Chemical Grouts
Hydrophobic polyurethane grouts:

**DeNeef CUT PURe** - is a hydrophobic polyurethane that, when mixed with Cut Cat PURe and makes contact with water, is designed to fill large voids in rock fissures, gravel layers, joints and cracks in concrete structures and for the cut-off of gushing water. Depending on the temperature and amount of accelerator used, the grout quickly cures to a rigid, closed cell polyurethane foam that is resistant to most organic solvents, mild acids, alkali, petroleum and micro-organisms.

ANSI/ NSF 61 certified for potable water.
Cut PURe:  • 50 gallons in a metal drum sealed under dry nitrogen.  • 5 gal metal pail sealed under dry nitrogen.
Cut Cat PURe Accelerator:  • 32 oz. cans.

**DeNeef SOIL PURe** - is a hydrophobic polyurethane that, when used alone or with Soil Cat PURe, is designed to increase the bearing capacity of permeable soil. In its uncured form, Soil PURe is a blackish-brown nonflammable liquid. When it comes in contact with water, the grout slightly expands and, depending on temperature and amount of accelerator used, quickly cures to a very dense open cell foam that is essentially unaffected by corrosive environments and microorganisms.

ANSI/ NSF 61 certified for potable water.
Soil PURe:  • 50 gallons in a metal drum sealed under dry nitrogen.  • 5 gal metal pail sealed under dry nitrogen.
Soil Cat PURe Accelerator:  • 25 oz. cans.

**DeNeef CFL PURe** - is a hydrophobic polyurethane grout that, when mixed with Flex Cat PURe, is designed to fill voids outside a structure. It may also be used in applications with high pressure flowing water. In its uncured form, CFL PURe is an amber colored, non-flammable liquid. When it comes into contact with water, the grout expands and depending on the temperature and amount of accelerator used quickly cures to a tough flexible closed-cell polyurethane foam that is essentially unaffected by corrosive environments.

ANSI/ NSF 61 certified for potable water.
CFL PURe:  • 50 gallons in a metal drum sealed under dry nitrogen.  • 5 gal metal pail sealed under dry nitrogen.
Flex Cat PURe Accelerator:  • 25 oz. cans.

**DeNeef Flex LV PURe** - is a hydrophobic polyurethane that, when used alone or with Flex Cat PURe, is designed to form a flexible gasket or plug in joints and cracks in concrete. When it comes into contact with water, the grout expands and depending on temperature and amount of accelerator used quickly cures to a tough flexible, closed-cell foam that is essentially unaffected by corrosive environments.

ANSI/ NSF 61 certified for potable water.
Flex LV PURe:  • 50 gallons in a metal drum sealed under dry nitrogen.  • 5 gal metal pail sealed under dry nitrogen.
Flex Cat PURe Accelerator:  • 25 oz. cans.

**DeNeef INJECTO® PURe** - is designed to form a flexible water tight gasket in injected joints. In its uncured form, INJECTO® PURe is a pale yellow nonflammable liquid. When it comes into contact with water, the grout expands and quickly cures to a tough flexible, closed-cell foam that is essentially unaffected by corrosive environments.

ANSI/ NSF 61 certified for potable water.
INJECTO® PURe:  • 50 gallons in a metal drum sealed under dry nitrogen.  • 5 gal metal pail sealed under dry nitrogen.

**DeNeef Flex SLV PURe** - is a very low viscosity hydrophobic polyurethane that, when used with Flex Cat PURe, is designed to form a flexible gasket or plug in very tight joints and hairline cracks. In its uncured form, Flex SLV PURe is a pale yellow, nonflammable liquid. When in contact with water the grout expands and depending on temperature and the amount of accelerator used quickly cures to a tough, flexible, closed cell polyurethane foam that is essentially unaffected by corrosive environments.

ANSI/ NSF 61 certified for potable water.
Flex SLV PURe:  • 50 gallons in a metal drum sealed under dry nitrogen.  • 5 gal metal pail sealed under dry nitrogen.
Flex Cat PURe Accelerator:  • 25 oz. cans.

Hydrophilic polyurethane grouts:

**DeNeef Sealfoam PURe** - is a nonflammable hydrophilic polyurethane resin designed to form a flexible gasket or plug in joints and cracks in concrete. In its uncured form, Sealfoam PURe is a pale yellow liquid. When it comes into contact with water, the grout expands quickly and cures to a tough, flexible, adhesive, closed-cell foam that is essentially unaffected by mildly corrosive environments.

ANSI/ NSF 61 certified for potable water.
Sealfoam PURe:  • 50-gallons in a metal drum sealed under dry nitrogen  • 5-gallon metal pail sealed under dry nitrogen.  • 10.5 oz. cartridges, Side-by-Side Cartridge 2 x 10.5oz
HA Multigel NF - is a hydrophilic polyurethane resin designed to react with water and form a water impermeable mass. In its uncured form, HA Multigel NF is a pale yellow, nonflammable liquid. When it comes into contact with water, the grout begins to foam or gel, depending upon the temperature and the amount of water present, and quickly and cures to a flexible, impermeable foam or gel mass unaffected by mildly corrosive environments.

HA Multigel NF: • 50-gallons in a metal drum sealed under dry nitrogen • 5-gallon metal pail sealed under dry nitrogen.

TWO COMPONENT URETHANES SUMMARY

DeNeef ROCK-TITE B3 - is a high-density, two-component polyurethane foam. It contains no CFC's or HFC's to create its cellular structure. Density of the product is formulated for 15-20 lb. per cubic foot. Pour temperatures remain stable between 120°F-130°F @ 8" lifts. Foam cream times may be adjusted from 30 seconds out to 2 minutes depending on requirements.

Rock-Tite B3: • 50-gallons in a metal drum • 5-gallon metal pail.

DeNeef ROCK-TITE 6 - is high-density, two-component polyurethane, water blown foam. It contains no CFC's or HFC's to create its cellular structure. Density of the product is formulated for 6 lb. per cubic foot. Pour temperatures remain stable between 120°F-130°F at 8" lifts. Foam cream times may be adjusted from 10 seconds out to 2 minutes depending on requirements.

