RIDGID

Pipe Patch Manual

RIDGID® Pipe Patching System

Table of Contents

*Original Instructions - English

RIDGID® Pipe Patching System

⚠ WARNING!

Read this Operator's Manual carefully before using this tool. Failure to understand and follow the contents of this manual may result in electrical shock, fire and/or serious personal injury.

Safety Symbols

In this operator's manual and on the product, safety symbols and signal words are used to communicate important safety information. This section is provided to improve understanding of these signal words and symbols.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE NOTICE indicates information that relates to the protection of property.

This symbol means read the operator's manual carefully before using the equipment. The operator's manual contains important information on the safe and proper operation of the equipment.

This symbol means always wear safety glasses with side shields or goggles when handling or using this equipment to reduce the risk of eye injury.

This symbol means always wear gloves when handling or using this equipment to reduce the risk of injury.

General Safety Warnings

⚠ WARNING

Read all safety warnings, instructions, illustrations and specifications provided with this equipment. Failure to follow all instructions listed below may result in electric shock, fire, and/or serious injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE!

- **Keep work area clean and well lit.** Cluttered or dark areas invite accidents.
- **Do not operate equipment in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Equipment may create sparks which may ignite the dust or fumes.
- **Keep children and by-standers away while operating equipment.** Distractions can cause you to lose control.
- **Avoid body contact with earthed or grounded surfaces such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electrical shock if your body is earthed or grounded.
- **Stay alert, watch what you are doing and use common sense when operating equipment.** Do not use equipment while you are tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating equipment may result in serious personal injury.
- **Do not overreach. Keep proper footing and balance at all times.** Whis enables better control of the equipment in unexpected situations.
- **Do not let familiarity gained from frequent use of equipment allow you to become complacent and ignore safety principles.** A careless action can cause severe injury within a fraction of a second.

Safety Information

⚠ WARNING

This section contains important safety information that is specific to this equipment.

Read these precautions carefully before using the Pipe Patch to reduce the risk of chemical burns or other serious personal injury.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE!

Keep this manual with the pipe patch for use by the operator.

Pipe Patch Safety

- **Always wear appropriate personal protective equipment.** Appropriate personal protective equipment always includes safety glasses and chemical resistant gloves and may include equipment such as face shields, long sleeves, safety shoes, hard hat, and respirator as appropriate. This will reduce the risk of injury.
  - **– Patch resin fumes may irritate the skin and lungs or damage the eyes.** Refer to the resin labeling and SDS for more information.

– **Drains may contain chemicals, bacteria and other substances that may be toxic, infectious, cause burns or other issues.**

- **Mix resin and wet out patch in a well-ventilated area.** This reduces the risk of irritation or reactions from resin fumes.
- **Do not leave mixed resin in container.** Chemical reactions during curing generate heat. If kept in the container, that heat could damage the container and cause burns. Empty all mixed resin onto patch and spread out. Excess resin can be left to dry on the protective table covering.
- **Do not inflate the packer outside of an appropriately sized pipe.** Do not inflate the packer without packer sleeve/patch/appropriate containment on the packer per these instructions. This will reduce the risk of the equipment bursting and causing serious damage or injury.
- **Do not over-pressurize the equipment.** This will reduce the risk of the equipment bursting and causing serious damage or injury.
- **Use proper equipment and patch combinations.** Improper combinations can result in an incomplete patch which increases the risk of leaks, equipment damage and injury.
- **Practice good hygiene. Do not eat or smoke while handling or operating the equipment or material. After handling or operating equipment, use hot, soapy water to wash hands and other body parts exposed to chemicals or drain contents.** This will help reduce the risk of health hazards due to exposure to toxic material.
- **Do not use if there is the risk of contact with other utilities (such as natural gas or electric) during operation.** Crossbores, improperly placed utilities and damaged drains could allow the equipment to contact and damage the utility. This could cause electrical shock, gas leaks, fire, explosion or other serious damage or injury.
- **Follow all applicable codes and regulations.** Do not use if prohibited by local code. This resin is not approved for use in the City of Los Angeles, CA.
- **Before operating the RIDGID Pipe Patch equipment, read and understand:**
  – This operator's manual.
  – The SDS and labeling for the resin components.
  – The instructions and warnings for any other equipment or material being used.

  Failure to follow all instructions and warnings may result in property damage and/or serious injury.

RIDGID® Contact Information

If you have any question concerning this RIDGID product:

– Contact your local RIDGID® distributor.

Description

The RIDGID® Pipe Patching System is a trenchless pipe repair and relining system. The system repairs cracks, holes, joint separation and other damage in a variety of pipe types, such as clay, concrete, cast iron or PVC.

The system uses a cylinderical fiberglass patch wet out with silicate resin. The patch is mounted on the inflatable installation tool (the "packer") and placed at the point of repair by pushrod or ropes. The packer is inflated to press the patch inside the repair point. When the resin is hardened, it creates a seal in the damaged area.

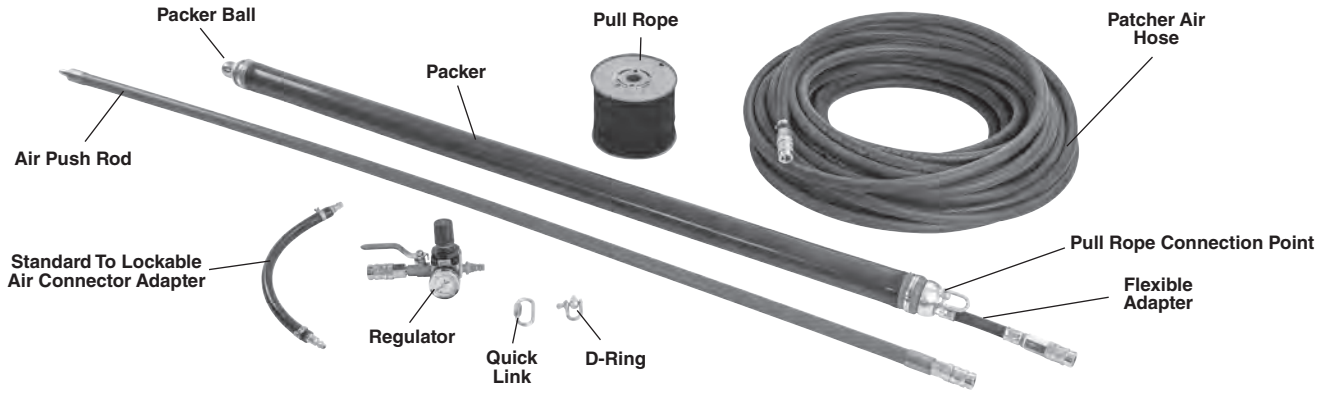


Figure 1 – RIDGID Pipe Patch Equipment

A variety of packers are available for different pipe sizes and patch lengths. *See Specifications.*

All pipe patch pneumatic equipment includes a special locking connector to reduce the risk of the connections coming apart during use.

This product is NOT suitable for use in potable water systems and is not for use in the City of Los Angeles.

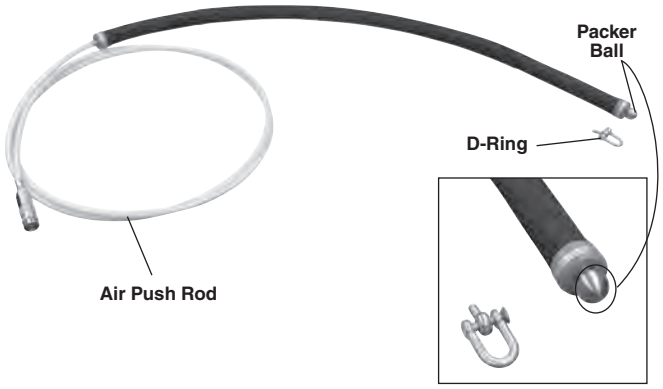


Figure 2 – 2" Packer With Integral Push Hose

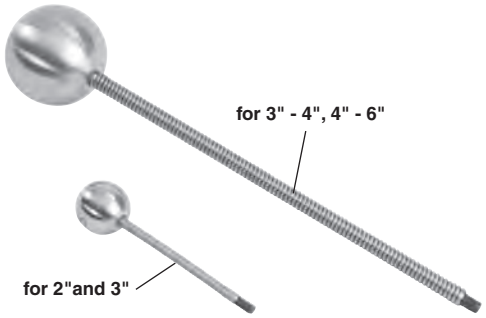


Figure 3 – Ball and Spring Leader Guide (Optional Accessories)

