



PermaGlass™
Installation Manual

Application Guidelines

Overview: Although all steps for applying the PermaGlass™ composite system are important, the following list of items is provided to maximize the application, integrity and performance of the reinforcement.

Notes:

1. The PermaGlass™ system comprise of two (2) separate operations: – 1) the repair of the defect area and 2) applying the “In Line Inspection Marker” for In Line Inspection. Use the marker bands on upstream and downstream sides of the repair. This method provides a unique signature and can be establish in the direction of flow.
2. The application of PermaGlass™ to repair the defect area will always require a “**Repair Zone**” which extends a minimum of 2” beyond both sides of the actual repair area. Example – defect is 10” long, Repair Zone for PermaGlass™ applied to the pipe is 14”
3. Keep the resin, and filler materials in the shade when working in ambient temperatures greater than 80 °F (27 °C). This will prevent captured heat build-up in the material packaging.
Remember the “working time” is directly affected by temperature, the cooler the temperature the longer working time you have. The warmer the temperature the less working time you have.
4. The anchor pattern and cleanliness requirement shall meet the minimum standard of NACE #3 finish or equivalent for pipe surface preparation prior to an PermaGlass™ Installation. Solvent wipe blasted surfaces so that any and all oils are removed.
5. In the event that the repair zone of the pipe cannot be media blasted, a hand grinder with disc (24 to 80 grit) may be used to create a clean anchor patterned surface. Solvent wipe surface (as applicable)
6. Do not use solvents **other** than ACETONE, MEK (methyl ethyl ketone) or Toluene during pipe surface preparations and cleaning.
Warning: Acetone, MEK and Toluene are highly flammable liquids. Careful handling is required. Be sure to read and be guided by the Safety Data Sheets (SDS).
7. The PermaGlass™ **must not** be installed over any type of soft material. Elastomeric materials (rubber based, mastic, urethane, etc.) interfere with the “load transfer path” to the bonded PermaGlass™.
8. PermaGlass™ shall be applied only to “**blunt**” defects. All sharp edges are to be removed from “gouge” type defects (ground out as required).

9. Ensure Filler material is placed in all cavities and “tented” areas (sides of long seam welds). This will ensure a “load-transfer” path to the PermaGlass™.
10. PermaGlass™ is to be used as a permanent repair method for external wall loss up to 80%, should the wall loss be greater or internal please contact WrapMaster, Inc directly for a temporary solution.
11. A pipe coating over the PermaGlass™ is recommended. The coating for *above ground pipe* must be clear not of dark color to minimize heat build-up to the composite. The PermaGlass™ resin does not contain UV inhibitors by itself. We recommend installing a UV coating over the top of all repairs.
12. The PermaGlass™ system may be applied in adverse weather conditions, but the installation area is to be protected (tented) from inclement conditions whenever possible. It also recommended the repair site be tented and heated when temperatures are below 50°F (0 °C) to expedite the cure time.

Basic Installation Steps

1. Put on gloves and safety glasses, along with any other appropriate chemical handling safety equipment.
2. Media blast pipe (2.5 mil profile) and ensure the removal all soft coatings.
3. Solvent wipe with acetone, MEK or Toluene and allow to flash for 1-2 minutes.
4. Using protective gloves mix the filler with the load transfer material until you have an consistent color and apply to effected area.
5. Apply load transfer material to all voids/“tented areas” and blend to pipe contour using tools provided.
6. Prepare a level, flat wet-out surface (e.g. a worktable by the side of the job) that is at least the width of the PermaGlass™ material and approximate. 6' long. Cover with provided plastic to insure a clean surface.
7. Unroll and lay out one segment of the PermaGlass™ substrate fabric on the wet-out work surface with the “mat” surface facing down.
8. Pour can small can epoxy hardener (B) into the large can epoxy resin (A) and mix using provided wooden stir sticks thoroughly mix for 1-2 minutes careful not to whip excessive air into the epoxy system. Pour can of the mixed resin onto the PermaGlass™ fabric laid out on work

surface, and with furnished applicator, distribute the resin evenly over the PermaGlass™ fabric. (1-can of parts A&B will do approximate of 10 square feet of PermaGlass™ fabric).