Rock-Tite 6: • 50-gallons in a metal drum • 5-gallon metal pail.

DeNeef AQUA-TITE - is a very fast reacting two-component polyurethane foam formulated to stop large flows of water. It contains no CFC's or HFC's. Density of the product is formulated for 4 lb. per cubic foot. Pour temperatures remain stable between 70°F-100°F. Foam cream times may be adjusted depending on requirements. Call the Technical Service Department if adjustment is needed.

Aqua-Tite: 10 gal units (2 x 5 gal. metal pails with flex spouts) 100 gallon units (2 x 50 gal in metal drums) Side by side cartridges (6 x 600 ml sets per case)

DeNeef DENEFOAM 200 – is a low-density, two-component, polyurethane HCFC Blown Spray Foam sealant that can be used to seal and fill voids. Denefoam 200 cures to ridged foam.

Denefoam 200: • 28 lb Disposable kits yielding 14 ft$^3$ of foam • 100 lb Returnable steel drums yielding 50 ft$^3$ of foam.

DeNeef DENE-LIFT 400- is a rigid, two component slab lifting polyurethane foam develops high compressive strength rapidly to lift slabs. Good dimensional stability and adhesion to concrete.

DeNeef FLOTATION FOAM- is a two component low density rigid polyurethane foam for filling in various construction voids and cavities that require a light weight, fire retardant foam.
<table>
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<td>Pure WATER REACTIVE</td>
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<tr>
<td>Cut Pure             X X X X X X X X X X</td>
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<td>Soil Pure             X X X X X</td>
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**ANISNS F61 APPROVED FOR POTABLE WATER**

**STRUCTURAL**

**WATER CUT-OFF**

**CRACK SEALING**

**CRACK OVERBANDING**

**STABILIZATION**

**SLAB STABILIZATION**

**PERMEATION GROUTING**

**COMPRESSION GROUTING**

**SPECIALTY GROUTING**

**PORT GROUTING**

**CURTAIN GROUTING**

**UNDER SEALING**

**OAKUM SEALING**

**HMA SEALING**

**HYDRAULIC CEMENT**

**COMPOUND SEALANT**

**HYDROPHILIC RUBBER**

**WATERSTOP**

**POST INJECTABLE**

**CONSTRUCTION JOINTS**

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**DN-053**

**REvised 09/2013**
CRACK INJECTION PROCEDURES

Polyurethanes, as well as some acrylics and acrylates, are commonly installed into joints and cracks for the purpose of stopping leaks and sealing voids. This process is very reliable if these steps are followed.

STEP 1: IDENTIFY AND PREPARE THE CRACK SURFACE

This step helps to identify the characteristics of the crack to be injected.

• Use a wire brush to physically remove mineral deposits and dirt
• Water can be used to help clean the area
• If severe deposits exist, a chemical cleaner can be used, but MUST be neutralized prior to continuing.
• If it is a wide crack or high water flows are encountered, it will be necessary to seal the surface of the crack with a surface sealing material; (example: hydraulic cement, epoxy gel, or oakum saturated with polyurethane grout).

• The surface sealing can be done before or after drilling the injection holes.

STEP 2. MARK PORT SPACING

PART A

Calculate Port Distance From Crack

Unlike epoxies, polyurethanes are injected at an angle to intersect the crack at its midpoint, allowing for a complete seal.

To intersect a crack at its mid-point, drill at a 45 degree angle at a distance of one half the thickness of the wall. For example with a 12 inch thick wall, drill holes 6 inches from crack.

Drilled holes should intersect the crack or joint at its mid-point. Grout can then easily travel towards the front and back of the crack, filling other voids along the way.

Injection pressure and the expansion pressure of the foam cause the resin to seal the entire width of the substrate, and secondary cracks, as well as various other defects that may be present, ensuring a water tight seal.

PART B

Polyurethanes are injected to allow port-to-port travel. Port spacing is determined by the width of the crack.

• The narrower the crack, the closer the ports must be placed.
• The wider the crack the further apart they can be placed.
Ports are alternated from side to side to ensure intersection of the crack as well as to prevent a weak side of the crack.

Packers or injection ports are supplied with a one-way ball valve or check valve.

STEP 3. DRILLING THE INJECTION HOLES

The standard drill hole will be 1/2” or 5/8” in diameter, proportional to the packer being used.

- Drill at a 45 degree angle, alternating sides, as described above.
- Flush drill holes with water to remove dust and debris before inserting packer.

STEP 4. INSTALL INJECTION PORTS OR PACKERS

A variety of packers that are suited for various types of applications are available.

- Place the selected packer in the drilled 1/2” or 5/8” diameter hole so that the top of the sleeve is just below the concrete surface.
- Tighten by a ratchet, socket or open-end wrench by turning clockwise until firm and secure.

STEP 5. PREPARE INJECTION EQUIPMENT

When using grouts that are water activated, it is necessary to have two pumps on site. One for water, the other for grout. Never use the water pump for grouting. Always ensure that water is never introduced into the grout pump.

Using a washing agent, flush the grout pump prior to injection and immediately after injection.

Flushing the pump eliminates the moisture in the pump and hoses and lubricates the system.
STEP 7. INJECTION OF GROUTS

Depending on the nature of the crack, different polyurethane grouts can be injected. Please review the technical data for the proper selection of the grout to be used. Always read and have on site the MSDS for the products used. The following information will provide help in making the product selection.

**Cut PURe and CFL PURe** are used for non-moving (static) cracks and gushing water.

**Flex LV PURe and Flex SLV PURe** are used for moving (dynamic) cracks or construction joints above and below grade.

**Sealfoam PURe** is used for moving cracks in continuously moist/wet environments.

**Superflex or Superflex AR** (methacrylic acrylate copolymer grouts) are used for extremely tight hairline cracks and spider cracking in moving and non-moving structures.

**Remember: always flush the grout injection pump with washing agent before starting the injection process.**

Begin the injection at the lowest packer installed on a vertical crack, or at the first packer flushed for a horizontal crack. During injection, you will notice that the Grout displaces water from the crack.

