



Installation Instructions for the PIG[®] Well Pad Containment Liner

The PIG[®] Well Pad Containment Liner should only be installed by crews trained by New Pig. New Pig offers this training on site. Installation by an untrained crew will void the warranty.

1. Site Preparation

- 1.1. Prior to liner installation, the pad site shall be graded and vibratory rolled in with #2A Modified type of stone. Soft or compressible areas which cannot be satisfactorily compacted should be removed and replaced with properly compacted fill. All surfaces to be lined shall be smooth and free of all loose stones, sharp objects, or debris of any kind. The sub base shall provide a firm, unyielding foundation with no steep changes, voids or abrupt breaks in grade.

NOTE: Capping and vibratory rolling in the sub base with a maximum 1-1/2" of 1B stone will greatly reduce rock punctures due from heavy equipment traffic.

IMPORTANT: Do not place the liner directly on cement dirt (cement mixed with soil). The hardened cement-dirt will not allow debris or sharp rocks to be pushed down into it. This will result in punctures to the liner. When cement-dirt is present, cover it with at least 3 inches of #2 stone.

- 1.2. It is the installer's responsibility to ensure the site's sub-base has been adequately prepared prior to liner installation.

2. Laying Out the Pad

- 2.1. Pad layout should be square or rectangular with corners laid-out at a 90° angle.

- 2.2. When laying out the site for the liner, the layout lines need to account for the extra liner length and width required for the berms. The overall length and width of the layout need to be increased based on the type of berms to be used, as recommended below:

- New Pig's Drive-Over Foam berm: 4' per layout side
- 8" plastic corrugate pipe: 3' per layout side
- Other types or diameters of berms: Determine the perimeter length of berm cross-section plus 8" per layout side.

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- 2.3. Mark the layout with paint using surveying equipment or a taut string pulled between the layout corners. Never sight down imaginary lines to mark the layout. On the side of the pad where the liner installation will begin, it is very important to mark this layout edge perfectly straight. This is the Starting Reference Line and it is used to align the first section of liner.

NOTE: Misalignment of the first section will result in wrinkles and will compound alignment errors in subsequent liner sections.

3. Laying Down the Liner

IMPORTANT: The smooth plastic sealing tabs of the well pad liner are color coded. One tab will have a clear plastic film on so it will appear gray or black in color. The other tab will be tinted with a color blue. This colored tab side should face the ground and the gray/black tab side should face up. If the colored tab is facing up, the liner is installed upside down and needs to be flipped over.

NOTE: Refer to Section 5 for seaming of full width sections of liner with tabs. Refer to Section 8 for a liner cut lengthwise with its seam tab removed.

- 3.1. Use a spreader bar to dispense the liner off the roll. Make sure the material unrolls from the top.



- 3.2. Roll out the pad liner and align the colored tab side with the Starting Reference Line. Cut this section to length per Section 4.

NOTE: It is important to keep the first piece to the Starting Reference Line, but wrinkle free. Pull the liner so the inner gray/black tab is flat and free of wrinkles.

- 3.3. As the liner is being unrolled, weigh down the liner with sandbags to keep it positioned.
- 3.4. Roll out the next piece of pad liner next to the previous piece so that the colored tab is facing down and is on top of the exposed gray/black tab. **Overlap the colored tab 5/8" onto the top surface of the liner.**



NOTE: The liner sections must all be unrolled in the same direction in order to keep the gray/black and colored tabs properly aligned.

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3.5. Refer to Section 5 for seam welding directions.

NOTE: The smooth plastic sides of both tabs must face each other and not be visible from the top when they are overlapped. Weld the two pieces together before rolling out more liner. Welding must be done colored side to gray/black side only or material will not weld properly.

3.6. After welding the seam of the first two pieces, continue this process until the pad site is covered.

NOTE: Never roll out more than one unseamed section of liner at a time. This is to prevent wrinkles and movement of the liner due to wind uplift. This also prevents site traffic damage to the unseamed sections.

4. Cutting the Liner

4.1. Use a safety, straight or small hook utility knife blade.

4.2. Press firmly against the material and cut the desired length.

NOTE: Always follow the customer guidelines for approved cutting tools. Cut-Resistant gloves shall be worn when cutting the liner.

5. Tab-To-Tab Seam Welding

NOTE: The welding operation requires two operators – one to run the wedge welder and an assistant to continuously adjust the seam to the optimum 5/8" overlap.

5.1. Seaming must be done using a solid wedge style automatic welder, such as the DemTech Services, Inc. (www.demtech.com): Pro-Wedge VM-20 with the PVC kit option. Follow all instructions that are provided in the manual.

5.2. Following the instruction manual, adjust the wedge welder to handle the thickness of PIG[®] Well Pad Containment Liner.

