



# FIELD INSTALLATION GUIDELINES

# Field Installation Guidelines

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## High strength liner systems

Reef Industries, Inc. proudly offers Permalon®, a uniquely engineered, polyethylene geomembrane. Patented construction techniques afford Permalon® products the best strength to weight ratio available with superior tear and puncture resistance as well.

Permalon® is designed to be lightweight and easily handled. Custom fabrication is available to meet specific project requirements. Individual panels of an acre in size are available.

# 800-231-6074

This document provides information related to the installation of liner systems. Included in this document is information to assist in assessing the site, provide guidance on site preparation, estimating staffing and support necessary for the installation and finally, information on installing the liner.

This document does not attempt to address all aspects of an installation for all applications. The information presented is general information in order to familiarize the individual with the overall scope of the project. Specific site criteria should be addressed prior to the start of the project to insure a successful installation.

# Section 1

## Site Evaluation and Preparation

To ensure that the liner will perform as required after installation a thorough site review is required. Items to be considered are substrate, fill and drain lines, utilities that may travel over, under or through the area, debris that may accumulate in the lined area and access to the pond area by personnel or animals.

One of the most important steps in protecting a liner is correct site preparation. Insufficient effort in this area may cause short and long term problems with the liner's performance.

Subgrade preparation is the most important part of the site work. The surface the liner will come in contact with must be smooth and free of rocks, debris and old vegetation. Ideally, the liner should be placed on a 4" – 6" sand base. In some cases, compacting existing subgrade materials and correction of any erosion damage that may exist will provide an adequate surface. Chunks of clay or dirt should be leveled or removed. Material such as crushed rock is not an acceptable surface for the liner.

Vegetation removal is also important. Dry weed stalks or brush become brittle and when broken may cause punctures. Tree roots or stumps should be completely removed or covered with 6" layer of fill dirt.

Underground utilities in the area should be marked prior to liner installation. All water should be drained from the pond and the site allowed to dry prior to installation.

Areas around pipe intrusions such as drain, fill and overflow lines should be smooth. Rip-rap around storm drains should be removed or covered. At least 1' – 2' of pipe needs to be exposed to allow for pipeboot installation.

The anchor trench can be mechanically or manually dug and is normally 6" – 12" wide and 12" – 18" deep. The trench should be located far enough back from the filled elevation of the pond to prevent the trench from being washed out.

Dirt should be placed to the outside of the trench for easy backfilling. The anchor trench can be dug just prior to placement or during liner installation.

Trenches dug too early may fill with dirt requiring the trench be cleaned out during the liner installation.

# Section 2

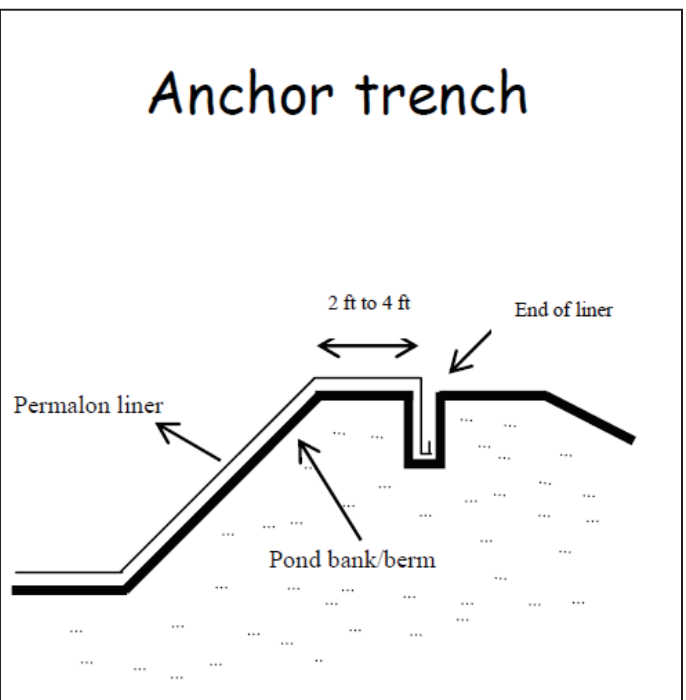
## Determining liner size requirements

The site should be measured to determine sizes required. "As-built" dimensions can vary significantly from blueprints or designed dimensions. Allowances should be made for anchor trenches or other anchoring system required.

Measurements should be generous and allow for slack in the liner once installed.

