



Fully Adhered Roofing System

Part II - Installation

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Installation Details



VersiWeld Fully Adhered Roofing System Part II - Installation

August 2008

FOR VERSICO AUTHORIZED ROOFING CONTRACTORS

The information contained herein is to serve as criteria for Versico Authorized Roofing Contractors regarding the application of the VersiWeld Fully Adhered Roofing System. Versico Authorized Roofing Contractors are advised to fully familiarize themselves with "Design Criteria", Part I, prior to performing the roofing installation. The Authorized Contractor, when assuming the role of the specifier, must comply with the requirements in Part I, "Design Criteria".

PRIOR TO THE INSTALLATION OF THIS ROOFING SYSTEM, REFER TO VERSICO'S MATERIAL SAFETY DATA SHEETS FOR SPECIFIC CAUTIONS AND WARNINGS REGARDING VERSICO PRODUCTS.

A. SUBMITTALS/WARRANTY PREREQUISITES

1. To ensure compliance with Versico's minimum warranty requirements, the following projects should be forwarded to Versico for review prior to installation, preferably prior to bid:
 - a. Total System Warranty projects where a wind speed warranty coverage greater than 55 mph is specified.
 - b. Projects where a 20-year Total System Warranty is specified.
Note: Projects where a greater wind speed coverage is specified or those with a 20-year Total System Warranty will require additional enhancements beyond those outlined in this section. Prior to installation, refer to "Attachments IV and V" in Part I, Design Criteria of this specification.
 - c. Air pressurized buildings, canopies and buildings with large openings where the total wall openings exceed 10% of the total wall area on which the openings are located (such as airport hangars, warehouses and large maintenance facilities).
 - d. Cold storage buildings and freezer facilities.
 - e. Projects where the VersiWeld membrane is expected to come in direct contact with petroleum based products or other chemicals.
2. Along with project submittals (shop drawings and Request for Warranty), the roofing contractor must include pullout tests when results are below the requirements identified in Part I, Design Criteria, "Attachment II"
3. Shop drawings must be submitted to Versico by the Versico Authorized Roofing Contractor along with a completely executed Notice of Award (Copy A of Versico's Request For Warranty form) for approval. Approved shop drawings are required for inspection of the roof and projects where on-site technical assistance is requested.

Shop drawings must include:

- a. Outline of roof and size
- b. Deck type (for multiple deck types)
- c. Location and type of **all** penetrations
- d. Perimeter and penetration details
- e. Key plan (for multiple roof areas) with roof heights indicated

When field conditions necessitate modifications to the originally approved shop drawings, a copy of the shop drawing

outlining all modifications must be submitted to Versico for revision and approval prior to inspection and warranty issuance.

4. **Inspection and Warranty Request** (Copy B of the Versico Request for Warranty form)

After project completion, an Inspection and Warranty Request must be submitted to Versico to schedule the necessary inspection of the project prior to issuance of the Versico Warranty.

5. **As-Built Projects** (roofing systems installed prior to project approval by Versico)

The Versico Authorized Contractor may supply Versico with an As-Built drawing for a project completed prior to Versico's approval. The As-Built drawings:

- a. Must conform to Versico's most current published specifications and details applicable at the time of bid.
- b. Must be submitted along with a completely executed Inspection and Warranty Request.
- c. Must include the items identified in Paragraph A.3 above.

Note: As-Built projects are not recommended for those projects referenced in Paragraph A.1 in order to ensure Versico warranty requirements have been met.

B. GENERAL JOB SITE CONSIDERATIONS

Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials. The contractor shall follow all safety regulations as recommended by OSHA and other agencies having jurisdiction.

1. Subject to project conditions, it is recommended to begin the application of this roofing system at the highest point of the project area and work to the lowest point to prevent water infiltration. This will include completion of all flashings, terminations and daily seals.
2. On phased roofing, temporary closures should be provided to prevent moisture infiltration.
3. When possible on multiple level roofs, begin the installation on the highest level to avoid or minimize construction traffic on completed roof sections.
4. This roofing system can be installed over **existing standing seam, flat seam or corrugated metal roofs**. For specific installation requirements, refer to the Purlin Attached Roofing System Specifications, published separately.

C. JOB SITE MATERIAL STORAGE AND HANDLING

1. Deliver materials to the job site in the original, unopened containers.
2. When loading materials onto the roof, the Versico Authorized Roofing Contractor must comply with the requirements of the specifier/owner to prevent overloading and possible disturbance to the building structure.
3. Job site storage temperatures in excess of 90° F may affect shelf life of curable materials (i.e., adhesives and sealants).
4. **When the temperature is expected to fall below 40° F**, outside storage boxes should be provided on the roof for temporary storage of liquid adhesives and sealants. Adhesive and sealant containers should be rotated to maintain their temperature above 40° F.
5. Do not store adhesive containers with opened lids due to the loss of solvent that will occur from flash-off.

6. Store VersiWeld membrane in the original undisturbed plastic wrap in a cool, shaded area and cover with light-colored, breathable tarpaulins. VersiWeld membrane that has been exposed to the elements must be prepared with Weathered Membrane Cleaner prior to heat welding. Refer to Paragraph I.2.b, Exposed Membrane Seam Preparation, for requirements.
7. Insulation and underlayment must be stored so that it is kept dry and is protected from the elements. Store insulation on a skid and completely cover with a breathable material such as tarp or canvas. If the insulation is lightweight, it should be weighted to prevent possible wind damage.

D. SUBSTRATE PREPARATION

Defects in the substrate surface must be reported and documented to the specifier, general contractor and the building owner for assessment. The Versico Authorized Roofing Contractor shall not proceed with the installation unless the defects are corrected.

1. **On retrofit - recover projects**, cut and remove wet insulation, as identified by the specifier, and fill all voids created by such removal with new insulation so that it is relatively flush (+/- 1/4") with the existing surface.
 - a. **For existing PVC membranes**, if the membrane is not removed, it must be cut into maximum 10' X 10' sections. All PVC flashings at the perimeter, roof drains and roof penetrations must be removed.
 - b. When installing the roofing system over **existing gravel surfaced built-up roof, loose gravel must be removed**. Power brooming is recommended by Versico to remove the loose gravel, which may trap moisture. Any uneven areas of the substrate must be leveled to prevent insulation from bridging.
2. When specified, the VersiWeld membrane may be **adhered directly to a new approved cellular or perlite lightweight insulating concrete with a minimum compressive strength of 225 psi**. Refer to "Attachment III" at the end of this section for applicable requirements.
3. **For all projects** (new or retrofit), the substrate must be relatively even without noticeable high spots or depressions and accumulated water, ice or snow must be removed to prevent the absorption of moisture in the new roofing components and roofing system.
4. Prior to the placement of membrane underlayment, clear the substrate of debris and foreign material that may be harmful to the roofing system.