Figure 4 – RIDGID Pipe Patch Kit General Contents

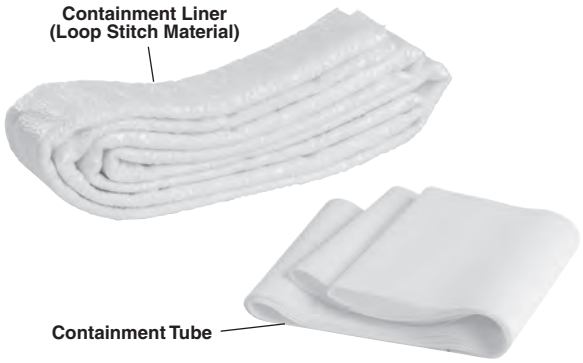
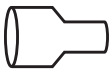


Figure 5 – Containment Kit Materials

Specifications

Pipe Patch Installation Equipment

Packer/ Nominal Pipe Ø	Overall Packer Length	Max. Patch Length	Minimum Encroachment Zone**	Packer Operating Pressure*	22°, 45°, Long Radius 90° Elbows 	Short Radius 90° Elbows and P-Trap 	Pipe Size Transitions 	Air Push Rods	Resin Amount	Resin Wet Out	Pipe Patch Elastic Bands
2"	43"	32"	3"	43 psi	Y	Y	N	10' Integral	32"	Off Packer	2"
3"	43"	32"	3"	60 psi	Y	Y	N	5' Sections	32"	On Packer	3" - 6"
3" - 4"	4'	36"	5"	50 psi	Y	4" Only	3" - 4"	5' Sections	3'	On Packer	3" - 6"
3" - 4"	7'	68"	5"	50 psi	Y	4" Only	3" - 4"	5' Sections	2 x 3'	On Packer	3" - 6"
4" - 6"	4'	36"	5"	36 psi	Y	6" Only	4" - 6"	5' Sections	3'	Off Packer	3" - 6"
4" - 6"	7'	68"	5"	36 psi	Y	6" Only	4" - 6"	5' Sections	2 x 3'	Off Packer	3" - 6"

* Do not exceed packer operating pressure
** Minimum amount of exposed packer rubber at end of patch required for proper installation of patch.

Air Push Rod (For use with 3" and larger packers)

Nominal Length ..... 5' (1.5 m) each

Maximum Reach ..... 100' (30.5 m)

Maximum Pressure ..... 217 PSI (15 Bar)

Not for use through P-traps or 3" elbows

Air Hose Length ..... 100' (30.5 m)

Pneumatic Connector Type ..... Locking

Adapter ..... Adapts standard air hose connectors to locking style used with RIDGID pipe patching equipment

Required Compressed Air Supply ..... 100 psi to 130 psi (6.9 to 9.0 Bar)

Pull Rope ..... 750 pound (3.3 kN) rating, ¼" (6.4mm) Diameter, 250' (76 m) Long

Gloves ..... Nitrile

2" RIDGID Pipe Patch Elastic Bands ..... Specially sized for use with RIDGID 2" packer

3" - 6" RIDGID Pipe Patch Elastic Bands ..... Specially sized for use with RIDGID 3" to 6" packers

Pipe Patch Specifications

Pipe patch kits are available for a variety of inner pipe diameters in various lengths. *Refer to the RIDGID catalog for specific offerings.*

Patch Material ..... Fiberglass

Resin Type ..... Two-Component Organic Silicate Mineral

Resin Mix Ratio ..... 2:1 by volume, Controlled by Containers. Make sure both containers are marked the same (32" or 3')

Resin Shelf Life ..... One Year, Use By Date On Carton/Resin Container

Resin Storage Temperature ..... 41°F to 113°F (5°C to 45°C) Do not allow resin to freeze

Resin Application Temperature ..... 41°F to 68° F (5°C to 20°C)

Working Time (Pot Life) ..... 15 Minutes (At Resin Application Temperature)

Resin Set Time ..... 90 Minutes (Internal Pipe Temperature 50F° to 68°F (10°C to 20°C))

180 Minutes (Internal Pipe Temperature 41°F to 49°F (5° to 9°C))

Final Hardness
Time ..... 240 Minutes (If Pressure Testing)

Typical patch
thickness ..... 0.16” (4 mm)

This product is NOT suitable for use in potable water applications and is not for use in the City of Los Angeles.

Standard Equipment

Refer to the RIDGID catalog for details on equipment supplied with specific catalog numbers.

NOTICE This pipe patching system is designed to repair pipes. If properly used, it should not further damage pipe that is being repaired. Pipe patching may not work in all instances. Improper use of the pipe patching system may obstruct the pipe. It may be necessary to access the damage by digging or other methods to properly fix the pipe damage.

Glossary of Common Pipe Patching Terms

Containment
Liner ..... The restrictive liner used to prevent the packer from over inflating in sections of pipe with bends.

Containment
Tube ..... The restrictive tube used to prevent the packer from over inflating in straight sections of pipe.

Encroachment
Zone ..... The area at each end of the packer that will not expand to the full to the pipe diameter when inflated. The patch CANNOT be in this zone. If the patch is in this zone, the patch will not be proper and may block the pipe. The encroachment zone is measured from the point where the black rubber meets the metal end of the packer. This zone is 3" long for the 2" & 3" packers and 5” long for the 3"-4" & 4"-6" packers.

Final Hardness Time (Also Known As
“Cure Time”) ..... The time at which the patch has reached its full hardness and is as strong as it will get.

Flexible
Adapter..... The short flexible air fitting assembly located at the back end of the packer which the Air Push Rod or the Patching Air Hose connect to.

Internal Pipe
Temperature..... The temperature inside the pipe to be patched, at the area to be patched. Higher temperatures decrease resin set time, lower temperatures increase set time.

Packer ..... The inflatable bladder used to inflate and hold the patch in place against the inside of the pipe while the patch hardens and cures.

Packer Sleeve .... The clear protective sleeve used to cover the packer and prevent contact with the resin.

Packer Test Insertion (Also Known As A
“Dry Run”) ..... The process of ensuring that the packer is able to navigate the pipe to the point of repair. During the test insertion, the packer should have a packer sleeve installed on it to protect the packer and packer sleeve is lubricated with oil soap to simulate the resin.

Patching Air
Hose..... Used in place of the push rods and attached to the air fitting on the packer when pulling the packer into place.

Resin Set
Time ..... The time required for the resin to sufficiently harden to allow the packer to be deflated and removed. Resin set time is temperature dependent. At this time, the pipe can be put back into service.

Pre-Operation Inspection

⚠ WARNING

Before each use, inspect your pipe patching system and correct any problems to reduce the risk of serious injury from chemical burns, infections and other causes and prevent system damage.

Always wear safety glasses, and other appropriate protective equipment.

1. Clean the equipment to be used to aid inspection and improve control during use.
2. Inspect the pipe patch equipment for the following items:
   - Proper assembly and completeness.

- Wear and damage, look for kinks, cuts, cracks and breaks.
- Any condition which may prevent safe and normal operation.

If any problems are found, do not use the equipment until the problems have been repaired or the parts replaced.

3. Inspect pull rope for wear and damage that could reduce its strength.
4. Inspect the patch kit components. Make sure all components are present and in good condition. Confirm the resin "use by" date is current and not expired *(See Figure 6)*.

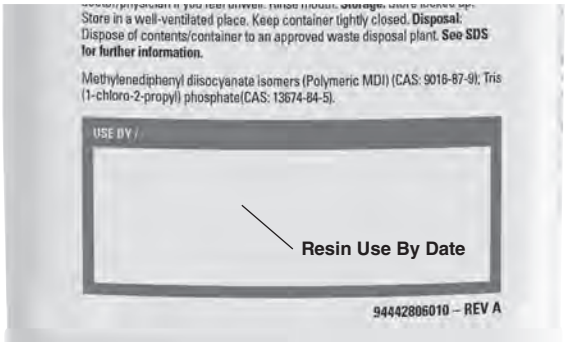


Figure 6 – Resin Use By Date

5. Inspect and maintain any other equipment being used per its instructions to make sure it is functioning properly.

Set-up And Operation

⚠ WARNING

Always wear appropriate personal protective equipment. Appropriate personal protective equipment always includes safety glasses and chemical resistant gloves and may include equipment such as face shields, long sleeves, safety shoes, hard hat, and respirator as appropriate. This will reduce the risk of injury.

Pipe patching resin fumes may irritate the skin and lungs or damage the eyes. *Refer to the resin labeling and SDS for more information.*

Drains may contain chemicals, bacteria and other substances that may be toxic, infectious, cause burns or other issues.

Mix resin and wet out patch in a well-ventilated area. This reduces the risk of irritation or reactions from resin fumes.

Follow all instructions and warnings for resins. Refer to the resin labeling and SDS for more information. This will help reduce the risk of health hazards due to exposure to resin material.

Do not leave mixed resin in container. Chemical reactions during curing generate heat. If kept in the container, that heat could damage the container and cause burns. Empty all mixed resin onto patch and spread out. Excess resin can be left to dry on the protective table covering.

