

Geomembrane And The Role It Plays In Waste Management



Landfill engineering and containment is a task that demands precise planning and the use of materials to prevent chemicals from leaching into the environment. It's a known fact that poor waste containment can contaminate water and soil quality to lead to poor health. Using geomembranes in landfill engineering can significantly reduce this.

Geomembranes are polymeric sheets made of PVC, polyethylene, synthetic rubber and similar materials. They're known for their impermeability to control fluid and gas from leaking into environments. They're mostly used as liners for waste liquids, golf course water holes, water and waste conveyance canals and to waterproof rockfill dams, concrete dams, pipelines and tunnels. This ability to contain fluid and gas makes them fundamental tools in waste management.

Like all man-made materials, in order for geomembranes to successfully waterproof and contain materials, they must be made of high quality products. Repeated testing and field tests produce accurate readings while installation by trained and certified personnel ensures that membranes work to full capability.

Geomembranes vary in chemical resistance, flexibility and cost depending on what material is used to construct them. Here's a look at the properties of different grades of plastic and rubber and what they offer.

HDPE: High density polyethylene is known for being relatively inexpensive but with good chemical resistance and weld strength. However, it has low puncture resistance, may crack under stress and has a high degree of thermal expansion.

PVC: Polyvinyl chloride or PVC can have fabricated seams, has good layflat behavior and is easy to seam. Conversely, it doesn't fare well under high and low temperatures and doesn't resist UV light well.

fPP-R: fPP-R, a polypropylene and rubber-based material, can be factory fabricated and has sound multiaxial properties. It handles strain well and maintains performance under low and high temperatures. However, chlorinated water and hydrocarbons weaken strength and durability.

LLDPE: Linear low density polyethylene is flexible, has better layflat and better multiaxial strain properties compared to HDPE. These benefits are balanced by poorer chemical and UV resistance, benefits offered by HDPE.

EPDM: EPDM or ethylene propylene diene monomer is a synthetic rubber known for its sealing characteristics. In geomembranes, it shows good performance in low temperatures, very good layflat behavior and sound resistance to UV light. What it lacks is a resistance to oils and hydrocarbons in addition to having less than satisfactory seam quality.

Butyl rubber: Also a synthetic rubber, butyl rubber shows good resistance to UV light and weathering. Its drawbacks include difficulty seaming, low tear strength and poor resistance to hydrocarbons.

Irrespective of what type of geomembrane is used, landfill preparation is crucial to deciding how effective liners are. For instance, sharp objects must be removed from the area as even if the membrane resists punctures well, weather conditions and chemicals will cause it to wear down over time.

When combined with geotextiles - plastic fabrics that separate water, waste and soil - geomembranes see increased resistance to tears and containment. In fact, most landfills lined with membranes are used in conjunction with geotextiles.

Geomembranes are also used in leachate ponds to prevent leachate from seeping into soil. A drainage system, filters, sumps and pumps are used and all components including the health of the membranes must be monitored since waste decomposes unevenly, buckles and distorts pipelines. If proper planning, execution and maintenance of leachate ponds is neglected, not only will waste seep into soil but gas production will increase.

Company Description

Industrial & Environmental Concepts, Inc., (IEC), is widely recognized as the worldwide leader in the design, fabrication, and installation of cover and liner systems.

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