

# LINING SYSTEMS

GEOMEMBRANES FOR  
PROTECTING STRUCTURES  
AND THE ENVIRONMENT





## The Plastics Experts.

The AGRU success story already spans seven decades. Founded in 1948 by Alois Gruber sen., the company is now counted among the most important comprehensive suppliers for piping systems, semi-finished products, protective liners for concrete and geomembranes made of engineering plastics. The fact that we provide everything as a single source supplier distinguishes us from many competitors. We process exclusively high-quality thermoplastic materials. And when it comes to problem-solving expertise for material selection and installation, we are your best partner.

More than four decades ago, AGRU set new standards with the production of calendered, large-format geomembranes. Since then, the company has continuously developed its LINING SYSTEMS and today offers an economical and reliable system solution for nearly every application worldwide. The modern production facilities of AGRU Kunststofftechnik GmbH enable not only the manufacture of smooth, textured, and slip-resistant geomembranes, but also the production of coextruded geomembranes, the integration of reinforcement elements, and the lamination of geotextiles. Geomembranes are available in widths of up to 7 m and thicknesses ranging from 0.5 mm to 4.0 mm. The materials include HDPE (high-density polyethylene), LLDPE (linear low-density polyethylene), VLDPE (very low-density polyethylene), and FPP (flexible polypropylene).

### Quality

At AGRU, customer satisfaction comes first. Technical consultations, training courses, welding instruction and expert supervision on-site are essential for this. AGRU maintains a quality management system according to the ISO 9001:2015 standard, as well as an environmental management system according to the ISO 14001:2015 standard and the safety and health management system according to the ISO 45001:2018 standard. Additionally, the products comply with international standards and are monitored and evaluated by independent testing agencies on a regular basis.

The start-to-finish attention to quality ensures that the products meet the strictest technical requirements.



# LINING SYSTEMS

## Universally deployable

**AGRU LINING SYSTEMS offer the right solution for every application through an array of products made of many different combinations of surfaces and materials while being supported by an extensive range of accessories. AGRU LINING SYSTEMS are found wherever geomembranes are used, such as in landfill and hydraulic engineering, ground-water protection, and building and tunnel sealing.**

### Soil and groundwater protection

**with geomembranes for mining, hydraulic and landfill engineering, and liquid manure and retention basins**

AGRU LINING SYSTEMS offer solutions for every requirement

- available in the materials HDPE, LLDPE, VLDPE and FPP
- availability of different surface structures (smooth, anti-slip or structured)
- signal layers enable visual control of the sealing system

### Efficient corrosion protection in tunnels

**AGRUFLEX protects the inner concrete shell**

AGRUFLEX made of VLDPE is the optimum solution

- for bored and cut-and-cover tunnels
- provides protection from aggressive mountain water
- perfectly matches the tunnel shape thanks to high flexibility

### Excellent product properties

**thanks to the use of the chemically resistant\* materials PE and PP**

AGRU LINING SYSTEMS have a long service life

- plasticiser-free plastics ensure long-term performance
- high tensile strength, elasticity and flexibility
- excellent static puncture resistance

### Economic installation

**simple and permanently leak-tight welding technologies**

Suitable for any application

- health-safe welding
- innovative installation methods (e.g. induction welding)
- the membranes are easy to install thanks to excellent elongation and flexibility

### One stop shopping

**liner, water stop profiles, discs and drainage pipes**

A complete system for the perfect watertight sealing

- welding rods, waterstop profiles and cleaner
- drainage systems in PE and PP for area and strip drainage
- compatible with concrete protective liners, semi-finished products and piping systems made by AGRU

\* according to media resistance list



## Excellent product properties

### Chemical and mechanical resistance

Lining material attributes are produced to meet the specific requirements of each application. Various types of PE and PP are available. AGRU application engineers with many years of experience will be happy to advise you on finding the solution that meets your needs.



#### High-density polyethylene (HDPE)

The ongoing development of HDPE compounds in the recent years has improved the performance of HDPE geomembranes significantly. AGRU HDPE geomembranes meet sealing technology requirements, providing best-in-class flexibility, good strength, and good elongation behavior. Additionally, the liner offers high chemical resistance and proven long-term durability. This state-of-the-art lining material is able to meet the project requirements of a variety of applications.



#### Low density PE (LLDPE)

LLDPE has a higher content of comonomers than HDPE, which means a higher degree of branching in the main chain. As a result, the crystalline content and the density are lower than those of HDPE. Plastic geomembranes made of LLDPE are more flexible than HDPE membranes and have a higher elongation at break under biaxial stresses. LLDPE plastic geomembranes are used in applications sensitive to settlement, such as the surface sealing of landfills and in hydraulic engineering.