The pond area should be measured in both directions. For a large pond area several measurements in both directions will provide more accurate information. The tape measure should be placed at the approximate location of the anchor trench and allowed to follow the contours of the slopes and bottom of the cell. Additional length or width should be added to this measurement to account for the anchor trench. 4'-6' per trench is usually sufficient.

Pipe intrusions such as drain, fill and overflow lines should be located and identified. At least 1.5'-2' of pipe needs to be exposed to allow for pipeboot installation. To secure the liner to the pipe intrusion, pipeboots will be required to be fabricated and sealed to the liner in the field. Note the type and size (diameter) of the pipe. The slope where the pipe is located should be noted, also (i.e. 3:1 side slope for a fill line). This information on pipe intrusions must be provided to Reef Industries so that pipeboots can be fabricated and provided as an accessory to the liner for field installation.



## Section 3

### Estimating manpower and equipment needs.

Liners are normally shipped via common carrier. Arrangements must be made to receive the liner and unload it from an enclosed trailer. Care should be taken to avoid puncturing the shipping container with forks or other items during handling.

In addition to heavy equipment that is necessary to move the crates, slings, chain or rope should also be available for pulling or lifting the container. Ropes may be required to secure the liner in the event of wind.

Sandbags are used to secure the liner during and after installation. Sandbags should be installed on the liner on a 15' x 15' grid and along the perimeter on 4'-6' increments. If high winds are expected more sandbags should be used. Handtools normally required are hammers or prybars (for opening the crates), shovels and rakes for performing last minute site preparation and filling sandbags. Gloves should be available for personnel who will be pulling on the liner.

The number of personnel required is dependent on the size and quantity of liner installed. For a 10,000 square foot liner, 3-5 people is generally sufficient. For a 40,000 square foot liner, a minimum of 8 people is required and at least 10 are recommended. Prior to liner placement, personnel may be used for last minute site work, assisting with container handling/opening and for filling sandbags.

Other items may be required depending on location and conditions. Where access is difficult or the unloading point is distant from the liner location, a flatbed trailer may be required to transport the liner.

*Approximate package weights and sizes: Permalon® Ply X-210.*

Liner Size	Weight (liner)	Weight (container)	Container type/size
40' x 100'	325 lbs	55 lbs	48" x 43" x 42" box
100' x 100'	810 lbs	255 lbs	4' x 4' x 4' crate
200' x 200'	3240 lbs	500 lbs	6' x 8' x 12' crate

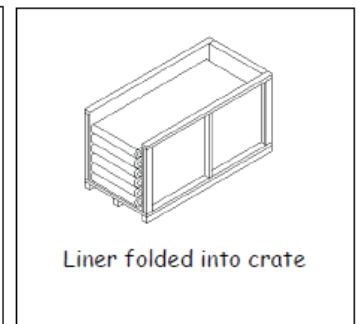
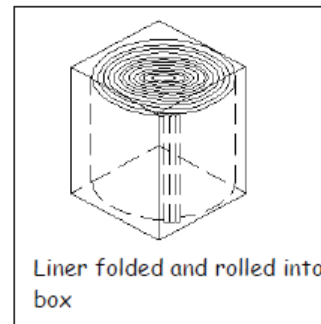
*Approximate package weights and sizes: Permalon® Ply X-210G.*

Liner Size	Weight (liner)	Weight (container)	Container type/size
20' x 50'	117 lbs	55 lbs	48" x 43" x 42" box
40' x 100'	468 lbs	55 lbs	48" x 43" x 42" box
100' x 100'	1170 lbs	500 lbs	6' x 8' x 2' crate

## Section 4

### Uncrating and positioning of liner systems

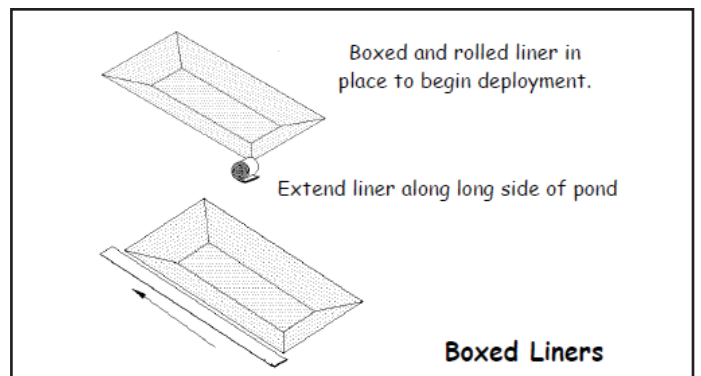
A deployment area must be designated for the site. Sufficient access is necessary for crate positioning, liner unpackaging and deployment. A roadway may be used if sufficiently prepared to prevent liner damage. A recommended width for the deployment area is minimally 20-30 feet. Smaller liners will be accordion folded, then rolled and placed in boxes. Larger liners are accordion folded into wooden crates. Instructions will be attached to the shipping container on how your specific liner has been packaged. Removal from the container and installation directions are also included.



