

Integrated Drainage System (IDS)

ADVANCED ENGINEERED
GEOSYNTHETIC SOLUTION FOR
CLOSURE AND CONTAINMENT
APPLICATIONS





The Plastics Experts.

AGRU America uses state-of-the-art equipment and the flat die calendar process to manufacture structured geomembranes with a consistent core thickness and greater physical properties than those made with other processes, such as blown film extrusion. AGRU uses only the highest-grade HDPE and LLDPE resins manufactured in North America.

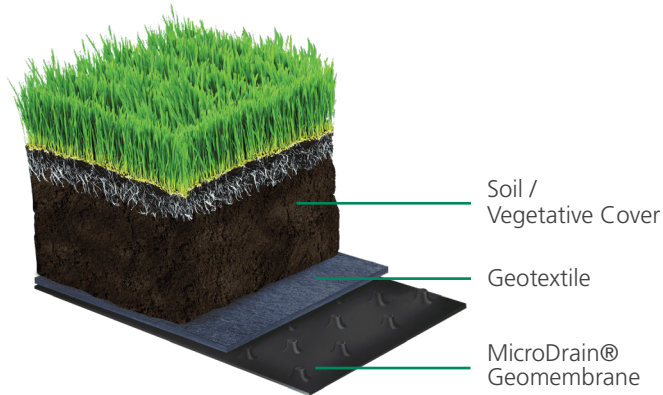
Founded in 1948, the AGRU success story is one that has been unfolding now for about seven decades. Its story began with Alois Gruber Sr., who envisioned a company that could be a single-source supplier of geosynthetic materials, piping systems, semi-finished products, and concrete protection liners made from engineered plastics. AGRU has since become an industry leader, manufacturing and supplying everything from a single source and providing a unique application-technical consulting perspective.



Quality

AGRU places customer satisfaction first. Our start-to-finish attention to quality ensures that our products meet and exceed the strictest technical specifications, providing safe operation within municipal solid waste, coal combustion residual (CCR), mining, oil & gas, water, and wastewater infrastructures.

AGRU Integrated Drainage System



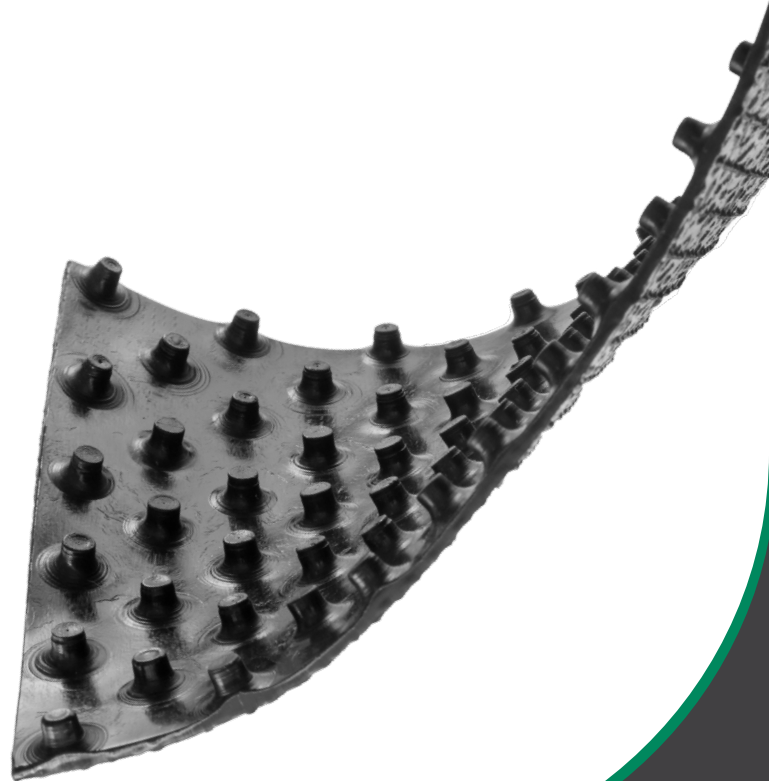
System Overview and Benefits

Geosynthetic drainage layers (geocomposite or geonet materials) have been used to replace the more expensive soil/aggregate drainage layers of earlier design methods. While these materials provide superior performance and cost savings compared with the natural soil/aggregate materials, they introduce challenges from an interface friction, specification conformance, and installation perspective. AGRU America has addressed these challenges by producing the Integrated Drainage System (IDS), a Subtitle D-compliant closure and containment system that incorporates an advanced drainage structure within the geomembrane component. By combining multiple layers—each with its unique benefits—into one product, AGRU provides a powerful closure and containment solution that also delivers significant cost savings.