Do not inflate the packer outside of an appropriately sized pipe. Do not inflate the packer without packer sleeve/patch/appropriate containment on the packer per these instructions. This will reduce the risk of the equipment bursting and causing serious damage or injury.

Do not over-pressurize the equipment. This will reduce the risk of the equipment bursting and causing serious damage or injury.

Follow setup and operating instructions to reduce the risk of injury from chemical burns, infections and other causes, and prevent system damage.

1. Check work area for:
   - Adequate lighting.
   - Place out of direct sunlight for mixing resin, near the point of insertion in the pipe.
   - Clear, level, stable, dry location for all equipment and operator.
   - Confirm that there is sufficient ventilation. When working indoors, windows may need to be opened and/or powered ventilation may be needed to remove resin fumes.
   - Clear path between patch wet out area and point of insertion in pipe.
2. Make sure all equipment has been properly inspected.

Proper pipe patch installation is dependent on preparation and timing. *Figure 7* shows the general pipe patching steps. Every Pipe Patching job is different and requires the installer to exercise good judgment and follow industry best practices. Every jobsite is different and requires the skill and good judgment of the installer to choose proper methods and practices. A checklist is provided at the end of this manual to help ensure that all steps are completed.

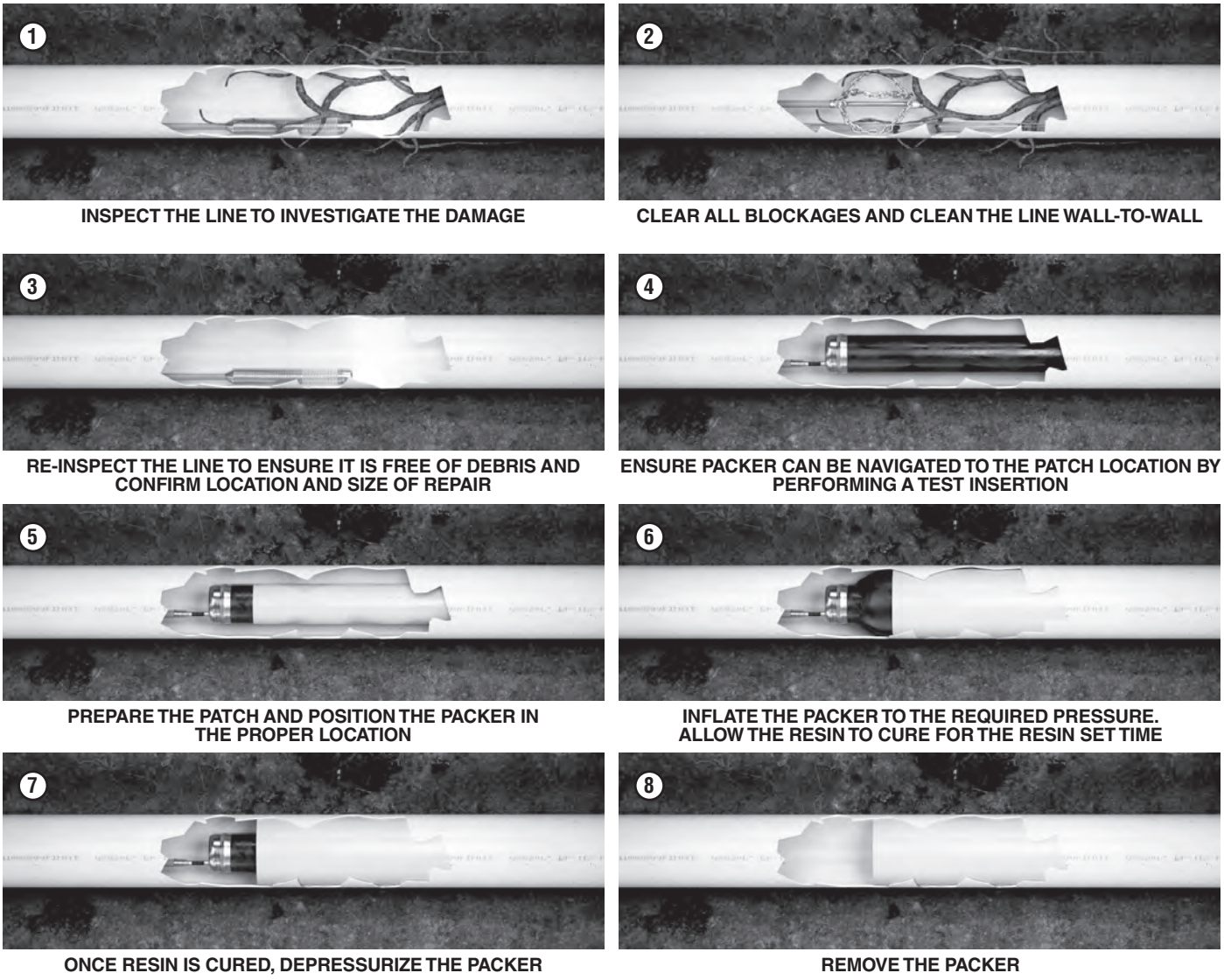
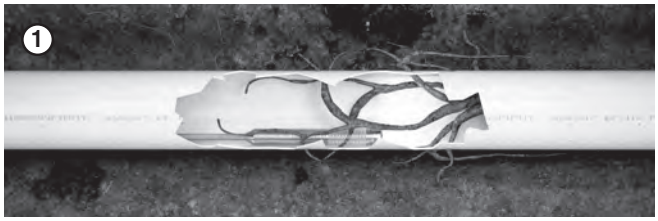


Figure 7 – Generalized Pipe Patching Steps (Sleeve/Containment Not Shown, Patch Position Shifted For Clarity)

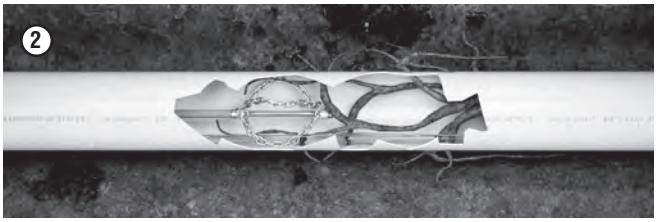
Pipe Preparation For Patch



1. Use video inspection camera equipment (“camera”) and determine:
   - The location and nature of the pipe damage and required patch *(Figure 7-1).*
   - The diameter and length of the patch that is needed. If needed, multiple patches can be applied for longer repairs. *See Installing Multiple Patches* section.
   - The pipe in the area to be patched should be mostly round.
   - If the packer will be placed such that portions of the packer will be unsupported. This would include:
     - Openings over 1" in diameter (such as T’s or pipe damage).
     - The packer extending into a larger size pipe or out of the drain.

If the packer is not properly supported, the patch can bulge into the unsupported area and/or the packer can be damaged or burst. In these cases, the proper containment material must be used *(see "Containment" section).*

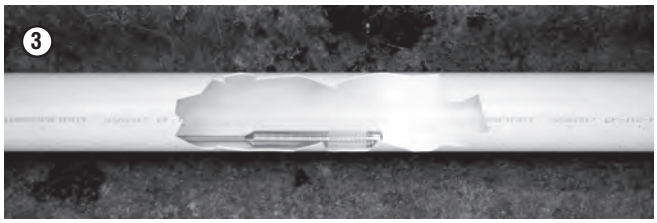
- Pipe size(s), type(s), transitions, traps, shifted pipe and other obstacles present that could prevent packer insertion or cause damage. The transitions in pipe system may require a smaller size packer.
- Best access to area to be patched. In some cases, it may be necessary to have access on both ends of the pipe to be patched to allow the packer to be pulled into position. Determine how the packer will be moved into position. A test insertion is required to confirm that the packer can be placed properly.
- Visual inspection of the pipe is required. Multiple visual inspections will be required throughout the patching process. While inspecting, determine the temperature of the pipe to be patched. If the pipe is hotter or cooler than the resin application temperature (41°F to 68°F (5°C to 20°C)), the resin set time will be affected. Lower temperatures will increase set time and higher temperatures may decrease set time.



CLEAR ALL BLOCKAGES AND CLEAN THE LINE WALL-TO-WALL

2. Thoroughly clean the pipe system. Remove all debris, roots and other materials that can block the movement of packer into place or damage the pipe patch and equipment inside pipe. *(Figure 7-2)*. Pipe should be cleaned to the pipe base material. When working in PVC or other plastic pipe, in addition to cleaning to the base material, the cleaning method needs to "roughen up" the base material. This "roughening up" helps to provide mechanical bonding of the patch to the pipe.

   Clean past the damage to allow water and debris to drain from the area. Area should be flushed and fluid flow shut off. Pipe can be patched with small amounts of water in the drain, but less water in the area is better. While the drain does not need to be perfectly clean, any material left in the drain may make the patching process more difficult and prevent proper sealing.