## Very low-density PE (VLDPE)

The PE product line is complemented by the AGRUFLEX VLDPE geomembranes. These combine the advantages of an HDPE geomembrane with a high degree of flexibility. Due to its excellent chemical, physical and biological properties, this product is suitable for a wide range of applications. Its main applications are in tunnel and pond construction.



## High-temperature-resistant geomembranes

Thanks to their improved service life at elevated temperatures, HTR plastic geomembranes enable new solutions in industry and for the energy transition, where processes involve higher temperatures. AGRU offers high-temperature-resistant geomembranes based on PP and PE, tailored to the specific requirements of each project. PE-HTR geomembranes do not achieve the same expected service life as PP-HTR geomembranes; however, they are considered UV-resistant.



## Flexible polypropylene (FPP)

FPP is the latest polyolefin material and was only introduced at the end of the last millennium. Because FPP does not need to be manufactured with plasticizers, it is completely homogenous with very low crystallinity, high strength, and maximum flexibility. In addition, FPP has a lower coefficient of thermal expansion than PE-based materials. Thanks to these properties, AGRUFLEX FPP membranes adapt to the substrate perfectly and are therefore ideally suited to pond construction.



## Electrically conductive geomembranes

Coextrusion techniques can be used to produce HDPE, LLDPE and VLDPE geomembranes with electrically conductive signal layers. On the one hand, this can help prevent static charging so that the membranes can be used in explosion-protected areas. On the other hand, these membranes are used as part of leakage detection systems.





# Environmental Protection with AGRU LINING SYSTEMS

AGRU plastic geomembranes are suitable for almost all applications and are designed for long service life.



## Groundwater protection

Groundwater is one of the most valuable natural resources and must be protected from contamination caused by industrial activities, infrastructure projects, and waste management facilities. AGRU geomembranes provide a reliable barrier that prevents hazardous substances from migrating into soil and aquifers, ensuring long-term environmental safety and regulatory compliance.



## Corrosion protection

Waterproofing of ground-contact structures involves the protection of buildings from moisture and water. For example, the foundation slab can be protected from damp and water rising from the ground by means of a horizontal seal with AGRU geomembranes. This durable material is root- and rodent-resistant, resistant to aggressive groundwater.

## Water reservoirs in alpine regions for the production of artificial snow

Water reservoirs are a key prerequisite for reliable and efficient snowmaking in ski resorts. They make it possible to provide water as needed and independently of current precipitation levels. In this way, water reservoirs ensure an early start to the season, high-quality slopes, and the economic stability of winter sports regions.



## Water reservoirs / canal sealing in agriculture

Increasing weather extremes and prolonged periods of drought pose major challenges for agriculture. Canals and water reservoirs are indispensable in this context: they secure irrigation, stabilize yields, and protect against the impacts of drought.



## Safe and efficient raw material extraction

Mines worldwide face the challenge of increasing their production capacities while simultaneously protecting the environment and developing mineral resources in an economically viable way. This task requires reliable sealing systems that meet strict safety and environmental protection standards – where AGRU has been providing leading solutions for many years.



## Flood protection

Decentralized and sustainable water management to reduce peak flood levels consisting of our HDPE geomembranes combined with a modular infiltration and stormwater retention system and a geotextile protective fleece has already become state of the art in many countries. This construction method helps reduce damage to infrastructure and protect people from the increasingly frequent occurrence of heavy rainfall events.

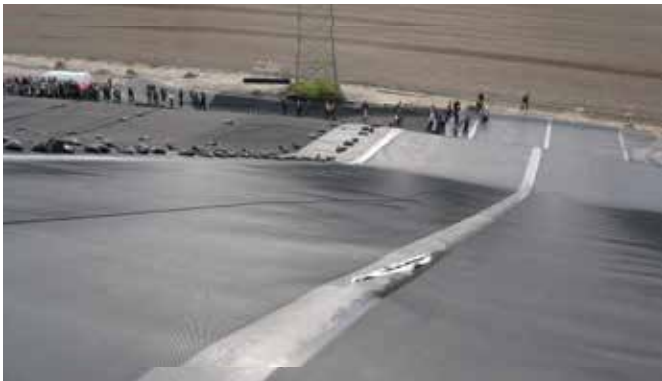




## Landfill engineering

### Effective groundwater protection

Landfill LINING SYSTEMS are chosen depending on the materials expected to be stored on site. In some cases, a second layer of HDPE or LLDPE geomembranes is installed alongside other geosynthetics. In every case, however, the geomembrane is always the primary lining element at a landfill to prevent rainwater penetration when the surface of the cell is being lined, and to prevent groundwater from being contaminated via the landfill cell's base liner.



#### Landfill capping

A landfill body consists of highly contaminated waste that should be prevented from leaching into groundwater and the surrounding environment. To keep rainwater from permeating into the landfill body, the site must be covered promptly after the landfill cell has been closed. Closure can only be postponed where further settling is expected as a result of insufficient compaction. Depending on the degree of contamination of the deposited materials, geosynthetic composite systems are used for the surface closure.



