



INSTALLATION PROCEDURE FOR PIPING

Aquawrap®

G-03 Fabric – G-05 Fabric – C-2 Carbon Fabric and Bear™ types

READ AND UNDERSTAND ALL MSDS'S FOR THESE PRODUCTS PRIOR TO HANDLING OR INSTALLING THEM. CHEMICAL GLOVES AND SAFETY GLASSES ARE MANDATORY. A FACTORY AUTHORIZED TRAINING SESSION IS REQUIRED FOR INSTALLATION ON ANY CODE REGULATED PIPING SYSTEM. THE FOLLOWING INSTRUCTIONS SERVE AS AN ADDITION TO TRAINING.

1. This product is not recommended for pipes with leaks or pipes which may develop leaks.
2. Planning is an essential part of a good installation. The elements of a good plan are having a proper wrap design (Note that the calculators we have available will assist in the development of a good wrap design.). The next step is to develop a wrap plan. This should include the number of lifts required and for long wraps segmenting the wrap on the pipe. Note that the number of layers per lift should be limited to 25 for the G-03 fabric 8 for the G-05 and 5 for the C-2 fabric. It is also important to mark the areas on the pipe so that the wrap gets installed in the proper position along the length of the pipe.
3. Major surface contamination buildup should be removed prior to any high quality cleaning. This is often done with water-based pressure washer machinery and high-alkalinity detergent wash.
4. Paint may or may not need to be removed, depending on the type of repair. Generally any paint or coating must be removed. All pipeline tape wraps, bitumen coatings, insulation, etc. must be removed.
5. Abrasive blast to a near white (NACE No.2/SSPC-SP 10) level all surfaces that the composite will contact. This is adequate for most work. Installations requiring structural adhesion, or for isolated patch applications where the patch is held to the work surface by its adhesion, must be white metal blasted (NACE No.1/SSPC-SP 5). Where abrasive blasting is dangerous or impossible, surfaces that the composite will contact should be abraded (scratched up) with the equivalent of an 80-grit abrasive and the metal surfaces should be brought to the equivalent of the appropriate NACE level mentioned above. If abrasive cleaning is not allowed, chemical cleaning of the affected are must be done. In addition, a high strength, high build epoxy should be applied over the worst areas and allowed to cure before the application of the composite reinforcement. (Fig.1 and Fig. 2)
6. For pipes with dents with gouges the gouge must be ground out to remove any residual cracks. Dye pen or mag particle inspection must be used to verify that any residual cracking has been removed. There must be at least 60% wall remaining in the gouge area. The dent should then be filled with structural filler compound per paragraph 7 below.



Fig. 1 – The sandblasting done on this line revealed more damage than was visible during the initial inspection. Proper cleaning is essential to a sound repair.



Fig. 2 – Surface preparation as shown is generally unacceptable. In cases where the pipe cannot be properly cleaned, it should be noted that the final ultimate properties of the composite layup may be compromised (such as bonding to the steel surface).

7. Excess dust and residue from the abrading should be blown or wiped away with oil-free compressed air or new, clean solvent wipes. Special precautions should be observed when cleaning surfaces operating at high temperatures (above 100°F), or for applications where a low flash point solvent is inappropriate. For this type of cleaning, use of Bromothane S solvent is recommended. It is non-flammable and leaves no residue on the surface.
8. All sharp corners, corrosion pits, dents, leak repairing patches and wall/diameter offsets greater than 1/8th-inch (3mm) (1/16th-inch for fluid-tight installations) should be smoothed with a high compressive and high flexural strength filleting and filling compound. The recommended filler compound for structural applications is BIO-FIX 911 or BIO-DUR 563 (Fig. 3 and Fig. 4). Alternative fillers may be used only for non-structural applications. Most circumferential piping welds and the like require no special filleting or smoothing. Check with a straight edge to confirm the surface is level.



The defect must be completely filled in and the compound must be smoothed and leveled out. Remove high spots and fill any low spots

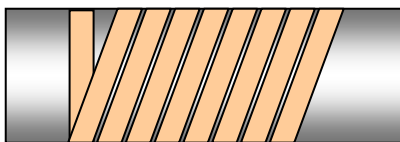


Use a straight edge to confirm evenness.

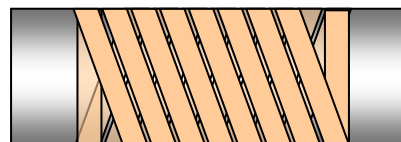
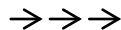
9. After filling and smoothing, wipe the surface again with a clean cloth and a solvent cleaner. Remove any dust or foreign matter from the surface of the pipe in the area of the repair.
10. Plan the wrap. Most applications are best done with spiral wrapping, but some require circumferential wrapping. The appropriate design calculator will assist in the wrap selection process. It is usually best to begin the wrap at one end of the damaged area. In the event that the damaged area is too long to complete the wrap before the resin cures the wrap must be done in sections. It is good practice to mark the areas of the pipe to be wrapped.
11. Apply 914 ABC Primer. It is important to select the proper primer for the application you are working