#### **Rolled liners in cardboard boxes**

Smaller liners are packaged to allow them to be unrolled at the pond site. As a general rule, liners of 15,000 square feet or less are accordion folded and then rolled. Rolled liners are packaged and shipped in cardboard boxes. The roll of material is tipped on its end to fit into the box, therefore the liner must be turned and positioned correctly at the site for deployment.

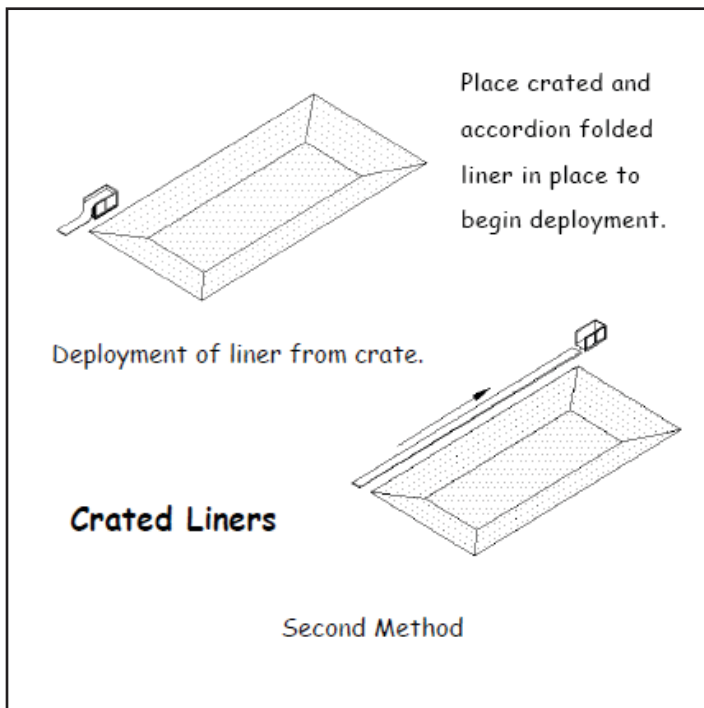
The liner package should be positioned at one corner of the deployment area. To determine how the package should be positioned and in which direction to turn the liner, the top should be removed. EXTREME care should be taken in opening the package to prevent damage to the liner. Once this position has been established the sides of the box should be opened. The liner should be rotated and oriented so that the end of the liner faces the deployment end of the pond. The liner can be unrolled along the length of the pond.



### Accordion folded liners in crates

Larger liners are shipped in wooden crates, both to protect the liner during shipment and to provide a workable package for moving the liner around the work site and to the final pond site. The crates are built of standard construction lumber. A liner is accordion folded across the width of the panel and then accordion folded into the crate. There are two ways to remove the liner from the crate. The method chosen determines the starting location for the crate. The first method requires the crate to be positioned at one corner of the area to be lined. The liner is then pulled from the crate parallel to the long side of the pond.

The second method again positions the crate at a corner of the area to be lined; the leading edge is then pulled from the crate and the crate is pulled backwards, allowing the liner to be deployed as the crate is moved.



The second method is preferred as 1) Potential for damage to the liner is minimized, and 2) Heavy equipment can be used to aid in the removal of the liner from the crate.

The top and marked end should be removed from the crate first. Pry bars and hammers are sufficient for opening the crate. Caution should be used while removing the wooden panels to insure that nails or wood splinters do not damage the liner. Exposed edges should be inspected to insure all nails, wood splinters or other sharp objects have been removed. The liner is now accessible and ready for removal. The leading edge of the liner should be pulled from the crate.