AGRU IDS offers increased shear strength performance, reliable long-term drainage performance, a reduction in required geosynthetic material, and reduced installation time and cost.

IDS Summary

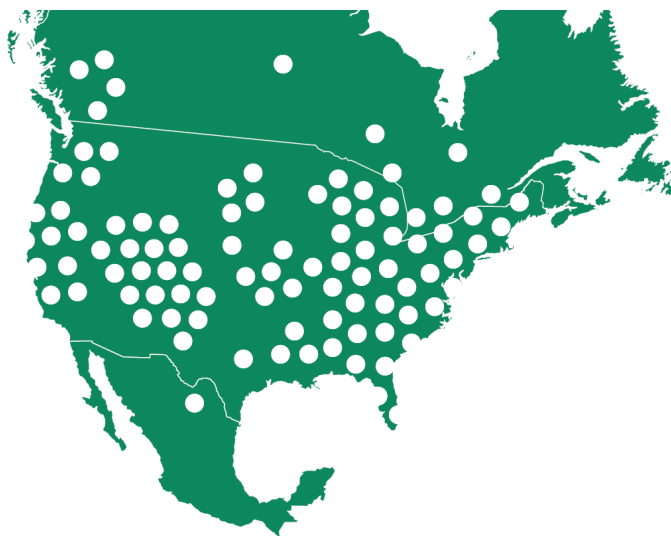
- Incorporates drainage and environmental containment performance into a single layer.
- Reduced need for separate drainage material layers, representing substantial cost savings and avoids material delay associated with geocomposites.
- High factor of safety for steep-slope stability.
- 50 mil thickness is 25% thicker than 40 mil membrane closure requirement.
- Applications include closure projects, double-lined ponds/reservoirs/pits, and containment pads for landfills and coal combustion residuals.
- Installs 15% faster when compared with traditional closure systems.
- Requires lower number of rolls to ship, unload, and store on-site.





AGRU Integrated Drainage System

Projects Installed Across North America



Strength and Stability

IDS provides maximum interface friction and a high factor of safety against sliding

High-Quality Construction

Meets ASTM and GRI GM13/17 standards

Project Highlights

- Between 2010 and 2016, AGRU Integrated Drainage System (IDS) was chosen as the solution of choice in dozens of projects across North America covering more than 3,000 acres.

Applications

Closure

IDS is an ideal closure solution for landfills as it can be configured based on the project specifications. The configuration will depend largely on the steepness of the slope of the closure area. For example, the steepest slopes would benefit from IDS utilizing AGRU Super Gripnet Liner, whereas less steep applications utilize MicroDrain liner.

IDS Configurations for Landfill Closures

FILTER LAYER

AGRUtex, an 8 oz/SY nonwoven geotextile (p. 6).

GEOMEMBRANE WITH IDS:

1. AGRU MicroDrain Liner –or–
2. Super Gripnet Liner (p. 9)



Containment

IDS is an excellent performing and cost savings containment solution for double-lined ponds, reservoirs, pits, and containment cells because it can be configured based on the project specifications. The IDS configuration will depend largely on the steepness of the slope of the containment area and normal load above the system.

IDS Configurations for Ponds, Reservoirs, Containment Cells and Pits

PRIMARY GEOMEMBRANE

Choose depending on the steepness of the slope.

1. AGRU Smooth Liner
2. AGRU MicroSpike Liner

SECONDARY GEOMEMBRANE WITH IDS

1. AGRU Drain Liner –or–
2. AGRU MicroDrain Liner –or–
3. Super Gripnet Liner





The Polyethylene Advantage

All AGRU geomembrane products are available in two high-quality resin types: high-density polyethylene (HDPE) or linear low-density polyethylene (LLDPE). AGRU geomembranes meet and exceed all GRI GM 13 (HDPE) and GRI GM 17 (LLDPE) test values.

IDS Component Specifications

IDS is a customizable system with several component options for each layer depending on the specific requirements of the project. Below is a breakdown of all IDS components and their available specifications.

AGRUTex®

AGRUTex is a nonwoven geotextile product line specifically designed for waste containment applications providing filtration, separation, and/or protection for other geosynthetics. Geotextiles help to ensure the long-term viability of waste storage units. Used in a wide variety of construction projects, AGRUTex is easy to install and has a track record of high performance.