E. VAPOR RETARDER INSTALLATION

Follow the respective manufacturer's recommended installation procedures and the specifier's instructions for the installation of the product specified.

F. INSTALLATION OF WOOD NAILERS

1. Install wood nailers in those locations that have been designated by the specifier and as approved by Versico.
2. The wood nailer must be installed so the top of the wood nailer is relatively flush (+/- 1/4") with the top surface of the insulation/underlayment and the width of the wood nailer exceeds the width of the metal flange (where applicable at edgings, scuppers, insulated collars, etc.) as shown on the appropriate Versico detail.
3. Follow the specifier's guidelines for securement of wood nailers.

G. INSULATION PLACEMENT/ATTACHMENT

1. Do not install more insulation/underlayment than can be covered by membrane in the same day.

2. All insulation boards must be butted together with no gaps greater than 1/4". Gaps greater than 1/4" are not acceptable.
3. When multiple layers of insulation are specified, staggering of joints between layers is recommended.
4. Approved Versico Insulation is typically mechanically secured to the roof deck with Versico Fasteners and 3 " diameter Insulation Plates, at the minimum rate of 1 every 2 square feet. Refer to Detail VWA-27 for fastening requirements. For **structural concrete, minimum 22 gauge steel or minimum 15/32" thick plywood decks or minimum 3/4" thick wood planks**, a reduced fastening density may be utilized as identified below.
 - a. When a single or top layer of **minimum 1-1/2" thick Versico Polyisocyanurate** Insulation is specified, the Versico Insulation may be mechanically attached at the minimum rate of 1 every 3.2 square feet (10 fasteners per 4' x 8' board). Refer to Detail VWA-27.2 for requirements.
 - b. When a single or top layer of **minimum 2" thick Versico Polyisocyanurate** Insulation is specified, the Versico Insulation may be mechanically attached at the minimum rate of 1 every 4 square feet (8 fasteners per 4' x 8' board). Refer to Detail VWA-27.2 for requirements.
 - c. **Dens-Deck® Prime** (1/4" or 1/2" thick) may be fastened at the rate of 12 fasteners/plates per 4' x 8' board (1 per 2.67 square feet) per Detail VWA-27.5. 5/8" thick Dens-Deck Prime may be fastened at the rate of 8 fasteners/plates per 4' x 8' board (1 per 4 square feet) in accordance with Versico Detail VWA-27.1.

Note: If a wind speed warranty greater than 55 mph is desired or a 20-year warranty is specified, additional insulation fastening may be required. Refer to "Attachments IV" and/or "Attachment V" in Part I, Design Criteria for requirements.

 - d. On reroof/no tearoff projects with a maximum roof height of 40' any Sure-seal Insulation (i.e., Versico Recovery Board, Polyisocyanurate Insulation less than 1-1/2" thick) may be secured at the minimum rate of **11 fasteners per 4' x 8' board (5 fasteners per 4' x 4' board)**. This option is **not applicable for 15-year Total System Warranty projects** or projects where extended wind speed coverage (greater than 55 mph) is desired. Refer to Detail VWA-27.3 for requirements.
5. When an approved oriented strand board (OSB) is specified as the membrane underlayment, it must be mechanically attached to the roof deck in accordance with Versico Detail VWA-27C.4.
6. **Alternate Insulation Attachment Methods**
 1. **FAST Adhesive**, a 100% spray-applied or bead-applied, two-component, low-rise urethane adhesive may be specified for insulation attachment in lieu of mechanical securement. **Refer to Attachment IV** in Part II, Application in the VersiWeld Fully Adhered Roofing System Specification.
 2. OlyBond 500BA or Spot Shot, a two-component polyurethane adhesive applied in approximately 1/2" - 3/4" beads spaced a maximum of 12" on center in the field of the roof and 6" on center at the perimeter (based on building height) may be utilized. Refer to the applicable Versico Technical Data Bulletin for specific installation instructions.
 3. Versigrip Insulation Adhesive, a one-component, moisture-curing, polyurethane adhesive applied in approximately 1/2"- 3/4" beads spaced a maximum of 12" on center in the field of the roof and 6" on center at the perimeter (based on building height) may be utilized. Refer to the applicable Versico Technical Data Bulletin for specific installation instructions.
 4. The building owner or specifier may select an alternate insulation attachment method, which incorporates a **solid mopping of insulation with hot asphalt**. Refer to "Attachment V" at the end of this section when this alternate insulation attachment method is specified.

5. When adhesive marketed by others is specified, contact the respective manufacturer regarding specific installation requirements and available warranty coverage. Versico warranties exclude products not supplied or marketed through Versico.

H. MEMBRANE PLACEMENT AND BONDING

1. **Ensure** that water does not flow beneath any completed sections of the membrane system by completing all flashings, terminations and daily seals by the end of each workday.
2. **Sweep** all loose debris from the substrate.
3. **Position** VersiWeld membrane over the acceptable substrate.
4. **Fold** membrane sheet back so half the underside is exposed.
5. **Stir** VersiWeld Bonding Adhesive thoroughly scraping the sides and the bottom of the can (minimum 5 minutes stirring is recommended). Bonding surfaces must be dry and clean.
6. **Apply** VersiWeld Bonding Adhesive to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be heat welded over adjoining sheet.

Apply adhesive evenly, without globs or puddles with a plastic core medium nap paint roller to achieve continuous coating of both surfaces at a coverage rate of approximately 120 square feet per gallon per one surface (membrane or substrate) or approximately 60 square feet per gallon per finished surface (includes coverage on both membrane and substrate). A 9" roller will easily fit into the 5-gallon containers.

A mechanical roller dispenser can be used to apply Bonding Adhesive when the continuous coating and coverage rate noted above are maintained.