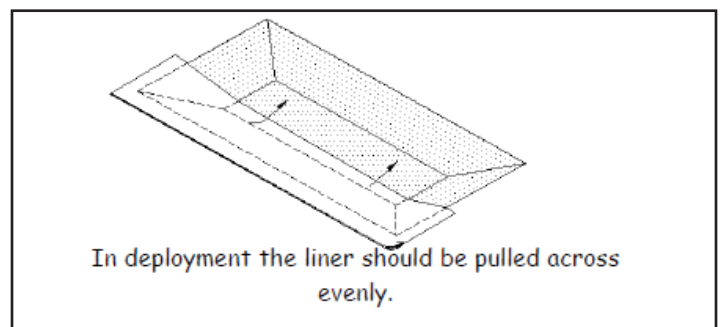
On some occasions the leading edge has been folded under the top fold or flap. To expose the leading edge, the top flap should be folded forward starting at the rear of the crate.

Several personnel may be required to perform this task. Approximately 20' of material should be removed from the crate. If the liner will be pulled along the long side of the pond with heavy equipment, a nylon sling should be wrapped around the liner bundle about 10' from the end and attached to the equipment. Chain or cable should not be used on the liner for pulling.

Personnel should continually watch the deployment area for sharp rocks or other debris that may damage the liner as it is being deployed. Once the liner is totally removed from the crate the sling may be removed.

If the second method of removing the liner from the crate is selected, the leading edge of the liner is removed from the crate and secured. The crate is then pulled backwards. (One method that may be utilized is supporting the rear of the crate with the bucket of a front end loader). A chain can be tied from the top of the bucket around the lower edge of the front of the crate and then back to the top of the bucket. The chain should be snug to insure the crate does not slip off the bucket during liner deployment.

Again, with this method, personnel should watch the area where the liner is being placed to be certain that no rocks are being exposed. Once the liner is fully removed from the crate, deployment across the pond may begin.



In deployment the liner should be pulled across evenly.

### AREAS OF NOTE

Everyone walking on the liner should wear soft-soled shoes! No golf shoes, cowboy boots or high-heels! Liners should never be deployed in high winds. Watch the local weather forecast and be aware of the times of day when strong winds are likely to be a problem. Careful preparation of the area to be lined is very important. Take extra care to remove rocks, debris, tree roots or anything else that might cause a puncture during the installation. It can be helpful to "think it through" before the liner installation actually begins. Walking through the process mentally several times may bring up questions that can be handled before problems develop. Call with questions. We at Reef Industries know that you haven't done this before, and we are here to help.

**1 800 231 6074**

## Section 5

### Placement of a Permalon® Liner

Once the crate materials, tools and other construction items have been removed from the immediate area the liner is ready for deployment across the pond. The pond area should be inspected again at this time to insure that it has been properly prepared.

At this point wind conditions are critical. Liners should not be installed during windy conditions. If excessive wind is allowed under the liner during deployment, the liner will act as a sail and personnel will not be able to control or retain the liner. If the wind is too strong to allow deployment, sandbags or other ballast should be used to secure the liner. Another recommendation is to take short lengths of rope and cinch the liner on about a 20'-30' spacing along the entire length. If the wind picks up and catches the liner edge, this method of securing the liner limits the amount of exposed surface area.

Personnel should be spread evenly along the deployment edge. The optimum spacing for personnel is about 20'-30' apart. The leading edge should be held firmly and the liner pulled across the pond evenly. A site supervisor should coordinate movement across the pond to insure the liner is pulled in unison.

If the liner cannot be pulled across the entire width in one pull, the leading edge should be secured, and personnel moved back to the remaining accordion folded section of the liner. Personnel should then pull the extra material across the pond. Utilizing this method, the liner can be "indexed" into position. The liner should not be pulled too tight. Wrinkles or folds will not affect the performance of the liner. The liner will stretch in warm or hot weather and contract in cool or cold weather. The lined area should be walked after deployment to insure that the liner is lying flat in all areas. Sandbags should be spread across the exposed area to protect against wind damage.

At this point, the perimeter of the liner should be temporarily secured. Allowing the liner to contract overnight and placing a little water or sand bag in the pond before securing the perimeter will help "seat" the liner. The edge of the liner may now be secured in the anchor trench. Extreme care should be taken if covering the bottom area of the pond with backfill or other ballast materials.



Call us at 1 800 231 6074 or visit  
[www.reefindustries.com](http://www.reefindustries.com) for information on other  
Reef Industries, Inc. products.

## Section 6

### Field extrusion welding

Permalon® material used for liner applications is fabricated in the largest panels practical to reduce or eliminate field seams. For those projects where it is impractical to make the cover in a single sheet, multiple panels are used that require field seams.