- Continue injecting until grout appears at the adjacent packer hole.
- Stop pumping and reinstall the packer in the adjacent hole, tighten and begin injecting on it.
- Continue this process until 3-4 packers have been grouted.
- Disconnect and go back to the first packer and inject all the ports for the second time. Some of the ports may take additional grout and further densify the material in the crack. Continue this process until the length of the prepared crack is injected.

**Note:** Injection pressure will vary from 200 psi to 2500 psi depending on the width of the crack, thickness of concrete and condition of concrete.

STEP 6. FLUSH CRACK

Flushing the crack will ensure that the crack is wet enough to react the grout when it is introduced into the crack.

- Using the water pump, attach the water pump hose to the zerk connector.
- Turn the pump on and inject the crack or joint.
- Continue until water flushes crack clean. Once the drilled holes and the crack have been flushed, the packers can be removed so that migration of the injected grout can be monitored.

[Figure 7. Two pumps: one for water and one for grout.]

[Figure 8. Flushing crack with water.]
STEP 8. RE-INJECT PACKERS WITH WATER

- Re-inject each packer with a small amount of water. This will ensure a full reaction of all resin in the drill holes.

STEP 9. SURFACE CLEANING AND REPAIR

- Use scraper to remove partially cured resin from the surface.
- Fully cured resin can be removed through mechanical methods including grinding.
- Let grout fully cure inside injected areas.
- Cut packers flush with surface or remove packers completely.
- Repair surface with appropriate material.

Inspect the pumping equipment to ensure proper operation and that the hoses that will be used for injection are not crimped, frayed or in need of repair.

STEP 10. EQUIPMENT CLEANING

- Flush grout pump immediately with WASHING AGENT until resin in line is displaced by cleaner. Resin should be washed out into a waste bucket.
- Circulate WASHING AGENT through pump for 10-20 minutes by connecting intake and outlet in an open five gallon pail.
- Flush lines one last time with fresh WASHING AGENT to remove contaminants.
- Store pump and hoses with vegetable oil or other environmentally friendly lubricant to protect lines and fittings.
STEP 12. EQUIPMENT REQUIREMENTS

SUPPLY LIST

1. Airless Pump Model 395st or Equivalent-2 MUST HAVE SEPARATE PUMPS FOR GROUT AND WATER.
2. Injection packers or bang in ports.
3. Face shields and safety glasses.
4. Latex or nitrile Gloves.
5. Plastic 5 gallon Buckets “Clean” - 5 each
6. Trash bags for lining buckets – optional. (Allows buckets to be reused)
7. Roll of 4 or 6 mil poly sheeting.
8. DeNeef Washing Agent for cleaning pumps.
9. Chemical Grout (and catalyst if required).
10. Good quality heavy-duty drill.
11. Drill bit 12 -18 inches long corresponding with packer size.
12. DeNeef Denepox Rapid Gel Epoxy in cartridges or other suitable material for surface sealing cracks.
15. Hard hats, ear plugs, and any other PPE required by the facility owner.
16. MSDS for all products on site.

NOTE:
Our recommendations for use of the product are based upon many years of actual field application and are believed to be reliable and should be used as a guide. This procedure may be modified to suit the actual jobsite conditions. However, since field conditions vary widely, the user must determine the suitability of the product for the particular use and specific method(s) of application.

www.deneef.com

Technical Service 1-800-732-0166

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users’ consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.–Conn., 82 Whittier Avenue, Cambridge, MA 02140.

In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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DN-055   Printed in U.S.A.   12/11   FA/PDF

Revised 08/2013
Injection Procedures

Mark and drill injection port holes. Holes should be drilled at 45 degree angles to intersect crack at center.

** By drilling ports at a 45 you allow resin to be injected in the middle of the crack and expand outwards.**
HAIRLINE OR SHRINKAGE CRACKS:
HYDRO ACTIVE® FLEX LV
HYDRO ACTIVE® FLEX SLV
HYDRO ACTIVE® SEALFOAM NF
SUPERFLEX AR

CONTROL JOINT:
HYDRO ACTIVE® FLEX LV
HYDRO ACTIVE® FLEX SLV
HYDRO ACTIVE® SEALFOAM NF
SUPERFLEX AR

EXPANSION JOINT WITH FAILED WATERSTOP:
HYDRO ACTIVE® SEALFOAM NF
HYDRO ACTIVE® FLEX LV
SUPERFLEX AR
OAKUM SOAKUM (SURFACE SEAL)
GASFAR JOINT SYSTEM
DENE-PLUG / DENE-PLUG HOT

GUSHING LEAK:
HYDRO ACTIVE® CUT
OAKUM SOAKUM (SURFACE SEAL)
## HAIRLINE CRACKS

### EQUIPMENT NEEDED:

<table>
<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Electric Grinder with Masonry Disc or Wire Wheel</td>
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<tr>
<td>2</td>
<td>Rotary Hammer with 5/8&quot; ½&quot;, or 3/8&quot; bit</td>
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<tr>
<td>3</td>
<td>Airless Sprayer With Zerk Coupler</td>
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<tr>
<td>4</td>
<td>Screw Driver or 9/32&quot; Nut Driver</td>
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<td>5</td>
<td>Mechanical Injection Packer</td>
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<tr>
<td>6</td>
<td>Socket Wrench with 3/8&quot; deep well socket and extension</td>
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<td>8</td>
<td>Vice Grips</td>
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<td>9</td>
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<td>Safety Goggles</td>
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<td>11</td>
<td>Rubber Gloves</td>
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<tr>
<td>12</td>
<td>Long Sleeve Shirt &amp; pants</td>
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### MATERIALS NEEDED:

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<tr>
<td>1</td>
<td>HA Flex SLV or HA Flex LV Or HA Sealfoam NF</td>
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<td>2</td>
<td>Washing Agent</td>
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</table>

### START WITH A VISIBLE CRACK

The surface of the crack may need to be cleaned off with a mechanical grinder or a wire brush. Deposits left by effervescence can inhibit full penetration of the grout.