- SPIRAL WRAP

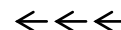
1. Open the first Aquawrap® pouch and begin the first layer of the wrap by doing one complete wrap, straight around the pipe.
2. When the first wrap is applied, continue wrapping and start a spiral toward the far end of the area to be wrapped. The wrap should be spiraled down the pipe with no edge to edge overlap. Continue to spiral the material around the pipe without overlapping so that each wrap's bottom or beginning edge just touches top or ending of the preceding one. Continue to wrap until the roll ends or the opposite end of the area to be wrapped is reached. Proceed to pull significant tension on the roll and wrap it around the pipe until the requisite number of layers is applied, thoroughly spraying with water, **EVERY** layer, as it is being wrapped.
3. When the roll has been completely applied, begin another roll starting the new roll's beginning end back about 6 inches onto the end of the previous roll.
4. When the opposite end of the area to be wrapped is reached stop and thoroughly spray the wrapped area with water. At this end of the wrapping area, make one complete straight wrap around and then begin spiraling the fabric the opposite way toward the beginning of the wrapping area. As before, the pitch of the spiral should such that the edge of each layer just touches the preceding layer without overlap. Spray each subsequent layer with water.
5. When the required number of layers has been applied secure the end. (See "SECURING THE WRAP", below.) If there is excess material on the roll which is not needed immediately for another wrap simply continue wrapping it until the roll is finished.



First Wrap

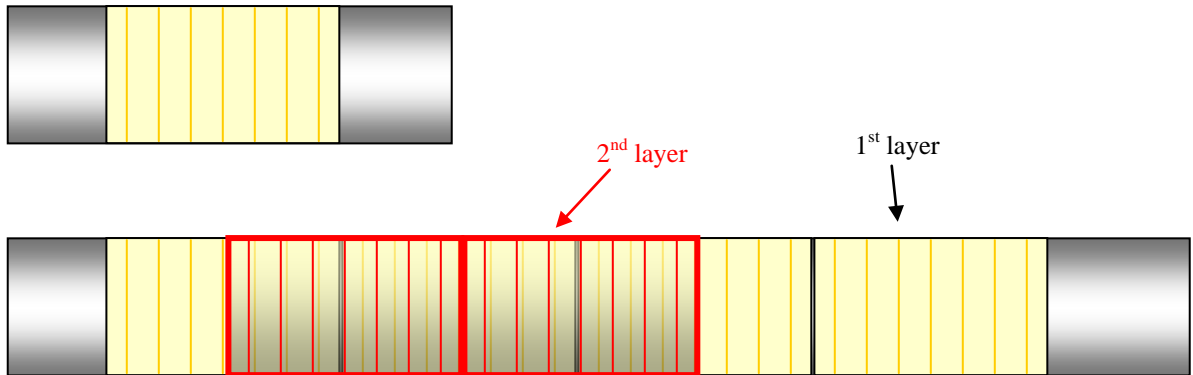


Second Wrap



- CIRCUMFERENTIAL WRAP:

1. Begin the first course by applying the required number of layers of fabric to one end of the area to be wrapped. Proceed to pull significant tension on the roll and wrap it around the pipe until the requisite number of layers is applied, thoroughly spraying with water, **EVERY** layer, as it is being wrapped.
2. Lay the second course next adjacent to the first. Adjacent layers should be edge to edge.
3. Continue wrapping until the opposite end of the pipe has been reached.



4. If more than one roll of material is required per course, overlay the first layer or fabric with the second by about 6 inches.
5. Secure the entire wrap.
6. Press the end of the roll down onto the pipe surface to be wrapped. An assistant should hold this starting point in tight contact with the pipe at all times.

Exceptions: a). When passing around or over obstructions, relax the tension while pressing downwards into the repair surface. Continue on around and do not start pulling tension again until you are certain that you are not pulling the Aquawrap® off of the obstruction. Apply extra layers in these regions. b). When transitioning from a large diameter down to a smaller diameter (for example, a concentric reducer) do not pull tension in the area of the transition, or the Aquawrap® will slip off of the larger diameter.

9. While wrapping, tiny droplets of water should be visible squeezing through the weave of the Aquawrap® fabric. If at any time there is a lack of such droplets visible, more activating water should be misted over the Aquawrap® surfaces with any appropriate sprayer.
10. If wrapping is interrupted, and the applied material cures to the “dry to touch” stage, BP-2 Primer should be brushed or rolled onto the dry surfaces before continuing with wrapping.
11. Tack the termination of the final layer of the final roll to the composite structure with Stricture Banding™ or Air Logistics Tiger Tabs™. All high performance repairs should be over-wrapped with Stricture Banding™. Apply the first wrap of Stricture Banding™ smoothly and with only slight tension; subsequent layers should be tightly stretched while wrapping.

Note: For areas of diameter transition (see Exceptions, above) the Stricture Banding™ should be applied first, tightly, only to the large diameter. A very light tension must be used in the actual transition area; followed by a full tension application in the smaller diameter area. Special techniques are available to overcome this situation where warranted. Contact Air Logistics Technical Support for details.

12. Perforate the surfaces of Stricture Banding™ using any suitable pointed object, such as the Perforator Tool, available from Air Logistics.
13. When cured to the touch, remove all Stricture Banding™. After the installation is fully dry (about 6 hours at 50% RH), paint all Aquawrap® surfaces or provide other coating protection from the elements. Air Logistics can furnish high quality paint for this over-coating. For water-submerged applications, a special primer and over-coating is required. Standard poly pipe tape may be used for applications below ground, provided there is not a significant amount of ground water. If ground water is present, use BP-4 Primer as the coating.