The Pioneer Of Geosynthetics

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Application Sheet

Geomembrane Supported Geosynthetic Clay Liners

GEOMEMBRANE SUPPORTED GEOSYNTHETIC CLAY LINERS (GCLS)

The GSE GundSeal GCL product composite provides the highest swelling and sealing of bentonite clay with the chemical resistance and impermeability of a polyethylene geomembrane.

GSE GundSeal consists of high quality sodium bentonite adhered to a 15 mil to 80 mil smooth or texture HDPE geomembrane, making it a unique one product composite liner for containment applications. A spunbonded geotextile is adhered to the bentonite surface to protect the bentonite during installation.

Given the documented hydraulic sealing provided by GSE GundSeal, the ease of its installation, and cost savings made possible by the simplicity of installing a single product, GSE GundSeal provides an effective alternative to conventional geomembrane and compacted clay or fabric GCL liner installations.

GSE GundSeal geomembrane supported GCL.

APPLICATIONS

GSE GundSeal is generally used in one of two fundamental capacities: (1) In a bottom liner system to contain fluid, such as in landfills, surface impoundments, and secondary containment applications, and (2) In a cover system to keep fluid out, such as in landfill caps and remediation closure applications. In either capacity, there are two general installation configurations to consider:

1. Single composite mode. In this mode the bentonite side of the material is installed face down and the geomembrane side face up, to form a one-product composite (geomembrane-clay) liner. Normally, given the effectiveness of the overlap seams, the overlaps are not mechanically joined but are simply overlapped for self-sealing. Alternately, it is possible to weld the geomembrane seams together, either using standard geomembrane hot-wedge or extrusion welding procedures.

Installation of overlapped GSE GundSeal as a composite liner on a closure project.

2. Encapsulated mode. In this mode, a supplemental overlying geomembrane is installed against the bentonite side of GSE GundSeal forming a geomembrane-bentonite-geomembrane composite liner. In this case, GSE GundSeal is usually installed with the bentonite side facing up with a supplemental geomembrane installed over the GSE GundSeal bentonite surface. The advantages of the encapsulated mode are that it increases fluid containment capability and also improves slope stability by keeping the bentonite dry over most of the area where GSE GundSeal has been deployed.

Installation of GSE GundSeal with an overlying GSE White geomembrane, forming encapsulated GundSeal.

HYDRAULIC PERFORMANCE

When utilized as a one product composite liner, the hydraulic performance of GSE GundSeal is superior to conventional geomembrane/compacted clay lining systems, given its excellent intimate contact, minimal wrinkles, and self sealing overlapped seams.

When utilized in an encapsulated liner(geomembrane/clay/geomembrane), GSE GundSeal hydraulic performance results in 17,000 times less leakage when compared to conventional geomembrane /compacted clay composite liner systems.

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Application Sheet

Examples of hydraulic and leakage comparisons between GSE GundSeal and conventional composite liner systems for different composite liner applications can be found in the GSE GundSeal Design Manual.

OVERLAPPED SEAM INTEGRITY

Given the excellent lay flat properties of installed GSE GundSeal liner, resulting in minimal geomembrane wrinkles, proven hydraulic performance of the overlap seams, and regulatory acceptance, GSE GundSeal seams can simply be overlapped with confidence that the composite lining system integrity will be maintained. Overlapped GSE GundSeal vs. conventional composite liners with welded geomembrane seams derive hydraulic performance benefits as well as economic savings due to decreased installation costs.

BENTONITE PROTECTION BY THE HDPE GEOMEMBRANE BACKING

The geomembrane backing of GSE GundSeal includes a high quality GSE HDPE geomembrane ranging in thickness from 15 mil to 80 mil (0.4 mm to 2.0 mm), and can be smooth or textured surface, depending on project slope requirements. In addition to providing an impermeable and chemical resistant carrier for the bentonite, the geomembrane backing also provides effective long-term protection and durability of the bentonite against cation exchange, wet/dry cycles, differential settlement, and bentonite contact with liquids and soils that may decrease the swelling and sealing capability of the bentonite.

SHEAR STRENGTH

If the bentonite must be kept dry in order to maintain a higher factor of safety for stability, then the 'encapsulated GSE GundSeal liner system is used. When GSE GundSeal is deployed in the encapsulated mode with a separate overlying geomembrane (geomembrane/bentonite/geomembrane),the textured geomembranes protect the bentonite from hydration and provide long term stability for sloping applications. Hydration of the bentonite is limited to areas adjacent to geomembrane defects and overlapped GSE GundSeal seams, resulting in up to 90% of the bentonite remaining dry over the life of the project.

The encapsulated GSE GundSeal liner system has been used successfully on many critical sloping applications in Europe, Asia, and the U.S. The design approach includes using a prorated shear strength design methodology that is discussed in detail in the GSE GundSeal Design Manual.

EASE OF INSTALLATION

Another advantage of the GSE GundSeal GCL is that with its HDPE geomembrane backing, it is easy to install. GSE GundSeal GCL panels are the longest and widest GCL rolls available in the industry thus providing fewer seams, lower scrap factor, and decreased roll handling during installation. A spun-bonded geotextile is attached to the bentonite surface for protection during material installation. GundSeal material can be unrolled or pulled into position without dislodging the bentonite.

Geomembrane deployed over GSE GundSeal forming encapsulated bentonite for slope performance.

THE GSE GUNDSEAL GCL DESIGN MANUAL

For a free copy of the state-of-the-practice design manual for utilizing GCLs in composite lining (geomembrane-clay) applications, please give us a call.

ENGINEERING SUPPORT

The GSE Engineering Support Staff is comprised of multidisciplinary product professionals to support you across a range of project requirements. This includes knowledge in geomembrane, geosynthetic clay liners, geonet, geocomposite, nonwoven geotextile and concrete protection products and application solutions. Rely on our technical staff to help you solve your project issues.

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