### DRILL INJECTION HOLES

Appropriate sized hole should be drilled at a 45° angle, so that it intersects the crack at roughly ½ the depth of the concrete. Maximum depth required on almost any structure is 18". Hammers with vacuum bits are not recommended.

Cracks tend to veer off in one direction or another below the surface level. Because of this, it may be necessary to stagger injection holes from one side of the crack to the other. This will insure that at least half of the holes intersect the crack.

Hole spacing depends on the width of the crack, but typically is between 6" and 10" for hairline cracks. Holes may be spaced as far apart as 24" on wider cracks. If the concrete being sealed is 6" deep or less, holes should be drilled directly into the crack no more that 6" apart.

On large jobs a 20' test section should be injected to determine the most feasible and economic port spacing.

### FLUSH INJECTION HOLES

A flush wand that will reach the back of the injection holes should be used to flush out the drilling dust. USE ONLY CLEAN WATER TO FLUSH OUT THE HOLES. It is very important to get the holes as clean as possible, otherwise the dust will clog up the crack and inhibit penetration of the grout.

### INSTALL PORTS

Mechanical packers should be used in weak concrete or for deep drilling. Packers should be inserted until the top of the rubber sleeve is flush with concrete. If the rubber is not flush with the concrete it may either spall the concrete when tightened down or blow out when the injection pressures start to rise. Use a 3/8" deep well socket to tighten the Packers.

The tips should be left off of all the Packers until you are ready to flush the crack. Bang-in ports are an excellent choice for good concrete where deep drilling is not necessary. Simply bang them into a 3/8" hole with a hammer.

### FLUSH THE CRACK

Install a tip on the first packer. USE ONLY CLEAN WATER TO FLUSH THE CRACK! Injection pressure should start at 250 p.s.i. and be increased as needed. This will clean dirt and other contaminants out, open the crack up, and insure that enough water is present to activate the grout. A non-staining dye may be added to the water to see where the flush water is coming out and to help separate ground water from flush water.
Start flushing with the injector that is at the bottom of a vertical crack, or at the very end of a crack if it is horizontal. Continue to flush with water until only contaminant free water is flowing out of the crack or the next port. If no water is being pumped through the port, the injection hole may not be intersecting the crack. If this is the case, drill another hole on the other side of the crack and repeat the above steps. Be sure not to cross through the first injection hole. Repeat this process for every port.

Note: The rubber in the Mechanical Packer tends to relax if left in the wall for more than eight hours. This causes the Packer to become loose and may cause blowouts when high pressure is used to inject the grout. To avoid this, the Packers may need to be re-tightened prior to grout injection.

In order to insure that the grout will not set up in the pump and hoses, it is best to use two different pumps – one for flushing and one for grout injection, for injecting into hairline cracks.

INJECT THE CRACK
Always wear safety glasses, rubber gloves and long sleeve shirt and pants when doing any type of pressure injection. See MSDS sheet before working with any DeNeef Construction Chemicals Inc.

Remove the tips from all of the ports. Re-tighten the Mechanical Packers if necessary. Put a tip on the first Packer used to flush and begin injecting DeNeef Construction Chemicals Inc. Patience is a must when doing crack injection. It may take several minutes to get resin flowing into the crack. Increase pressure in 100 p.s.i. increments as necessary. The lowest pressure that will get penetration should always be used, but it may be necessary to increase the pressure as high as 1000 p.s.i. Be very careful when turning the pressures up this high, as the concrete may shear or the Packer can blow out of the hole. This usually results in the technician being sprayed with grout. If grout begins to flow freely from the crack, stop injection to give the material time to activate. The crack would seal enough to begin injection again within a few minutes. If the flow does not stop, Dene Plug (rapid setting hydraulic cement) may be necessary to plug the leak. Clean the grout off of the crack as much as possible before applying Dene Plug. It will set within a few minutes.

Note: It is useful for a small amount of grout to drip out of the crack. It allows the technician to see how far the grout has traveled and it will seal itself up within a few minutes. Continue to pump until material has penetrated the entire distance between the first and second Packer. The grout will not always visible travel the entire distance in hairline cracks. Once the further point of grout travel has been obtained, move on to the next Packer and repeat the process.

FLUSH THE PUMP
At the end of the day, the pump should be thoroughly flushed out using DeNeef Washing Agent. Grout left in the pump overnight may set up and ruin the pump.

REMOVE THE PORTS
It is usually best to wait 24 hours before removing the Packers. If it is necessary to remove the Packers the same day, a small amount of water should be injected into each hole before removing. Usually a 3/8” socket and wrench, vice grips, and a small screwdriver are necessary to remove the Mechanical Packers. Bang-in Ports are removed with vice grips.

PATCH INJECTION HOLES
The injection holes should be patched with an epoxy gel (Denepox 125 or Dene Plug).

GRIND GROUT OFF SURFACE
Use an electric grinder with a grinding disc or a wire wheel to remove the grout from the surface. Use caution; a wire wheel can “grab” the grout and be pulled from the technician’s hands. Install a tip on the first packer.
GUSHING LEAKS

EQUIPMENT NEEDED:

1. Electric Grinder with Masonry Disc or Wire Wheel
2. Rotary Hammer with 5/8" ½", or 3/8" bit
3. Airless Sprayer With Zerk Coupler
4. Screw Driver or 9/32" Nut Driver
5. Mechanical Packers or Bang in Ports
6. Socket Wrench with 3/8" deep well socket and extension
7. Flush Wand
8. Vice Grips
9. Hammer
10. Safety Goggles
11. Rubber Gloves
12. Long Sleeve Shirt & Pants

MATERIALS NEEDED

1. HA Cut or HA Flex LV or HA Sealfoam NF
2. Dry Oakum
3. Washing Agent
4. Dene Plug

DRILL RELIEF HOLES/INJECTION HOLES
Reduce water pressure as much as possible. Drill relief holes (also to be used as injection holes) below or at the side of the leak. When the crack is patched the water will be diverted through the relief holes and the pressure on the crack will be reduced. An appropriate size hole should be drilled at a 45° angle so that it intersects the crack at roughly ½ the depth of the concrete. 18 inches is the maximum depth required on almost any structure. DeNeef recommends the use of a heavy-duty rotary hammer for drilling. Hammers with vacuum bits are not recommended.