CAUTION: Due to solvent flash-off, condensation may form on freshly applied Bonding Adhesive when the ambient temperature is near the dew point. If condensation develops, possible surface contamination may occur and application of Bonding Adhesive must be discontinued. Allow surface to dry and apply a thin freshener coat at a coverage rate approximately half the coverage rate stated above to previously coated surface when conditions allow for continuing.

7. **Allow** adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
8. **Roll** the coated membrane into the coated substrate while avoiding wrinkles.
9. **Brush** down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
10. **Fold** back the unbonded half of the sheet and repeat the bonding procedures. **Apply** Bonding Adhesive to the remaining exposed underside of membrane and adjacent substrate and complete this section as described above.
11. **Install** adjoining membrane sheets in the same manner, overlapping edges a minimum of 2" to provide for a minimum 1-1/2" heat weld. It is recommended that all splices be shingled to avoid bucking of water.
CAUTION: If aesthetics are of concern, protect completed sections of the roof so Bonding Adhesive will not discolor the membrane surface. Do not place Bonding Adhesive containers or their lids directly on the surface of the VersiWeld membrane.

I. HEAT WELDING PROCEDURES

1. **General**

- a. Heat weld the VersiWeld membrane sheets using the Automatic Heat Welder or Hot Air Hand Welder and silicone roller. For description of **heat welding equipment** and generator/electrical requirements, refer to "**Attachment II**" at the end of this section.
 - b. It is recommended that membrane sheets be installed in groups of 3 in order to routinely examine the heat welded seams as work progresses across the roof deck during each day.
 - c. When roof slope exceeds 5" per horizontal foot, use of the Automatic Heat Welder may become more difficult; use of the Hand Held Hot Air Welder is recommended.
2. **Check the surfaces** of the VersiWeld membrane to be heat welded to ensure they are properly prepared as outlined below:
- a. **Membrane Cleaning** - The surfaces to be heat welded must be clean. Membrane overlaps, which become contaminated with field dirt must be cleaned with Weathered Membrane Cleaner. Weathered Membrane Cleaner should be wiped dry with a clean Splice Wipe prior to welding. No residual dirt or contaminants should be evident.
 - b. **Exposed Membrane Seam Preparation** - Surface oxidation of VersiWeld membrane will occur upon exposure to heat and sunlight. **After exposure to the elements**, membrane must be cleaned with **Weathered Membrane Cleaner prior to heat welding** as follows:
 - 1) Apply Weathered Membrane Cleaner to the surface of the membrane which has been exposed using a clean Seam Wipe or other white rag and wipe along the direction of the seam.

If natural fiber rags are used, they must be white to prevent fabric dye from discoloring the membrane.

Prior to heat welding, wipe the surface where Weathered Membrane Cleaner has been applied with a clean, dry Seam Wipe or other white rag to remove cleaner residue.
 - 2) Weathered Membrane Cleaner will achieve approximately 600 linear feet (one surface) of coverage per gallon for a standard heat welded splice area.
 - c. The membrane can typically be repaired with the standard cleaning method referenced above. In cases where the standard cleaning method is not sufficient, additional scrubbing and cleaning will be required. Refer to Paragraph J.2, Welding Problems/Repairs.
3. **Operating Automatic Heat Welder**
- a. **Temperature Settings**

When making a VersiWeld splice, no one temperature setting or speed can be used to describe the temperature setting or speed to set the robot. The splice must be tested to determine the quality of the splice.

Consult the respective heat welding machine manufacturer for recommendations concerning proper temperature setting and speed control of their equipment.

Typically, the colder the ambient temperature (and likewise the membrane temperature) the slower the Automatic Heat Welder speed control must be adjusted to produce proper seams.

As a general guide, VersiWeld membrane will weld at a lower temperature (1000° F) and faster speed (10' to 15' per minute) than most other heat welded membrane materials.

With the Leister Varimat Automatic Heat Welder, the suggested heat setting is 1004° F at 12.5' per minute. With any other brand of robot welder, the temperature should be set at the manufacturer's recommended temperature to obtain the correct splice results.

The following is a list of items to be checked to determine the temperature setting and the speed at which a splice should be completed:

- 1) When the membrane is in direct sunlight, the temperature or robot speed may have to be adjusted when moving into a shaded area, check the splice results.

Remember the membrane surface in a shaded area will be cooler than a membrane surface that is in sunlight.

Darker colored membrane (such as gray) will be warmer than white and may affect the welder speed.

- 2) Dampness on the membrane from dew, a passing rain shower or misting condition will reduce heat from the splice due to evaporating moisture from the membrane surface. The heat welding temperature (increased) or the robot speed (slower) will have to be adjusted to produce a good splice. Water must be wiped from the welding surface prior to welding the splice.

- 3) Wind has a cooling affect as it blows over the surface. It will also affect the air flow in the splice reducing the effectiveness of the hot air gun. This will require the operator to increase heat from the hot air gun or reduce the welder speed.

- 4) Substrates make a substantial difference in the amount of heat required to produce a proper heat welded splice. The robot will have to be adjusted accordingly:

Plywood and Concrete act as heat sinks and will take a higher temperature or slower speed setting than insulation.

Cool damp substrates will take a higher temperature or slower speed setting than dry substrates.

- 5) Membrane "bleed-out" from between sheets will not occur with VersiWeld membrane if properly welded. If bleed-out is occurring (the dark underside of the membrane begins to melt and flow), the welder speed should be increased to reduce welding temperature.

b. **Equipment Set-Up**

Equipment set up is the responsibility of the Authorized Contractor. When poor welding is occurring check the following:

- 1) If the membrane is overheated on one side or the other, check the nozzle to be sure it is distributing the heat evenly between the two sheets.
- 2) If the heat is bypassing the edge of the sheet producing a cold weld along the edge of the splice, be sure the nozzle is completely under the sheet and the air dam is in place and functional.
- 3) If the probed splice is tight at the edge but a cold weld is present in the center of the splice (the heat is melting the edges but does not melt the center of the splice), check to be sure the robot is not running too fast.
- 4) Ensure the silicone pressure wheel is intact with no voids in the silicone. If voids are present, incomplete welding will result.
- 5) If a machine with a brass plate air dam is used, be sure all wheels on the air dam are not binding. Binding wheels will cause sheet movement and distortion during the welding process.