Technical Specifications

- Produced in weights ranging from 3.0 oz/sy to 35 oz/sy and widths up to 19 feet
- 100% polypropylene nonwoven geotextile

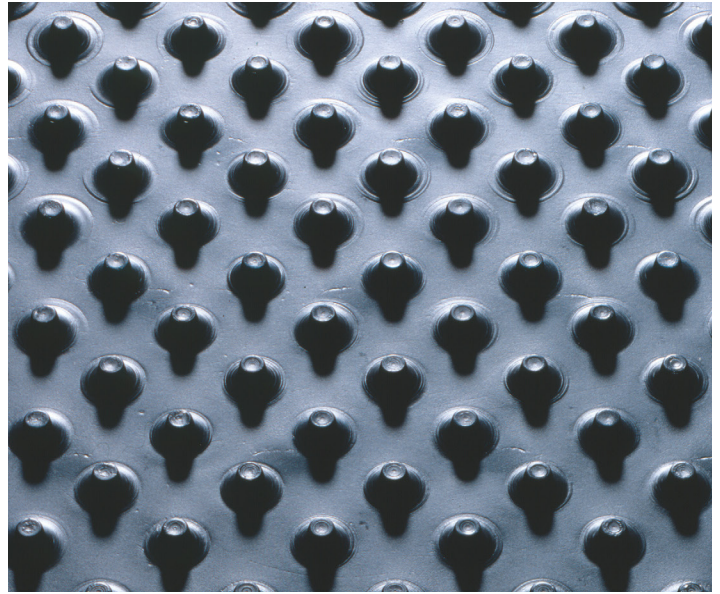


AGRU Drain Liner®

Drain Liner comprises upward-facing drainage studs with consistent pattern and spacing, delivering high flow rates and reliable drain capacity. These built-in studs eliminate the need for a separate geonet or geocomposite drainage layer, providing cost savings in material reduction and installation. The stud pattern also reduces the potential for chemical and biological clogging when compared with conventional geonet materials. The bottom-facing portion of the geomembrane is smooth, similar to AGRU Smooth Liner. Finally, the product's smooth edges allow for thermal welding between adjacent sheets

Technical Specifications

- Stud height: 130 mil (3.3 mm)
- Combined with AGRU Smooth Liner

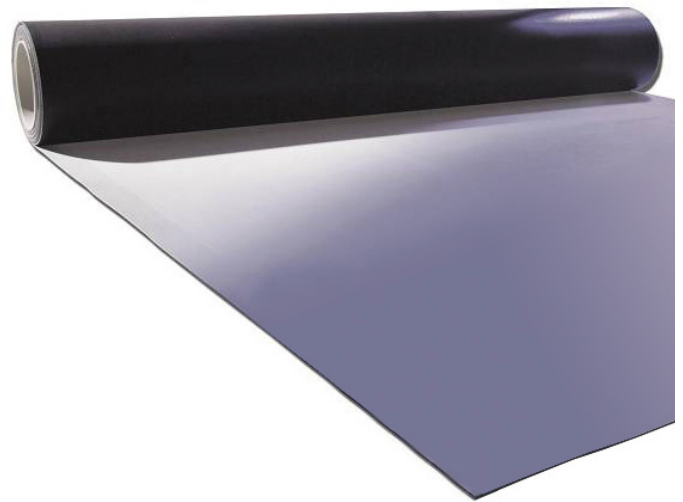


AGRU Smooth Liner®

Smooth Liner is ideal for any application that requires a tough and flexible barrier, minimal interface friction performance, a broad range of chemical resistance and capable of delivering high performance over the project's lifetime.

Technical Specifications

- Available in thickness between 30 mm and 100 mm
- Available in white for improved thermal expansion and contraction performance
- Rolled on 23' wide plastic cores to ensure ease of installation, increased safety while unloading or staging eliminating the problem of collapsed cores