Cracks tend to veer off in one direction or another below the surface level. For this reason it may be necessary to stagger injection holes from one side of the crack to the other. This will insure that at least half of your holes intersect the crack. Hole spacing depends on the width of the crack, but typically for gushing leaks only a few holes are necessary.

FLUSH INJECTION HOLES
This is not necessary if water is running out of the holes. A flush wand that will reach the back of the injection holes should be used to flush out the drilling dust. USE ONLY CLEAN WATER TO FLUSH OUT THE HOLES. Make sure to get the holes as clean as possible to insure penetration of the grout.

APPLY THE SURFACE SEAL
Dene-plug (a fast setting hydraulic cement) to clean, sound concrete. If the crack is extremely wide, the Oakum Soakum Technique may be used (see Dry Oakum)

INSTALL PORTS
½" and 5/8" Packers are mechanical injection ports. Install so the top of the rubber sleeve is flush with concrete. If the rubber is not flush with the concrete it may either spall the concrete when tightened down or blow out when the injection pressures start to rise. Use a 3/8" deep well socket to tighten the Packers. Do not beat on the Packer with a hammer. This will damage the threads and the tip will not be able to screw on. Leave off tips of Packers until you inject.

NOTE: The rubber in the Packer tends to relax if left in the wall for more than eight hours. This causes the Packer to become loose and may cause blowouts when high pressure is used to inject the grout. To avoid this, the Packers may need to be re-tightened prior to grout injection.
**INJECT THE GROUT**

Please see MSDS before working with any DeNeef product. Always wear safety glasses, rubber gloves, long sleeve shirts and pants when doing any type of pressure injection. It is best to use two different pumps – one for flushing and one for grout injection.

Grout may be injected as a single component or two components. For two-component injection, a two-component pump with a static mixing chamber at the end of the hoses may be used. DeNeef Products can be mixed at a 1:1 ratio of grout to water. The mix ratio has only a slight affect on cured properties of grout. Call DeNeef 800 732-0166 for more information on pumping equipment.

If, after surface sealing, you are still encountering problems with water flow, inject HA Cut with a maximum dose of Cat. The HA Cut reacts very fast and expands up to 2,000%. It will seal off the leak very quickly. If the crack is expected to move HA Cut requires a catalyst, and should be poured into a mixing bucket and mixed with the proper amount of Cut Cat. See technical literature or label on pail for proper mix ratio. Do not allow any moisture to enter the pail.

In most pressure injection procedures it is necessary to leave the tips off of all the Packers that haven’t had grout injected through them. They allow air and water to vent out of the crack. Failure to do this will result in excess pressure building up in the crack and possible cause further damage to the structure. This is not always necessary with a gushing leak. If the leak is bad, the pressure will vent to the water source. Remove the tips from all of the Packers. Re-tighten the Packers if necessary. Put a tip on the lowest Packer and begin injecting DeNeef. The lowest pressure that will get penetration should always be used (250 p.s.i. minimum). But it may be necessary to increase the pressure as high as 1000 p.s.i. Be very careful when increasing pressure. If the surface seal blows out and grout begins to flow freely from the crack, Dene Plug may be necessary to re-plug the leak. Clean the grout off of the crack as much as possible before applying the Dene Plug. It should set within a few minutes. Continue to pump until material has penetrated the entire distance between the first and second Packer. The grout should begin to flow out of the second Packer. If this occurs, put the tip on the second Packer and continue to pump into the first.

**FLUSH THE PUMP**

At the end of the day the pump should be thoroughly flushed using Washing Agent non-flammable solvent. Material left in the pump overnight may set up.

**REMOVE THE PACKERS**

In a gushing leak, the packers can usually be removed within an hour after injection is completed using a 3/8” socket and wrench, vice grips, and a small screwdriver.

**PATCH INJECTION HOLES**

Seal the injection holes to a depth of one inch with an epoxy gel: (Denopox Gel 125 or Dene Plug)

**GRIND GROUT OFF SURFACE**

Use an electric grinder with a grinding disc or a wire wheel to remove any excess grout from the surface. Use caution, a wire wheel can “grab” the grout and be pulled from the technician’s hands.
EXPANSION JOINTS AND WIDE CRACKS

EQUIPMENT NEEDED:
1. Electric Grinder with Masonry Disc or Wire Wheel
2. Rotary Hammer with 5/8", ½", or 3/8" bit
3. Sprayer with zerk coupler
4. Screw Driver or 9/32" Nut Driver
5. DeNeef Mechanical Packers or Bang-In Ports
6. Socket Wrench with 3/8" deep well socket and extension
7. Flush Wand
8. Vice Grips
9. Hammer
10. Safety Goggles
11. Rubber Gloves
12. Long Sleeve Shirt & pants

MATERIALS NEEDED:
1. HA Flex LV or HA Sealfoam NF or HA CUT
2. Dry Oakum
3. Washing Agent

START WITH A CLEAN CRACK
Clean the surface of the crack. All loose or unsound material must be removed.

DRILL INJECTION HOLES
Appropriate sized hole should be drilled at a 45° angle, so that it intersects the crack at roughly ½ the depth of the concrete. Maximum depth required on almost any structure is 18". DeNeef recommends the use of a heavy-duty rotary hammer. Cracks tend to veer off in one direction or another below the surface level. For this reason, it may be necessary to stagger injection holes from one side of the crack to the other. This will insure that at least half of the holes intersect the crack.

Hole spacing depends on the width of the crack, but typically is between 6" and 10" for hairline cracks. Holes may be spaced as far apart as 24" on wide cracks. If the concrete being sealed is 6" deep or less, holes should be drilled directly into the crack 4" deep and no more that 6" apart.
On large jobs a 20' test section should be injected to determine the most feasible and economic port spacing.