One method of joining adjacent panels of Permalon® liner material is through the use of field extrusion welding equipment. The process involves applying a hot bead or extrudate over the overlapped panel sections. The extrudate provides a permanent bond between the two panels and consists of materials similar to those used in manufacturing the liner material. The weld has the same chemical, UV, and moisture resistance as the base liner material. If properly performed, this seaming method produces a watertight seam.

Subgrade: General considerations for subgrades are given in Section 1. Considerations for subgrade conditions that are of primary importance for a liner that is to be field seamed include:

- 1) Degree of compaction,
- 2) smoothness, and
- 3) dryness.

Soft subgrades will allow the extrusion welder to bog down, thus making seaming difficult and inconsistent. Rough or irregular subgrades cause irregular seams due to difficulties in maintaining the correct contact angle between welder and liner. Wet subgrades cause two problems: 1) water softens the subgrade, and 2) water acts as a heat sink, drawing heat out of the seam and causing a weak seam.

Preparation: The surfaces to be welded must be clean and dry. It is critical that the individual responsible for the liner installation communicates with the Reef Industries technician and/or sales staff for proper planning. Weather conditions, site conditions, and availability of personnel and equipment must be worked out in advance.

#### IMPORTANT NOTE!!!

##### The following equipment will be required onsite for projects requiring extrusion welding:

- Portable Generator – 5 kW minimum, 220 VAC single phase @50/60 Hz.
- Preferred Receptacle – Hubbell twist-lok, 250V 30A
- Rags, mops, paper towels – Sandbags
- Hammers and pry bars for opening crates.
- Screwdrivers and basic hand tools.



## Section 7

### Working with Fab Tape™ & Permalon® PST Tape

Fab Tape™ is a double sided bituminous adhesive tape which is applied between overlapping panels for field seaming (this is not the recommended method for making long panel seams), field repairs and installation of pipe boots.

Permalon® PST, a 4" wide pressure sensitive tape is used to secure the exposed edge of the top panel to the second panel after bonding with Fab Tape™.

The surfaces that will receive the tape should be clean and dry. Dirty or wet surfaces should be completely cleaned with water, paper towels, dry rags or other materials that will prepare the surface for the tape.

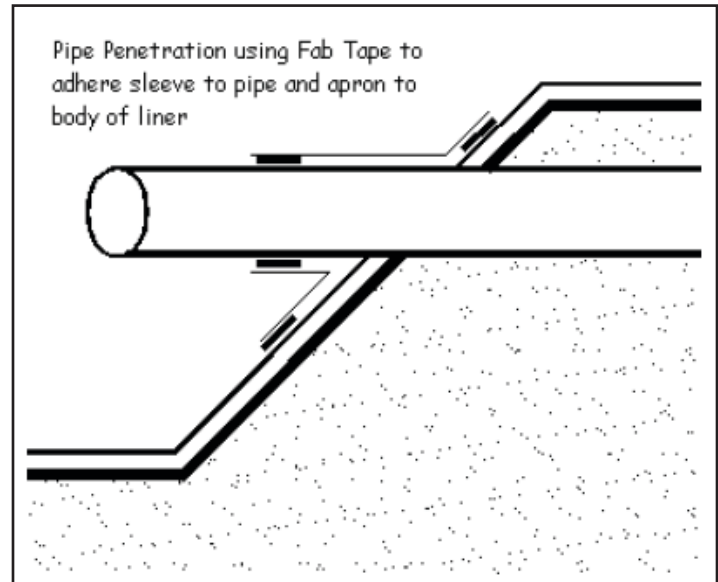
Both of the tape products obtain the optimum adhesion when the surfaces to be bonded are warm. The surfaces should be at least 60°F to insure an acceptable bond. In order to obtain a bond at lower temperatures, external heat may be required. The use of an industrial style hot air blower is one recommended method. Extra care should be taken when attempting to place Fab Tape™ at temperatures below 32°F.

To install Fab Tape™, the overlapping top panel edge should be pulled back approximately one foot. A row of Fab Tape™ should be placed about 2" - 3" away from the edge of the bottom panel. The tape should be applied as straight and as uniformly as possible. The tape should be allowed to follow the contours of the panel and should not be stretched tight. If fold-overs exist in the material, they should be smoothed prior to placement of the tape. Applying firm pressure ensures that the tape is sealed to the material. Once the first row of tape is installed, place a second row of tape approximately 2" away from the first row, following the same steps as for the first row.