RE-INSPECT THE LINE TO ENSURE IT IS FREE OF DEBRIS AND CONFIRM LOCATION AND SIZE OF REPAIR

3. Reinspect the drain with the camera. Confirm that the drain is properly cleaned and meets the requirements for patching. Ensure that the pipe is free of sharp features that could damage the packer, such as broken sections of pipe. Position the camera head at the center of the damaged area to be patched and mark the camera push cable (for example with tape around the push cable, *See Figure 8*) near the pipe entrance. This will be used to determine the measurement to the damaged area for patching. *See Figure 7-3.*
4. In an open area, layout the camera push cable so that the mark on the push cable is visible. Measure the distance from the camera head (patch location) to the mark on the camera push cable to confirm how far into the drain the patch will be placed. *See Figure 8.*
5. Determine if the packer will be put in place using the air push rod, a pull rope, or a combination of both. A pull rope is always used at the same end as the air push rod. If using a second pull rope from other side of the packer, route the rope through the pipe. NOTE: The push rods cannot be used to push through P traps or bends in pipe size 3" or under. In this case, the lockable air hose will be attached to the back of the packer with a pull rope on each end of the packer.

   Air Push Rods

   Assemble enough air push rods to reach the patch point. Lay the assembled packer and attached air push rods next to the camera push cable. Mark the air push rod at the same distance as the mark on the camera push cable, *see Figure 8*. This will help properly locate the patch in the pipe. Remove one air push rod that will later be attached to the packer when installing the packer sleeve.

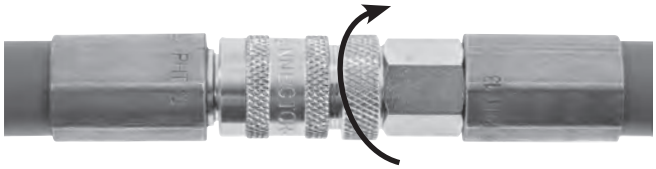
Figure 8 – Marking Patch Position On Camera Push Rod, Transferring To Air Push Rod or Air Hose

Lock each pushrod coupling *(Figure 9)* to reduce the risk that they come apart in the drain. Wrap each locked coupling with tape from one red section to the next to prevent resin from entering and curing in the coupling.

The 2" Packer has an integral push hose and it cannot be used with separate air push rods.

a. Loosen Locking Ring on Female Fitting

b. Align the Fittings and Push Together



c. Tighten the Locking Ring

d. Sleeve Tightened

e. Tape the Connection

Figure 9 – Locking Air Push Rod Couplings

Pull Ropes

A pull rope connection point is supplied at both ends of the packer. A pull rope is always used at the air supply end of the packer to withdraw the packer (do not pull on the air push rod or air hose unless you are using the 2" packer).

If using a pull rope on the front of the packer, the packer ball will need to be unscrewed and the rope attachment eye bolt screwed in place *(See Figure 10)*. Rope can be attached directly to the eye bolt, or the supplied D-ring or quick link. Securely attach the pull ropes.

When using only pull ropes, attach the air hose to the packer and lay the assembled packer and hose next to the camera push cable. Mark the air hose at the same distance as the mark on the camera push cable *(Similar to Figure 8)*. This will help properly locate the patch in the pipe.

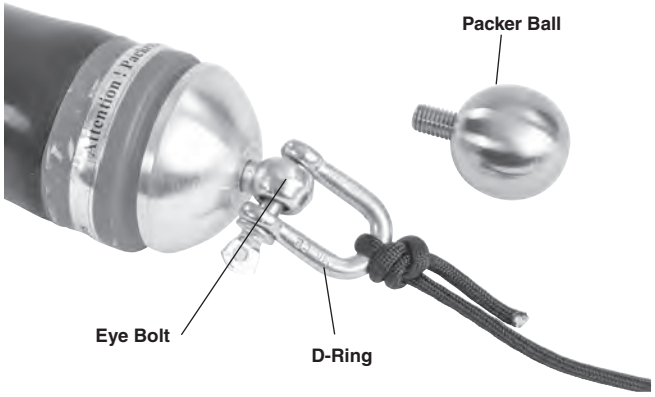


Figure 10 – Removing Packer Ball/Installing Eye Bolt

6. Set up air supply and run an air hose to the point of use. Attach the regulator to the air hose. Pull the regulator adjustment knob out and turn clockwise to confirm that there is adequate pressure (at least 100 psi) available to the regulator. Air pressure must be available throughout the patching process to ensure a complete patch. Pull the regulator adjustment knob out and turn counterclockwise to reduce the air pressure to zero. *See Figure 11.* Place regulator out of way until ready to inflate the packer.

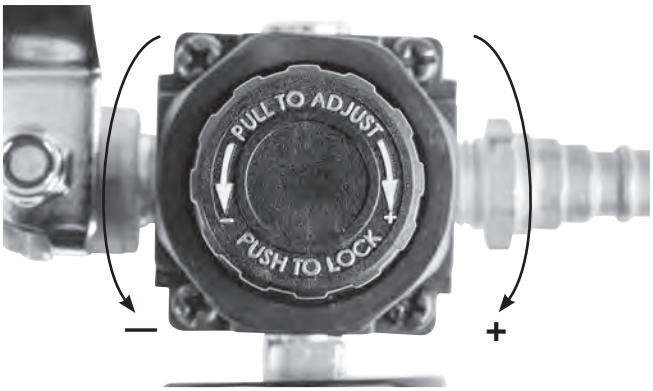


Figure 11 – Adjusting Regulator Pressure Pull Knob To Adjust, Push Knob To Lock

7. Prepare the packer for the test insertion. Install packer sleeve.

Installing Packer Sleeve

The packer sleeve protects the packer from the resin and simplifies clean up.

1 Confirm that you have the correct packer, equipment and materials for the patching work.

2. If needed, install containment on the packer (*see Containment section* – Containment not used for test insertion) .

3. Lay out the plastic table covering to protect your selected work area from the resin and keep material and equipment clean.

4. Make sure that the packer is clean. If needed, apply baby powder to the rubber portion of the packer and clean up any excess baby powder in the work area.

5. Insert the packer inside the provided clear packer sleeve. *See Figure 12.*

Figure 12 – Inserting Packer Into Sleeve

6. The sleeve should extend approximately 1" past the front of the packer and approximately 6" past back of the packer (past the air connector), *See Figure 13.*

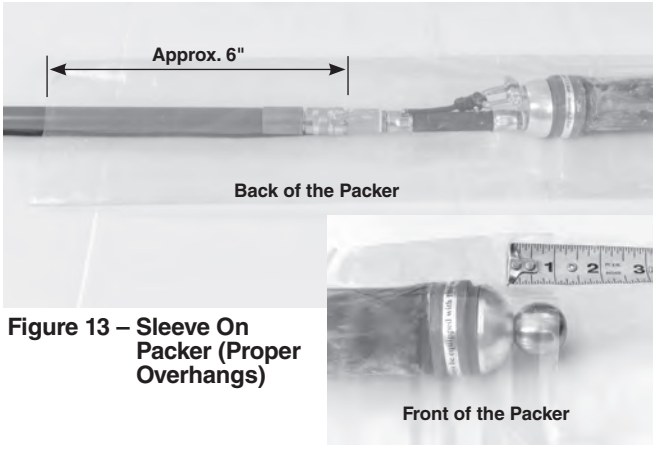


Figure 13 – Sleeve On Packer (Proper Overhangs)

7. Place the packer in the middle of the width of the sleeve. Fold the edges of the sleeve up and tight to the packer. *See Figure 14.*

Figure 14 – Folding Sleeve Around Packer and Taping

8. Securely tape the packer sleeve at the front of the packer *(Figure 14)*. Wrap the tape around the metal end of the packer, down over the curve of the end of the packer, but do not cover the threaded connector. Wrapping the tape down over the curve of the packer end is important for proper retention of the sleeve in place.