FLUSH INJECTION HOLES
A flush wand that will reach the back of the injection holes should be used to flush out the drilling dust. USE ONLY CLEAN WATER TO FLUSH OUT THE HOLES. It is very important to get the holes as clean as possible, otherwise the dust will clog the crack and inhibit penetration of the grout.

INSTALL PORTS
Mechanical packers should be used in weak concrete or for deep drilling. Insert until the top of the rubber sleeve is flush with concrete. If the rubber is not flush with the concrete it may either spall the concrete when tightened down or blow out when the injection pressures start to rise. Use a 3/8" deep well socket to tighten the Packers. The tips should be left off of all the Packers until you are ready to flush the crack. Bang-in ports are an excellent choice for good concrete where deep drilling is not necessary. Simply bang them into a 3/8" hole with a hammer.

FLUSH THE CRACK
Install a tip on the first packer. USE ONLY CLEAN WATER TO FLUSH THE CRACK! Injection pressure should start at 250 p.s.i. and be increased as needed. This will clean dirt and other contaminants out, open the crack up, and insure that enough water is present to activate the grout. A non-staining dye may be added to the water to see where the flush water is coming out and to help separate ground water from flush water.
Start flushing with the injector that is at the bottom of a vertical crack, or at the tightest end of a horizontal crack. Continue to flush with water until only contaminate free water if flowing out of the crack or the next packer. If no water is being pumped through the packer, it is probably because the injection hole does not intersect the crack (this is a dead hole). If this is the case, drill another hole on the other side of the crack and repeat the above steps. Be sure not to cross through the first injection hole. Repeat this process for every port.
Note: The rubber in the Mechanical Packer tends to relax if left in the wall for more than eight hours, which may cause blowouts when high pressure is used to inject the grout. To avoid this, the Packers may need to be re-tightened prior to grout injection.

APPLY THE SURFACE SEAL:
A surface seal (Dene Plug) must be applied in order to contain the grout within a wide crack (make sure crack is clean). If the crack is extremely wide, the Oakum Soakum technique may be used (see Dry Oakum). If water is gushing out of the crack, remove the tips from the Packers. They will act as a vent to reduce the water pressure on the crack making it easier to apply the surface seal.

INJECT THE GROUT
Please see MSDS sheet before working with any DeNeef Construction Chemicals Inc. products. Always wear safety glasses, rubber gloves, and long sleeve shirts and pants when doing any type of pressure injection. In order to insure that the grout will not set up in the pump and hoses, it is best to use two different pumps—one for water and one for grout. Grout may be injected as a single component or two components. For two-component injection, a two-component pump with a static mixing chamber at the end of the hoses may be used.

H A Sealfoam NF and H A Flex LV are the best materials on the market for injecting into wide cracks. Leave the tips off of all the Packers that have not had grout injected through them. They will allow air and water to vent out of the crack. Failure to do this will result in excess pressure building up in the crack and possibly cause further damage to the structure. Remove the tips from all of the Packers. Re-tighten the Packers if necessary. Put a tip on the first Packer used to flush and begin injecting grout. Patience is a must when doing crack injection. It may take several minutes to get resin flowing into the crack. Increase pressure in 100 p.s.i. increments as necessary. The lowest pressure that will get penetration should always be used, but it may be necessary to increase the pressure as high as 1,000 p.s.i. Be very careful when turning the pressures up this high. If you are not careful, the concrete may shear or the Packers may blow out of the hole. This usually results in the technician being sprayed with grout. If the surface seal blows out and grout begins to flow freely from the crack, stop injection to give the material time to activate. It should be able to seal the crack enough to begin injection again within a few minutes. If the flow does not stop, Oakum Soakum may be necessary to re-plug the leak. Clean the grout off of the crack as much as possible before applying the Oakum Soakum. It should set within a few minutes.

NOTE: It is useful for a small amount of grout to drip out of the crack. It allows the technician to see how far the grout has traveled and it will seal itself up within a few minutes. Continue to pump until material has penetrated the entire distance between the first and second packer. The grout should begin to flow out of the second port. Once the furthest point of grout travel has been obtained, move on to the next port and repeat the process.

FLUSH THE PUMP
At the end of the day, the pump should be thoroughly flushed out using “DeNeef Washing Agent”. Grout left in the pump overnight may set up and ruin the pump.

REMOVE THE PACKERS
It is usually best to wait 24 hours before removing the Packers. Before removing Packers, a small amount of water should be injected into each hole before removing. Usually a 3/8 socket and wrench, vice grips, and a small screwdriver are necessary to remove the Mechanical Packers. Bang-in Ports are removed with vice grips.

PATCH INJECTION HOLES
The injection holes should be patched to a depth of one inch with an epoxy gel (Denepox 125 or Dene Plug)

GRIND GROUT OFF SURFACE
Use an electric grinder with a grinding disc or a wire wheel to remove the grout from the surface. Use caution; a wire wheel can “grab” the grout and be pulled from the technician’s hands.
PROCEDURE FOR SEALING FLOOR SLAB JOINTS: OPTION 1

1. ROUT AND CLEAN JOINT TO A DEPTH OF ½ THE THICKNESS OF THE CONCRETE SLAB (9 18 INCHES ON A 36 INCH SLAB).
2. MAKE SURE JOINT IS A LEAST ¾ INCHES WIDE.
3. SATURATE OAKUM IN DE NEEF HYDRO ACTIVE * FLEX LV BY SUBMERGING IN PRODUCT, FOLLOWED BY SUBMERGING IN WATER.
4. IMMEDIATELY PLACE SATURATED MATERIAL IN JOINT AT THE DEPTH ½ THICKNESS OF THE SLAB (PREVIOUSLY CLEANED).
5. ALLOW TO CURE APPROXIMATELY 40 MINUTES.
6. PLACE DE NEEF SIS SYSTEM HOSE DIRECTLY ON THE SATURATED MATERIAL, RUNNING HOSE IN MAXIMUM 20 FOOT LENGTHS.
7. PLACE CLOSED CELL BACKER ROD IN JOINT APPROXIMATELY 6 INCHES ABOVE THE SIS SYSTEM.
8. MAKE SURE SIS SYSTEM INJECTION ENDS ARE STICKING OUT THROUGH THE CLOSED CELL BACKER ROD.
PUMP DE NEEF HYDRO ACTIVE * FLEX LV THROUGH THE SIS SYSTEM, UNDER LOW PRESSURE AS REQUIRED IN THE INJECTO INSTALLATION INSTRUCTIONS.