After the second row of Fab Tape™ has been installed, the release paper should be removed from both rows of tape and the top panel secured to the bottom. Again, do not pull the material tight during the securing process, as excess tension will eventually result in numerous wrinkles that are difficult to seal. All voids and wrinkles should be sealed with Fab Tape™. The exposed edge of the panel can now be secured to the bottom sheet with a layer of pressure sensitive tape. Apply the tape so that half is on one panel and half on the second panel. Press into place and insure that the tape is secure.

After completion, seams should be inspected to insure that sufficient adhesion has been obtained in all areas. If the tape has not adhered, the tape should be resealed. If the tape has become contaminated with dirt or other foreign substances it should be replaced. The liner should be positioned as necessary to insure that during operation the liner/liner seam will not be under tension.

Pipes and other penetrations through the liner can be sealed by using a pipe boot. This is a flanged tube fabricated at the factory using the liner material. The tube fits over the pipe and the flange is sealed to the liner using Fab Tape™. If required, the open end of the tube may be sealed with Fab Tape™ or gasketed and mechanically sealed.



## Section 8

### Finishing the installation

#### SECURING THE LINER

After the liner has been aligned as necessary and no further shifting is required, the liner can be permanently secured. Sandbags or other ballast may be required to remain on the cover until other fill materials are placed on the liner. \* Spacing of this ballast is determined on a job-by-job basis. Along the perimeter the liner needs to be adequately secured in the anchor trench. A standard anchor trench is approximately 12"-18" deep and approximately 6"-12" in width. The edge of the liner should be placed into the trench and extend along the bottom of the trench. Backfill materials should be used to secure the liner but should not contain any items (rock, wood, scrap metal) which may damage the liner. If excess liner is present, the excess liner can be placed in the anchor trench or trimmed off.

**\* Reef Industries, Inc. recommends backfill and cover for all lining materials where long term service and performance are required. Certain liners must be backfilled and covered; failure to do so will void any warranty coverage. See your sales representative for application specifics and requirements.**

# Section 9

## Field Repairs

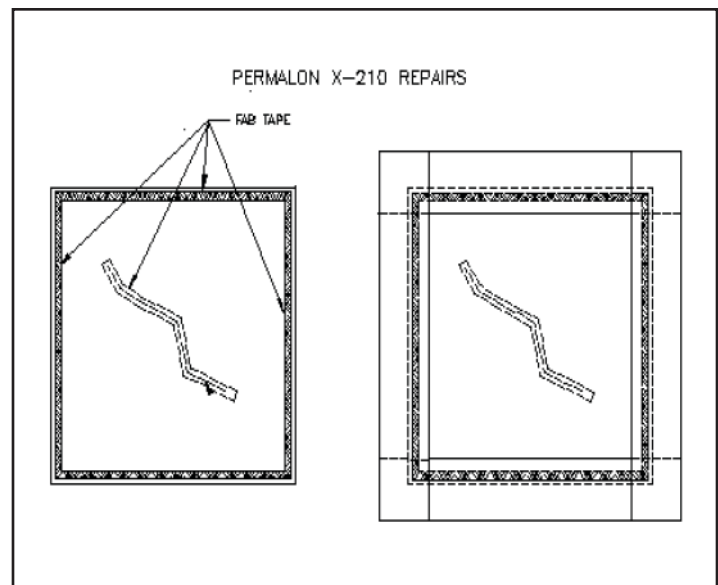
Repairs to liners can be made in the field and consist of patching over cuts or punctures, additions to existing liners or projects where sections of liner need to be removed and new sections added. The condition of the existing liner must be carefully evaluated to determine if a patch or repair is possible.

The success of the patch or repair depends on the liner's environment during use and the location. Seaming should be performed on sections of the liner which have retained their integrity. A liner that has degraded due to long-term exposure may not be repairable and may need to be replaced.

Once the state or condition of the liner has been determined, the area where the repairs or seams will occur should be evaluated. For liners, the sub-grade must be reviewed. Welding needs to be accomplished on a smooth, firm substrate.

The following steps should be followed when preparing an area for welding:

1. The area where the welding is to occur should be clean. All dirt or residue must be totally removed from the weld area. After removal of these deposits, the surface can be cleaned with isopropyl alcohol.
2. Seaming surfaces must be free from moisture. If the weld area is wet or damp the area must be dried. Additionally, field seaming cannot be performed during rain or drizzle or snow conditions.
3. The ambient temperature should be greater than 45 degrees Fahrenheit. Lower temperatures produce greater difficulties in achieving an effective weld.
4. The liner and patch material should be positioned as required minimizing the amount of wrinkles or folds in the weld area. Care should be taken to insure that sufficient material is positioned to insure the liner will not be placed under tension during use. Thermal contraction during cold weather should also be considered.