- 6) The Automatic Heat Welder nozzle should be adjusted as close to the pressure wheel as possible. If the nozzle is too far away from the pressure wheel, distortion of the membrane may occur due to heat expansion.

Note: Adjust weld nozzle so the curved portion (heel) extending outside the seam area does not contact or drag on the exposed surface of the membrane. This portion of the nozzle should be 1/16" to 1/8" above the membrane surface.

- 7) Overheating the membrane will cause poor welds. It is recommended that the automatic welder be run not less than 10' a minute on average temperature days. Only on very cold days would the welder be run below this speed. The temperature and welder speeds must be determined based on test welds prior to actual sheet welding.
- 8) Clean screen of dirt and debris on air inlet of heat gun every day. Accumulation of contaminants on screen will reduce air flow and heat output of welder.

c. **Membrane Welding**

- 1) Prepare the Automatic Heat Welder and allow it to warm for approximately 5 to 10 minutes to reach operating temperature.
- 2) Position the Automatic Heat Welder properly prior to seaming with the guide handle pointing in the same direction the machine will move along the seam.
- 3) Lift overlapping membrane sheet and insert blower nozzle of Automatic Heat Welder between the overlap. Immediately begin moving machine along seam to prevent burning the membrane.
- 4) Proceed along the seam ensuring that the small guide wheel in front of the machine aligns with the edge of the top membrane sheet. Guide the machine from the front only.

CAUTION: Ensure the power cord has plenty of slack to prevent dragging the machine off course (which could result from a tightly stretched cord).

- 5) At all splice intersections, roll the seam with a silicone roller to ensure a continuous heat welded seam (the membrane should be creased into any membrane step-off with the edge of the silicone roller). A false weld may result due to surface irregularities created by multiple thicknesses of VersiWeld membrane sheets.

Note: When using 60-mil or thicker VersiWeld Membrane, TPO "T" Joint Cover or a surface splice of VersiWeld Non-Reinforced Flashing must be applied over all "T" joint splice intersections, refer to Detail VWA-2.1.

- 6) To remove the Automatic Heat Welder from the finished splice, stop the movement of the machine and immediately remove the nozzle from the seam area.
- 7) Mark the end of the heat welded seam with a water-soluble marker for easy identification. A Hand Held Welder will be necessary to complete the weld in the area between where the Automatic Heat Welder is stopped and restarted.
- 8) **Perform a test weld** at least at the start of work each morning and afternoon. Test welds should be made if any changes in substrate or weather conditions occur.

- 9) **Recommendation to Prevent Membrane Creeping and Movement**

- a) The operator of the robot must apply foot pressure to the membrane, kicking and sliding the membrane under the robot to keep the membrane tight. Always have the operator stand on the unfastened sheet of membrane to prevent sheet movement.
- b) Do not release foot pressure from the membrane until the pressure wheel rolls over the membrane in front of the foot that is holding the membrane in place.

c) **Use of Welding Tracks**

Set welding tracks lengthwise along the splice, close to the Automatic Heat Welder air dam to reduce membrane movement caused by the welding process. The operator must continue to apply foot pressure to the welding tracks to help hold the membrane splice in place. Welding tracks are moved as welder progresses along seam.

Welding tracks can be:

- Sheet metal, 22 gauge – 12" wide by 10' long (with rounded corners).
- Aluminum or steel plates – 1/4" x 3", 4' to 6' long (with rounded corners).
- Lay flat tubing filled with sand – 4' to 6' long.
- Wood planks – 2" x 12" X 4' to 6' long.
- Heavy plywood – 3/4" x 24" x 8' long.

d. **Test Cuts**

- 1) Perform a test weld at least at the start of work each morning and afternoon.
- 2) The test sample should be approximately 1 inch wide and longer than the width of the seam (cut across the heat welded seam).
- 3) Peel the test sample apart after it has thoroughly cooled (approximately 10 minutes) and examine for a consistent 1-1/2" wide minimum weld. Delamination of the membrane from the scrim-reinforcement is an indication of a properly welded seam.
- 4) Identify the following seam problems to assure seam quality:

Discolored or melted membrane – Increase speed or decrease temperature setting if membrane discolors or exhibits melting (membrane begins to flow).

Voids and wrinkles - A proper heat welded seam has no voids or wrinkles and must be at least 1-1/2" wide. Refer to Seam Probing procedures outlined below for proper inspection of seam deficiencies.

4. **Hand Held Welder Settings**

- a. Temperature setting for hand held welders when used for flashing should be approximately "6" (on a scale from 1 to 10).
- b. Temperature settings for hand held welders when used for membrane should be approximately "8" (on a scale from 1 to 10).
- c. Exact settings will vary based on ambient temperatures, substrate and type of welder.
- d. Silicone roller should always be placed flat against membrane to be welded. **Do not turn roller on edge to weld membrane or flashings.**

5. **Seam Probing**

Versico's Seam Probe is recommended to be used to probe all heat welded seams. As an option, a cotter pin puller can

be used to probe heat welded seams. Probing seams must be done once heat welds have thoroughly cooled. Heat welded seams must be probed throughout the day to check seam quality and to make proper adjustments to heat welding equipment. **The repair of deficiencies must be done routinely throughout the day but no later than the end of each workday.**

- a. Allow heat welded seams to cool thoroughly for approximately 30 minutes. Premature probing can damage warm seams.
- b. Draw the probing tool tip along the edge of the heat welded seam. Apply firm pressure to probe the seam junction, but not into the bottom membrane sheet. The tool will not penetrate into the lap area of a properly welded seam.
- c. If the seam probing tool penetrates into the lap area, mark the seam using a water-soluble marker at the beginning and the end of voids or wrinkles in the seam edge.
- d. Repair seam deficiencies as soon as possible using the hand held welder. Versico recommends that repairs be made the same day they are discovered.
- e. Probe **repaired seams** after they have cooled completely. If the repair is acceptable, wipe off the water soluble marker lines; if not acceptable, repair the seam using the procedures for repair of heat welded seams as outlined in Repair Procedures for Aged VersiWeld Membrane.

Note: All laps must be probed each day soon after it has cooled to verify the welder set-up is effective. Particular attention must be given to all membrane intersections and heat welded seams at insulation joints. In addition, there should be periodic checks (including at the start of each day) to verify good peel strength.

