM to a uniform grey colour & render the outside of the exposed ends of the liner, thoroughly filling the spaces between the ribs of the liner. Build up the epoxy on the outside of the liner to a diameter just greater than the inside diameter of the couplers, but don't place any epoxy within 20mm from the open ends of the liner. Use soapy water on your gloves to allow you to mold the epoxy without it sticking to your gloves.	 

2.1.5	Slip the two couplers onto the PVC filler piece so the ends are flush & make a mark on the PVC at the inside end of each coupler.	
2.1.6	Place the PVC filler piece into the gap & slide each coupler outward 70mm.	
2.1.7	Tighten all four clamps on each coupler firmly.	
2.1.8	Place appropriate bedding material leaving a 50mm gap under the repair, ensuring it is adequately compacted. Then encase the repair in concrete.	

2.1.9	Back-fill the pit with suitable material, compacting progressively as fill is placed.	
2.1.10	Note that a repair carried out to a high standard as described above can be considered to be complete & permanent. For circumstances where extra security is required, install an internal fiberglass patch covering, sealing & strengthening the entire repair. The "Interpatch" fiberglass patching process is covered by a separate Interflow procedure.	

2.2. Repairing a Damaged Section of Lined Pipe – Host Pipe INTACT

Materials Required:

- 2 off “Fernco Flexseal **DSC175-200** Couplers” (available from Reece Civil) – Note that the DSC175-200 Coupler is only applicable to 6” VC Host Pipes (the old, thick-wall type). Use the appropriately sized coupler for the diameter of the pipe being repaired.
- 2 off “Flexseal Coupler Bushes **BC16/164**” (available from Reece Civil) – Note that the BC16/164 is for use with the DSC175-200 Coupler only – again choose the appropriately sized Bush for the Coupler & Pipe size.
- PVC DWV Pipe to suit the Host Pipe Diameter (sufficient length to bridge the repair).
- “**Megapoxy PM** Epoxy Filling Paste” (available from Interflow Stores).

2.2.1





Cleanly & squarely cut out the damaged section of pipe / liner.



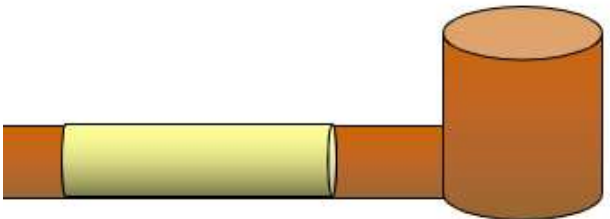


2.2.2

Mix enough Megapoxy PM to a uniform grey colour. Work epoxy into the cut ends between the Liner & the Host Pipe. Render to a smooth finish ensuring all excess is removed from the inside of the Liner. Use soapy water on your gloves to allow you to mold the epoxy without it sticking to your gloves.





2.2.3	Cut a piece of DWV PVC pipe to fill the gap in the liner, slip a BC16/164 bush onto each end, align flush with the ends & mark the PVC at the inside edges of the two bushes.	
2.2.4	Now slide the two bushes inward & slip two DSC175-200 couplers over the PVC pipe and over each bush such that the inner edges of the bushes align flush with the inner edges of the couplers.	
2.2.5	Place the filler piece into the gap & slide the bushes & couplers outward so that the inner edge of each bush is still aligned with the inner edge of the coupler as well as the marks you made on the PVC pipe.	
2.2.6	Gradually tighten all four clamps on each coupler firmly.	


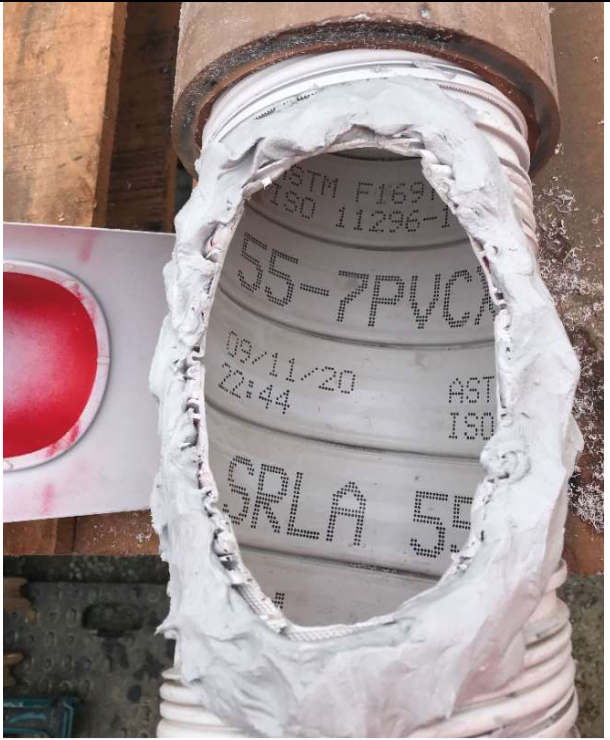
2.2.7	Place appropriate bedding material leaving a 50mm gap under the repair, ensuring it is adequately compacted. Then encase the repair in concrete.	
2.2.8	Back-fill the pit with suitable material, compacting progressively as fill is placed.	
2.2.9	Note that a repair carried out to a high standard as described above can be considered to be complete & permanent. For circumstances where extra security is required, install an internal fiberglass patch covering, sealing & strengthening the entire repair. The "Interpatch" fiberglass patching process is covered by a separate Interflow procedure.	