5.3. Set the temperature to 550°F and the travel speed to 999 in the low gear (18ft/min).

NOTE: Seam welding in water, mud, snow or excessive moisture should be avoided as this can affect the integrity of the seam. If unavoidable, then clear the seams of mud, snow and free-standing water as much as possible. Adjust

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the wedge welder settings to a starting point of 600°F (never exceed 650°F) and/or set the travel speed to 599 or lower for good seam quality. Never set the speed below 250 on the lower gear.

- 5.4. Make sure the 5/8" overlap of the material is aligned and straight before you begin welding the seam.
- 5.5. Begin seaming from the end of the liner. Start so that the first/previous welded piece of liner is on your left. When feeding material into the machine, the gray/black tab is always on the bottom of the wedge and the colored tab is always on the top of the wedge.
- 5.6. Continue welding the seam along its entire length. The welder's assistant needs to constantly ensure the tab is overlapping 5/8" immediately in front of the welding unit. Avoid stopping in the middle of welding a seam as you will create a burnt area that will need to be patched. (See Section 10 for patching procedure.)
- 5.7. The welding operation creates some puckering along the seam which needs to be laterally pulled out once the welding unit is clear and before the next section is laid out.



- 5.8. When the seam weld is completed, another section of liner can be laid out and its seam welded as detailed in Section 3.

6. In-Field Butt Seaming



The last section of liner pulled off a roll may be too short depending on the pad dimensions. It can be butt welded to another piece of liner to achieve the required length. The butt weld will ensure a liquid-tight seam.

- 6.1. Align first piece of material as stated in section 5.4, but do not weld.
- 6.2. Flip it over the trailing end of the first piece to show its bottom side. This will expose the 2 tabs created during factory seaming. The loose portion of the tabs needs to be trimmed back by 5" to avoid catching on the seaming wedge. This also ensures a liquid-tight seal to the second piece.



- 6.3. Load a new roll to the spreader bar. Overlap the second piece onto the first piece by at least $5 \pm 1/2$ " and dispense the remaining length. Align second piece of material as stated in section 5.4, but do not weld.
- 6.4. Measure and mark the 5" overlap of the second piece of material to the first piece. Trim second piece if needed to obtain the 5" overlap.
- 6.5. Place the end of the first piece on top of the second piece and ensure that both pieces are in a straight line and are not cocked. This can be done by observing their long edges in relationship to the previous welded liner section.
- 6.6. Weld the butt seam using the *DemTech Wedge Welder* set at 650° F and at a speed of 499. The wedge should be set further underneath the overlap as to leave a $1/2$ " unbonded section on the edge of the top section. This is required for the sealant that is applied in step 6.7.



- 6.7. The butt seam needs both poly tabs trimmed back to prevent a void when seam welding tab to tab.



- 6.8. Wedge weld the tab of the butt-welded pieces to the previous laid piece as per Section 5 instructions.

NOTE: Never weld the tab-to-tab seam before butt welding shorter pieces together. Doing so will cause seam leakage.

- 6.9. Apply SilapreneSolidSeal[®] sealant to the exposed ½” flap of the butt seam as per steps 7.2 through 7.4

7. Factory Butt Seams

Rolls of liner 12 feet or wider will occasionally have factory welded butt seams. The butt seams are marked with a red flag or tape. These seams are not liquid tight and need to be seamed in the field. The installer must seal these seams with SilapreneSolidSeal[®] sealant (New Pig Part #: PTY131-BK) to ensure a liquid-tight seal.

- 7.1. The factory butt seam needs both poly tabs trimmed back to prevent a void when seam welding tab to tab as shown in step 6.5.
- 7.2. Place the tip of the sealant tube under the top flap of the butt seam and apply a bead of the sealant to the entire length of the butt seam.
- 7.3. Go around the corners of the top flaps with the sealant to create a liquid-tight seal.
- 7.4. Apply pressure to the seam to spread out the sealant bead further under the flap.

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NOTE: It is recommended to perform the sealing steps (7.2 to 7.4) after completing the tab-to-tab seaming of this piece and the next piece. This prevents fouling of the wedge welder with the sealant.

8. Seaming of Non-Tabbed Long Seams

Occasionally lengths of liner without tabs will need to be seamed along their length to create a liquid-tight seam. This requires a welded lap-type seam with sealant. Also referred to as a “butt weld”.

8.1. Trim edges to be seamed in a straight line so that the width of the piece is constant along its length.

NOTE: Inconsistent width along the length of liner pieces will result in wrinkles and will compound alignment errors in subsequent liner sections.