- f. **Apply TPO Cut-Edge Sealant** on all cut edges of the reinforced membrane (where the scrim reinforcement is exposed) **after seam probing** is completed. TPO Cut-Edge Sealant is not required on vertical splices. When a 1/8" diameter bead of Cut-Edge Sealant is applied, approximately 225 – 275 linear feet of coverage per squeeze bottle can be achieved.

J. WELDING PROBLEMS/REPAIRS

1. A Hand Held Hot Air Welder and a 2" wide silicone roller must be used when repairing the VersiWeld membrane. When the **entire** heat welded **seam** is to be **overlaid**, an **Automatic Heat Welder** may be used.
2. Prior to proceeding with any repair procedure, the area to be repaired must be cleaned and any material that has been exposed to the elements must be prepared with Weathered Membrane Cleaner as outlined in Paragraph 1.2.b, Exposed Membrane Seam Preparation. The membrane can typically be repaired with a standard cleaning method. In cases where the standard cleaning method is not sufficient, the following procedures must be used.
 - a. Scrub the area to be welded with a primer pad and Weathered Membrane Cleaner. The cleaner will become discolored with abraded membrane during this procedure.
 - b. Clean all residue from the area to be welded with a Seam Wipe or natural fiber (cotton) clean rag.
 - c. Weld the new membrane to the cleaned area using standard welding procedures.
3. Voids in welded seams can be repaired using a Hand Held Hot Air Welder and a silicone roller.
4. Position the hand held welder facing into void so hot air is forced between overlapping membranes. Roll the top membrane surface using positive pressure toward the outer edge until the heated membrane surfaces are fused.
5. Exposed scrim-reinforcement (resulting from scorching surface of membrane) and test weld areas must be repaired by overlaying the damaged area with a separate piece of VersiWeld reinforced membrane with rounded corners. The

overlay must extend a minimum of 2" past the area to be repaired.

6. **Probe** all edges of the overlay once cooled to ensure a proper weld has been achieved.
7. **Seal** all cut edges of VersiWeld reinforced membrane with TPO Cut-Edge Sealant.

Note: The same overlay repair procedures may be used for punctures in the VersiWeld membrane.

K. ADDITIONAL MEMBRANE SECUREMENT

Additional membrane securement is required at the perimeter of each roof level, roof section, curb, skylight, interior wall, penthouse, etc., at any inside angle change where slope or combined slopes exceed 2" in one horizontal foot, and at other penetrations in accordance with the applicable Versico details.

Securement may be achieved as follows:

1. Versico standard 2" diameter Seam Fastening Plates or HPVX Plates may be used to secure the membrane, which will be flashed with a separate piece of VersiWeld Reinforced Membrane as shown in the applicable Versico Detail.
2. As an option, 6" wide **TPO PS RUSS** may be installed in conjunction with Versico Fasteners and 2" diameter Seam Fastening Plates spaced a maximum of 12" on center below the deck membrane. The securement strip shall be installed horizontally at the base of walls or penetrations. The deck membrane is primed with TPO Primer, spliced to the RUSS and continued as wall flashing resulting in continuous membrane flashing without penetration of the deck membrane.
3. Securement of the membrane shall be a maximum of 12" on center. Fasteners shall be positioned 6" minimum to 9" maximum from the inside or outside corner.
4. Refer to the "Insulation Fastening Criteria" chart in "Attachment I" at the end of this section for the required Versico Fastener/Plate with the corresponding deck type.
5. After securing the membrane, flash in accordance with the appropriate detail.

L. FLASHING

1. General Flashing Conditions

Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using VersiWeld **reinforced** membrane. VersiWeld non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets and scuppers as well as inside and outside corners when the use of pre-molded or pre-fabricated accessories are not feasible.

When possible, all reinforced membrane splices are heat welded with the Automatic Heat Welder. The Hand Held Hot Air Welder should be utilized in hard to reach areas, smaller curbs, vertical splices and when using non-reinforced membrane.

- a. All existing **loose** flashing must be removed prior to application of VersiWeld membrane especially when the new VersiWeld Flashing is to be adhered. The new VersiWeld membrane must totally conceal all existing intact flashing, but must not conceal weep holes or cover existing throughwall counterflashing.
- b. Install surface mounted reglets and compression bar terminations directly to the wall surface.
- c. **Application of VersiWeld Bonding Adhesive**

On vertical surfaces such as walls, curbs and pipes, **Bonding Adhesive is not required** when the **flashing**

height is 12" or less and the membrane is **terminated under metal counterflashing** (nailed). When a **coping or termination bar** is used for the vertical termination, the **Bonding Adhesive may be eliminated when the flashing height is 18" or less.**

- 1) When required as noted on Versico's installation details, membrane shall be adhered to vertical surfaces with VersiWeld Bonding Adhesive. The Bonding Adhesive shall be applied continuously, without globs or puddles, with a plastic core medium nap paint roller. A 9" roller will easily fit into the 5-gallon containers.
 - 2) The Bonding Adhesive must be applied to both the membrane and the surface to which it is being bonded to achieve a coverage rate of approximately 120 square feet per gallon per one surface (membrane or substrate) or approximately 60 square feet per gallon per finished surface (includes coverage on both membrane and substrate).
 - 3) After the Bonding Adhesive has dried to the point that it is tacky but does not string or stick to a dry finger touch, roll the membrane into the adhesive.
- d. Care must be taken when setting the flashing to avoid bridging greater than 3/4" at angle changes (i.e., where a parapet or roof penetration meets the roof deck). This can be accomplished by creasing the membrane into the angle change.
 - e. Terminate the edges of the installed membrane in accordance with Versico's applicable VWC-9 Termination Details.
 - f. In areas where metal counterflashing or surface mounted reglets are used as the vertical termination, the counterflashing must be sealed with a rubber grade caulking to prevent moisture migration behind the new wall flashing.
 - g. On Total System Warranty projects, Versico's Termination Bar in conjunction with Water Cut-Off Mastic must be installed under counterflashings and surface mounted reglets used for vertical wall terminations.

2. Walls, Parapets, Curbs, Skylights, etc. (VWC-5 and VWC-12 Details)

The flashing height must be calculated so that the VersiWeld membrane flashing includes a minimum 1-1/2" heat weld beyond the Fastening Plates.