#### Landfill base sealing

Pollutants must be prevented from leaching out of the landfill cell in order to protect the surrounding soil and groundwater from contamination. Geosynthetic composite systems are also used at the base of the cell, which significantly reduces the work involved and costs compared with traditional systems.

## Drainage pipes

The drainage of a landfill body means the material has to meet special resistance requirements during the construction phase, because the drainage pipes are in continuous contact with the aggressive dissolved media. Once the landfill cell has been closed, no water is expected to flow in; the drainage therefore acts as control drainage and the pipes are exposed to concentrated amounts of landfill leaching.



## PE 100-RC pipes

The landfill leachate has to be transported from the outlet structures to the treatment units in order to be treated. AGRU PE 100-RC pipes of the highest quality are used here to prevent contamination of the environment.



## Manholes / structural components / Pipe penetrations

The combination of AGRU pipes, fittings and sheets with our HDPE and LLDPE geomembranes ensures that they all can be welded to the landfill body permanently with stable, leakproof joints. As a one-stop system supplier, AGRU is able to match the various components optimally in terms of welding capability.



## Temporary sealing

Landfill cells cannot always be filled in time and handed over for follow-up maintenance. Sometimes, settlements have to take place before the final cover can be installed. As a result, temporary sealing systems that fit in well with the surrounding landscape are often required. AGRU offers a variety of colours for this purpose on request.





# AGRUFLEX tunnel liners

## Efficient corrosion protection for tunnel constructions

Tunnels are intended to be used for a very long time. For this reason, the sealing system requirements set by authorities are very strict. AGRUFLEX tunnel liners are made of highly flexible VLDPE with thicknesses ranging from 1.2 mm to 4.2 mm and widths between 2 m and 4 m and can also be laminated with non-woven textiles if required. This tunnel liner possesses excellent flexibility, high chemical resistance, and is suitable for drinking water applications. With its superb light-reflecting properties, the white signal layer not only enhances safety in a tunnel, but also offers an easy visual inspection to identify and remedy damage.

### New Austrian Tunnelling Method

With the boring approach, the rock is secured with rock bolts, steel arches or other construction elements after excavation. These are then covered with shotcrete and the tunnel shape is created. The seal carrier, which is a „finely graded“ shotcrete, forms the surface for the interior construction work. To protect the liner and for drainage purposes, non-wovens are often installed between the shotcrete and the liner.



### Cut-and-cover approach

With the cut-and-cover method, either a HDPE geomembrane or the flexible VLDPE tunnel membrane is used, depending on the project requirements. In most cases, the liner can simply be spread over the tunnel without being attached, but in certain cases, it is fixed to the outer wall of the tunnel. Fastening by means of water stop profiles is a cost-effective and technically proven option.



## Standard installation

The protection and drainage non-woven is fastened to the wall of the tunnel using mounting discs anchored to the seal carrier in a specified pattern. Following this, the liner is attached to the mounting discs using the penetration-free hot-air welding method. The VLDPE tunnel membranes are joined using hot-wedge welding. The white signal layer reliably indicates any damage that occurs during the installation. The tunnel can be segmented by partitioning off the block joints using the AGRU water stop profile.



## Installation using Induktifix

The AGRU Induktifix system was developed so that thermoplastic linings could be fastened to concrete structures using electromagnetic induction without the lining system being penetrated. In a tunnel, this enables wider membranes to be installed, which in turn offers speed benefits and increased system safety during installation by reducing the number of welds required.



## Welding

The membranes are normally welded using hot-wedge welding. In case of penetration, defects that have to be repaired or complex geometries, extrusion welding is also possible. Subsequent pressure testing of the hot-wedge welds using a test channel is carried out in accordance with the national requirements or the sealing solution.



## Water stop profiles

To supplement its geomembranes, AGRU also offers external water stop profiles. These are made of specially selected, highly flexible VLDPE materials. The arrangement of the anchor studs allows them to be anchored optimally in concrete. The main application for water stop profiles is sealing construction joints and block joints in concrete structures.





## AGRUFLEX pond liners



AGRUFLEX pond liners made of FPP and VLDPE meet the highest ecological sustainability standards. This applies to their production, installation and throughout their service life.

As a one-stop system supplier, AGRU offers accessories for every challenge. Thanks to AGRU's wide product portfolio, we are able to provide membranes up to 5 meters wide for large public projects.

All our geomembranes are free of migrating plasticisers and therefore allow you to enjoy a swim without any worries.