8.2. Align the second piece of liner so that it overlaps the top of first piece of liner by $5 \pm \frac{1}{2}$ ”.

8.3. Using the wedge welder as set up in Section 6, weld the seam. The wedge should be set further underneath the overlap as to leave a $\frac{1}{2}$ ” unbonded section on the edge of the top section. This is required for the sealant which is applied in step 8.4.



8.4. Apply SilapreneSolidSeal® Sealant to the exposed $\frac{1}{2}$ ” flap of the lap seam as per steps 7.2 through 7.4.

9. Testing the Seams

The installer may be required to non-destructively test all seams over their full length for seam integrity. There are three non-destructive tests that can be used with Pig®



Well Pad Liner according to ASTM D4437: Air Lance Test, Mechanical Point Stressing, or Vacuum Box Testing. If the Vacuum Box Testing is used, the seams must be tested and reported according to ASTM D5641.

9.1. Air Lance Test

- 9.1.1. Inspect all seams for unbounded areas using an air nozzle directed on the upper seam edge and surface to detect loose edges, ripples indicating unbounded areas within the seam, or other undesirable seam conditions.
- 9.1.2. Check all bonded seams using a minimum 50 psi air supply directed through a 3/16 inch nozzle, held not more than 2 inches from the seam edge and directed at the seam edge.

9.2. Mechanical Point Stressing

- 9.2.1. A blunt instrument shall be run along the edge of the seam to find obvious unbounded areas. The procedure shall not puncture or otherwise damage the liner.

9.3. Vacuum Box Testing

9.3.1. Equipment

- 9.3.1.1. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, a vacuum gauge and vacuum source. Unit needs to pull a vacuum level of 3 to 5 in Hg. New Pig recommends using a *DemTech Self Contained Vacuum Plate*.
- 9.3.1.2. Soap solution consisting of approximately 1 teaspoon of liquid dish soap per gallon of water. Alternately, windshield washing fluid may be used.
- 9.3.1.3. A garden pump sprayer for the application of the soap solution.

9.3.2. Procedure

- 9.3.2.1. Wet along the seam of liner with the soap solution for at least the length of vacuum box. The felt surface will wick and spread the solution.

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9.3.2.2. Place the vacuum box over the wet seam and turn it on to create a vacuum of 3-5 in Hg.

9.3.2.3. Examine the seam for soap bubbles created by pinholes. Bubbles due to pinholes will move from the center of the seam to the closest edge of the vacuum box and will not typically trace the seam.

NOTE: If active bubbles are tracing the length of the seam, it is due to the air leaking in between the seam's top surface and the vacuum box's gasket. Allow this bubbling to subside before checking for seam pinholes.

NOTE: Bubbling along the outside edge of the tester is caused by the felt texture and is not due to pinholes.

9.3.2.4. For a period of 10 seconds, examine the liner seam through the viewing window for the presence of pinhole bubbles. If seam pinhole bubbles are detected, mark that seam section for repair.

9.3.2.5. If no pinhole bubbles appear after 10 seconds, release the vacuum and continue checking the rest of the seam.

9.3.2.6. Test all in-field seams, factory seams and liner patches for pinholes.

9.3.2.7. Record all leaks by seam location.

9.3.2.8. All areas where pinhole bubbles appear must be repaired and then retested. Refer to Section 10.

10. Patching the Liner

NOTE: Before patching the liner check the LEL reading. If the reading is zero, proceed with patching.

NOTE: Be sure to comply with customer's requirements on gas testing meters.

NOTE: Cut-Resistant gloves shall be worn patching the liner.

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10.1. Clean and dry the area around the hole or puncture.

10.1.1. Brush off any dirt or debris.

10.1.2. If there is standing water, use a wet vacuum to remove.



10.1.3. To prepare fork tears for patching, place a piece of liner underneath the tear to reinforce the area. Use the hot air gun to tack the reinforcement layer and liner together. This gives strength to the damaged area. Force SilapreneSolidSeal[®] sealant along the edge of the tear.





10.1.4. Once a tear is repaired from the bottom, proceed to patch it as stated in sections 10.1.5. – 10.1.13.

10.1.5. Cut a dry patch 4" -6" larger than the damaged area in all directions.



10.1.6. Apply a generous bead of SilapreneSolidSeal[®] sealant around the hole, puncture or tear.

NOTE: Protect the SilapreneSolidSeal[®] sealant boxes and tubes from precipitation and cold. If they get wet or cold, the tubes may split in the caulking gun.

NOTE: SilapreneSolidSeal[®] sealant starts to set up in 30 minutes to hour. Cold and dry conditions may take longer. Full cure typically takes four hours.



- 10.1.7. Center the patch over the hole or puncture and press down to spread the sealant.



- 10.1.8. Heat tack the patch using a BAK Rion or Leister hot air gun.

- 10.1.9. Set the temperature dial to #7 and aim it between the patch and the liner.