9. Secure the packer sleeve to the packer with provided elastic bands doubled over every 12" **Using the correct elastic bands, doubling them over and properly placing them is very important to the function of the packer and patch.** *See Figure 15 and 16.*

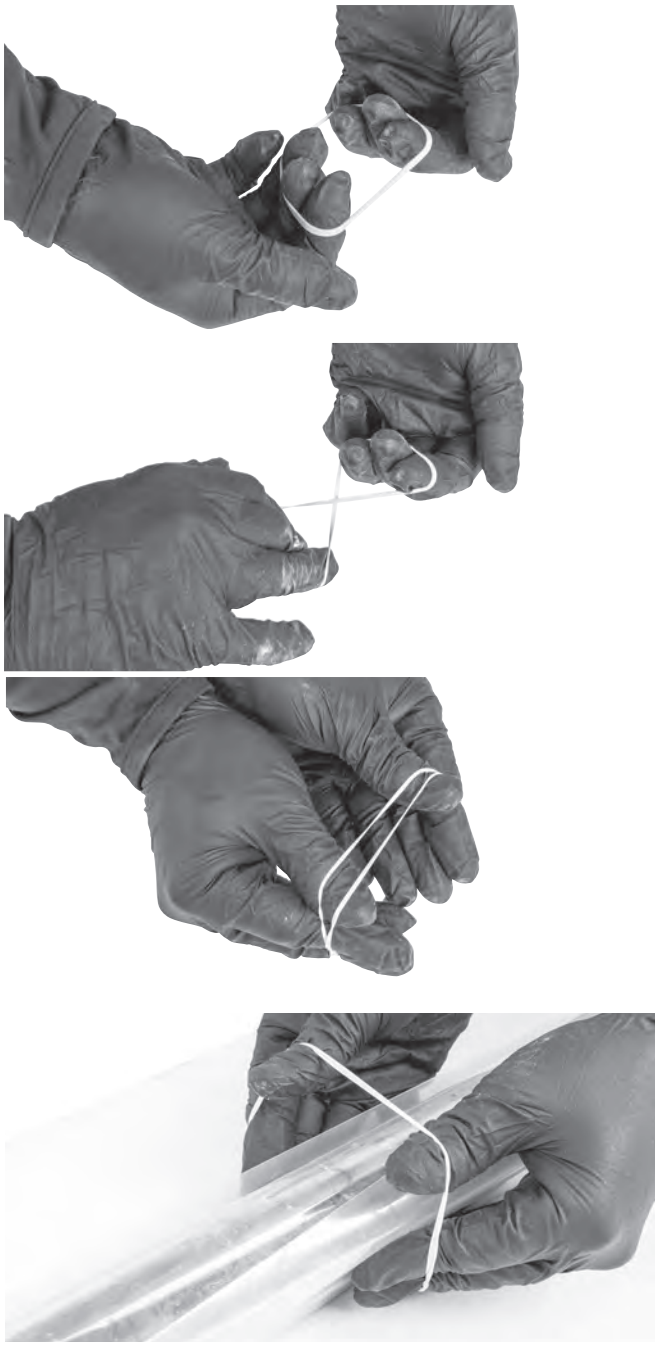


Figure 15 – Doubling Over Elastic Bands

Figure 16 – Elastic Band Placement On Packer Sleeve (Every 12")

10. Secure the sleeve at the back end of the packer with tape, similar to the front. Wrap the tape around the metal end of the packer, down over the curve of the end of the packer. Wrapping the tape down over the curve of the packer end is important for proper retention of the sleeve in place. *See Figure 17.*

Figure 17 – Securing The Sleeve With Tape At The Back Of The Packer

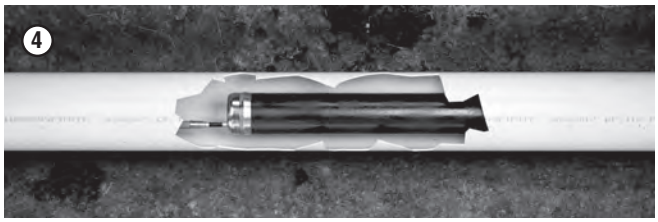
11. Roll the sleeve back to allow access to the air push rod connection and pull rope tie off point. Securely connect a single air push rod (or the air hose) and tape the connection. Securely connect the pull rope *(see Figure 10)*. Roll the sleeve down the length of the rod and rope and securely tape the end of the sleeve. *See Figure 18.*

Figure 18 – Packer With Packer Sleeve Installed, Ready For Use

Packer Test Insertion

The packer test insertion ensures that the packer and equipment can navigate the pipe to the damaged section in the required time and be retrieved without damage. This increases the likelihood of a successful patch. Do not attempt to install the patch without first doing a test insertion. Consider the additional thickness that the containment/patch will add to the packer during patching and whether that will prevent proper insertion of the patch. If you cannot place the packer in the required time during the test insertion, do not attempt to patch the pipe.

This is general guidance on packer insertion. Every jobsite is different and requires the skill and good judgment of the installer to choose proper methods and practices. For instance, a second access point on the other side of the patch may be required. This allows an additional pull rope to be fed through the pipe and attached to the front of the packer to help pull the packer into place.



ENSURE PACKER CAN BE NAVIGATED TO THE PATCH LOCATION BY PERFORMING A TEST INSERTION

1. Make sure that the correct packer is properly prepared, including the installation of a packer sleeve. Containment is not typically needed for test insertion.
2. The packer sleeve can be lubricated with a small amount of oil soap to simulate the lubricity of the resin on the packer. The optional accessory ball and spring guide can be used in place of the packer ball for improved navigation.
3. Carefully insert the packer into the pipe system. Monitor the amount of time it takes to insert the packer.

4 Insert packer so that the distance mark on the air push rod or air hose is near the same point at the pipe entrance. Determine if it will be possible to navigate the packer and the patch to the patch site before the patch resin hardens. DO NOT INFLATE packer during test insertion. Installing the patch is time sensitive and if it is difficult or takes too much time, it can cause the patching process to not work.

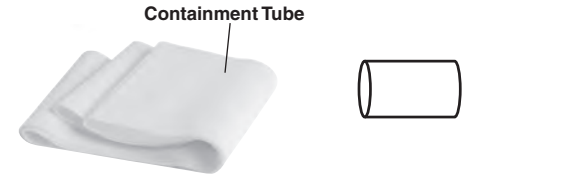
5 Reinspect the drain with camera. Confirm that the packer is in the correct spot to apply the pipe patch.

6. Using the pull rope, retrieve the packer from the pipe system. Do not pull on the air push rods, this can damage the air push rods.
7. Remove the used packer sleeve from the packer. Remove the air push rod or air hose assembly from the packer.

Containment

If the packer will be placed such that portions of the packer will be unsupported (such as T's or pipe damage over 1" in diameter, connections, breaks, or the packer extends into a larger size pipe or out of the drain) then containment must be used. Additionally, if the pipe is believed to be brittle (based on material, age, inspection results, etc.), containment should always be used.

Containment can be done with a:



- containment tube (for straight pipes)

- containment liner (loop stitch material) (for use in bends).

Figure 19 – Containment Examples

Containment reduces the risk of the patch bulging into the unsupported area and/or the packer being damaged or bursting. Containment is always done under the packer sleeve and will be removed with the packer after the patch is complete. Because the packer diameter is larger than it normally would be, a pull rope may be needed to pull the packer into place. Containment tube and liner can be reused, but if it is, it should be inspected to make sure that it is in good shape and not damaged.

Containment Tube

The containment tube is used for straight pipes when containment is needed. Containment tubes can be used at one end, both ends or over the full packer.

For Ends Only

Determine the containment tube length. At a minimum, the containment tube should be at least 12" (305 mm) long and must extend at least 4" (100 mm) under the patch. If applying a patch less than full length, the tube can extend more than 4" under the end of the patch, but no less. *See Figure 20*.

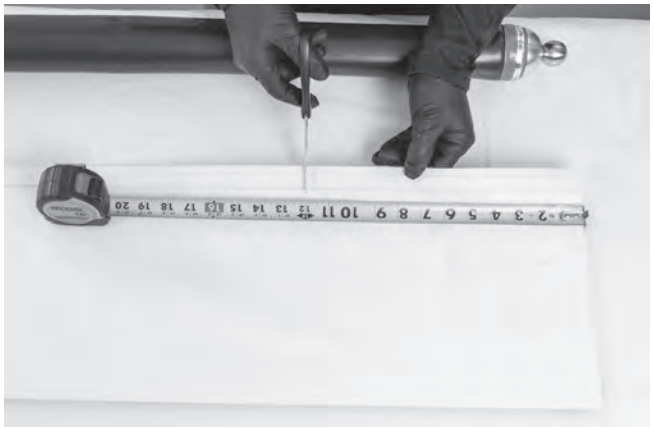


Figure 20 – Minimum Containment Tube Length

1. Using sharp scissors, cleanly and squarely cut the containment tube to length. A clean, square cut will minimize tearing when inflating.
2. Place the containment tube over the packer, lining it up with the end of the packer.
3. Place the packer in the middle of the width of the tube. Fold the edges of the tube up and tight to the packer. *See Figure 21.*

Figure 21 – Folding Containment Tube Around Packer

4. Securely tape the containment tube to the end of the packer *(Figure 22)*. Wrap the tape around the metal end of the packer, down over the curve of the end of the packer, but do not cover the threaded connector.

Back of the Packer

Front of the Packer

Figure 22 – Containment Tube Taped To End of Packer (End Containment Only – Not For Complete Packer)

5. Use provided elastic bands doubled over individually every 9"-12" to keep the containment tube neatly folded and secured to the packer body.
6. Continue building out your packer as normal by installing the packer sleeve.