## Product range

A liner thickness of 1.5 mm is recommended for pond liners.  
We offer the following products:

### VLDPE

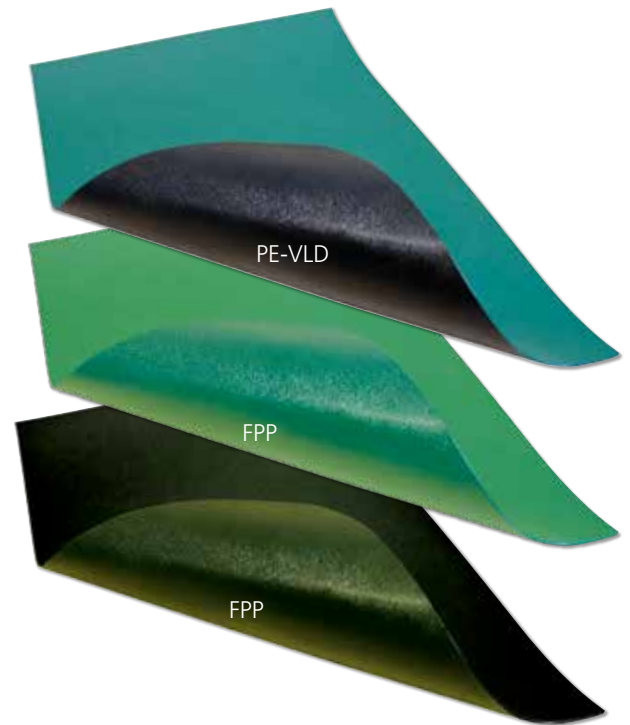
- Roll size: 5 m x 100 m - colour: black
- Roll size: 2 m x 25 m - colour: turquoise  
(turquoise signal layer on black base membrane)

### FPP

- Roll size: 5.15 m x 100 m - colour: black
- Roll size: 2 m x 25 m - colour: emerald green\*
- Roll size: 2 m x 25 m - colour: chromium oxide green\*

Other thicknesses, widths, roll lengths and colours are available on request!

\* Emerald green as well as chromium oxide green FPP liners are only available dyed through. No signal layer.





## Geomembranes and accessories from a single source

Whether you need welding accessories, drainage pipes, water stop profiles, or interlocking profiles, AGRU provides all the components you need to install permanently leak-proof AGRU LINING SYSTEMS quickly.



### Drainage pipes

Drainage is especially essential in tunnel and landfill cell construction. Our piping system does not only consist of full pipes, we can also offer perforated or slotted pipes made of PE or PP. Dimensioning is project-specific. You can choose a bright, inspection-friendly interior surface if you wish. For reproducible welding results, AGRULINE E-fittings round off the range of products here.

AGRU drainage pipes are extruded black PE 100 pipes with a smooth inner surface ( $k \leq 0.01$  mm), meeting static and dynamic requirements in tunnel and landfill construction. They are impact-resistant while providing the flexibility required for underground installation. Manufactured from high-quality PE 100, they withstand heavy traffic loads.

AGRU drainage systems meet all relevant requirements:

- Rapid intake, collection, and discharge of seepage and groundwater
- Prevention of surface water infiltration into the subsoil
- Ring stiffness in accordance with DIN EN 12666
- Easy handling due to low weight
- Outdoor storage down to  $-30$  °C
- UV resistance
- Fast installation using electrofusion couplers
- Slot pattern based on DIN 4266



## Colored plastic geomembranes

In addition to the standard black version, AGRU plastic geomembranes are also available in various colors, with the choice of color going far beyond mere visual differentiation. Colors serve important technical functions, such as reducing heat through reflection, improving visibility during inspections and damage detection, or clearly distinguishing different system layers. Targeted color selection thus supports construction execution, operational safety, and quality assurance of the entire sealing system.



## AGRU surface textures

AGRU offers a wide range of embossed surface textures for plastic geomembranes, specifically tailored to different applications. Choosing the right texture significantly affects friction behavior, drainage performance, and stability. Therefore, the surface texture is not merely an aesthetic feature but a functional element that plays a crucial role in the performance and durability of the sealing system.



## AGRU welding rod

The welding rod is an essential component for the proper joining of plastic geomembranes. It ensures that weld seams are mechanically strong, permanently watertight, and homogeneous with the base material. AGRU provides the matching welding rod for each product to ensure consistent weld quality, high seam strength, and long-term operational reliability.



## AGRULOCK

This vertical sealing system is ideal for the separation of contaminated groundwater. AGRULOCK is also the product of choice for construction sites where the groundwater level must be kept at a certain level. The water-impermeable barrier is easy to install. The profiles can be welded to the geomembrane using conventional welding machines.





The Plastics Experts.

Your distributor

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

0426

agru Kunststofftechnik Gesellschaft m.b.H.  
Ing.-Pesendorfer-Strasse 31  
4540 Bad Hall, Austria

T. +43 7258 7900  
F. +43 7258 790 - 2850  
office@agru.at



Visit us  
online at  
[www.agru.at](http://www.agru.at).