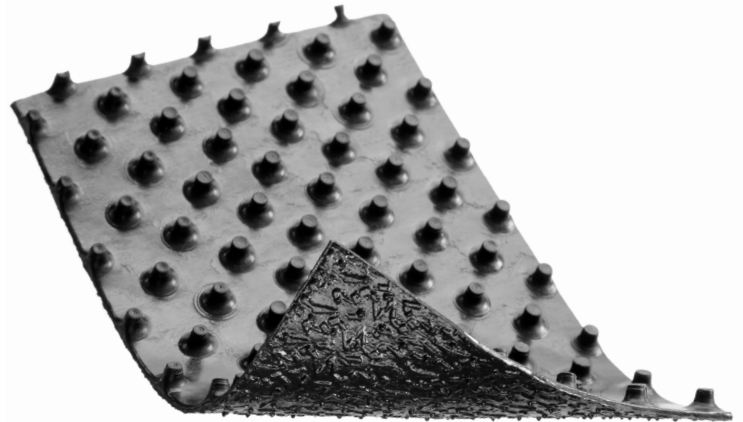


AGRU MicroDrain® Liner

MicroDrain geomembrane comprises upward-facing studs with consistent pattern and spacing, delivering high flow rates and reliable drain capacity. These built-in studs eliminate the need for a separate geonet or geomembrane drainage layer, providing cost savings in material usage and installation. The stud pattern also reduces the potential for chemical and biological clogging. The bottom-facing portion of the liner is textured to improve slope stability, made with AGRU MicroSpike Liner. Finally, the product's smooth edges allow wedge welds between adjacent sheets, and a special cutting tool can remove studs from cross seams as needed prior to welding.

Technical Specifications

- Stud height: 130 mil (3.3 mm)
- Combined with AGRU MicroSpike Liner

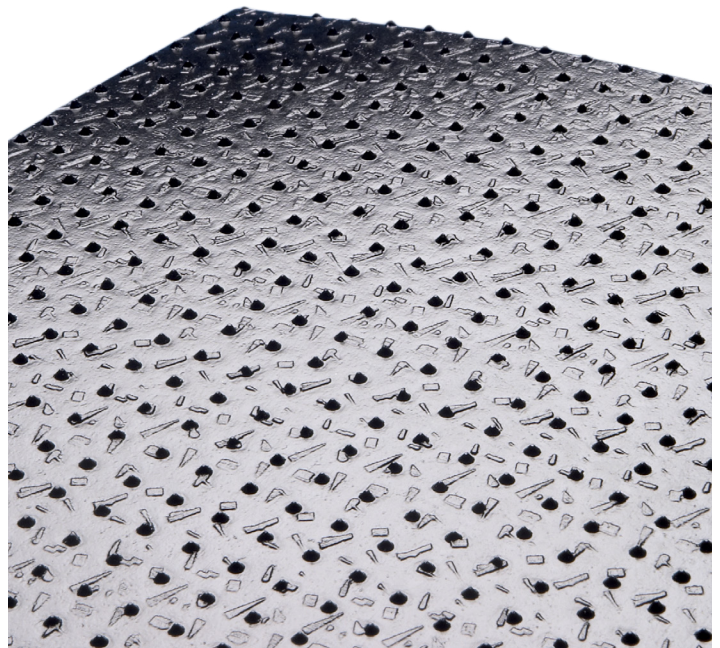


AGRU MicroSpike® Liner

MicroSpike Liner features consistent texture and friction angle values, making it the material of choice in containment applications where slope stability is essential. To create MicroSpike, AGRU uses the patented manufacturing process called flat die-cast extrusion. Flat die-cast extrusion provides uniform asperity height that is also higher than competitive products.

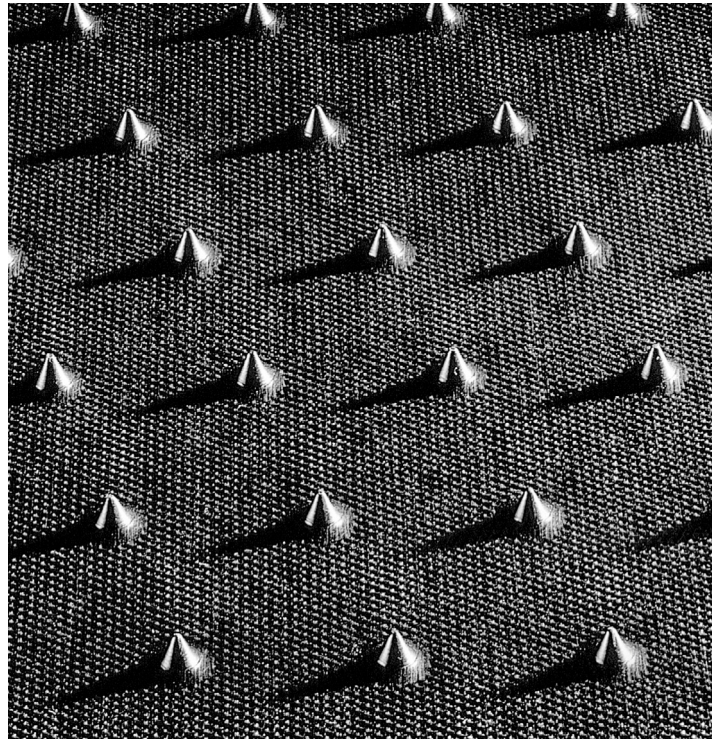
Technical Specifications

- MicroSpike made with LLDPE offers 400% Elongation at Break (HD 350%)
- Most consistent textured surface and core thickness available in industry
- Available in thickness between 30 mm and 100 mm
- Four customizable colors: black/white, green, or natural