- 10.1.10. Work the heated patch into the liner with a 2" wide roller.

NOTE: Seam rollers wider than 2" should not be used as they do not adequately follow the contours of the sub-base. This can result in a patch that leaks.



10.1.11. Seal the entire perimeter with the hot air gun, making sure all edges are secured and there are no loose flaps.

NOTE: Hold gun at 15-20 degree angle to trap hot air. Avoid dragging your hand as this will scorch the surface of the liner.

NOTE: When the hot air gun tip comes in close proximity to or touches the SilapreneSolidSeal[®] small amounts of smoke are a normal and acceptable occurrence.

NOTE: To avoid coming in contact with the SilapreneSolidSeal[®] with the hot air gun tip when patching, simply roll back one edge of the patch to see the caulking. Place hot air gun tip approximately 1" away from caulking and weld to edge. Repeat this for all four sides. These welds create a cross/plus sign. Weld the remaining corners.

NOTE: Only hot air weld felt to felt. Cut poly edges off of scrap liner.

CAUTION: The tip of the hot air gun gets extremely hot. Never lay it down on the liner or hold it over one spot for a prolonged period of time Cool the gun down by setting temperature to #0 for a few minutes before turning off and storing.

10.1.12. Apply SilapreneSolidSeal[®] sealant to the outer edges of the patch and work it into the felt layer to ensure a liquid-tight repair.

NOTE: Work SilapreneSolidSeal[®] into the felt layer immediately. If bead is not worked in, it may eventually separate from the felt due to traffic.





10.1.13. After the sealant has set (1 to 4 hrs), test the patch with the vacuum box for leaks. Fix any leaks with additional sealant or, if necessary, with a larger covering patch.

11. Berming the Liner

Various materials can be used to form the core of the berm such as railroad ties and plastic corrugated pipe. New Pig recommends using our foam drive-over berm.

NOTE: Hat type berms are not recommended because they are susceptible to leaks.

11.1. Installing New Pig's Foam Drive-Over Berm with stone:

11.1.1. Allow 4' for this style of berm.

11.1.2. Fold back the liner 51" from the painted perimeter line.

11.1.3. Take a 15" wide straight piece of liner and align to the folded edge.

11.1.4. Weld the 15" piece of liner to the folded liner using a Demtech welder (ie. Prayer Seam) or a lap type seal welder. Temperature should be set at 500°F and a speed of 18ft/min.

11.1.5. Place bottom side of foam underneath 15" piece of liner.

11.1.6. Unfold liner back over tucking the liner tight to the foam.

11.1.7. Place stone on the back side of liner ramping it up to the top of berm.



11.2. Installing Other Berm Types:

Many different materials may be used for berming. The following procedures are generalized and may need to be adjusted to suit the particular berm type you are using.

11.2.1. Chalk a reference line on the liner for placement of the berm. Ensure there is enough liner material exterior to the line for forming the berm.

11.2.2. Installing the liner over the top of the berm:

11.2.2.1. Pull back the liner to the reference line and place the berm core material on the ground next to the liner.

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11.2.2.2. If the berm is corrugated or railroad ties, run the liner over the top of the berm and make a mechanical attachment on the outside of the berm using, for example, a washer head screw. Trim to size if needed.

11.2.3. Installing the liner under the berm and then back on top:

11.2.3.1. Set the berm core material along the outside of the reference line.

11.2.3.2. Bring the liner back over the top with the loose end resting on the liner inside the berm.

11.2.3.3. Use a 2" wide roller and the Bak Rion or Leister hot air gun with the temperature dial set at #7 to seal the loose end into the liner.



11.2.3.4. It is recommended to have a 6" to 8" welding tab. To prevent the foam from shifting, this tab must be completely welded.

11.2.3.5. If the liner is wet and an adequate heat seal cannot be achieved, you must dry out the liner using a wet vac. Then take an additional dry piece of liner and sandwich between



the two damp/wet layers welding both sides of the dry piece to the damp/wet.

11.2.3.6. When folding the corners, ensure all liner edges on top of or inside the berm to prevent a leak point lower than the berm height.

11.2.3.7. When berming an inside corner, you must add an additional piece of liner. It must be sealed with SilapreneSolidSeal® sealant (New Pig Part #: PTY131-BK) and a hot air gun.

If you have questions please call our 24/7 Well Pad Liner Customer Service line:

Toll Free

1-855-PIG-LINER (744-5463)

E-mail

pigliner@newpig.com

PIG® Well Pad Containment Liner Installation Instructions Agreement

The undersigned acknowledges that they have read and understood the Installation Instructions, and agrees to install the **PIG® Well Pad Containment Liner** in accordance with these instructions.

Date: _____

Company: _____

Signature of Company Representative: _____

Printed Name of Company representative: _____

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