- a. Fasten at angle change as identified in Paragraph K, Additional Membrane Securement, with the required Versico Fastener and Plate.
- b. Flash the fasteners/plates with a separate piece of VersiWeld reinforced membrane; crease the flashing into the angle change before attaching it to the vertical surface.
- c. As an option, 6" wide TPO PS RUSS may be used and the field membrane can be adhered to the RUSS and continued as wall flashing as shown on the applicable Versico Detail.

3. Metal Edge Terminations (VWC-1 Details)

The metal edge must be secured to the wood nailer as specified by the manufacturer. Refer to the appropriate VWC-1 Detail for flashing options and requirements.

4. Roof Drains (VWC-6 Details)

- a. VersiWeld membrane may extend into the drain sump when the slope of the sump is less than 3" to one horizontal foot. Refer to the Detail VWC-6.1.

When the drain sump is greater than 3" to one horizontal foot, additional membrane securement must be installed. Refer to Detail VWC-6.2.

- b. Only drain strainers which have been approved by the specifier in accordance with all applicable codes may be used.

5. Other Penetrations

a. Pipes, Round Supports, etc.

- 1) Flash pipes with Molded Pipe Seals or Split Pipe Seals where their installation is possible. Deck flanges cannot be overlapped or installed over angle changes. Molded pipe flashings cannot be cut and patched; deck flanges cannot be overlapped or installed over angle changes.
- 2) Where Molded Pipe Flashings or Split Pipe Seals cannot be installed, APPLY FIELD FABRICATED PIPE FLASHING using VersiWeld non-reinforced membrane. Refer to Detail VWC-8.2.

- b. **Flexible Penetrations** (braided cables, conduits, wires, etc.) must be enclosed in a stable "goose neck". Apply a TPO Split Pipe Seal or field fabricated pipe flashing to flash the goose neck.

- c. **Hot pipes** that exceed 120° F, must utilize an insulated metal collar and rain hood, flashed with a field fabricated pipe flashing. Refer to Detail VWC-8.3.

- d. For **pipe clusters** or unusually shaped penetrations, a TPO Molded Sealant Pocket must be utilized. Refer to Detail VWC-16.

6. Existing Roof Tie-Ins (VWC-13 Details)

Depending on the type of the existing roofing system, the tie-in method will vary. Total isolation between the two roofing systems or weep holes may be required to address moisture migration from one roofing system to another.

Versico uncured Flashing must be used at the tie-in between Versico and asphalt based roofing systems (i.e., BUR, Modified Bitumen or mineral surface cap sheets). Refer to the applicable VWC-13 Details for installation requirements.

M. ROOF WALKWAYS

- 1. Install walkways in those locations as designated by the specifier in accordance with "Design Criteria", Part I of this specification.

2. VersiWeld Heat Weldable Walkway Rolls

- a. If VersiWeld membrane or Walkway Roll has been exposed to the elements, use Weathered Membrane Cleaner to prepare the area to be welded to the walkway material.

If the membrane has been exposed for an extended period of time or is heavily contaminated by dirt, a primer pad may be used with the Weathered Membrane Cleaner to expose a weldable surface. All residue should be removed by wiping with a clean dry Splice Wipe or other white natural fiber (cotton) rag.

- b. Position the walkway material and cut the Walkway Rolls into maximum 10' lengths and position with a minimum 1" gap between adjacent pieces to allow for water drainage. Cut the walkway so a 4" minimum gap is created over any field splices. (Since the attachment of the walkway to the membrane is permanent, this will allow access to the field seams).

- c. Using an Automatic Heat Welder, weld all 4 edges of the walkway material to the membrane. (Typically the same speed and temperature settings will be used for this procedure as for welding membrane to membrane. A test weld is always recommended prior to performing welds to the installed membrane). A hand held welder may be utilized, however, productivity will be decreased.

If possible, allow the walkway to warm by the sun prior to welding so distortion will not occur due to expansion. As an alternative, the VersiWeld Walkway Roll may be adhered to the membrane surface with QA Seam Tape/TPO Primer.

3. Concrete Paver Blocks

Install a slip sheet of VersiWeld reinforced membrane or two layers of MP Safeguard Mat under all concrete pavers for the protection of the deck membrane. The protective layer must extend a minimum of 2" on each side of the walkway.

4. Versico Interlocking Rubber Pavers

Rubber Pavers can be loose laid directly over the membrane. Installation instruction sheets are available from Versico.

Note: Pavers are not recommended for walkways when slopes exceed 2" per horizontal foot.

N. DAILY SEAL

1. On phased roofing, when the completion of flashings and terminations is not possible by the end of each work day, provisions must be taken to temporarily close the membrane to prevent water infiltration.
2. Temporarily seal any loose membrane edge down slope using asphaltic based roof cement, hot asphalt, spray urethane foam or a similar product so that the membrane edge will not buck water. Caution must be exercised to ensure that the membrane is not temporarily sealed near drains in such a way as to promote water migration below the membrane.
3. On existing built-up roofs, remove the gravel. The surface must be clean and dry.
4. After embedding the membrane in daily seal material, CHECK FOR CONTINUOUS CONTACT. Provide continuous pressure over the length of the temporary seal with 15' lengths of 2-1/2" diameter Lay Flat Tubing filled with dry sand.

Note: The use of rigid wood nailers is not recommended due to warping and because constant compression cannot be achieved on an uneven substrate.

5. When work is resumed, pull the VersiWeld membrane free; trim and remove membrane where the daily seal material was previously applied before continuing installation of adjoining sections.

O. CLEAN UP

If required by the specifier to ensure the aesthetics of the surface of the VersiWeld membrane, hand prints, footprints, general traffic grime, industrial pollutants and environmental dirt may be cleaned from the surface of the VersiWeld membrane by scrubbing with soapy (non-abrasive soap) water and rinsing the area completely with clean water. Weathered Membrane Cleaner can also be used to clean the surface of the VersiWeld membrane.

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VERSIWELD FULLY ADHERED ROOFING SYSTEM

"Attachment I" Insulation Fastening Criteria

August 2008

The following chart indicates the appropriate Versico Fasteners and Plates for insulation securement with the referenced roof deck and includes minimum penetration requirements and pilot hole criteria. For minimum pullout requirements, refer to Attachment II, Withdrawal Resistance Criteria, in Part I, Design Criteria.