For Full Packer

1. Measure the Containment tube to cover the entire packer, including the hose and locking connector, *See Figure 23.*

   For the 2" Packer the locking connector does not need to be covered. The length of the containment tube should be the length of the 2" packer plus 4".

Figure 23 – Cutting Containment Tube To Length For Full Packer

2. Using sharp scissors, cleanly and squarely cut the containment tube to length. A clean, square cut will minimize tearing when inflating.
3. Place the containment tube over the packer, lining up with the end of the front metal head of the packer.
4. Place the packer in the middle of the width of the tube. Fold the edges of the tube up and tight to the packer.
5. Securely tape the containment tube to the end of the packer *(Figure 24)*. Wrap the tape around the metal end of the packer, down over the curve of the end of the packer, but do not cover the threaded connector.

Figure 24 – Containment Tube Taped To End Of Packer, Elastic Bands Every 12"

6. Use provided elastic bands doubled over individually every 9"-12" to keep the containment tube neatly folded and secured to the packer body.
7. Continue building out your packer as normal by installing the packer sleeve.

Containment Liner

Containment liner is required when patching through bends to prevent wrinkles. Examples can be large holes or corrosion in a bend. Using containment liner will increase the overall diameter of the packer making it tighter in pipe but will not restrict the packer from navigating the bends. Containment liner has loop stitch on the inside. Containment liner cannot be used as a patch and patch cannot be used as containment liner.

1. Measure the containment liner to cover the entire packer end to end, including the metal ends of the packer. *See Figure 25.*

Figure 25 – Measuring Containment Liner

2. Using sharp scissors, cleanly and squarely cut the containment liner to length.
3. Slide the containment liner onto the packer. Baby powder can be used on the packer to more easily slide the liner over packer.
4. Tightly apply tape to the containment liner over the metal ends of the packer as shown in *Figure 26*. Tape should start where the black rubber of the packer meets the metal head and continue over the rounded end (but not cover the threaded connector). The tightness of the tape over the rounded end holds the containment liner in place. *See Figure 26.* Apply doubled over elastic bands every 12". If needed, the liner can be folded over.

Figure 26 – Packer With Liner, Ends Taped, Doubled Over Elastic Bands Applied Every 12"

5. Continue building out your packer as normal by installing the packer sleeve. Pulling the patch onto the packer with containment liner will be difficult.

Preparing The Patch

Always wear safety glasses and the provided protective gloves when handling the resin. Prepare the patch and resin only on the supplied table covering.

See resin containers and SDS for further information on proper handling and use.

Once the resins are combined, the patching process is time limited and must be completed within the resin working time. If time runs out before the packer is inflated in place, the patch must be disposed of and the process restarted. Be sure all materials, equipment and personnel are available and properly staged to minimize the time it takes to get the patch prepared and in place.

1. Confirm that the packer is correctly prepared. Any needed containment should be in place and the packer sleeve installed.
2. Lay the patch next to the packer, centered along the length. Confirm that there are equal lengths of black rubber packer at either end of the patch – these are the encroachment zones. Encroachment zones are important to the proper installation of the patch. If the patch is too close to the ends of the packer (in the encroachment zone), the end of the patch will not be held tightly to the pipe inside diameter and the patch may not work. *See the Specifications Table* for the minimum encroachment zone for each packer.

   Encroachment Zone - The area at each end of the packer that will not expand to the full to the pipe diameter when inflated. The patch **CANNOT** be in this zone. If the patch is in this zone, the patch will not be proper and may block the pipe. The encroachment zone is measured from the point where the black rubber meets the metal end of the packer. This zone is 3" long for the 2" & 3" packers and 5" long for the 3"-4" & 4"-6" packers.

   If containment is being used on the packer, the end of the encroachment zone can be found by feeling for the transition from the hard metal end of the packer to rubber section.

   If the encroachment zones are less than specification, then the patch should be carefully trimmed with sharp scissors to allow at least the minimum encroachment zone at either end of the packer.

   Once patch length, position and encroachment zones are confirmed, using a permanent marker, mark the end locations of the patch on the packer sleeve. *See Figure 27.*

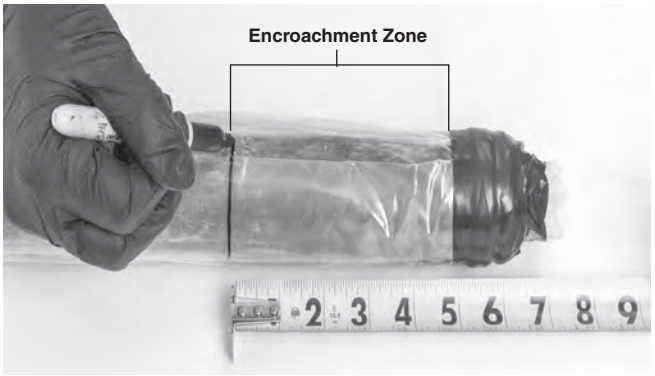


Figure 27A – Marking Encroachment Zone/Patch Ends On Packer Sleeve

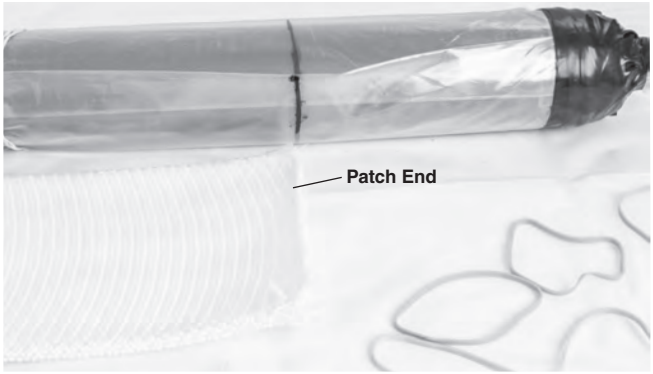


Figure 27B – Marking Encroachment Zone/Patch Ends On Packer Sleeve

Wet Out Patch With Resin

Mixing Resin

3. Confirm that you have the correct patch resins – you will always be mixing a set of two containers, one marked "Part A" and one marked "Part B". Both containers should be marked for the same length of the patch (32" or 3'). If making a 6' patch you will need two sets of 3' containers. Confirm the use by date is still good. Do not use out of date resin – this can cause an improper patch.

4. Confirm that the patch resins are within the resin application temperature. If they are outside of the application temperature take appropriate steps to bring them within temperature, such as placing the unopened resin containers in cool or warm water bath. If they are too warm, the resin will harden more quickly, and if too cool, the resin will harden more slowly.

5. Carefully open both resin containers. Pour all of Part A into Part B. Securely replace the cap on resin and vigorously shake the container for at least a minute to thoroughly mix. Record the time that the resins were poured together.

Wet Out Patch Off Packer

This is the generally recommended wet out method. Wetting out the patch off the packer typically makes it easier to fully saturate the patch with the resin. This method cannot be used for the 3"-4" packer.

1. With the patch in the middle of the table covering, mix the resin and carefully open. Pour all the resin mixture on the patch. Do not keep the mixed resin in the container, it will start to heat up and may rupture or melt the container.

   Using your gloved hands, thoroughly work the resin into the patch. The patch should turn the yellow resin color – there should be no white areas. *See Figure 28.* Enough resin is supplied to fully saturate the patch plus some. This excess resin can be left and allowed to dry on the plastic table covering.

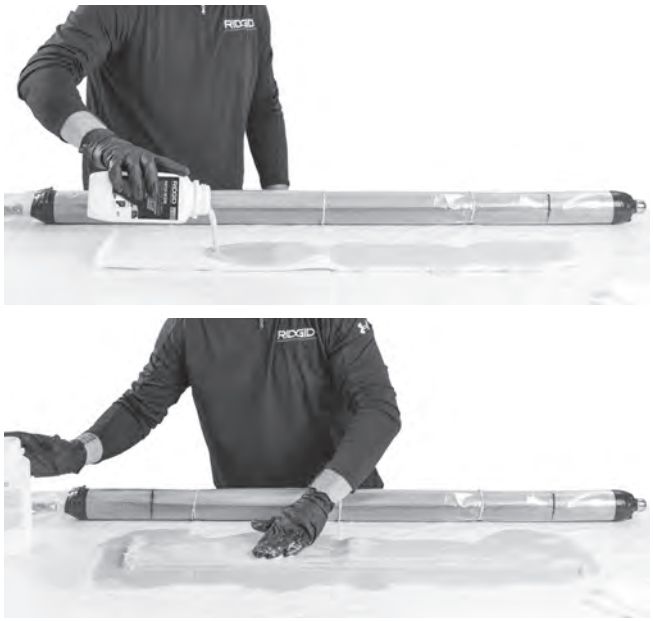


Figure 28 – Wetting Out The Patch Off The Packer

2. Carefully insert the packer into the patch *(Figure 29)*. Do not stretch or deform the patch. Position the patch at the center of the packer assembly. Confirm that the patch is centered and encroachment zones (as marked earlier) are visible at each end. It is important to have the patch centered on the packer to reduce the risk of an improper patch. Confirm that the patch is properly placed relative to any containment tube.