9. Roll up the fully saturated resin PermaGlass™ segment onto the applicator stick provided and transport to the prepared pipe.
10. Within 10-20 minutes of wetting-out, unroll the segment onto the prepared pipe surface using a uniform tension to avoid wrinkles and assure that no voids are present. After 1st layer is on pipe install Tracer ILLI marker magnets (4) upstream and (4) down Stream. Apply the design number of layers that has been engineered for the specific repair. When applying more than one roll of fabric overlap the end and start of the fabric by 4” tightly apply the rolls of fabric and assure that no voids or wrinkles are in the repair.
11. Tightly apply 2-6 layers of compression wrap over the repair after all the prescribed layers are on the pipe.
12. Lightly perforate the surface of the stretch wrap to enable the epoxy to be distributed evenly.
13. Allow to cure until a shore D rating of 78 or above is achieved. Approximate 2 hours during “normal operating” temperatures.
14. Remove the compression wrap, it is recommended to use a pipe coating over total repair area.

Detailed Installation Procedure

Step 1 – Inspect pipe defect area.

- Access the repair area for defects and determine the material required for the repair.
- PermaGlass™ is provided in 10’ sections based on the diameter of the pipe. The desired thickness will be premeasured and sent out according to the engineered design.

The defect area must fit the following criterion:

1. Prepare pipe by removing any loose debris and oily substances.
2. All sharp corners and dents should be rounded or ground smoothly.
3. All sharp corners, dents and pitting should then be filled using the epoxy filler material.
4. Pipe surface temperatures should be between 40 °F and 130 °F during PermaGlass™ application.
Note: If surface temperatures are above 130°F please consult Wrapmaster, Inc directly prior to installing.

Step 2 – Check List of Materials

Use the following check list to ensure all items and tools are accounted for prior to initiating the repair.



Application Kit

- _____ Garbage Bags
- _____ Plastic Layout Sheet
- _____ Plastic Putty Knives
- _____ Applicator for Epoxy
- _____ Fiberglass Tape
- _____ Wooden Stir sticks



Application Kit

- _____ Premeasured PermaGlass™ E-Glass Rolls
- _____ Premeasured Resin” aka” dump kit of A&B Epoxy
- _____ Constrictor Wrap
- _____ Perforator (Sold Separately)
- _____ Tracer™ ILI detectable magnets (Sold Separately)

The tools supplied by the installer are minimal but will be required.

Tools required by installer

- Solvent (Acetone, MEK, Toluene)
- Sandpaper (24-80 grit)
- Rags
- Measuring Tape
- Pencil Durometer
- Tarp (12' x 12') Folding wet out tables
- Sideline Tent

Items available for purchase

- (Tracer™) In Line Inspection magnets
- Perforator™

Step 3 – Prepare pipe surface

- Media-blast the pipe surface to a minimum of a NACE #3 or use a side-grinder with 24-80 grit sanding disks to provide an anchor pattern extending a minimum of 2” beyond both sides of the defect area.
- Solvent wipe surface with Acetone, MEK or Toluene (review appropriate SDS).
- Ensure that all soft coatings, paint, corrosion residue and weld splatter have been removed.
- Remove all “sharp edges”, defects must be “blunt”.
- The PermaGlass™ reinforcement system shall not be applied to any surface having an existing elastomeric coating without notification to WrapMaster, Inc.

NOTE: All “coal tar” and zinc residue must be removed from the repair area. These materials can inhibit the cure time and affect the bonding properties.

Step 4 – “Layout” repair area

- Measure the repair area for documentation purposes, ensuring that the “repair zone” extends a minimum of 2” beyond either side of the defect area. Using a pipe marker – circumferentially “mark” the repair zone for reference during the actual repair process.