AGRU Super Gripnet® Liner

Super Gripnet Liner comprises upward-facing studs with consistent pattern and spacing, delivering high flow rates and reliable drain capacity. These built-in studs eliminate the need for a separate geonet or geomembrane drainage layer, providing cost savings in material usage and installation. The stud pattern also reduces the potential for chemical and biological clogging. The bottom-facing portion of the liner has grip for a high-friction surface that delivers superior slope performance. Finally, the product's smooth edges allow wedge welds between adjacent sheets, and a special cutting tool can remove studs from cross seams as needed prior to welding.



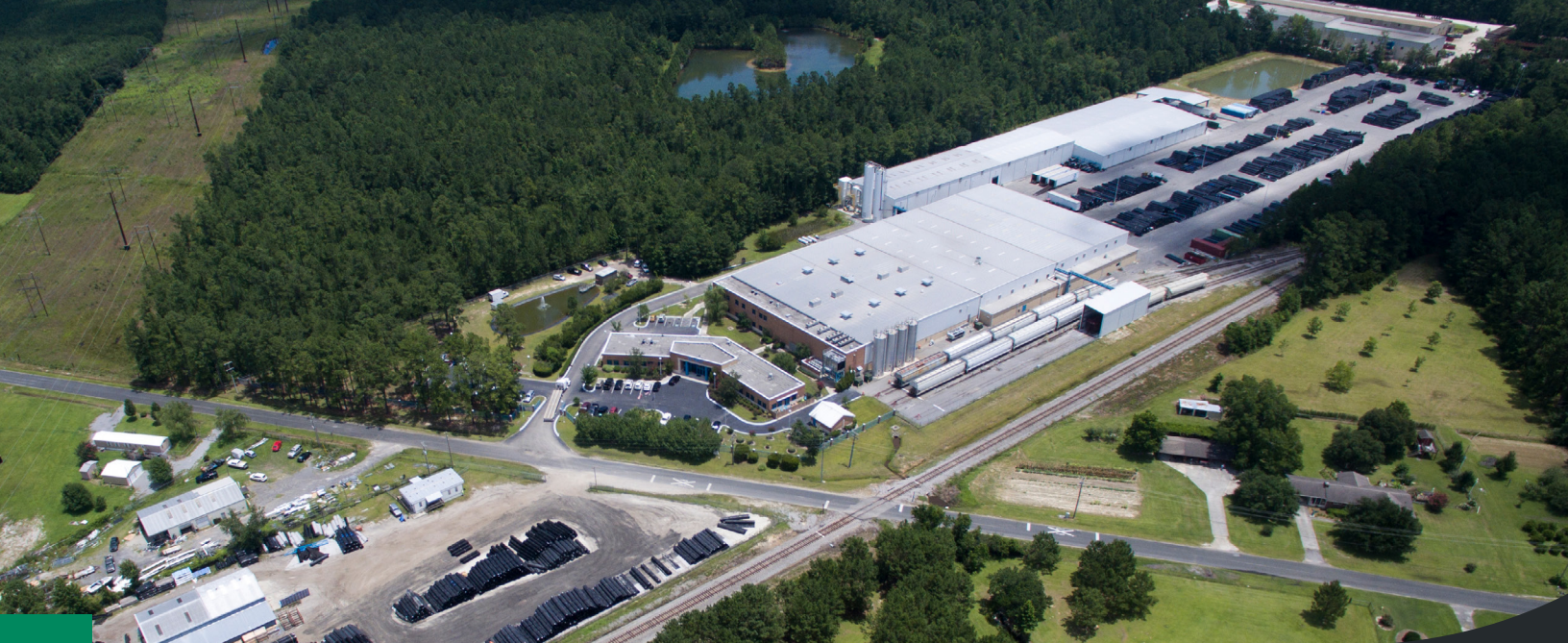
Technical Specifications

- Stud height: 130 mil (3.3 mm)
- Grip height: 175 mil (4.45 mm)









Subject to errors of typesetting, misprints and modifications.
Illustrations are generic and for reference only.

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