Figure 29 – Inserting The Packer In Patch

3. Gather the excess patch together and fold over neatly *(see Figure 30)*. At the front end of the patch apply a doubled over elastic band at the front edge of the patch and every 1/2" past that until there are 4 elastic bands in place. Continue to place doubled over elastic band every 4" along the remaining length of the patch. Place another 4 elastic bands 1/2" apart at the other end of the packer. *See Figure 31*. **Doubling over and proper placement of the elastic bands is**

important to ensure that the patch stays in place and does not move on the packer. Wipe excess resin off the packer sleeve (not the patch).

Figure 30 – Gathering And Folding The Patch

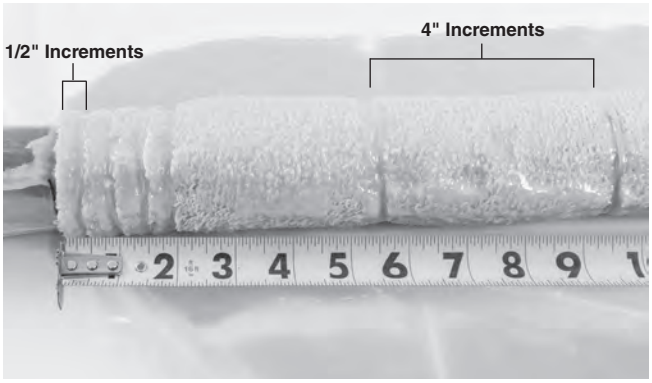


Figure 31 – Placement Of Doubled Over Elastic Band On Patch

Figure 32 – Patch Properly Wet Out And Secured With Doubled Over Elastic Bands

4. The Patch is ready to repair the pipe. Use the plastic table covering around the patch to contain resin and allow it to be carried to the pipe opening.

Wet Out Patch On Packer

This method is always used on the 3"-4" packers and when using containment on the 3" packer. Prior to mixing the resin, carefully insert the packer into the patch. Do not stretch or deform the patch. Position the patch at the center of the packer assembly. Confirm that the patch is centered and encroachment zones (as marked earlier) are visible at each end. It is important to have the patch centered on the packer to reduce the risk of an improper patch. Confirm that the patch is properly placed relative to any containment tube.

1. With the packer and patch in the middle of the table covering, mix the resin and carefully open. Pour all the resin mixture on the patch. Do not keep the mixed resin in the container, it will start to heat up and may rupture or melt the container.

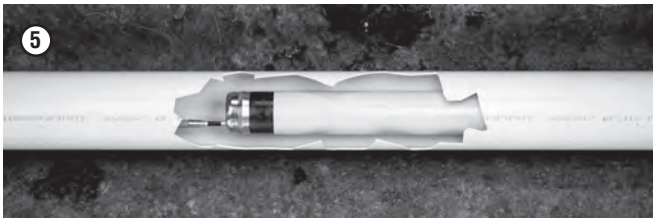
   Using your gloved hands, thoroughly work the resin into the patch. *See Figure 33.* The patch should turn the yellow resin color – there should be no white areas. Enough resin is supplied to fully saturate the patch plus some. This excess resin can be left and allowed to dry on the plastic.

Figure 33 – Wetting Out The Patch On The Packer

2. Reconfirm that the patch is centered, encroachment zone is visible at each end and that the patch is properly placed relative to any containment devices.
3. Gather the excess patch together and fold over neatly. At the front end of the patch apply a doubled over elastic band at the front edge of the patch and every 1/2" past that until there are 4 elastic bands in place. Continue to place doubled over elastic bands every 4" along the remaining length of the packer. Place another 4 elastic band 1/2" apart at the other end of the packer. *See Figure 31*. **Doubling over and proper placement of the elastic bands is important to ensure that the patch stays in place and does not move on the packer.** Wipe excess resin off the packer sleeve (not the patch).
4. The patch is ready to repair the pipe. Use the plastic table covering around the patch to contain resin and allow it to be carried to the pipe opening.

Pipe Patching

1. Change gloves.
2. If needed, attach the ball & spring leader guide to the front of the packer. The leader guide will help the packer negotiate bends and p-traps. Otherwise, if not using a pull rope at the front of the packer, securely install the packer ball.
3. Securely attach the remaining air push rods, pull ropes and air hose assembly to the packer. Tape the connections to reduce the risk of resin getting in the fittings or the connection from coming loose.
4. If needed, a small amount (up to 8 oz.) of an oil type soap can be placed in the pipe to lubricate the equipment as it is inserted.
5. Insert the packer assembly inside the pipe system. Using the information learned from the test insertion, work the patch into the place *(see Figure 7-5)*. When the insertion mark on the air push rod or air hose aligns with the pipe entrance, inspect the patch position with the camera and confirm correct positioning. Patch must be properly positioned prior to inflating the packer. Confirm time since the resin was mixed. Do not exceed the allowable working time. Wrapping the camera inspection head spring with tape can help to prevent resin from accumulating and drying in the spring.



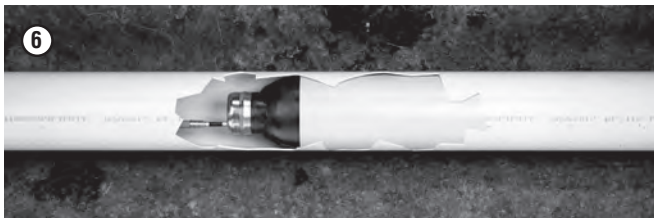
PREPARE THE PATCH AND POSITION THE PACKER IN THE PROPER LOCATION

6. Attach the pressure regulator to the air push rod or air hose.
7. Open the regulator valve. Pull the regulator knob and slowly turn the regulator knob clockwise to inflate the packer to the required air pressure *(Figure 7-6)*. *Refer to the Specifications table* for pressure values for specific packer size. **Note the time that the packer was inflated. If you have exceeded the allowable working time since the resin was mixed, the packer/patch will need to be removed and you will need to start with a new patch. *See Figure 34*.**

Figure 34 – Pressure Gauge

Always use the pressure regulator on packer. Exceeding the maximum pressure, may result in the packer rupturing. Incorrect inflation of packer could result in the patch collapsing, or not opening up to the full pipe diameter. This could also lead to the packer becoming stuck in the pipe.

Once the packer is properly inflated, inspect the patch position with the camera again to confirm correct. Continue to monitor the air pressure to confirm that it does not unexpectedly decrease. Do not shut the regulator valve or change the air pressure.

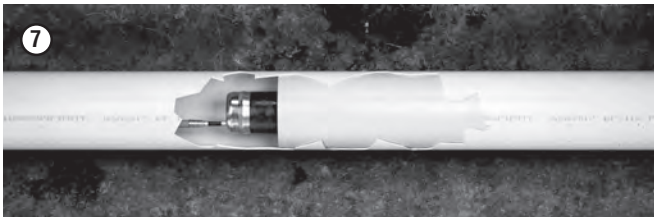


INFLATE THE PACKER TO THE REQUIRED PRESSURE. ALLOW THE RESIN TO CURE FOR THE RESIN SET TIME

Wipe up any spilled resin, allow to harden and dispose.

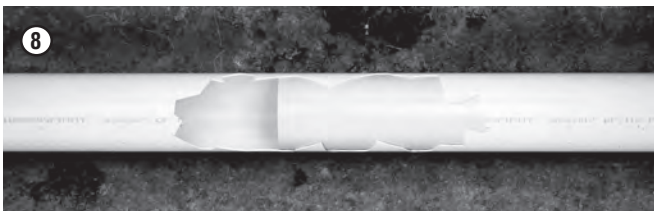
8. Allow the resin to cure for the appropriate amount of time ("Set time"). Generally, the resin set time is 90 minutes. If the internal pipe temperature is below 50°F (10°C), set time is 180 minutes. If the pipe being patched is outside of the resin application temperature range, resin set time will be affected and further adjustments may need to be made. Lower temperatures will increase set time and higher temperatures may decrease set time. **FULL CURE TAKES PLACE AT 4 HOURS** under normal conditions.

   Do not depressurize the packer before the set time is complete. This could cause improper sealing, failure of the patch, and blockage of the pipe.
9. Depressurize the system to loosen the packer assembly from the patch. *See Figure 7-7.*



ONCE RESIN IS CURED, DEPRESSURIZE THE PACKER

10. Remove the air hose connection and pressure regulator from the air push rod.
11. Using the pull rope, retrieve the packer assembly from the pipe system. Do not pull the packer assembly with the air push rods. The air push rods are designed for pushing the packer into place and delivering air into the packer. They are not designed to be used as the primary method of extracting the packer and could break if exposed to undue force.
12. Check the pipe patch with the camera. *See Figure 7-8*.



