



A variety of methods exist to weld geomembranes. The appropriate method often depends on the consideration of several factors. This tech note discusses the more common welding techniques and when they should be considered.

When considering the process of welding two materials together we need to understand the materials at a molecular level. To weld two compatible materials together their two surfaces need to be softened in some manner, and to a certain depth in order for the two materials to co-mingle and become fused together as one. For most plastics, and therefore for most geomembranes, this can be done by two methods; chemically or thermally.

When thermally welding plastics together the two surfaces are softened with heat and then forced together causing the two materials to mix and upon cooling are “welded” together. When chemically welding materials together, rather than using heat, a solvent is used to soften the two surfaces. When they are then pressed together the two surfaces mix, and rather than cooling down, the solvent evaporates off leaving the two materials “welded” together. While the procedures are quite different, the final outcome is essentially the same. Many other factors need to be considered before selecting the appropriate method such as ambient temperatures, the similarity of the two materials and the scope of the project.

Hot-Air Welding

Hot Air Welders are small light-weight welders that, just as their name implies, use hot air to join materials together. This welding technique is suitable for all of the more common geomembranes including PVC, Urethane, HDPE, Polypropylene and LLDPE. The interface of the two overlapping layers of geomembrane are exposed to heated air that softens their surfaces, which are then pressed together to form a strong bond. Hot-air welders are generally used for detail work or to “tack” materials together in the field.

Extrusion Welding

Extrusion welders are larger and heavier welders that use a plastic welding rod forced down a heated barrel by an internal screw. The welding rod is softened and mixed in the heated barrel, and is then pushed out as a molten bead of plastic directly onto the geomembrane liner. This molten bead of material is shaped by a Teflon shoe over the edge of the overlapped materials. Hot air is blown into the overlap ahead of the molten plastic in order to soften the material to form a stronger weld. The welding rod used by the extrusion welder must be selected to be compatible with the geomembrane, often being manufactured from the very same resin batch.



This style of welding is largely restricted to HDPE, Polypropylene and LLDPE materials as the likelihood of material degradation in the heated barrel makes this welding technique unsuitable for PVC or Urethane based geomembranes.

Chemical Welding

This style of welding is only applicable to geomembranes that can be suitably softened by a solvent, restricting their use mainly to PVC and urethane based geomembranes. An advantage of chemical welding is its ease of application, requiring little more than a paint brush and the appropriate solvent. It is however extremely subject to environmental conditions, low temperatures or high humidity can greatly affect the quality of a chemical weld.

Wedge-Welding

Wedge welders are smaller hand-held machines that weld two overlapped sheets of material. The welder heats the interface between the two materials with a heated metal "Wedge" and then presses the materials together to form a weld. The thermoplastic materials are then fused at the molecular level.



Split-Wedge



Single-Wedge

Contain Enviro Services uses wedge welding as the basic technique for welding both prefabricated liners in our shop as well as field liner installations. Wedge welders run at a comparatively high speed between clean, overlapped material and are used for the long straight welds. More complicated work such as curves or attaching pipe boots should not be done with a wedge-welder; detail work like this should be done with extrusion, hot-air or chemical welding.

Many geomembrane installations require our crews to utilize several different welding techniques on the same project. Contain Enviro Services Installation Technicians are fully trained in all aspects of geomembrane installation for both primary and secondary containment applications. Our Quality Assurance/Quality Control documentation is available for all projects which fully details and logs our geomembrane installation, welding and testing procedures.