Small rips and tears in the liner can be repaired with Fab Tape™ and a small Permalon® patch.

1. Surround cut with Fab Tape™. Use this tape liberally.
2. Press patch or Permalon® PST firmly into Fab Tape™.



# Field Personnel Handout

**This handout should be provided to all field personnel who will be handling the liner material.**

The following information should familiarize you with the liner installation process.

- **SAFETY** - The information provided in this handout does not replace or supersede any standard or required safety procedures or information. The activities associated with the liner placement may be a new experience for many or all of the personnel. Remember to work in a method that will not place yourself or others working with you in danger. If you see someone who may be placing himself or herself in a hazardous or dangerous position, please inform your supervisor or warn the person immediately of the potential danger.

***Soft-soled shoes should be worn to protect the liner from damage when walking on the liner. Cowboy boots or other hard-soled shoes are not allowed.***

Gloves are also recommended. The liner is pulled into place by hand and gloves will protect the hands during this portion of the operation as well as protect the hands from the material during hot weather. (The liner temperature can reach 140-160 degrees Fahrenheit.) Personnel should also be aware that exposed skin might be burned if it comes in direct contact with the heated material.

- **WEATHER** - Liner installation must be coordinated with the weather. If rain or snow is predicted and the liner cannot be installed prior to the start of the inclement weather, installation should be postponed. Once moisture has accumulated on the liner, the ponded water must be removed before the liner can be moved or shifted. Additionally, wet surroundings create a muddy environment from which mud and rocks can be more easily tracked onto the liner. Mud or dirt will not affect the performance of the liner, however in areas where field seams or welding is required the quality of the seam can be adversely affected. The most unpredictable component is wind. Light breezes are not a major factor in liner installation, however, when winds approach or exceed 10 mph, placement and anchoring the liner becomes a serious issue. Liners should not be installed during windy or strong breeze conditions. If excessive wind is allowed under the liner during deployment, the liner will act as a sail and personnel will not be able to control or retain the liner. If the wind is too strong to allow deployment, sandbags or other ballast should be used to secure the liner.
- **FINAL SITE REVIEW** - Personnel working in the area where the liner is to be placed should be aware of any potential items that could damage the liner. Examples are rocks, rough surfaces, dried vegetation, large clumps of dried clay, steel debris, wire, brick, wood, etc. All items should be removed prior to placement of the liner. If during the installation of the liner, these items are discovered in the area where the liner is to be placed, they should be removed and/or brought to the attention of the supervisor. It is much easier to remove an item before installation commences.
- **TOOLS** - A variety of tools are used during the installation process such as hammers, pry bars, rakes, shovels, etc. A central point for these items should be maintained which allow personnel to keep track of their location to insure they are not covered with the liner. If you have been provided with pull grips, keep track of its location so that it is available the next time it is required. Also, none of these items should be dropped on the liner or thrown next to the liner. They may bounce onto the liner and cause damage.
- **OPENING THE CRATE** - Most liners are shipped in wooden crates which protect the liner during shipment and at the job site. Portions of the crate must be removed prior to placement of the liner. Since all sections of the crate have been nailed together, lumber removed from the crate will contain nails. All sections removed should be stored or positioned in such a fashion that does not create a hazard for other personnel. Nails should be removed or boards should be stacked with the nails pointing down. **NOTE: DO NOT THROW LUMBER OR OTHER MATERIALS ONTO ANY PORTION OF THE LINER.** Nails may remain in areas where lumber is removed. All nails in these areas should be removed before any portion of the liner is removed from the crate.
- **REMOVING THE LINER FROM THE CRATE** - Liners are accordion folded and then accordion folded again into the box. To remove and place the liner, the operation needs to be reversed. The last fold into the box must be the first fold out. The original packing and shipping will have compressed the liner into the crate which means that normally as personnel are pulling the liner out of the crate, one or more personnel is needed in the crate to assist with the deployment. The liner material can be stiff and heavy therefore sufficient personnel should be available. All personnel should pull uniformly and steadily. Teamwork provides the best results.

If a liner has been removed from the crate and wind conditions make deployment impractical, short lengths of rope should be used to cinch the liner on about a 20'-30' spacing along the entire length. If the wind picks up and catches the liner edge, this method of securing the liner limits the amount of exposed surface area. Additionally ballast material may also be necessary to protect the liner from wind damage.