Deck/Parapet Type	Versico Fasteners (1)	Minimum Penetration	Pilot Hole Depth	Pilot Hole Diameter
Steel or Lightweight Insulating Concrete over Steel	HPVX, HPV, ASAP or InsulFast	3/4"	N/A	N/A
Structural Concrete, rated 3,000 psi or greater	CD-10	1"	(2)	7/32"
	HD 14-10	1"	(2)	3/16"
Wood Plank, min. 15/32" thick Plywood or min. 7/16" OSB	HPVX, HPV, ASAP or InsulFast	Min. 1" (3)	N/A	N/A
Cementitious Wood Fiber	NTB (4)	1-1/2"	(5)	N/A
Gypsum	NTB (4)	1-1/2"	(2)	7/16", 1/2" or 9/16" (6)
Masonry (block, brick or concrete)	Term Bar Nail-In (7)	3/4"	(2)	1/4"

Notes:

- (1) Only 3" diameter insulation fastening plates can be used for insulation attachment.
- (2) The pilot hole must be predrilled to a sufficient depth to prevent contact between the fastener point and any accumulated dust in the predrilled hole. This will help prevent bottoming out of the fastener during installation.
- (3) For wood planks only, fastener penetration shall not exceed 1-1/2".
- (4) The NTB Fastener and the 2" diameter fastening plate (provided as a complete fastening assembly) must be used for additional membrane securement. The 3" diameter fastening plate (provided for use with the NTB Fastener) must be used for attachment of insulation.
- (5) Most cementitious wood fiber decks do not require pre-drilling; however, Versico should be contacted prior to installation for verification of specific types that may require a pilot hole to be predrilled.
- (6) Pilot hole size may be varied to maximize pullout resistance.
- (7) Used for the securement of compression bar terminations or Seam Fastening Plates (used for additional membrane securement into vertical masonry surfaces).

N/A = Not Applicable

VERSIWELD FULLY-ADHERED ROOFING SYSTEM

"Attachment II" Heat Welding Equipment

August 2008

1. Automatic Heat Welder

An electrically powered, self-propelled device that utilizes an electrical resistance heating element or heater and fan-forced super heated air to weld VersiWeld membrane seams.

- a. **Welding speed:** The speed of the welding machine must be no faster than necessary to produce a good heat weld, and will vary according to environmental conditions.
- b. **Temperature recommendations:** Operating temperature is approximately 1000° F (#8 temperature setting). VersiWeld TPO Membrane will not "bleed out" (membrane begins to flow out from edge).

2. Hot Air Hand Welder

An electrically powered, hand-held device that utilizes an electrical resistance heating element or heater and fan-forced super heated air to heat weld VersiWeld membrane and flashing. A hand-held **silicone** rubber roller is used in conjunction with the welder to apply the pressure that fuses the heated membrane surfaces to each other.

The hand-held welder is typically used to repair seams, or when the use of the Automatic Heat Welder is inappropriate (such as flashing penetrations and on high sloped surfaces).

3. **Electrical Cords:** For generator requirements and maximum length of electrical cords, refer to Generator/Electrical Requirements below.
4. **Seam Probe:** The probing of heat welded seams is an important step in the application of a VersiWeld Roofing System. Versico recommends the use of a Versico Seam Probe to probe all heat welded seams. All seams must be probed (**after the seam has thoroughly cooled**) with the appropriate seam probing tool and all deficiencies must be repaired accordingly with a hand held hot air welder no later than the end of each work day.
5. **Silicone Rubber Roller:** A 2" wide rubber roller used for rolling heat welded splices.
6. **Generator/Electrical Requirements**

Building power supplies do not typically provide the proper amount of power necessary for consistent heat welding. The use of a portable generator conforming to the following guidelines is strongly advised.

- a. A **minimum 6500 watt generator** with a minimum output of 210 volts is required **for one Automatic Heat Welder**. Reduced power availability will result if additional equipment is connected to the generator and may result in faulty heat welded seams. GFI (Ground Fault Interrupter) protection is recommended. Additional generators will be required for operating other power tools and hand held heat welders.

Electrical cords (3 conductor) of the maximum length indicated must be used with the corresponding wire as listed:

Maximum Length	Wire Size
50 foot	#12
100 foot	#10
300 foot	#8

- b. A **minimum 3,000 watt generator** may be used to power a maximum of **two hand held heat welders** as long as no other equipment is connected. This generator should service a minimum of 110 volts and be GFI (Ground Fault

Interrupter) protected.

Electrical cords (3 conductor) of the maximum length indicated must be used with the corresponding wire as listed below:

Maximum Length	Wire Size
50 foot	#14
100 foot	#12

For extension cords longer than 100', consult an electrician or electrical contractor to ensure proper size of generator and wire.

7. Heat Welding Precautions

- a. Check the welding machine set-up to ensure proper alignment of the heating nozzle, airdam, pressure wheels, or moving parts to see they move properly or are free-spinning. Test run the welding machine to ensure it moves forward following a straight line. If the alignment is off, make necessary adjustments.
- b. Make sure the air intake is open. Clean out the air intake screen for the blower unit at each start up.
- c. Check the machine for worn or broken parts which need to be replaced. Exercise care to protect the pressure wheel from notches or cuts to prevent incomplete sealing of the welded seam.
- d. Before the machine is connected to the power source, make sure it is switched off to prevent a power surge that could damage the unit. Turn the unit on and allow the blower/heater unit to warm up for approximately 5 to 10 minutes to reach operating temperature.
- e. Clean the heat nozzle with a wire brush to remove any build-up of membrane, as needed.
- f. To extend the life of the heating element of the Heat Welding Equipment, always turn the temperature adjustment down so the welder can cool prior to switching the machine off.
- g. Follow all care and maintenance instructions recommended by the respective manufacturer.
- f. It is recommended that two Automatic Heat Welders and two generators be available at the project site in the event of mechanical failure.

VersiWeld Fully-Adhered Roofing System

"Attachment III"

Direct Application Over Lightweight Insulating Concrete

March 2007

When specified, the VersiWeld TPO membrane may be adhered directly to a new approved cellular or perlite lightweight insulating concrete with a minimum compressive strength of 225 psi.