Step 5 – Apply load transfer paste

Mixing the Putty: A MIXING SURFACE AND A PUTTY KNIFE IS REQUIRED - Either use a polyethylene mixing board or cardboard from the shipping boxes. Use the plastic putty knife to dispense and mix the materials. The putty materials are pre-packaged in foil pouches:

- **(MMA441} Putty Part A – Tan pouches** 1 pouch per Filler Kit
- **(MP-54420-CS Red-B) Putty Part B Activator – Red pouches** 1 pouch per Filler Kit
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View of Putty Mixing process



GUIDELINES: Listed below are instructions for application of materials under adverse conditions.

- **For condensing or “sweaty” pipe** – Solvent wipe the pipe surface. Apply the putty or paste to the defect area when the solvent “flashes off” the condensate.
- **For Temperatures below 40 °F (5 °C)** – Keep the paste, epoxy and PermaGlass™ warm (Inside a vehicle). Solvent wipe pipe surface and allow to flash.

Step 6 – Application Instructions

1. Prepare a level, flat wet-out surface (e.g. a worktable by the side of the job) that is at least the width and length of the PermaGlass™ segments. Cover this work surface with polyethylene sheet
2. Put on gloves and safety glasses, along with any other appropriate chemical handling safety equipment.
3. Unroll and lay out one segment of the PermaGlass™ substrate fabric on the wet-out work surface.
4. Pour all the contents of the Part B small container into one of the Part A larger containers. Mix these components together. Mixing should be done slowly to avoid air bubble formation.
5. Pour about half of the mixed resin onto the PermaGlass™ fabric laid out on work surface, and with furnished applicator, distribute the resin evenly over the entire PermaGlass™ fabric using slow steady strokes. Resin must be applied to the PermaGlass™ fabric before the fabric is applied to the vessel or pipe. Wet out back side as required.
6. Fabric can be tailored on site to suit the specific geometry of the repair.
7. Roll up the resin wetted PermaGlass™ segment onto the applicator stick and transport to the prepared pipe.
8. Install “Tracer™” ILI Marker magnets over the first layer of repair zone on the upstream and downstream of the repair.
9. Within 20 minutes of wetting-out, unroll the segment onto the prepared pipe surface resin wetted side down. Press fabric into the application surface area with gloved hands or supplied applicator, working trapped air bubbles to the edge and forcing the PermaGlass™ into tight contact with the primed surface(s) below.
10. Repeat applying PermaGlass™ segment until all layers / segments are used in the kit. It is best to set the starting point of each layer at different locations around the repair area. For example, start at the noon position, then move to say the 3-o clock position, etc. If several kits are to be used to a section of pipe or member, apply the initial first layer to the entire length of repair area, and then second and third kits to be applied should be offset 4 inches.
11. Once all PermaGlass™ kits are installed, wrap over those layers with spiral wrapping compression wrap with at least (2) layers – 4 layers is preferable.
12. Allow the PermaGlass™ to cure until dry to the touch.
13. Remove compression wrap.
14. Coat the entire repair area with approved UV and weather barrier coating. Two coats are recommended.

Allow the materials to cure for approximately two (2) hours before coating and backfill.

General guidelines for paste and epoxy materials

- Keep materials away from open flames – materials are flammable, review Safety Data Sheets (SDS) for material handling.
- Both the filler paste and epoxy materials should be stored between 40 °F – 70 °F (5 °C – 22 °C). AVOID PROLONG STORAGE ABOVE 90 °F (32 °C).
- **For cold weather application**—materials will thicken, ensure the materials are thoroughly mixed prior to application. **Epoxy resin mix time for temperatures < 40 °F (5 °C) should be adjusted to mix for 8-10 minutes.**
- Ensure all soft materials, coal tar and zinc residue are removed from pipe prior to application.
- Keep the filler paste and epoxy components out of direct sunlight to prevent “heat build-up” which may affect available “working time”.

Clean-up and disposal of materials:

- Acetone, MEK and Toluene will “soften” cured materials to assist in clean up.
- Unmixed or uncured materials may be removed by wiping or scraping excess material, then followed by a solvent wipe.
- Unused materials should be sealed in their original packaging containers and stored in covered area.