**HOLES OR LINER DAMAGE** - The liners and/or covers provided with this order have been inspected prior to shipment to insure that the material does not contain defects. If during the course of the liner placement, you discover a hole or the material is damaged during installation, please notify your supervisor or on-site representative from the liner company. Do not feel you will be held responsible for the damage that you discover. The objective is to provide an intact product. Holes or damage can be more easily repaired prior to utilizing the liners instead of afterwards.

**LINER PLACEMENT** - Once the liner is removed from the crate, the liner is ready to be pulled into position. Depending on the size of the panel and the number of personnel available, the entire panel may be pulled at one time or it may require several incremental pulls. Grips or pullers (Vise-Grips with handles) may be provided to assist with the deployment. The tool has small pieces of angle iron welded into the jaw of the vise grip and also has a U-shaped handle. The liner is pinched between the pieces of angle and the handle is used for pulling. These tools can be used instead of pulling by hand and allow the person to pull utilizing more force. The pullers should be firmly secured to the liner with the vise grip pointing in the same direction as the direction you will be pulling. Do not twist the grip or install the grips at an angle. Utilizing the tool correctly will protect the liner from damage.

Personnel should be spread evenly along the deployment edge. The optimum spacing for personnel is about 20'-30' apart. Example: On a 200' long liner, 9-11 personnel would be required. The leading edge should be held firmly and the liner pulled across the pond evenly. Personnel working with the liner should hold the liner close to the ground (2'-3') to prevent large amounts of air from becoming trapped under the liner. A site supervisor should coordinate movement across the pond to insure the liner is pulled in unison. A small amount of air trapped under the cover aids in deployment. If the wind increases in intensity or it appears that too much air is traveling under the cover, the leading edge of the cover should be held closer to the ground or held down temporarily until the wind gust dissipates.

If insufficient personnel are available to pull the entire liner at one time, one section should be pulled as far as reasonable and then secured. Workers then can move over to the remaining accordion folded section of the liner. Personnel should then pull the extra material across the pond. Utilizing this method, the liner can be "indexed" into position.

Once the liner has been roughly positioned where necessary, final positioning is required. Excess slack will need to be removed, but the liner should not be pulled too tight. Wrinkles or folds will not affect the performance of the liner and some excess material will be allowed to remain to allow the liner to expand and contract as necessary. The lined area should be walked after deployment to insure that the liner is lying flat in all areas and also to inspect for damage. Sandbags should be spread out across the exposed area to protect against wind damage. At this point, the perimeter of the liner should be temporarily secured. If the liner is allowed to contract overnight or if water is placed in the pond, these activities will help seat the liner. The edge of the liner can now be anchored or secured in the anchor trench or totally secured with backfill or other ballast materials.

**SECURING THE LINER** - After the liner has been positioned as required and no further shifting is required, the liner can be permanently secured. Sandbags or other ballast may be required to remain on the cover until other fill materials are placed on the liner. Spacing of this ballast is determined on a job-by-job basis. Along the perimeter the liner needs to be adequately secured in the anchor trench. A standard anchor trench is approximately 12"-18" deep and approximately 6"-12" in width. The edge of the liner should be placed into the trench and extend along the bottom of the trench. Backfill materials should be used to secure the liner but should not contain any items (rock, wood, scrap metal) which may damage the liner. If excess liner is present, the excess liner can be placed in the anchor trench or trimmed off.

### **Pre-Installation Checklist for Permalon® Liner System**

The following equipment will be required on-site in order to commence extrusion welding of a Permalon® liner:

- **Portable Generator** - 5 KW minimum, 220 VAC single phase @ 50/60 Hz.
- **Preferred receptacle** - Hubbel twist-lok, 250V 30A
- **Ballast** - Sufficient sandbags or tires should be provided to ballast the liner in case of wind. Quantity and spacing will depend on site conditions and layout. Failure to ballast properly may result in a "blow-out", i.e. the liner turns into a large kite.
- **Proper shoes** - Personnel walking on the liner must wear smooth soled shoes. Cleats can pick up stones and cause much damage. **Leather gloves** are recommended while handling the material. There shall be no smoking on the liner
- **Misc.** - Rags, mops, sponges, paper towels, brooms for cleaning seam areas in case of mud, rain, etc.
- **Hammers and pry bars** for opening crates.
- **Basic hand tools.**