SECTIONAL VIEW OF CONCRETE SLAB

CLOSED CELL BACKER ROD (TWO AND ONE HALF TIMES) WIDER THAN THE JOINT WIDTH

AREA TO BE GROUTED WITH DE NEEF HYDRO ACTIVE * FLEX LV

OAKUM SATURATED IN DE NEEF HYDRO ACTIVE * FLEX LV AND WATER

DENEEF SIS SYSTEM INJECTABLE HOSE

24-36 INCH CONCRETE SLAB

¾" INCH JOINT
PROCEDURE FOR SEALING FLOOR SLAB JOINTS: OPTION 2

1. ROUT AND CLEAN JOINT TO A DEPTH OF \( \frac{1}{2} \) THE THICKNESS OF THE CONCRETE SLAB 9 18 INCHES ON A 36 INCH SLAB).
2. MAKE SURE JOINT IS A LEAST \( \frac{3}{8} \) INCHES WIDE.
3. SATURATE OAKUM IN DE NEEF HYDRO ACTIVE® FLEX LV BY SUBMERGING IN PRODUCT, FOLLOWED BY SUBMERGING IN WATER.
4. IMMEDIATELY PLACE SATURATED MATERIAL IN JOINT AT THE DEPTH \( \frac{1}{2} \) THICKNESS OF THE SLAB (PREVIOUSLY CLEANED).
5. ALLOW TO CURE APPROXIMATELY 40 MINUTES.
6. PLACE CLOSED CELL BACKER ROD IN JOINT APPROXIMATELY 6 INCHES ABOVE THE BOTTOM SEAL.
7. INSERT \( \frac{3}{4} \) INCH INJECTION NEEDLE THROUGH THE UPPER BACKER ROD SEAL.
8. PUMP DE NEEF HYDRO ACTIVE® FLEX LV ACCELERATED WITH 1% FLEX CAT UNDER LOW PRESSURE TAKING INTO CONSIDERATION THE EXPANSION OF 3-5 TIMES FOR THE DE NEEF HYDRO ACTIVE® FLEX LV.

24-36 INCH CONCRETE SLAB

SECTIONAL VIEW OF CONCRETE SLAB

CLOSED CELL BACKER ROD (TWO AND ONE HALF TIMES) WIDER THAN THE JOINT WIDTH

\( \frac{3}{8} \) INCH JOINT

OAKUM (TWO AND ONE TIMES LARGER THAN CRACK WIDTH) SATURATED IN DE NEEF HYDRO ACTIVE® FLEX LV AND WATER

DE NEEF
CONSTRUCTION CHEMICALS, INC.
PROCEDURE FOR SEALING FLOOR SLAB JOINTS: OPTION 3

1. ROUT AND CLEAN JOINTS TO A DEPTH OF 1/2 THE THICKNESS OF THE CONCRETE SLAB (18 INCHES ON A 26 INCH SLAB).
2. ANGLE DRILL THROUGH CONCRETE TOWARDS THE JOINT, 1/2 TO 3/4 DIAMETER HOLES THROUGH THE CONCRETE SLAB. HOLES SHOULD BE 6-8 INCHES OFF THE JOINT AND SHOULD ALTERNATE SIDES. INSERT PACKERS.
3. SATURATE OPEN CELL BACKER ROD IN DE NEEF HYDRO ACTIVE ® FLEX LV BY SUBMERGING IN PRODUCT, FOLLOWED BY SUBMERGING IN WATER.
4. IMMEDIATELY PLACE SATURATED MATERIAL IN JOINT AT THE DEPTH 1/4 TO 1/2 THICKNESS OF THE SLAB (PREVIOUSLY CLEANED).
5. ALLOW TO CURE APPROXIMATELY 40 MINUTES.
6. PUMP POTABLE WATER INTO EACH PORT TO ENSURE MOISTURE FOR REACTIVITY WITH GROUT.
7. PUMP HYDRO ACTIVE ® COMBI GROUT ACCELERATED WITH 2% FLEX CAT UNDER LOW AS REQUIRED TAKING INTO CONSIDERATION THE EXPANSION FACTOR OF 10-12 TIMES FOR THE EXPANSION DE NEEF HYDRO ACTIVE COMBI GROUT. WATCH FOR PORT TO PORT TRAVEL TO ENSURE COVERAGE.
8. REMOVE PORTS AND REPAIR DRILL HOLES USING DE NEEF DENEPLUG, RAPID SET MORTAR
PROCEDURE FOR SEALING FLOOR TO WALL JOINTS: OPTION 1

1. ANGLE DRILL THROUGH CONCRETE TOWARDS THE JOINT, ½ INCH DIAMETER HOLES THROUGH THE CONCRETE SLAB. HOLES SHOULD BE A MAXIMUM OF 9 INCHES OFF THE JOINT AND DETERMINED BY SLAB THICKNESS, MIDPOINT INTERSECTION DESIRED.
2. SPACE DRILL HOLES A MAXIMUM OF 12 INCHES APART. SPACING WILL VARY DEPENDING ON THE WIDTH (TIGHTNESS) OFF THE JOINT.
3. INSERT ½ INCH PACKERS.
4. PUMP POTABLE WATER INTO EACH PORT TO ENSURE MOISTURE FOR REACTIVITY WITH GROUT.
5. PUMP DE NEEF HYDRO ACTIVE ® FLEX LV ACCELERATED WITH 3% FLEX CAT UNDER MODERATE PRESSURE AS REQUIRED, TAKING INTO CONSIDERATION THE EXPANSION FACTOR OF 6-8 TIMES FOR DE NEEF HYDRO ACTIVE ® FLEX LV.
6. WATCH FOR PORT TO PORT TRAVEL TO ENSURE COVERAGE.
7. REMOVE PORTS AND REPAIR DRILL HOLE USING DE NEEF DENEPLUG, RAPID SET MORTAR.