REMOVE THE PACKER

13. Remove the air push rod sections, pull rope and leader guide from the packer.
14. Clean up the area. Allow excess resin to dry on table covering and dispose.

Installing Multiple Patches

If the damaged area is longer than one patch, or if there are multiple damaged areas, it is acceptable to install multiple patches. When installing multiple patches, generally start with the patch that is the furthest down the line and work back to the access point. Once the first patch has reached its resin set time, the next patch can be started. Patches can be overlapped as necessary - be aware of the additional reduction in diameter from overlapping patches.

Storage

⚠ WARNING Disassemble the air push rod sections. Make sure the equipment is clean. Wrap the air hose and pull ropes. Store the packer and equipment in carry case, or store straight and flat. Do not place anything on the packer – this can damage the packer and cause leaks. The equipment must be kept dry and indoors or well covered if kept outdoors. Store the equipment in a locked area that is out of reach of children and people unfamiliar with pipe patching system. This equipment can cause serious injury in the hands of untrained users.

Maintenance Instructions

⚠ WARNING

The pipe patching system must not be connected to any air connection before any maintenance.

Always wear safety glasses and other appropriate protective equipment when performing any maintenance.

Cleaning

After each use, clean the packer, air push rods and other connections with a damp, soft cloth. A mild detergent or antibacterial solution can be used if desired. Do not use solvents, abrasives or other harsh cleaning agents. Do not let anything into the air connections. Dirt, liquids, etc. in the air system can damage the regulator and packer and prevent proper operation.

Wipe off the dried resin using a paper towel.

Once the packer is clean, apply baby powder to the black rubber portions of the packer. This will help protect the rubber and allow sliding between the packer and the packer coverings during use.

Check air connections/threads, clean as necessary.

Packer Testing

Test the packer to check for leaks and for proper inflation. Do not test packer outside of properly sized pipe to avoid equipment damage and burst hazard..

1. Install a packer sleeve on the packer.
2. Take a straight length of pipe matching the packer diameter rating and at least one foot longer than the packer. Make sure that pipe inside is clean and free from debris.
3. Install a single air push rod to the packer. Insert the packer inside the pipe, centering it in length.
4. Turn the regulator knob all the way counter-clockwise to lower the pressure to zero. Close the regulator valve. Attach the pressure regulator at the end of air push rod. Attach the compressed air supply to the pressure regulator.
5. Open the regulator valve. Slowly turn the regulator knob clockwise to inflate the packer to the required air pressure. *Refer to the Specifications table* for pressure values for specific pipe size. Shut the regulator valve.

6. Wait for 5 minutes and check the air pressure. If the pressure has dropped, there is a leak, do not use the packer until the leak is fixed. Leaks in the connections may be able to be fixed by tightening connections or lubricating seals. If the packer itself is leaking, it can be sent for service.
7. After the test is complete, depressurize the system and disassemble.

Service And Repair

⚠ WARNING

Improper service or repair can make machine unsafe to operate.

Service and repair on the Pipe Patching system must be performed by a RIDGID Authorized Independent Service Center. Use only RIDGID service parts.

For information on your nearest RIDGID Authorized Independent Service Center or any service or repair questions, *see Contact Information* section in this manual.

Optional Equipment

⚠ WARNING

To reduce the risk of serious injury, only use accessories specifically designed and recommended for use with the RIDGID Pipe Patching System, such as those listed below.

Catalog No.	Description
74658	Pipe Patch Starter System - 2" Pipe x 32" Repair
74663	Pipe Patch Starter System - 3" Pipe x 32" Repair
74673	Pipe Patch Starter System - 3-4" Pipe x 3' Repair
74683	Pipe Patch Starter System - 4-6" Pipe x 3' Repair
74693	Pipe Patch Kit - 2" Pipe x 32" Repair
74698	Pipe Patch Kit - 3" Pipe x 32" Repair
74703	Pipe Patch Kit - 3-4" Pipe x 3' Repair
74708	Pipe Patch Kit - 3-4" Pipe x 6' Repair
74713	Pipe Patch Kit - 4-6" Pipe x 3' Repair
74718	Pipe Patch Kit - 4-6" Pipe x 6' Repair
74723	Pipe Patch Containment Kit for 2" Packer
74728	Pipe Patch Containment Kit for 3" Packer
74733	Pipe Patch Containment Kit for 3-4" Packer
74738	Pipe Patch Containment Kit for 4-6" Packer
74743	Pipe Patch Packer - 2" Pipe x 43" Length
74748	Pipe Patch Packer - 3" Pipe x 43" Length
74753	Pipe Patch Packer - 3-4" Pipe x 4' Length
74758	Pipe Patch Packer - 3-4" Pipe x 7' Length
74763	Pipe Patch Packer - 4-6" Pipe x 4' Length
74768	Pipe Patch Packer - 4-6" Pipe x 7' Length
74773	Pipe Patch Air Push Rod - 5' Length
74783	Pipe Patch Air Regulator
74798	Pipe Patch Ball & Spring Leader Guide for 3-4" & 4-6" Packers
74803	Pipe Patch 2" Ball Guide for 3-4" & 4-6" Packers
74808	Pipe Patch Flexible Adapter - 3-4" Packers
74813	Pipe Patch Flexible Adapter - 3" & 4-6" Packers
74818	Pipe Patch Standard to Lockable Air Adapter
74823	Pipe Patch Pull Rope - 250' Length
74828	Pipe Patch 100' Air Hose - Fittings Included
74838	Pipe Patch 1/4" Steinco F/F Lockable Coupling
74848	Pipe Patch “D” Ring for 3-4" & 4-6" Packers
74873	Pipe Patch Quick Links (Qty-2)
74863	Pipe Patch Resin Only - 3' Patch
74878	Pipe Patch Resin Only - 32" Patch
74858	Pipe Patch Elastic Bands for 3", 3-4" & 4-6" Packers
74853	Pipe Patch Carry Bag
74868	Pipe Patch Tape
75358	Pipe Patch Elastic Bands for 2" Packers
75368	Pipe Patch “D” Ring for 2" & 3" Packers
74883	Pipe Patch Air Gauge
74888	Pipe Patch Ball & Spring Leader Guide for 2" & 3" Packers
74893	Pipe Patch 2" Ball Guide for 2" & 3" Packers

Disposal

Parts of this equipment contain valuable materials and can be recycled. There are companies that specialize in recycling that may be found locally. Dispose of the com-ponents in compliance with all applicable regulations. Contact your local waste management authority for more information.

Pipe Patching Checklist

Follow all instructions and warnings for the Pipe Patch System.

1. All materials and equipment are available, inspected and ready for use ..... ❑
2. Resin use by date is current and not expired ..... ❑
3. Patch location has been inspected and is appropriate ..... ❑
4. Patch location has been thoroughly cleaned and flushed ..... ❑
5. Packer test insertion has been successfully completed ..... ❑
6. Packer containment has been properly evaluated and applied as needed ..... ❑
7. Packer sleeve properly installed on packer ..... ❑
8. Patch is properly prepared. Length, position & encroachment zones have been confirmed and patch end points have been marked on packer sleeve ..... ❑
9. Resin temperature is within resin application temperature ..... ❑
10. All of resin part A poured into resin part B container. **Record time** _____. Shake vigorously for one minute. Packer must be inflated and patch in place within 15 minutes of pouring resins together ..... ❑
11. Patch is properly wet out on/off packer ..... ❑
12. Patch is properly secured to packer with pipe patch rubber bands ..... ❑
13. Patch/packer proper inserted to correct location and confirmed in proper location with camera ..... ❑
14. Packer inflated to proper pressure: **Record time** _____. ..... ❑

    Packer Inflation Pressures

    2" - 43psi (3 bar)

    3" - 60psi (4.2 bar)

    3" - 4" - 50psi (3.5 bar)

    4" - 6" - 36psi (2.5 bar)

    Packer must be inflated and patch in place within 15 minutes of pouring resins together. If you have exceeded the allowable working time since the resin was mixed, the packer/patch will need to be removed and you will need to start with a new patch.

15. Patch position re-inspected with the camera to confirm proper location ..... ❑
16. Resin has been allowed to set for an appropriate amount of time ..... ❑

    Resin Set Time

    90 Minutes (Internal Pipe Temperature 50°F to 68°F (10°C to 20°C))

    180 Minutes (Internal Pipe Temperature 41°F to 49°F (5°C to 9°C))

17. Depressurize and remove packer. **Record time** _____. ..... ❑

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