2.3. Making a New Lateral Connection – Host Pipe NOT Intact

Materials Required:

- 1 off "PVC DWV Boss Connector 150 x 100 x 45deg" (available from Reece Civil) - Note that this part is only applicable to 150mm Host Pipes. Use the appropriately sized Boss Connector for the Host Pipe you are connecting into.
- 2 off "Dura Hose Clamp S/Steel 150-170mm" (available from Reece Civil) – Again, use appropriately sized clamps for larger diameter Liners.
- 500mm of PVC DWV Pipe to suit Lateral Diameter (must either have a spigot end – or else use a 100mm Female/Female Socket to join Lateral Pipe to Boss Connector).
- **"Megapoxy PM Epoxy Filling Paste"** (available from Interflow Stores).

2.3.1	Remove remnants of Host pipe from the outside of the liner & clean the outside of the liner of all debris.	
2.3.2	Place the Boss Connector into position on the outside of the cleaned liner & mark the position using spray paint through the lateral arm. Remove the Boss Connector & mark the cut-out line 10mm outside the paint mark all around.	



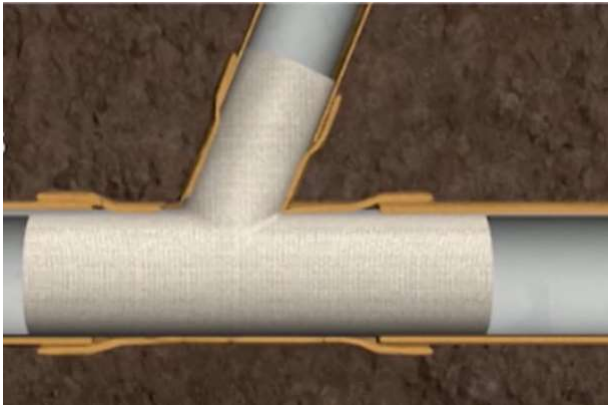
2.3.3	<p>Cut out the liner as marked using an Oscillating Cutter & clean up using a Die Grinder fitted with a suitable Burr. Test fit the Boss Connector to make sure that it sits down against the Liner.</p>	
2.3.4	<p>Mix enough Megapoxy PM to a uniform grey colour. Apply a bead of Epoxy onto the liner fully surrounding the cut-out, ensuring that it goes between the ribs of the liner & sits approximately 10mm above the high points of the ribs. Use soapy water on your gloves to allow you to mold the epoxy without it sticking to your gloves.</p>	

2.3.5	<p>Sit the Boss Connector in place, fit the Stainless Steel Hose Clamps, positioning them between the guides & tighten firmly.</p>	
2.3.6	<p>Reach inside the lateral arm with a Nitrile glove & strike off the epoxy to create a good seal between the Boss Connector & the Liner. Remove any excess from inside the liner</p>	

2.3.7

Glue a 500mm straight length of PVC DWV Pipe onto the Lateral Arm of the Boss Connector








2.3.8	Place appropriate bedding material leaving a 50mm gap under the repair, ensuring it is adequately compacted. Then encase the repair in concrete.	
2.3.9	Back-fill the pit with suitable material, compacting progressively as fill is placed.	
2.3.10	Note that a connection carried out to a high standard as described above can be considered to be complete & permanent. For circumstances where extra security is required, install an "Interfit" junction seal covering, sealing & strengthening the entire connection. The Interfit junction sealing process is covered by a separate Interflow procedure.	




2.4. Making a New Lateral Connection – Host Pipe INTACT


Materials Required:

- 2 off “Fernco Flexseal **DSC175-200** Couplers” (available from Reece Civil) – Note that the DSC175-200 Coupler is only applicable to 6” VC Host Pipes (the old, thick-wall type). Use the appropriately sized coupler for the diameter of the pipe being repaired.
- 2 off “Flexseal Coupler Bushes **BC16/164**” (available from Reece Civil) – Note that the BC16/164 is for use with the DSC175-200 Coupler only – again choose the appropriately sized Bush for the Coupler & Pipe size.
- PVC DWV Pipe to suit the Host Pipe Diameter (sufficient length to bridge the repair).
- PVC DWV Pipe to suit the Lateral Diameter.
- 1 off “PVC DWV Junction 150mm x 100mm x 45 Degree Female & Female Plain”. (available from Reece Plumbing or Civil) – Notes on appropriate sizing as above.
- “**Megapoxy PM** Epoxy Filling Paste” (available from Interflow Stores).

2.4.1	Take a PVC DWV Junction fitting & glue a 250mm long stub of PVC DWV Pipe into both ends of the main section. Also glue a 500mm straight length of PVC DWV Pipe into the Lateral Branch. Place the glued assembly over the Main Host Pipe in the appropriate position & mark the Main for cutting.	
2.4.2	Cleanly & squarely cut out the section of the Main Host Pipe / Liner as marked.	

2.4.3	<p>Mix enough Megapoxy PM to a uniform grey colour. Work epoxy into the cut ends between the Liner & the Host Pipe. Render to a smooth finish ensuring all excess is removed from the inside of the Liner. Use soapy water on your gloves to allow you to mold the epoxy without it sticking to your gloves.</p>	
2.4.4	<p>Slip a BC16/164 bush onto each end of the junction assembly, align the ends flush & mark the PVC at the inside edges of the two bushes.</p>	
2.4.5	<p>Now slide the two bushes inward & slip two DSC175-200 couplers over the PVC pipe and over each bush such that the inner edges of the bushes align flush with the inner edges of the couplers.</p>	

2.4.6	Place the junction assembly into the gap & slide the bushes & couplers outward so that the inner edge of each bush is still aligned with the inner edge of the coupler as well as the marks you made on the PVC pipe.	
2.4.7	Rotate the assembly into a suitable orientation & gradually tighten all four clamps on each coupler firmly.	
2.4.8	Place appropriate bedding material leaving a 50mm gap under the repair, ensuring it is adequately compacted. Then encase the repair in concrete.	

2.4.9	Back-fill the pit with suitable material, compacting progressively as fill is placed.	
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