PORT HOLES ARE ANGLE DRILLED THROUGH SLAB TO INTERSECT THE JOINT AT APPROX. HALF THE THICKNESS OF THE SLAB. DRILL OFF THE JOINT 7 TO 9 INCHES IN MOST CASES.

MAXIMUM SPACING WILL BE 12 INCHES BETWEEN DRILLED PORT HOLES.
PROCEDURE FOR SEALING FLOOR TO WALL JOINTS: OPTION 2

1. ANGLE DRILL THROUGH CONCRETE TOWARDS THE JOINT, \( \frac{1}{2} \) INCH DIAMETER HOLES THROUGH THE CONCRETE SLAB. HOLES SHOULD BE A MAXIMUM OF 6 INCHES OFF THE JOINT, MIDPOINT INTERSECTION DESIRED.

2. SPACE DRILL HOLES A MAXIMUM OF 12 INCHES APART. SPACING WILL VARY DEPENDING ON THE WIDTH (TIGHTNESS) OF THE JOINT.

3. INSERT \( \frac{1}{2} \) INCH PACKERS.

4. PUMP POTABLE WATER INTO EACH PORT TO ENSURE MOISTURE FOR REACTIVITY WITH GROUT.

5. PUMP DE NEEF HYDRO ACTIVE ® FLEX LV ACCELERATED WITH 3% FLEX CAT UNDER MODERATE PRESSURE AS REQUIRED, TAKING INTO CONSIDERATION THE EXPANSION FACTOR OF 6-8 TIMES FOR DE NEEF HYDRO ACTIVE ® FLEX LV.

6. WATCH FOR PORT TO PORT TRAVEL TO ENSURE COVERAGE.

7. REMOVE PORTS AND REPAIR DRILL HOLE USING DE NEEF DENEPLUG, RAPID SET MORTAR.
Pipe Estimating Guide for Oakum and Resin

The estimation guide below is for a joint width of 1 1/2” to 2 1/2”. All values are approximate.

<table>
<thead>
<tr>
<th>I.D. of Pipe</th>
<th>Length of Oakum (ft)</th>
<th>Gallons of Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>24”</td>
<td>6 1/2</td>
<td>0.7</td>
</tr>
<tr>
<td>30”</td>
<td>8</td>
<td>1.4</td>
</tr>
<tr>
<td>36”</td>
<td>9 1/2</td>
<td>1.7</td>
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<tr>
<td>42”</td>
<td>11</td>
<td>1.9</td>
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<tr>
<td>48”</td>
<td>12 1/2</td>
<td>2.2</td>
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<tr>
<td>54”</td>
<td>14</td>
<td>2.5</td>
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<tr>
<td>60”</td>
<td>15 1/2</td>
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<tr>
<td>120”</td>
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</tr>
</tbody>
</table>

Revised 07/2013
Challenge:
Ground water infiltrates through open joints and cracks in underground pipes, increasing the effluent volume and raising treatment costs. In addition, this water carries fine soils into the pipes leaving exterior voids. Eventually this can lead to pipe collapse, sink holes, and even roadway failure.

Solution:
Point grout injection of chemical grout, DeNeef® Cut PURe or ROCK-TITE 6, into the voids and around the pipe. This fills the voids, stabilizes the soil, and stops ground water from infiltrating into the pipe. Any voids under the roadway due to sinkhole settlement can also be point grouted.

Procedure:
1. Locate pipe leak with remote TV camera. Place camera on the upstream side of the leak.
2. Measure from the manhole to a location in the street directly above the leak.
3. Drill holes through the roadway, on each side of the pipe, directly above the leak.
4. Air or water-jet the injection probes to a depth of one foot below the invert of the pipe.
5. Connect the grout pump to one injection probe and inject approximately one gallon of chemical grout. Remove this injection probe from grouting zone.
6. Monitor leaking area with the remote TV camera. If leak does not stop after the first injection, pump an additional one gallon of chemical grout through the second injection probe.
7. Immediately remove the second injection probe from the grout zone. If leakage continues, repeat steps 4 through 7.
8. Raise injection probes to within 18-24 inches below the bottom of the roadway.
9. Pump approximately one gallon of chemical grout through each probe to fill any voids and stabilize the roadway.

www.deneef.com

Technical Service  1-800-732-0166

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.–Conn., 62 Whittemore Avenue, Cambridge, MA 02140.

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ACCESSORIES

Hydraulic Zerk Connector

F-Assembly

High Pressure Ball Valve Assembly

Button Head Connectors: Neoprene (L) and Nylon (R)

Grout Injection Needle 1/8” or 1/4” diameter

www.deneef.com

Technical Service 1-800-732-0166

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Packers

Top to bottom:
• Blue 5/8” OD High Pressure Packer, zerk fitting, 2.9” long, 2” extension available.
• Red 1/2” OD High Pressure Packer, zerk fitting, 2.9” long, 2” extension available.
• Green 5/8” OD Mechanical Packer, zerk fitting, 2.8” long.
• Yellow 1/2” OD Mechanical Packer, zerk fitting, 2.8” long.
• Black 1/2” OD Extended Mechanical Packer without zerk, 3.5” long.
• Black 1/2” OD Extended Mechanical Packer with zerk, 3.8” long.

Top to bottom:
• Injecto Packer for use with INJECTO® Tube.
• Plastic 3/8” Drive In Packer, zerk fittings included.
• Plastic 1/2” Drive In Packer, zerk fittings included.
• Button Head Packer 0.66” diameter without zerk, 4” long.
• Button Head Packer 0.66” diameter with zerk, 4” long.
Packers

Top to bottom:

• Injecto Form Holder Packer for use with INJECTO ® Tube.

• Epoxy Port for epoxy crack injection.

• 2” extension for High Pressure (red and blue) injection packers.

• Combi Packer 1/2” OD 3.4” long.