The Authorized Contractor must provide Versico with a copy of a certification letter from the lightweight insulating concrete manufacturer which references the project name and location and contains the manufacturer's brand name, minimum compressive strength, average wet and air dry densities.

The substrate must be free of any debris, fins, loose and foreign materials. Fill any gaps in the substrate greater than 1/4" with an appropriate material.

Application Cautions

1. Do not proceed with the membrane installation until the lightweight insulating concrete substrate has cured a minimum of 48 hours. If necessary, consult with the lightweight insulating concrete manufacturer concerning additional drying time.
2. After rain or other precipitation, follow the manufacturer's requirements concerning proper visual inspection and additional drying time prior to adhering the membrane.
3. Prior to membrane installation, darker areas, especially along hairline cracks in the concrete, may serve as an indication of moisture entrapment and possible standing water beneath the surface. If this condition is found, consult with the lightweight insulating concrete manufacturer for proper corrective measures.
4. Except when lightweight insulating concrete is poured over slotted steel decks, the roofing contractor must conduct core cuts at the minimum rate of 1 every 2,000 square feet. The core cuts should be located around hairline cracks (if present) where darker areas are visible. After core cuts have been taken, the substrate should be examined for evidence of moisture above the structural deck and, if found, a wet/dry vacuum system, as recommended by the lightweight insulating concrete manufacturer, must be utilized to remove standing water from beneath the surface of the concrete.
 - a. To ensure the efficient operation of the vacuum system, a tight seal must be provided between the nozzle of the vacuum and the lightweight concrete substrate.
 - b. A one-way pressure relief vent, approved by Versico, must be installed over each core cut in accordance with Detail A-14.1.

VersiWeld Fully-Adhered Roofing System

"Attachment IV"

Insulation Attachment With Hot Asphalt (Grid System)

March 2007

A. GENERAL

1. The alternate attachment method for roof insulation incorporates the use of a flood coat of **hot asphalt (ASTM D312, Type III or IV)** to attach an approved insulation to an acceptable substrate.
2. Proper insulation attachment is greatly dependent upon workmanship, quality and quantity of asphalt, and both the ambient and asphalt temperatures at the time of installation. The building owner or specifier must ensure correct insulation attachment in accordance with established built-up roof practices, including a solid mopping of the insulation in a flood coat of hot asphalt.
3. The insulation attachment with hot asphalt is typically **excluded from the Membrane System Warranty**. Projects where a Total System Warranty is specified, must be forwarded to Versico for review to determine specific requirements components and installation procedures.

B. INSTALLATION CRITERIA

1. The surface to which the insulation is to be adhered must be secure. The wind uplift resistance of the asphalt adhered insulation will not exceed that provided by the existing membrane and substrate below.
2. For new construction or projects with a complete tearoff, a base sheet may be required in accordance with standard built-up roofing practices prior to the flood coat of hot asphalt.
3. The size of the insulation boards must not exceed 4' by 4' with the understanding that some boards will require trimming to accommodate substrate unevenness and also ensure proper insulation attachment.
4. During asphalt application, care shall be taken to prevent asphalt from oozing through the insulation joints and contacting the membrane.
5. Versico EPS, the EPS surface of Versico EPS/Composite, and DOW roof insulations are **not acceptable** for use with this attachment method.
6. On coal tar pitch, when using white VersiWeld membrane, minimum 1 inch thick Polyisocyanurate is the required membrane underlayment. If gray or tan VersiWeld membrane is used, minimum 1.4" thick Polyisocyanurate is required.

A grid nailer is strongly recommended to subdivide the roof area into smaller sections of 2400 square feet to provide containment to reduce the problem of insulation separation should it occur. Contact Versico for grid nailer requirements.

VersiWeld® Roofing System Installation Details

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Metrics

Length

1/8 inch = 3 mm
1/4 inch = 6 mm
15/32 inch = 12 mm or 1.2 cm
1/2 inch = 13 mm or 1.3 cm
5/8 inch = 16 mm or 1.6 cm
3/4 inch = 19 mm or 1.9 cm
1 inch = 2.5 cm
1-1/4 inches = 3.8 cm
1-1/2 inches = 4 cm
2 inches = 5 cm
3 inches = 8 cm
4 inches = 10.5 cm
5 inches = 12.7 cm
5-1/2 inches = 14 cm
6 inches = 16.5 cm
9 inches = 23 cm
12 inches = 31 cm
18 inches = 46 cm
24 inches = 61 cm
3 feet = .9 m
3 feet, 6 inches = 1.1 m
4 feet = 1.2 m
4 feet, 6 inches = 1.4 m
5 feet = 1.5 m
8 feet = 2.4 m
10 feet = 3 m
50 feet = 15.2 m
75 feet = 22.9 m
100 feet = 30 m
250 feet = 76.2 m

10 feet per minute = 3 m per minute
15 feet per minute = 4.6 m per minute

.045 inch = 1.1 mm
.060 inch = 1.5 mm

Roof Slope

2 inches in 12 inches = 16 cm/m
3 inches in 1 horizontal foot = 25 cm/m
5 inches in 12 inches = 41 cm/m
18 inches in 12 inches = 150 cm/m

Fastening Density

1 per 2 square feet = 1 per 1.86 m²
1 per 4 square feet = 1 per 3.72 m²
1 per 5.3 square feet = 1 per 4.93 m²
1 per 6.4 square feet = 1 per 5.95 m²

Weight

80 pounds = 36 kg
100 pounds = 45.4 kg
150 pounds = 68 kg
300 pounds = 136 kg
360 pounds = 163 kg
500 pounds = 227 kg
800 pounds = 363 kg

Wind Speed

55 mph = 88.5 km per hour
72 mph = 115.9 km per hour
79 mph = 127.1 km per hour
80-89 mph = 128.7 - 143.2 km per hour
90-99 mph = 144.8 - 159.3 km per hour
100 mph = 161 km per hour
120 mph = 193.1 km per hour

Temperature

25° Fahrenheit = 3.5° Celsius
32° Fahrenheit = 0° Celsius
40° Fahrenheit = 4.5° Celsius
90° Fahrenheit = 32° Celsius
120° Fahrenheit = 49° Celsius